

DOENGES • MOORHOUSE • MURR

# NURSING CARE PLANS

Guidelines for Individualizing  
Client Care Across the Life Span

10<sup>TH</sup> EDITION

## INDEX OF DISEASES/DISORDERS

- Acid-base imbalances *DavisPlus*  
Acquired immunodeficiency syndrome (AIDS), 800  
Acute coronary syndrome (ACS), 54  
Acute kidney injury (acute renal failure), 595  
Adult leukemias, 569  
Alcohol: acute withdrawal, 919  
Alzheimer's disease, 851  
Amputation, 718  
Anemia—iron deficiency, anemia of chronic disease, pernicious, aplastic, hemolytic, 541  
Angina: chronic/stable, 64  
Anorexia nervosa, 413  
Aplastic anemia, 541  
Appendectomy, 382  
Asthma, 132
- Bariatric surgery, 442  
Benign prostatic hyperplasia (BPH), 686  
Brain infections: meningitis and encephalitis, 267  
Bulimia nervosa, 413  
Burns: thermal, chemical, and electrical—acute and convalescent phases, 740
- Cancer, general considerations, 945  
Cardiac dysrhythmias, 85, 86  
Cardiac surgery: postoperative care, 98  
Cardiomyoplasty, 46  
Cerebrovascular accident/stroke, 247  
Chemical burns, 741  
Cholecystectomy *DavisPlus*  
Cholecystitis with cholelithiasis, 399  
Cholelithiasis, 399  
Chronic obstructive pulmonary disease (COPD) and asthma, 132  
Cirrhosis of the liver, 494  
Colostomy, 368  
Coronary artery bypass graft (CABG), 98  
Craniocerebral trauma—acute rehabilitative phase, 226  
Crohn's disease, 352
- Dementia: Alzheimer's type/vascular dementia/, Lewy body disease, frontotemporal dementia, 851  
Deep vein thrombosis (DVT), 120  
Diabetes mellitus, 454  
Diabetic ketoacidosis, 454  
Dialysis: hemodialysis (HD), 641  
Dialysis: peritoneal (PD), 635  
Disaster considerations, 980  
Disc surgery (now called Spinal Surgery), 276  
Dysrhythmias, 85, 86
- Eating disorders: anorexia nervosa/bulimia nervosa, 413  
Electrolyte imbalances *DavisPlus*  
Electrical burns, 740  
Encephalitis, 267  
End-stage renal disease, 607  
Enteral feeding, 525  
Esophageal bleeding, 347  
Extended care, 896
- Fecal diversions: postoperative care of ileostomy and colostomy, 368  
Fluid and electrolyte imbalances, *DavisPlus*  
Fractures, 702
- Gastrectomy/gastroplasty (see *DavisPlus*)  
Gastric bypass, 442  
Glaucoma *DavisPlus*  
Graves' disease, 471
- Heart failure: chronic, 38  
Hemodialysis, 641  
Hemolytic anemia, 541  
Hemothorax, 169  
Hepatitis, 482  
Herniated nucleus pulposus (see *DavisPlus*)  
HIV-positive client, 785  
Hospice, 970  
Hypercalcemia (calcium excess) (see *DavisPlus*)  
Hyperkalemia (potassium excess) (see *DavisPlus*)  
Hypermagnesemia (magnesium excess) (see *DavisPlus*)  
Hypernatremia (sodium excess) (see *DavisPlus*)  
Hypertension: severe, 26  
Hyperthyroidism (Graves' disease, thyrotoxicosis, thyroid storm), 471  
Hypervolemia (extracellular fluid volume excess) (see *DavisPlus*)  
Hypocalcemia (calcium deficit) (see *DavisPlus*)  
Hypokalemia (potassium deficit) (see *DavisPlus*)  
Hypomagnesemia (magnesium deficit) (see *DavisPlus*)  
Hyponatremia (sodium deficit) (see *DavisPlus*)  
Hypovolemia (extracellular fluid volume deficit) (see *DavisPlus*)  
Hysterectomy, 666
- Ileostomy, 368  
Inflammatory bowel disease: ulcerative colitis, Crohn's disease, 352  
Iron-deficiency anemia, 541
- Laminectomy (see Spinal Surgery), 276  
Laryngectomy (see *DavisPlus*)  
Lewy body disease, 851  
Leukemias, 569  
Lung cancer: postoperative care, 159  
Lymphomas, 582
- Mastectomy, 675  
Meningitis, 267  
Metabolic acid-base imbalances (see *DavisPlus*)  
Metabolic acidosis—primary base bicarbonate deficiency (see *DavisPlus*)  
Metabolic alkalosis—primary base bicarbonate excess (see *DavisPlus*)  
Minimally invasive direct coronary artery bypass (MIDCAB), 98  
Multiple sclerosis, 311  
Myocardial infarction, 72
- Obesity, 430
- Bariatric surgery, 442
- Pancreatitis, 511  
Parkinson's disease, 330  
Parenteral feeding, 525  
Pediatric considerations, 993  
Peritoneal dialysis, 635  
Peritonitis, 389  
Pernicious anemia, 541  
Pneumonia, 147  
Pneumothorax, 169

- Primary base bicarbonate deficiency (see *DavisPlus*)  
Primary base bicarbonate excess (see *DavisPlus*)  
Primary carbonic acid deficit (see *DavisPlus*)  
Primary carbonic acid excess (see *DavisPlus*)  
Prostatectomy, 694  
Psychosocial aspects of care, 835  
Pulmonary emboli (PE), 120  
Pulmonary tuberculosis (TB), 204
- Radical neck surgery (see *DavisPlus*)  
Renal calculi, 656  
Renal dialysis—general considerations, 623  
Renal failure: acute, 595  
Renal failure: chronic, 607  
Respiratory acid-base imbalances (see *DavisPlus*)  
Respiratory acidosis (see *DavisPlus*)  
Respiratory alkalosis (see *DavisPlus*)  
Rheumatoid arthritis (RA), 824  
Respiratory failure/ventilatory assistance, 187  
Ruptured intervertebral disc (see *DavisPlus*)
- Seizure disorders, 216  
Sepsis/Septic Shock, 772  
Sickle cell crisis, 552  
Spinal cord injury (acute rehabilitative phase), 288
- Stroke, 247  
Substance use disorders (SUDs), 929  
Surgical interventions, 873
- Thermal burns, 740  
Thrombophlebitis: venous thromboembolism, 120  
Thyroidectomy (see *DavisPlus*)  
Thyrototoxicosis, 471  
Total joint replacement, 729  
Total nutritional support: parenteral/enteral feeding, 525  
Tuberculosis (TB), pulmonary, 204
- Ulcerative colitis, 352  
Upper gastrointestinal bleeding, 340  
Urinary diversions/urostomy (postoperative care)  
Urinary stones (calculi), 656  
Urostomy, 645
- Valve replacement, 98  
Vascular dementia, 851  
Venous thromboembolism (VTE) disease, 120  
Ventilatory assistance (mechanical), 187
- Wound care: complicated or chronic, 762

## KEY TO ESSENTIAL TERMINOLOGY

### CLIENT ASSESSMENT DATABASE

Provides an overview of the more commonly occurring etiology and coexisting factors associated with a specific medical and/or surgical diagnosis or health condition as well as the signs and symptoms and corresponding diagnostic findings. The Database contains the information used to identify Nursing Diagnoses for planning client care.

### NURSING PRIORITIES

Establishes a general ranking of needs and concerns on which the Nursing Diagnoses are ordered in constructing the plan of care. This ranking would be altered according to the individual client situation.

### DISCHARGE GOALS

Identifies generalized statements that could be developed into short-term and intermediate goals to be achieved by the client before being “discharged” from nursing care. They may also provide guidance for creating long-term goals for the client to work on after discharge.

### NURSING DIAGNOSIS

The general need or problem diagnosis is stated without the distinct cause and signs and symptoms, which would be added to create a client diagnostic statement when specific client information is available. For example, when a client displays increased tension, apprehension, quivering voice, and focus on self, the nursing diagnosis of Anxiety might be stated: severe Anxiety related to value conflict, threat to current status as evidenced by increase in tension, apprehensiveness; voice quivering, self-focused.

In addition, diagnoses identified within these guides for planning care as actual, risk, health promotion, or syndrome can be changed or deleted and new diagnoses added, depending entirely on the specific client situation or available information.

### MAY BE RELATED TO/POSSIBLY

#### EVIDENCED BY

These lists provide the usual or common reasons (etiology) why a particular need or problem may occur with probable signs and symptoms, which would be used to create the “related to” and “evidenced by” portions of the *client diagnostic statement* when the specific situation is known.

When a risk diagnosis is used, the identified risk factors serve as the “evidenced by” segment of the nursing diagnosis statement, and interventions are provided to prevent progression to a problem-focused diagnosis. Furthermore, health-promotion diagnoses (readiness for enhanced) do not contain related factors but do have defining characteristics for the “evidenced by” segment of the client diagnostic statement.

### DESIRED OUTCOMES/EVALUATION

#### CRITERIA—CLIENT WILL

These give direction to client care as they identify what the client or nurse hopes to achieve. They are stated in general terms to permit the practitioner to modify or individualize them by adding timelines and specific client criteria so they become “measurable.” For example, “Client will appear relaxed and report anxiety is reduced to a manageable level within 24 hours.”

Nursing Outcomes Classification (NOC) labels are also included. The outcome label is selected from a standardized nursing language and serves as a general header for the outcome indicators that follow.

### ACTIONS/INTERVENTIONS

Nursing Interventions Classification (NIC) labels are drawn from a third standardized nursing language and serve as a general header for the nursing actions that follow.

Nursing actions are divided into independent—those actions that the nurse performs autonomously—and collaborative—those actions that the nurse performs in conjunction with others, such as implementing physician orders. The interventions in this book are generally ranked from most to least common. When creating the individual plan of care, interventions would normally be ranked to reflect the client’s specific needs and situation. In addition, the division of independent and collaborative is arbitrary and is actually dependent on the individual nurse’s capabilities, agency protocols, and professional standards.

### RATIONALE

Although not commonly appearing in client plans of care, rationale has been included here to provide a pathophysiological basis to assist the nurse in deciding about the relevance of a specific intervention for an individual client situation.



## NURSING DIAGNOSES ACCEPTED FOR USE AND RESEARCH FOR 2018-2020

Activity Intolerance [specify level]	Diversional Activity Engagement, deficient
Activity Intolerance, risk for	Dry Eye, risk for
Activity Planning, ineffective	Dry Mouth, risk for
Activity Planning, risk for ineffective	Eating Dynamics, ineffective adolescent
Acute Substance Withdrawal Syndrome	Eating Dynamics, ineffective child
Acute Substance Withdrawal Syndrome, risk for	Eating Dynamics, ineffective infant
Adaptive Capacity, decreased intracranial	Electrolyte Imbalance, risk for
Adverse Reaction to Iodinated Contrast Media, risk for	Elimination, impaired urinary
Airway Clearance, ineffective	Emancipated Decision-Making, impaired
Allergy Reaction, risk for	Emancipated Decision-Making, readiness for enhanced
Anxiety	Emancipated Decision-Making, risk for impaired
Aspiration, risk for	Emotional Control, labile
Attachment, risk for impaired	Energy Field, imbalanced
Autonomic Dysreflexia	Falls, risk for
Autonomic Dysreflexia, risk for	Family Processes, dysfunctional
Behavior, disorganized infant	Family Processes, interrupted
Behavior, risk for disorganized infant	Family Processes, readiness for enhanced
Behavior, readiness for enhanced organized infant	Fatigue
Bleeding, risk for	Fear
Blood Glucose Level, risk for unstable	Feeding Pattern, ineffective infant
Blood Pressure, risk for unstable	Female Genital Mutilation, risk for
Body Image, disturbed	Fluid Balance, readiness for enhanced
Breast Milk Production, insufficient	[Fluid Volume, deficient hyper/hypotonic]
Breastfeeding, ineffective	Fluid Volume, deficient [isotonic]
Breastfeeding, interrupted	Fluid Volume, excess
Breastfeeding, readiness for enhanced	Fluid Volume, risk for deficient
Breathing Pattern, ineffective	Fluid Volume, risk for imbalanced
Cardiac Output, decreased	Frail Elderly Syndrome
Cardiac Output, decreased, risk for	Frail Elderly Syndrome, risk for
Childbearing Process, ineffective	Gas Exchange, impaired
Childbearing Process, readiness for enhanced	Gastrointestinal Motility, dysfunctional
Childbearing Process, risk for ineffective	Gastrointestinal Motility, risk for dysfunctional
Chronic Pain Syndrome	Grieving
Comfort, impaired	Grieving, complicated
Comfort, readiness for enhanced	Grieving, risk for complicated
Communication, impaired verbal	[Growth, risk for disproportionate] (retired 2018)
Communication, readiness for enhanced	Health, deficient community
Confusion, acute	Health Behavior, risk-prone
Confusion, risk for acute	Health Literacy, readiness for enhanced
Confusion, chronic	Health Maintenance, ineffective
Constipation	Health Management, ineffective
Constipation, chronic functional	Health Management, ineffective family
Constipation, perceived	Health Management, readiness for enhanced
Constipation, risk for	Home Maintenance, impaired
Constipation, risk for chronic functional	Hope, readiness for enhanced
Contamination	Hopelessness
Contamination, risk for	Human Dignity, risk for compromised
Coping, compromised family	Hyperthermia
Coping, defensive	Hyperbilirubinemia, neonatal
Coping, disabled family	Hyperbilirubinemia, risk for neonatal
Coping, ineffective	Hypothermia
Coping, ineffective community	Hypothermia, risk for
Coping, readiness for enhanced	Hypothermia, risk for perioperative
Coping, readiness for enhanced community	Immigration Transition, risk for complicated
Coping, readiness for enhanced family	Impulse Control, ineffective
Death Anxiety	Incontinence, bowel
Decision-Making, readiness for enhanced	Incontinence, functional urinary
Decisional Conflict	Incontinence, overflow urinary
Denial, ineffective	Incontinence, reflex urinary
Dentition, impaired	Incontinence, risk for urge urinary
Development, risk for delayed	Incontinence, stress urinary
Diarrhea	Incontinence, urge urinary
Disuse Syndrome, risk for	Infection, risk for

Injury, risk for	Role Strain, caregiver
Injury, risk for corneal	Role Strain, risk for caregiver
Injury, risk for urinary tract	Self-Care, readiness for enhanced
Insomnia	Self-Care deficit, Bathing
Knowledge, deficient	Self-Care deficit, Dressing
Knowledge, readiness for enhanced	Self-Care deficit, Feeding
Latex Allergy Reaction	Self-Care deficit, Toileting
Latex Allergy Reaction, risk for	Self-Concept, readiness for enhanced
Lifestyle, sedentary	Self-Esteem, chronic low
Liver Function, risk for impaired	Self-Esteem, risk for chronic low
Loneliness, risk for	Self-Esteem, risk for situational low
Maternal-Fetal Dyad, risk for disturbed	Self-Esteem, situational low
Memory, impaired	Self-Mutilation
Mobility, impaired bed	Self-Mutilation, risk for
Mobility, impaired physical	Self-Neglect
Mobility, impaired wheelchair	[Sensory Perception, disturbed (specify: visual, auditory, kinesthetic, gustatory, tactile, olfactory)] (retired 2012)
Mood Regulation, impaired	Sexual Dysfunction
Moral Distress	Sexuality Pattern, ineffective
Mucous Membrane Integrity, impaired oral	Shock, risk for
Mucous Membrane Integrity, risk for impaired oral	Sitting, impaired
Nausea	Skin Integrity, impaired
Neonatal Abstinence Syndrome	Skin Integrity, risk for impaired
Neurovascular Dysfunction, risk for peripheral	Sleep, readiness for enhanced
Nutrition: less than body requirements, imbalanced	Sleep Deprivation
Nutrition, readiness for enhanced	Sleep Pattern, disturbed
Obesity	Social Interaction, impaired
Occupational Injury, risk for	Social Isolation
Overweight	Sorrow, chronic
Overweight, risk for	Spiritual Distress
Pain, acute	Spiritual Distress, risk for
Pain, chronic	Spiritual Well-Being, readiness for enhanced
Pain, labor	Standing, impaired
Palliative/end-of-life care—hospice,	Stress Overload
Parenting, impaired	Substance Withdrawal Syndrome, acute
Parenting, readiness for enhanced	Substance Withdrawal Syndrome, risk for acute
Parenting, risk for impaired	Sudden infant Death, risk for
Perioperative Positioning Injury, risk for	Suffocation, risk for
Personal Identity, disturbed	Suicide, risk for
Personal Identity, risk for disturbed	Surgical Recovery, delayed
Physical Trauma, risk for	Surgical Recovery, risk for delayed
Poisoning, risk for	Surgical Site Infection, risk for
Post-Trauma Syndrome	Swallowing, impaired
Post-Trauma Syndrome, risk for	Thermal Injury, risk for
Power, readiness for enhanced	Thermoregulation, ineffective
Powerlessness	Thermoregulation, risk for ineffective
Powerlessness, risk for	Thromboembolism, risk for venous
Pressure Ulcer, risk for	Tissue Integrity, impaired
Protection, ineffective	Tissue Integrity, risk for impaired
Rape-Trauma Syndrome	Tissue Perfusion, ineffective peripheral
Relationship, ineffective	Tissue Perfusion, risk for decreased cardiac
Relationship, readiness for enhanced	Tissue Perfusion, risk for ineffective cerebral
Relationship, risk for ineffective	Tissue Perfusion, risk for ineffective peripheral
Religiosity, impaired	Transfer Ability, impaired
Religiosity, readiness for enhanced	Trauma, risk for vascular
Religiosity, risk for impaired	Unilateral Neglect
Relocation Stress Syndrome	Ventilation, impaired spontaneous
Relocation Stress Syndrome, risk for	Ventilatory Weaning Response, dysfunctional
Resilience, impaired	Violence, risk for other-directed
Resilience, readiness for enhanced	Violence, risk for self-directed
Resilience, risk for impaired	Walking, impaired
Retention, urinary	Wandering [specify sporadic or continual]
Role Conflict, parental	[ ] author recommendations
Role Performance, ineffective	

Herdman, TH, and Kamitsuru, S (eds): *Nursing Diagnoses—Definitions and Classification 2018–2020*. Copyright © 2018, 1994–2018 NANDA International. Used by arrangement with Thieme. In order to make safe and effective judgments using NANDA-I nursing diagnoses, it is essential that nurses refer to the definitions and defining characteristics of the diagnoses listed in this work.

# NURSING CARE PLANS

**Guidelines for Individualizing  
Client Care Across the Life Span**

**10<sup>th</sup> EDITION**

**Marilynn E. Doenges, APRN, BC-Retired**

Clinical Specialist, Adult Psychiatric/Mental Health Nursing, Retired  
Retired Adjunct Faculty  
Beth-El College of Nursing and Health Sciences, UCCS  
Colorado Springs, Colorado

**Mary Frances Moorhouse, RN, MSN, CRRN**

Adjunct Faculty/Clinical Instructor  
Pikes Peak Community College  
Nurse Consultant/TNT-RN Enterprises  
Colorado Springs, Colorado

**Alice C. Murr, BSN, RN-Retired**

Retired Legal Nurse Consultant, certified Rehabilitation Case  
Manager, and certified practitioner in Critical Care Nursing  
Parkville, Missouri

F. A. Davis Company  
1915 Arch Street  
Philadelphia, PA 19103  
[www.fadavis.com](http://www.fadavis.com)

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*Acquisitions Editor:* Jacalyn Sharp

*Senior Content Project Manager:* Amy M. Romano

*Art and Design Manager:* Carolyn O'Brien

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## CONTRIBUTORS TO THE 10TH EDITION

### **Lisa L. Doremus, MSN, RN, CMSRN**

Hospice Nurse  
Abode Hospice & Home Health  
Adjunct Faculty  
Pikes Peak Community College  
Colorado Springs, Colorado

### **Linda R. Renberg, BA**

Instructor, Retired  
English, Music and Education  
Mitchell, South Dakota  
*Statistical Research*

## CONTRIBUTORS TO PREVIOUS EDITIONS

Mope T. Adeola, RN, MSN, CNS, OCN

Jane V. Arndt, MS, RN, CWOCN

Sharon A. Aronovitch, PhD, RN, ACNS-BC, CWOCN-AP

Cathryn Baack, PhD, RN, CPNP

Nancy Buttry, MSN, RN

Kathleen A. Curtis, RN, MSN

Rosemary Fliszar, PhD, RN, CNE

Catherine M. Gagnon, RNC-OB, MSN

Brenda Hicks, RN, OCN

Christie A. Hinds, MSN, APRN-BC

Jennifer Limongiello, MSN, ARNP

William H. Loughmiller, CRT

Maria Mackey, MSN, RN

Margaret (Peggy) Malone, MN, RN, CCRN

Larry Manalo, RN, MSN

Julie Matheny, RRT

Laure Miller, MSN, RN

Kathleen Molden, RN, MSN, CNE

Ellen Odell, DNP, ACNS, CNE, RN

Lillian Ostrander, RN, MSN, MALS

Kimberly Tucker Pfennigs, MA, BAN, RN

Nancy E. Rogers, MA, BSN, RN

Gilda Rolls-Dellinger, RN

Rochelle Salmore, MSN, RN, CGRN, NE, BC

April Sheker, RN, MSN(c), CMSRN

Geri L. Tierney, RN, BSN, ONC

Kathleen H. Winder, RN, BSN

Ruth A. Wittmann-Price, PhD, RN, CNS, CNE

David W. Woodruff, MSN, RN-BC, CMSRN, CEN

Anne Zobec, MS, RN, CS, NP, AOCN

## REVIEWERS FOR THE 10TH EDITION

### Catherine D. Hall, MSN, RN, OCN, CNE

Assistant Professor  
Albany State University  
Albany, Georgia

### Norma Katz, MS, PMHNP, BC, RN

Assistant Professor  
Westchester Community College  
Valhalla, New York

### Laurel Lalicker, MSN, RN, CNN, CNE

Professor  
Aims Community College  
Greeley, Colorado

### Margaret Mackowick, MR, RN

Assistant Professor  
North Dakota State University  
Fargo, North Dakota

### Tammie McCoy, PhD, RN

Professor and Chair, BSN Department  
Mississippi University for Women  
Columbus, Mississippi

### Roxann Sparks, RN, MSN, MICN, LNC, ENPC

Assistant Director, Vocational Nursing  
Merced College  
Merced, California

### Annette Stacy

Emeritus Associate Professor of Nursing  
Arkansas State University  
Jonesboro, Arkansas

### Heather Vitko, RN, MSN, CCRN, CNL

Assistant Professor  
Saint Francis University  
Loretto, Pennsylvania

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**The late Nancy Lea Carter, RN, MA**  
Clinical Nurse, Orthopedics  
Albuquerque, New Mexico

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**Kathe Lynn Ellis**  
Case Manager  
Colorado Springs, Colorado  
*Statistical Research*

## INTRODUCTION

We are often asked how we came to write the Care Plan books. In the late 1970s, we were involved with some publishing efforts that did not come to fruition. In this work, we had included care plans, so ensuing discussions revolved around the need for a Care Plan book. We spent a year struggling to write care plans before we realized our major difficulty was the lack of standardized labels for client problems. At that time, we were given a list of nursing diagnoses from the Clearinghouse for Nursing Diagnosis, which became the North American Nursing Diagnosis Association (NANDA) and is now NANDA International (NANDA-I). This work answered our need by providing concise titles that could be used in various plans of care and followed across the spectrum of client care. We believed these nursing diagnosis labels would both define and focus nursing care.

Because we had long been involved in direct client care in our nursing careers, we knew there was a need for guidelines to assist nurses in planning care. As we began to write, our focus was the nurse in a small rural community who at 2 a.m. needed the answer to a burning question for her client and had few resources available. We believed the book would give definition and direction to the development and use of individualized nursing care. Thus, in the first edition, the theory of nursing process, diagnosis, and intervention was brought to the clinical setting for implementation by the nurse. We also anticipated that nursing students would appreciate having access to these guidelines as they struggled to learn how to provide nursing care. Therefore, we did not consider the book to be an end in itself but rather a vehicle for the continuing growth and development of the profession. Obviously, we struck a chord and met a need because the first edition was an immediate success.

In becoming involved with the original NANDA, we acknowledged that maintaining a strict adherence to its wording, while adding our own clearly identified recommendations, would help develop this neophyte standardized language and would promote the growth of nursing as a profession. We have continued our involvement with NANDA-I, promoting the use of the language by practicing nurses in the United States and around the world and encouraging them to participate in updating and refining the diagnoses. The wide use of our books within the student population has supported and fostered the acceptance of both the activity of diagnosing client problems or needs and the use of standardized language.

Nursing instructors initially expressed concern that students would simply copy the plans of care and thus limit their learning. However, as students used the plans to individualize care and to develop practice priorities and client care outcomes, the book met with more acceptance. Instructors began not only to recommend the book but also to adopt it as an adjunct text. Today, it remains a best-selling nursing

care plan book, recognized as an important adjunct for student learning.

In writing the second edition, we recognized the need for an assessment tool with a nursing focus instead of a medical focus. Not finding one that met our needs, we constructed our own. To facilitate problem identification, we categorized the nursing diagnosis labels and the information obtained in the client assessment database into a framework entitled “Diagnostic Divisions.” Our philosophy is to provide a way in which to gather information and to intervene beneficially, while thinking about the rationale for every action we take and the standardized language that best expresses it. When nurses do this, they are defining their practice and are able to identify it with a code and charge for it. By doing this, we promote client protection (quality of care issue) and provide for the definition and protection of nursing practice and the protection of the individual (legal implications). The latter is important because we live in a litigation-minded society and the nurse’s license and livelihood are at stake.

One of the most significant achievements in the healthcare field over the past 25 or more years has been the emergence of the nurse as an active coordinator and initiator of client care. Although the transition from physician’s帮mate to healthcare professional has been painfully slow and is not yet complete, the importance of the nurse within the system can no longer be denied or ignored. Today’s nurse designs nursing care interventions that move the total client toward improved health and maximum independence.

Professional care standards and healthcare providers and consumers will continue to increase the expectations for nurses’ performance. Each day brings new challenges in client care and the struggle to understand the human responses to actual and potential health problems. To meet these challenges competently, the nurse must have up-to-date assessment skills and a working knowledge of pathophysiological concepts concerning the common diseases and conditions presented. We believe that this book is a tool, providing a means of attaining that competency.

In the past, plans of care were viewed principally as learning tools for students and seemed to have little relevance after graduation. However, the need for a written format to communicate and document client care has been recognized in all care settings. In addition, healthcare policy, governmental regulations, and third-party payer requirements have created the need to validate many things, including appropriateness of care provided, staffing patterns, and monetary charges. Thus, although the student’s “case studies” are too cumbersome to be practical in the clinical setting, it has long been recognized that the client plan of care meets certain needs and therefore its appropriate use was validated.

The practicing nurse, as well as the nursing student, can welcome this text as a ready reference in clinical practice. It is designed for use in the acute care, community, and home-care settings. It is organized by systems for easy reference.

Chapter 1 reviews the use of the nursing process in formulating plans of care and the nurse's role in the delivery of that care. Nursing diagnoses, outcomes, and interventions are discussed to assist the nurse in understanding her or his role in the nursing process. In this book, we have also linked NANDA-I diagnoses with two other standardized nursing languages—Nursing Interventions Classification (NIC) and Nursing Outcomes Classification (NOC).

A nursing-based assessment tool and NANDA-I diagnosis labels organized in Diagnostic Divisions are provided to assist the nurse in employing critical thinking and identifying appropriate nursing diagnoses. A sample client situation with an individual database and a corresponding plan of care is included to further demonstrate how critical thinking is used to adapt nursing process theory to practice. Finally, several creative approaches for developing and documenting the planning of care are also included. Mind mapping is one technique or learning tool provided to assist you in achieving a holistic view of your client, enhance your critical thinking skills, and facilitate the creative process of planning client care.

Chapters 2 through 14 present plans of care that include information from multiple disciplines to assist the nurse in providing holistic care. In addition to the care plans in the textbook, you will also find Psychiatric and Maternal/Newborn care plans on *DavisPlus*. (To access these, use the *Plus* Code found in front of your book.)

Each plan includes a Client Assessment Database presented in a nursing format and associated Diagnostic Studies. After the database is collected, Nursing Priorities are sifted from the information to help focus and structure the care. Discharge Goals are created to identify what should be generally accomplished by the time of discharge from the care setting.

Nursing diagnosis labels are then chosen and combined with possible related factors designated by “may be related to,” and/or the signs and symptoms or defining characteristics as “possibly evidenced by,” to create Client Diagnostic

Statements that provide a clear picture of the client’s needs. Next, Desired Client Outcomes are stated in measurable behavioral terms to evaluate both the client’s progress and the effectiveness of care provided.

Corresponding actions/interventions are designed to promote resolution of the identified client needs. The nurse acting independently or collaboratively within the health team then uses a decision-making model to organize and prioritize nursing interventions. No attempt is made in this book to indicate whether independent or collaborative actions come first because this must be dictated by the individual situation. We do, however, believe that every collaborative action has a component that the nurse must identify and for which nursing has responsibility and accountability.

Rationales for the nursing actions, which are not required in the customary plan of care, are included to assist the nurse in deciding whether the interventions are appropriate for an individual client. Additional information is provided to further assist the nurse in identifying and planning for rehabilitation as the client progresses toward discharge and across all care settings. Continuing the life span, a plan of care for children (Pediatric Considerations) is included in Chapter 14, and Pediatric Pearls have been added to 14 plans of care common to this population. The Pediatric Pearls are noted by this icon . Finally, a bibliography is provided as a reference and to allow further research as desired.

This book is designed for students who will find the plans of care helpful as they learn and develop skills in applying the nursing process and using nursing diagnoses. It will complement their classroom work and support the critical thinking process. The book also provides a ready reference for the practicing nurse as a catalyst for thought in planning, evaluating, and documenting care.

As a final note, this book is not intended to be a procedure manual, and efforts have been made to avoid detailed descriptions of techniques or protocols that might be viewed as individual or regional in nature. Instead, the reader is referred to a procedure manual or text covering Standards of Care if detailed direction is desired.

As we always say when we sign a book, “Use and enjoy.”

MED, MFM, and ACM

## CONTENTS IN BRIEF

**INDEX OF NURSING  
DIAGNOSES APPEARS  
ON PAGE v**

### INTRODUCTION xiv

#### CHAPTER 1

The Nursing Process: Planning Care Using Critical Thinking 1

#### CHAPTER 2

Cardiovascular Disorders 26

- Hypertension: Severe 26
- Heart Failure: Chronic 38
- Acute Coronary Syndromes (ACS) 54
- Angina: Chronic/Stable 64
- Myocardial Infarction 72
- Dysrhythmias 85
- Cardiac Surgery: Coronary Artery Bypass Graft (CABG) and Valve Replacement: Postoperative Care 98
- Aortic Aneurysms (Abdominal and Thoracic) 110
- Venous Thromboembolism (VTE) Disease Including Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE) 120

#### CHAPTER 3

Respiratory Disorders 132

- Chronic Obstructive Pulmonary Disease (COPD) and Asthma 132
- Pneumonia 147
- Lung Cancer: Postoperative Care 159
- Pneumothorax/Hemothorax 169
- Acute Lung Injury/Acute Respiratory Distress Syndrome 177
- Respiratory Failure/Ventilatory Assistance 187
- Pulmonary Tuberculosis (TB) 204

#### CHAPTER 4

Neurological/Sensory Disorders 216

- Seizure Disorders 216
- Craniocerebral Trauma—(Acute Care Phase) 226
- Cerebrovascular Accident (CVA/Stroke) 247
- Brain Infections: Meningitis and Encephalitis 267
- Spinal Surgery 276
- Spinal Cord Injury (Acute and Rehabilitative Phases) 288
- Multiple Sclerosis (MS) 311
- Parkinson's Disease (PD) 330
- Glaucoma (see DavisPlus)
- Herniated Nucleus Pulpitus (Ruptured Intervertebral Disc) (see DavisPlus)

#### CHAPTER 5

Gastrointestinal Disorders 340

- Upper Gastrointestinal Bleeding 340
- Inflammatory Bowel Disease (IBD): Ulcerative Colitis, Crohn's Disease 352
- Fecal Diversions: Postoperative Care of Ileostomy and Colostomy 368
- Appendectomy 382
- Peritonitis 389
- Cholecystitis with Cholelithiasis 399
- Cholecystectomy (see DavisPlus) 407
- Gastrectomy/Gastric Resection (see DavisPlus)

#### CHAPTER 6

Metabolic and Endocrine Disorders 413

- Eating Disorders: Anorexia Nervosa/Bulimia Nervosa 413
- Obesity 430
- Bariatric Surgery 442

Diabetes Mellitus and Diabetic Ketoacidosis 454

Hyperthyroidism, Thyrotoxicosis, and Thyroid Storm 471

Hepatitis 482

Cirrhosis of the Liver 494

Pancreatitis 511

Total Nutritional Support: Parenteral/Enteral Feeding 525

Metabolic Acid-Base Imbalances (see DavisPlus)

Metabolic Acidosis: Primary Base Bicarbonate Deficiency

Metabolic Alkalosis: Primary Base Bicarbonate Excess

Thyroidectomy (see DavisPlus)

#### CHAPTER 7

Diseases of the Blood/Blood-Forming Organs 541

- Anemias: Iron Deficiency, Anemia of Chronic Disease, Pernicious, Aplastic, Hemolytic 541
- Sickle Cell Crisis 552
- Adult Leukemias 569
- Adult Lymphomas 582

#### CHAPTER 8

Renal and Urinary Tract Disorders 595

Acute Kidney Injury (Acute Renal Failure) 595

Renal Failure: Chronic Kidney Disease and End-Stage

Renal Disease 607

Renal Dialysis: General Considerations 623

*Peritoneal Dialysis (PD) 635*

*Hemodialysis (HD) 641*

Urinary Diversions: Urostomy (Postoperative Care) 645

Urinary Stones (Calculi) 656

#### CHAPTER 9

Women's Health 666

Hysterectomy 666

Mastectomy 675

#### CHAPTER 10

Men's Health 686

Benign Prostatic Hyperplasia (BPH) 686

Prostatectomy 694

#### CHAPTER 11

Orthopedic Disorders 702

Fractures 702

Amputation 718

Total Joint Replacement 729

#### CHAPTER 12

Integumentary Disorders 740

Burns: Thermal, Chemical, and Electrical (Acute and Convalescent Phases) 740

Wound Care: Complicated or Chronic 762

#### CHAPTER 13

Systemic Infections and Immunological Disorders 772

Sepsis/Septic Shock 772

The HIV-Positive Client 785

Acquired Immunodeficiency Syndrome (AIDS) 800

Rheumatoid Arthritis (RA) 824

#### CHAPTER 14

General 835

Psychosocial Aspects of Care 835

Dementias: Alzheimer's Type/Vascular Dementia/Lewy Body Disease/Frontotemporal Dementia 851

Surgical Interventions 873	Pediatric Considerations 993
Extended/Long-Term Care 896	Fluid and Electrolyte Imbalances (See <i>DavisPlus</i> )
Alcohol: Acute Withdrawal 919	Definitions for NANDA-I Nursing Diagnoses Used in This Text 1009
Substance Use Disorders (SUDs) 929	Index of Nursing Diagnoses 1013
Cancer: General Considerations 945	
Palliative/End-of-Life Care—Hospice 970	
Disaster Considerations 980	

## DETAILED CONTENTS

**INDEX OF NURSING  
DIAGNOSES APPEARS ON  
PAGE v**

### INTRODUCTION xiv

#### CHAPTER 1

The Nursing Process: Planning Care Using Critical Thinking 1  
Defining Nursing 1  
Critical Thinking 1  
Where Does Nursing Diagnosis Fit? 1  
How the Nursing Process Works with Nursing Diagnosis 2  
The Plan of Care 11  
Doing It 11  
    *Step 1: Assessment 11*  
    *Step 2: Diagnosis 11*  
    *Step 3: Planning 11*  
    *Step 4: Implementation 17*  
    *Step 5: Evaluation and Documentation of Plans of Care 18*

#### CHAPTER 2

Cardiovascular Disorders 26  
Hypertension: Severe 26  
    *Cardiac Output, risk for decreased 30*  
    *Activity Intolerance 32*  
    *Pain, acute 32*  
    *Overweight 33*  
    *Coping, ineffective 33*  
    *Health Management, ineffective 35*  
Heart Failure: Chronic 38  
    *Cardiac Output, decreased 43*  
    *Activity Intolerance 46*  
    *Fluid Volume, excess 47*  
    *Gas Exchange, risk for impaired 49*  
    *Pain, risk for chronic 50*  
    *Skin Integrity, risk for impaired 50*  
    *Health Management, ineffective 51*  
Acute Coronary Syndrome (ACS) 54  
    *Pain, acute 58*  
    *Tissue Perfusion, risk for decreased cardiac 60*  
    *Cardiac Output, risk for decreased 61*  
    *Knowledge, deficient 63*  
Angina: Chronic/Stable 64  
    *Pain, risk for acute 67*  
    *Cardiac Output, risk for decreased 69*  
    *Health Management, ineffective 70*  
Myocardial Infarction 72  
    *Pain, acute 77*  
    *risk for decreased cardiac Tissue Perfusion 78*  
    *Cardiac Output, risk for decreased 79*  
    *Activity Intolerance 82*  
    *Anxiety [moderate/severe] 82*  
    *Knowledge, deficient 83*  
Dysrhythmias 85  
    *Cardiac Output, risk for decreased 90*  
    *Poisoning, risk for [Digoxin Toxicity] 94*  
    *Health Management, ineffective 96*  
Cardiac Surgery: Coronary Artery Bypass Graft (CABG) and Valve Replacement: Postoperative Care 98  
    *Cardiac Output, risk for decreased 102*  
    *Pain, acute 104*  
    *Breathing Pattern, risk for ineffective 106*

*Skin/Tissue Integrity, impaired 107*  
*Knowledge, deficient 108*

Aortic Aneurysms: (Abdominal and Thoracic) 110  
Venous Thromboembolism (VTE) Disease Including Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE) 120  
    *Tissue Perfusion, ineffective peripheral 125*  
    *Pain, acute 127*  
    *Gas Exchange, impaired (in presence of pulmonary embolus) 128*  
    *Knowledge, deficient 130*

#### CHAPTER 3

Respiratory Disorders 132  
Chronic Obstructive Pulmonary Disease (COPD) and Asthma 132  
    *Airway Clearance, ineffective 137*  
    *Gas Exchange, impaired 140*  
    *Nutrition: less than body requirements, imbalanced 142*  
    *Health Management, ineffective 143*  
Pneumonia 147  
    *Airway Clearance, ineffective 151*  
    *Gas Exchange, impaired 153*  
    *Infection, risk for [spread] 154*  
    *Activity Intolerance 155*  
    *Pain, acute 156*  
    *Fluid Volume, risk for deficient 157*  
    *Knowledge, deficient 158*  
Lung Cancer: Postoperative Care 159  
    *Gas Exchange, impaired 163*  
    *Airway Clearance, ineffective 165*  
    *Pain, acute 166*  
    *Anxiety [specify level] 167*  
    *Knowledge, deficient 167*  
Pneumothorax/Hemothorax 169  
    *Breathing Pattern, ineffective 173*  
    *Knowledge, deficient 177*  
Acute Lung Injury/Acute Respiratory Distress Syndrome 177  
    *Respiratory Failure/Ventilatory Assistance 187*  
    *Breathing Pattern, ineffective/Spontaneous Ventilation, impaired 192*  
    *Airway Clearance, ineffective 195*  
    *Communication, impaired verbal 196*  
    *Anxiety [specify level] 197*  
    *Oral Mucous Membrane, impaired 198*  
    *Nutrition: less than body requirements, imbalanced 198*  
    *Infection, risk for 199*  
    *Ventilatory Weaning Response, risk for dysfunctional 201*  
    *Knowledge, deficient 203*  
Pulmonary Tuberculosis (TB) 204  
    *Infection, risk for [spread/reactivation] 208*  
    *Airway Clearance, ineffective 210*  
    *Gas Exchange, risk for impaired 211*  
    *Nutrition: less than body requirements, imbalanced 212*  
    *Health Management, risk for ineffective 214*  
Respiratory Acid-Base Imbalances (See DavisPlus)  
    *Respiratory Acidosis (Primary Carbonic Acid Excess) (See DavisPlus)*  
    *Gas Exchange, impaired*  
    *Respiratory Alkalosis (Primary Carbonic Acid Deficit) (See DavisPlus)*  
    *Gas Exchange, impaired*

**CHAPTER 4**

Neurological/Sensory Disorders 216

Seizure Disorders 216

*Trauma/Suffocation, risk for* 220  *Airway Clearance, risk for ineffective* 220  *Self-Esteem, [specify situational or chronic low]* 223  *Health Management, ineffective* 224

Craniocerebral Trauma—Acute Rehabilitative Phase 226

*risk for decreased intracranial Adaptive Capacity* 233  *Breathing Pattern, risk for ineffective* 237  *Confusion, risk for acute* 238  *[Sensory Perception, disturbed (specify)]* 239  *Infection, risk for* 240  *Nutrition: less than body requirements, risk for imbalanced* 241  *Mobility, impaired physical* 242  *Trauma, risk for physical* 243  *Family Processes, interrupted* 244  *Knowledge, deficient* 245

Cerebrovascular Accident (CVA)/Stroke 247

*Tissue Perfusion, ineffective cerebral* 252  *Mobility, impaired physical* 255  *Communication, impaired verbal [and/or written]* 257  *[Sensory Perception, disturbed (specify)]* 258  *Self-Care deficit [specify]* 259  *Coping, ineffective* 261  *Swallowing, risk for impaired* 262  *Neglect, unilateral* 264  *Knowledge, deficient* 265

Brain Infections: Meningitis and Encephalitis 267

*Infection, risk for [spread]* 270  *Intracranial Adaptive Capacity, risk for decreased* 272  *Comfort, impaired* 273  *Knowledge, deficient* 275

Spinal Surgery 276

*Peripheral Neurovascular Dysfunction, risk for* 279  *Injury, risk for [spinal]* 280  *Breathing Pattern, risk for ineffective* 281  *Pain, acute* 281  *Mobility, impaired physical* 283  *Infection, risk for* 283  *Urinary Retention, risk for acute* 285  *Knowledge, deficient* 286

Spinal Cord Injury (Acute Care and Rehabilitative Phase) 288

*Breathing Pattern, risk for ineffective* 292  *Trauma, risk for [additional spinal]* 294  *Mobility, impaired physical* 295  *[Sensory Perception, disturbed tactile/proprioception]* 297  *Pain, acute* 298  *Grieving* 299  *Self-Esteem, risk for situational low* 301  *Bowel Incontinence/Constipation* 302  *Elimination, impaired urinary* 303  *Pressure Ulcer/Tissue Integrity, risk for impaired* 305  *Knowledge, deficient* 306  *Autonomic Dysreflexia, risk for* 309

Multiple Sclerosis (MS) 311

*Fatigue* 315  *Self-Care deficit [specify]* 318  *Elimination, impaired urinary* 320  *Constipation/bowel Incontinence, risk for* 322  *Self-Esteem, risk for chronic* 324  *Powerlessness* 324  *Coping, risk for ineffective* 323  *Coping, risk for compromised family* 326  *Urinary Elimination, impaired* 320  *Caregiver Role Strain, risk for* 327  *Health Management, readiness for enhanced* 328

Parkinson's Disease (PD) 330

*Mobility, impaired physical/Walking, impaired* 333

Swallowing, impaired 336

Confusion, risk for chronic 338

**CHAPTER 5**

Gastrointestinal Disorders 340

*Upper Gastrointestinal Bleed* 340  *Fluid Volume, deficient* 340  *Shock, risk for* 344  *Anxiety [specify level]* 349  *Pain, acute* 350  *Knowledge, deficient* 350

Inflammatory Bowel Disease (IBD): Ulcerative Colitis,

Crohn's Disease 352

*Diarrhea* 359  *Fluid Volume, risk for deficient* 361  *Nutrition: less than body requirements, imbalanced* 361  *Anxiety [specify level]* 363  *Pain, acute* 364  *Coping, ineffective* 365  *Health Management, ineffective* 366

Fecal Diversions: Postoperative Care of Ileostomy and Colostomy 368

*Body Image, disturbed* 370  *Pain, acute* 371  *Skin Integrity, risk for impaired* 372  *Skin Integrity, risk for impaired* 374  *Fluid Volume, risk for deficient* 375  *Nutrition: less than body requirements, risk for imbalanced* 376  *Constipation/Diarrhea, risk for* 377  *Sleep Pattern, disturbed* 378  *Sexual Dysfunction, risk for* 378  *Knowledge, deficient* 380

Appendectomy 382

*Infection, risk for/Surgical Site Infection, risk for* 385  *Fluid Volume, risk for deficient* 386  *Pain, acute* 387  *Knowledge, deficient* 388

Peritonitis 389

*Infection, risk for [spread]* 392  *Shock, risk for* 395  *Pain, acute* 396  *Nutrition: less than body requirements, risk for imbalanced* 397  *Anxiety [specify level]* 398  *Knowledge, deficient* 398

Cholecystitis With Cholelithiasis 399

*Pain, acute* 403  *Fluid Volume, risk for deficient* 404  *Nutrition: less than body requirements, risk for imbalanced* 405  *Knowledge, deficient* 406

Cholecystectomy 407 (See DavisPlus)

**CHAPTER 6**

Metabolic and Endocrine Disorders 413

Eating Disorders: Anorexia Nervosa/Bulimia Nervosa 413

*Eating Dynamics, ineffective child/adolescent* 419  *Nutrition: less than body requirements, imbalanced* 419  *Fluid Volume, risk for deficient* 423  *Body Image, disturbed* 424  *Self-Esteem, chronic low* 425  *Coping, readiness for enhanced family* 427  *Skin Integrity, risk for impaired* 428  *Health Management, ineffective* 429

Eating Disorders: Obesity 430

*Obesity: more than body requirements, imbalanced* 340  *Lifestyle, sedentary* 437  *Body Image, risk for disturbed* 438  *Social Isolation, impaired* 440  *Health Management, ineffective* 441

Bariatric Surgery 442

*Breathing Pattern, ineffective* 445

- Tissue Perfusion, risk for ineffective [specify]* 447
- Fluid Volume, risk for deficient* 447
- Nutrition: less than body requirements, risk for imbalanced* 448
- Skin/Tissue Integrity, impaired* 449
- Infection, risk for* 450
- Diarrhea* 451
- Knowledge, deficient* 452
- Diabetes Mellitus and Diabetic Ketoacidosis 454
- Fluid Volume, deficient [specify]* 459
- Blood Glucose Level, unstable* 461
- Infection, risk for* 464
- [Sensory Perception, risk for disturbed (specify)]* 465
- Coping, ineffective* 466
- Health Management, ineffective* 467
- Hyperthyroidism, Thyrotoxicosis and Thyroid Storm 471
- Cardiac Output, risk for decreased* 475
- Fatigue* 477
- Nutrition: less than body requirements, risk for imbalanced* 478
- Anxiety [specify level]* 478
- Dry Eye, risk for* 480
- Knowledge, deficient* 481
- Hepatitis 482
- Liver Function, impaired* 486
- Fatigue* 487
- Nutrition: less than body requirements, imbalanced* 489
- Fluid Volume, risk for deficient/Bleeding* 490
- Self-Esteem, risk for situational low* 491
- Infection, risk for [secondary/spread]* 492
- Knowledge, deficient* 493
- Cirrhosis of the Liver 494
- Nutrition: less than body requirements, imbalanced* 498
- Fluid Volume, risk for excess* 500
- Infection, risk for* 502
- Skin Integrity, risk for impaired* 503
- Breathing Pattern, risk for ineffective* 504
- Bleeding, risk for* 505
- Venous Thromboembolism* 505
- Confusion, risk for acute* 507
- Body Image, disturbed* 509
- Health Management, ineffective* 509
- Pancreatitis 511
- Pain, acute* 516
- Fluid Volume, risk for deficient* 517
- Nutrition: less than body requirements, imbalanced* 519
- Blood Glucose Level, risk for unstable* 521
- Infection, risk for [sepsis]* 522
- Gas Exchange, risk for impaired* 523
- Health Management, ineffective* 523
- Total Nutritional Support: Parenteral/Enteral Feeding 525
- Nutrition: less than body requirements, imbalanced* 530
- Infection, risk for* 534
- Injury, risk for* 535
- Aspiration, risk for* 536
- Fluid Volume, risk for imbalanced* 537
- Knowledge, deficient* 538
- Metabolic Acid-Base Imbalances DavisPlus
- Metabolic Acidosis—Primary Base Bicarbonate Deficiency*
- DavisPlus*
- Metabolic Alkalosis—Primary Base Bicarbonate Excess*
- DavisPlus*
- CHAPTER 7**
- Diseases of the Blood/Blood-Forming Organs 541
- Anemias—Iron Deficiency, Anemia of Chronic Disease, Pernicious, Aplastic, Hemolytic 547
- Activity Intolerance* 547
- Nutrition: less than body requirements, imbalanced* 549
- Infection, risk for* 550
- Knowledge, deficient* 551
- Sickle Cell Crisis 552
- Gas Exchange, impaired* 558
- Pain, acute/chronic* 560
- Tissue Perfusion, risk for ineffective [specify]* 562
- Fluid Volume, risk for deficient* 564
- Mobility, impaired physical* 564
- Skin Integrity, risk for impaired* 565
- Infection, risk for* 566
- Health Management, ineffective* 566
- Adult Leukemias 569
- Infection, risk for* 574
- Fluid Volume, risk for deficient* 575
- Pain, acute* 577
- Fatigue* 578
- Knowledge, deficient* 579
- Adult Lymphomas 582
- Gas Exchange, risk for impaired* 587
- Nausea* 590
- Sexual Dysfunction* 591
- Knowledge, deficient* 592
- CHAPTER 8**
- Renal and Urinary Tract Disorders 595
- Acute Kidney Injury (Acute Renal Failure) 595
- Fluid Volume, excess* 601
- Cardiac Output, risk for decreased* 603
- Fluid Volume, risk for deficient* 604
- Infection, risk for* 605
- Knowledge, deficient* 606
- Renal Failure: Chronic Kidney Disease and End-Stage Renal Disease 607
- Electrolyte Imbalance, risk for* 613
- Cardiac Output, risk for decreased* 614
- Activity Intolerance, risk for* 616
- Bleeding, risk for* 617
- Confusion, risk for acute* 618
- Skin Integrity, risk for impaired* 619
- Oral Mucous Membrane, risk for impaired* 620
- Health Management, ineffective* 620
- Renal Dialysis—General Considerations 623
- Nutrition: less than body requirements, imbalanced* 625
- Skin Integrity, risk for impaired* 627
- Self-Care deficit (specify)* 628
- Constipation, risk for* 629
- Confusion, risk for acute* 630
- Anxiety [specify level]* 631
- Body Image, disturbed* 631
- Health Management, risk for ineffective* 633
- Peritoneal Dialysis (PD) 635
- Fluid Volume, risk for excess* 635
- Fluid Volume, risk for deficient* 636
- Trauma, risk for physical* 637
- Pain, acute* 638
- Infection, risk for* 639
- Breathing Pattern, risk for ineffective* 640
- Hemodialysis (HD) 641
- Injury, risk for* 642
- Fluid Volume, risk for deficient* 643
- Fluid Volume, risk for excess* 644
- Urinary Diversions: Urostomy (Postoperative Care) 645
- Skin Integrity, risk for impaired* 647
- Body Image, disturbed* 648
- Pain, acute* 650
- Infection, risk for* 651
- Sexual Dysfunction, risk for* 653
- Knowledge, deficient* 654
- Urinary Stones (Calculi) 656
- Pain, acute* 660
- Elimination, impaired urinary* 661

- Fluid Volume, risk for deficient* 663  
*Knowledge, deficient* 664
- CHAPTER 9**  
 Women's Health 666  
*Hysterectomy* 666  
*Urinary Retention, risk for [acute]* 668  
*Constipation, risk for* 669  
*Tissue Perfusion, risk for ineffective (specify)* 670  
*Sexual Dysfunction, risk for* 671  
*Grieving* 672  
*Knowledge, deficient* 673  
*Mastectomy* 675  
*Anxiety* 679  
*Tissue Integrity, impaired* 680  
*Pain, acute* 681  
*Self-Esteem, situational low* 682  
*Mobility, impaired physical* 683  
*Knowledge, deficient* 684
- CHAPTER 10**  
 Men's Health 686  
*Benign Prostatic Hyperplasia (BPH)* 686  
*Urinary Retention, [acute/chronic]* 689  
*Pain, acute* 691  
*Fluid Volume, risk for deficient* 692  
*Anxiety [specify level]* 692  
*Knowledge, deficient* 693  
*Prostatectomy* 694  
*Elimination, impaired urinary* 696  
*Bleeding, risk for* 697  
*Infection, risk for* 698  
*Pain, acute* 699  
*Sexual Dysfunction, risk for* 700  
*Knowledge, deficient* 700
- CHAPTER 11**  
 Orthopedic Disorders 702  
*Fractures* 702  
*Injury, risk for* 706  
*Pain, acute* 707  
*Peripheral Neurovascular Dysfunction, risk for* 709  
*Gas Exchange, risk for impaired* 711  
*Mobility, impaired physical* 712  
*Tissue Integrity, risk for impaired/Pressure Ulcer* 714  
*Infection, risk for* 715  
*Knowledge, deficient* 716  
*Ampputation* 718  
*Pain, acute* 721  
*Tissue Perfusion, risk for ineffective peripheral* 723  
*Infection, risk for* 724  
*Mobility, impaired physical* 725  
*Grieving* 726  
*Knowledge, deficient* 728  
*Total Joint Replacement* 729  
*Pain, acute* 731  
*Bleeding, risk for* 733  
*Infection, risk for* 734  
*Peripheral Neurovascular Dysfunction, risk for* 735  
*Mobility, impaired physical* 736  
*Constipation, risk for* 737  
*Knowledge, deficient* 738
- CHAPTER 12**  
 Integumentary Disorders 740  
*Burns: Thermal, Chemical, and Electrical—Acute and Convalescent Phases* 746  
*Airway Clearance, risk for ineffective* 747  
*Fluid Volume, risk for deficient* 749
- Pain, acute* 749  
*Infection, risk for* 751  
*Peripheral Neurovascular Dysfunction, risk for* 754  
*Nutrition: less than body requirements, imbalanced* 755  
*Mobility, impaired physical* 756  
*Skin Integrity, impaired [grafts/donor site]* 757  
*Post-Trauma Syndrome, risk for* 759  
*Knowledge, deficient* 760  
*Wound Care: Complicated or Chronic* 762  
*Skin/Tissue Integrity, impaired* 765  
*Pain, acute/chronic* 767  
*Infection, risk for* 769  
*Nutrition: less than body requirements, imbalanced* 769  
*Health Management, risk for ineffective* 770
- CHAPTER 13**  
 Systemic Infections and Immunological Disorders 772  
*Sepsis/Septic Shock* 772  
*Infection, risk for [progression; opportunistic/hospital acquired]* 776  
*Hyperthermia* 778  
*Shock, risk for* 779  
*Fluid Volume, risk for deficient* 781  
*Confusion, risk for acute* 783  
*Gas Exchange, risk for impaired* 783  
*Knowledge, deficient* 784  
*The HIV-Positive Client* 785  
*Health Behavior, risk-prone* 788  
*Fatigue* 790  
*Nutrition: less than body requirements, imbalanced* 791  
*Knowledge, deficient* 793  
*Social Isolation, risk for* 797  
*Health Management, ineffective* 798  
*Acquired Immunodeficiency Syndrome (AIDS)* 800  
*Infection, risk for [progression/onset of opportunistic infection]* 805  
*Fluid Volume, risk for deficient* 807  
*Breathing Pattern, ineffective* 808  
*Bleeding, risk for* 810  
*Nutrition: less than body requirements, imbalanced* 811  
*Pain, acute/chronic* 813  
*Skin Integrity, impaired* 814  
*Oral Mucous Membrane, impaired* 815  
*Fatigue* 816  
*Confusion, risk for acute/chronic* 817  
*Death Anxiety* 819  
*Social Isolation* 820  
*Health Management, ineffective* 822  
*Rheumatoid Arthritis (RA)* 824  
*Pain, acute/chronic* 827  
*Mobility, impaired physical* 829  
*Role Performance, ineffective* 830  
*Self-Care deficit (specify)* 831  
*Home Maintenance, risk for impaired* 831  
*Health Management, risk for ineffective* 832
- CHAPTER 14**  
 General 835  
*Psychosocial Aspects of Care* 835  
*Coping, ineffective* 837  
*Decisional Conflict (specify)* 838  
*Coping, compromised family* 839  
*Coping, readiness for enhanced family* 840  
*Anxiety [specify level]* 841  
*Self-Esteem, risk for situational low* 843  
*Grieving [specify]* 845  
*Religiosity, risk for impaired* 847  
*Health Management, ineffective* 848  
*Violence, risk for self- or other-directed* 849

Dementias: Alzheimer's Type/Vascular Dementia/Lewy Body Disease/	
Frontotemporal Dementia 851	
<i>Injury, risk for</i> 857	
<i>Confusion, chronic</i> 858	
<i>[Sensory Perception, disturbed (specify)]</i> 861	
<i>Anxiety</i> 862	
<i>Grieving</i> 863	
<i>Sleep Deprivation</i> 864	
<i>Self-Care deficit (specify type/level)</i> 865	
<i>Nutrition: less/more than body requirements, risk for imbalanced</i> 866	
<i>Bowel Incontinence/Elimination, impaired urinary</i> 867	
<i>Sexual Dysfunction, risk for</i> 868	
<i>Coping, compromised family</i> 869	
<i>Health Maintenance, ineffective</i> 870	
<i>Role Strain, risk for caregiver</i> 871	
<i>Relocation Stress Syndrome, risk for</i> 872	
Surgical Interventions 873	
<i>Knowledge, readiness for enhanced</i> 877	
<i>Anxiety [specify level]</i> 878	
<i>Perioperative Positioning Injury, risk for</i> 880	
<i>Injury, risk for</i> 881	
<i>Infection, risk for</i> 883	
<i>Hypothermia/Hypothermia, risk for [perioperative]</i> 885	
<i>Breathing Pattern, ineffective</i> 886	
<i>[Sensory Perception, disturbed (specify)]</i> 887	
<i>Fluid Volume, risk for deficient</i> 889	
<i>Pain, acute</i> 890	
<i>Tissue Integrity, impaired</i> 892	
<i>Tissue Perfusion, risk for ineffective</i> 894	
<i>Health Management, readiness for enhanced</i> 895	
Extended/Long-Term Care 896	
<i>Relocation Stress Syndrome, risk for</i> 898	
<i>Grieving</i> 900	
<i>Memory, impaired</i> 901	
<i>Coping, compromised family</i> 903	
<i>Poisoning, risk for [drug toxicity]</i> 904	
<i>Communication, impaired verbal</i> 905	
<i>Sleep Pattern, disturbed</i> 906	
<i>Nutrition: risk for less than body requirements/Overweight</i> 907	
<i>Self-Care deficit [specify]</i> 909	
<i>Skin Integrity, risk for impaired</i> 910	
<i>Elimination, risk for impaired urinary</i> 911	
<i>Constipation/Diarrhea, risk for</i> 912	
<i>Mobility, impaired physical</i> 914	
<i>Pain, chronic</i> 915	
<i>Sexual Dysfunction, risk for</i> 916	
<i>Health Management, readiness for enhanced</i> 917	
Alcohol: Acute Withdrawal 919	
<i>Acute Substance Withdrawal Syndrome</i>	
<i>Breathing Pattern, risk for ineffective</i> 927	
<i>Cardiac Output, risk for decreased</i> 928	
Substance Use Disorders (SUDs) 929	
<i>Denial, ineffective</i> 932	
<i>Acute Substance Withdrawal Syndrome, risk for Coping, ineffective</i> 933	
<i>Powerlessness</i> 937	
<i>Nutrition: less than body requirements, imbalanced</i> 938	
<i>Self-Esteem, chronic low</i> 828	
Family Processes, dysfunctional 941	
Sexual Dysfunction 943	
Knowledge, deficient 944	
Cancer—General Considerations 945	
<i>Fear/Anxiety [specify level]</i> 950	
<i>Grieving</i> 952	
<i>Self-Esteem, risk for situational low</i> 953	
<i>Pain, acute/chronic</i> 954	
<i>Nutrition: less than body requirements, imbalanced</i> 957	
<i>Fluid Volume, risk for deficient</i> 959	
<i>Fatigue</i> 960	
<i>Infection, risk for</i> 961	
<i>Oral Mucous Membrane, risk for impaired</i> 962	
<i>Skin/Tissue Integrity, risk for impaired</i> 964	
<i>Constipation/Diarrhea, risk for</i> 965	
<i>Sexual Dysfunction, risk for</i> 966	
<i>Family Processes, risk for interrupted</i> 967	
<i>Health Management, readiness for enhanced</i> 968	
Palliative/End-of-Life Care—Hospice 970	
<i>Pain, acute/chronic</i> 972	
<i>Fatigue</i> 974	
<i>Grieving/Death Anxiety</i> 975	
<i>Coping, compromised family</i> 977	
<i>Spiritual Distress, risk for</i> 978	
<i>Role Strain, risk for caregiver</i> 979	
Disaster Considerations 980	
<i>Injury, risk for/Trauma, physical</i> 983	
<i>Infection, risk for</i> 985	
<i>Anxiety [severe/panic]</i> 986	
<i>Spiritual Distress risk</i> 989	
<i>Post-Trauma Syndrome, risk for</i> 990	
<i>Coping, ineffective community</i> 991	
<i>Coping, readiness for enhanced community</i> 992	
Pediatric Considerations 993	
<i>Pain, acute/chronic</i> 996	
<i>Anxiety/Fear</i> 997	
<i>Activity Intolerance</i> 998	
<i>Development, risk for delayed [Growth]</i> 999	
<i>Nutrition: less than body requirements, risk for imbalanced</i> 1001	
<i>Injury, risk for (specify: Trauma, Suffocation, Poisoning)</i> 1002	
<i>Fluid Volume, risk for imbalanced</i> 1003	
<i>Family Processes, interrupted</i> 1004	
<i>Thermoregulation, risk for ineffective</i> 1005	
<i>Health Maintenance, risk for ineffective</i> 1006	
Fluid and Electrolyte Imbalances (see DavisPlus)	
<i>Hypervolemia (Extracellular Fluid Volume Excess)</i>	
<i>Hypovolemia (Extracellular Fluid Volume Deficit)</i>	
<i>Hyponatremia (Sodium Deficit)</i>	
<i>Hyponatremia (Sodium Excess)</i>	
<i>Hypokalemia (Potassium Deficit)</i>	
<i>Hyperkalemia (Potassium Excess)</i>	
<i>Hypocalcemia (Calcium Deficit)</i>	
<i>Hypercalcemia (Calcium Excess)</i>	
<i>Hypomagnesemia (Magnesium Deficit)</i>	
<i>Hypermagnesemia (Magnesium Excess)</i>	
Definitions for NANDA-I Nursing Diagnoses Used in This Text 1009	
Index of Nursing Diagnoses 1013	

## CONTENTS ON DAVIS PLUS

<p>Psychiatric Care Plans</p> <p>Neurodevelopmental Disorders</p> <p><i>Pervasive Developmental Disorder</i></p> <p><i>Attention-Deficit Disorder</i></p> <p>Schizophrenic Spectrum and Other Psychotic Disorders</p> <p><i>Schizophrenia</i></p> <p><i>Schizoaffective Disorder</i></p> <p><i>Delusional Disorder</i></p> <p>Bipolar and Related Disorders</p> <p><i>Bipolar Disorder</i></p> <p>Depressive Disorders</p> <p><i>Major Depressive Disorder</i></p> <p><i>Premenstrual Dysphoric Disorder</i></p> <p>Anxiety Disorders</p> <p><i>Generalized Anxiety Disorder</i></p> <p><i>Anxiety Disorder</i></p> <p><i>Panic Disorder (Phobias)</i></p> <p>Obsessive-Compulsive and Related Disorders</p> <p><i>Obsessive-Compulsive Disorder</i></p> <p>Trauma and Stressor-Related Disorders</p> <p><i>Posttraumatic Stress Disorder</i></p> <p><i>Adjustment Disorder</i></p> <p>Dissociative Disorders</p> <p><i>Dissociative Identity Disorder</i></p> <p>Somatic Symptom and Related Disorders</p> <p><i>Somatic Symptom Disorder</i></p> <p>Feeding and Eating Disorders</p> <p><i>Anorexia Nervosa/Bulimia Nervosa</i></p> <p><i>Obesity</i></p> <p>Elimination Disorders</p> <p><i>Enuresis/Encopresis</i></p> <p>Sexual Dysfunctions</p> <p><i>Sexual Dysfunctions and Paraphilic Disorders</i></p> <p>Gender Dysphoria</p> <p><i>Gender Dysphoria</i></p> <p>Disruptive, Impulse-Control, and Conduct Disorders</p> <p><i>Oppositional Defiant Disorder</i></p> <p><i>Conduct Disorder</i></p> <p>Substance-Related and Addictive Disorders</p> <p><i>Alcohol-Related Disorders</i></p> <p><i>Stimulant-Related Disorders (Amphetamines, Cocaine, Caffeine, and Nicotine) and Inhalant Disorders</i></p> <p><i>Depressants (Barbiturates, Nonbarbiturates, Hypnotics and Anxiolytics, Opioids)</i></p> <p><i>Hallucinogen, Phencyclidine, and Cannabis-Related Disorders</i></p> <p><i>Substance Dependence/Abuse Rehabilitation</i></p> <p>Dementia and Amnestic and Other Neurocognitive Disorders</p> <p><i>Dementia of the Alzheimer's Type/Vascular Dementia</i></p> <p><i>Dementia Due to HIV Disease</i></p> <p>Personality Disorders</p> <p><i>Antisocial Personality Disorder</i></p> <p><i>Borderline Personality Disorder</i></p> <p><i>Passive-Aggressive Personality Disorder</i></p> <p>Other Mental Disorders</p> <p><i>Psychological Factors Affecting Medical Conditions</i></p> <p><i>Parenting Growth-Promoting Relationship</i></p> <p><i>Problems Related to Abuse and Neglect</i></p>	<p>Maternal/Newborn Care Plans</p> <p>Prenatal Concepts</p> <p><i>Genetic Counseling</i></p> <p><i>First Trimester</i></p> <p><i>Second Trimester</i></p> <p><i>Third Trimester</i></p> <p><i>High-Risk Pregnancy</i></p> <p><i>Prenatal Substance Dependence/Abuse</i></p> <p><i>Pregnant Adolescent</i></p> <p><i>Cardiac Conditions</i></p> <p><i>Gestational Hypertension</i></p> <p><i>Diabetes Mellitus: Prepregnancy/Gestational</i></p> <p><i>Prenatal Hemorrhage</i></p> <p><i>Prenatal Infection</i></p> <p><i>Premature Dilation of the Cervix (Incompetent/Dysfunctional Cervix)</i></p> <p><i>Spontaneous Termination</i></p> <p><i>Elective Termination</i></p> <p><i>Preterm Labor/Prevention of Delivery</i></p> <p>Intrapartal Concepts</p> <p><i>Labor Stage I—Latent Phase</i></p> <p><i>Labor Stage I—Active Phase</i></p> <p><i>Labor Stage I—Transition Phase (Deceleration)</i></p> <p><i>Labor Stage II—Expulsion</i></p> <p><i>Labor Stage III—Placental Expulsion</i></p> <p><i>Dysfunctional Labor/Dystocia</i></p> <p><i>Labor: Induced/Augmented</i></p> <p><i>Cesarean Birth</i></p> <p><i>Precipitous Labor/Delivery or Unplanned/Out-of-Hospital Delivery</i></p> <p><i>Intrapartal Hypertension</i></p> <p><i>Intrapartal Diabetes Mellitus</i></p> <p>Maternal Postpartal Concepts</p> <p><i>Stage IV—First 4 Hours Following Delivery of the Placenta</i></p> <p><i>The Client at 4 Hours to 2 Days Postpartum</i></p> <p><i>Care Following Cesarean Birth (4 Hours to 3 Days Postpartum)</i></p> <p><i>24–48 Hours Following Early Discharge</i></p> <p><i>1 Week Following Discharge</i></p> <p><i>4–6 Weeks Following Discharge</i></p> <p><i>Postpartal Hemorrhage</i></p> <p><i>Postpartal Diabetes Mellitus</i></p> <p><i>Puerperal Infection</i></p> <p><i>Postpartal Thrombophlebitis</i></p> <p><i>Parents of a Child With Special Needs</i></p> <p><i>Perinatal Loss</i></p> <p>Newborn Concepts</p> <p><i>First Hour of Life</i></p> <p><i>Neonate at 2 Hours to 2 Days of Age</i></p> <p><i>Neonate at 24–48 Hours Following Early Discharge</i></p> <p><i>Neonate at 1 Week Following Discharge</i></p> <p><i>Infant at 4 Weeks Following Birth</i></p> <p><i>Preterm Infant</i></p> <p><i>Deviations in Growth Patterns</i></p> <p><i>Circumcision</i></p> <p><i>Hyperbilirubinemia</i></p> <p><i>Infant of an Addicted Mother</i></p> <p><i>Infant of an HIV-Positive Mother</i></p>
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## Medical Surgical Care Plans

### Fluid and Electrolyte Imbalances

*Hypervolemia (Extracellular Fluid Volume Excess)*  
*Hypovolemia (Extracellular Fluid Volume Deficit)*  
*Hyponatremia (Sodium Deficit)*  
*Hyponatremia (Sodium Excess)*  
*Hypokalemia (Potassium Deficit)*  
*Hyperkalemia (Potassium Excess)*  
*Hypocalcemia (Calcium Deficit)*  
*Hypercalcemia (Calcium Excess)*  
*Hypomagnesemia (Magnesium Deficit)*  
*Hypermagnesemia (Magnesium Excess)*  
Gastrectomy/gastroplasty  
Herniated nucleus pulposus  
Hypercalcemia (calcium excess)  
Hyperkalemia (potassium excess)  
Hypermagnesemia (magnesium excess)  
Hypernatremia (sodium excess)  
Hypervolemia (extracellular fluid volume excess)

Hypocalcemia (calcium deficit)

Hypokalemia (potassium deficit)

Hypomagnesemia (magnesium deficit)

Hyponatremia (sodium deficit)

Hypovolemia (extracellular fluid volume deficit)

Laryngectomy

Metabolic Acid-Base Imbalances

*Metabolic Acidosis: Primary Base Bicarbonate Deficiency*

*Metabolic Alkalosis: Primary Base Bicarbonate Excess*

Primary base bicarbonate deficiency

Primary base bicarbonate excess

Primary carbonic acid deficit

Primary carbonic acid excess

Radical neck surgery

Respiratory Acid-Base Imbalances

*Respiratory Acidosis (Primary Carbonic Acid Excess)*

*Respiratory Alkalosis (Primary Carbonic Acid Deficit)*

Ruptured intervertebral disc

Thyroidectomy

# The Nursing Process: Planning Care Using Critical Thinking

## DEFINING NURSING

Nursing encompasses autonomous and collaborative care of individuals of all ages, families, groups, and communities, sick or well, and in all settings. Nursing care is a key factor in achieving positive outcomes for the client with illness, as well as in the enhancement of client satisfaction in all phases of healthcare. The goals of nursing care include the prevention of illness, the provision of rehabilitation for compromising conditions, and the maximization of health. Where a return to health is not possible, nurses are also instrumental in helping the individual to achieve relief of pain and other discomforts, as well as to potentially experience a more peaceful death. So do these things define nursing?

Through the years, the “what” and “how” of the work of nursing have been explained by numerous nursing organizations in a number of publications to help define the work of nursing. Nursing interventions are based on needs identified by the client and the nurse during data collection. The 1980 *Nursing: A Social Policy Statement* by the American Nurses Association (ANA) defined nursing as the “diagnosis and treatment of human responses to actual and potential health problems,” providing a framework for understanding nursing’s relationship with society and nursing’s obligations to those receiving nursing care (Neuman, n.d.). In the 2003 *Nursing: A Social Policy Statement*, the ANA definition was expanded: “Nursing is the protection, promotion, and optimization of health and abilities, prevention of illness and injury, alleviation of suffering through the **diagnosis** and treatment of human response, and advocacy in the care of individuals, families, communities, and populations.” Human responses that are the phenomena of concern to nurses include “any observable need, concern, event, or fact of interest to nurses that may be the target of evidenced-based nursing practice” (ANA, 2010).

The nursing profession had already implemented (in the 1950s) a problem-solving process that “combines the most desirable elements of the art of nursing with the most relevant elements of systems theory, using the scientific method” (Shore, 1988). This “nursing process” evolved into five steps central to nursing actions and the delivery of high-quality, individualized client care in any setting. These are the following:

(1) Assessment (systematic collection of data relating to clients and their problems and needs), (2) diagnosis (analysis and interpretation of data), (3) planning (prioritizing needs, identifying goals, and choosing solutions), (4) implementation (putting the plan into action), and (5) evaluation (assessing the effectiveness of the plan and changing the plan as indicated by current needs).

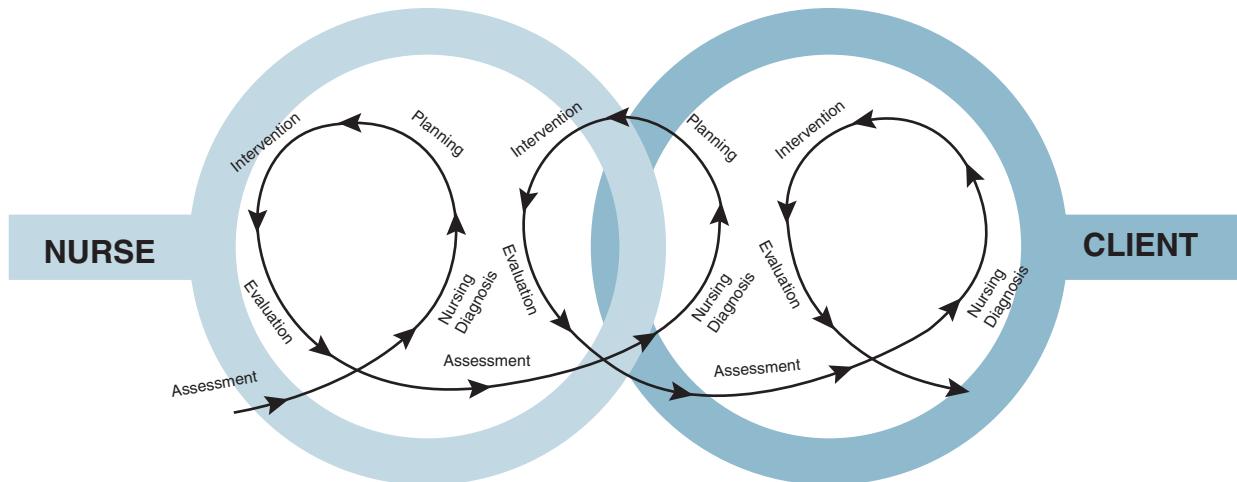
The nursing process combines the skills of critical thinking with the skills of hands-on care and creates a method of active problem-solving that is both dynamic and cyclic. Although some view the nursing process as separate and progressive steps, the elements are actually interrelated. Taken together, they form a continuous circle of thought and action throughout the client’s contact with the healthcare system. Figure 1.1 demonstrates the way this cyclic process works.

## CRITICAL THINKING

The ability to think critically is vital to the success of effectively using the nursing process. Critical thinking in general has been defined as the “intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and evaluating information gathered from or by observation, experience, reflection, reasoning, or communication, as a guide to belief and action” (Scriven & Paul, 1987). In nursing, critical thinking for clinical decision making has been defined as “the ability to think in a systematic and logical manner with openness to question and reflect on the reasoning process used to ensure safe nursing practice and quality care” (Heaslip, 1993, revised 2008). Nursing critical thinking requires a comprehensive knowledge base; use of one’s cognitive, psychomotor, and affective skills; established standards of care for best practice; and ongoing nursing research. The final product of this effort is effective nursing action, which is carried out and documented in the plan of care for a specific client.

## WHERE DOES NURSING DIAGNOSIS FIT?

In 1991, the ANA *Standards of Clinical Nursing Practice* described the client care process and standards for professional performance, providing impetus and support for the development and use of **nursing diagnosis** in the practice setting. Nursing diagnoses are useful in providing a uniform



**Figure 1.1** Diagram of the nursing process. The steps of the nursing process are interrelated, forming a continuous circle of thought and action that is both dynamic and cyclic.

way of identifying, focusing on, and dealing with specific client needs and responses to actual or high-risk problems and life processes.

While a number of standardized nursing languages have been developed using nursing diagnosis terminology, we have supported and operationalized the NANDA-International's (NANDA-I's) research and ongoing work of identifying client problems and needs for which nurses are accountable. NANDA-I defines nursing diagnosis as “a clinical judgment concerning a human response to health conditions/life processes, or a vulnerability for that response, by an individual, family, group, or community . . . and provides the basis for selection of nursing interventions to achieve outcomes for which the nurse has accountability” (Herdman & Kamitsuru, 2018). NANDA-I nursing diagnosis labels (see page 1049) provide a format for expressing the problem identification portion of the nursing process.

There are **four forms** of nursing diagnoses: “1) **problem-focused**—a clinical judgement concerning an undesirable human response to health conditions/life processes that exists in an individual, family, group, or community; 2) **health promotion**—a clinical judgement concerning motivation and desire to increase well-being and to actualize health potential; 3) **risk**—a clinical judgement concerning the susceptibility of an individual, family, group, or community for developing an undesirable human response to health conditions/life processes; 4) **syndrome**—a clinical judgement concerning a specific cluster of nursing diagnoses that occur together, and are best addressed together and through similar interventions” (Herdman & Kamitsuru, 2018).

## HOW THE NURSING PROCESS WORKS WITH NURSING DIAGNOSIS

1. Collect a client database (nursing interview, physical assessment, and diagnostic studies) combined with information collected by other healthcare providers.
2. Review and analyze the client data.

3. Synthesize the gathered client data as a whole and then label the clinical judgment about the client’s responses to these actual or high-risk problems and life processes.
4. Compare and contrast the relationships of clinical judgments with related or risk factors and defining characteristics for possible NANDA nursing diagnosis labels. This step is crucial to choosing and validating the appropriate nursing diagnosis label that will be used to create a specific client diagnostic statement. The defining characteristics and related factors associated with the chosen NANDA nursing diagnosis are reviewed and compared with the client data. If the diagnosis is not consistent with at least two or more cues, additional data may be required or another nursing diagnosis considered.
5. The results of the synthesis of the collected data are written concisely to create the client diagnostic statement by combining the nursing diagnosis with the identified NANDA related factors, defining characteristics, or risk factors to best reflect the client’s situation.

In this text, to facilitate the steps needed to arrive at a nursing diagnosis and to aid in the critical thinking process, we developed an assessment database that uses a **nursing focus** instead of the traditional medical approach of a review of systems (Fig. 1.2). To achieve this nursing focus, we have grouped NANDA-I nursing diagnoses into related categories titled Diagnostic Divisions (Box 1.1).

These categories reflect a blending of theories, primarily Maslow’s hierarchy of needs and a self-care philosophy. And because diagnostic divisions are based on human responses and needs rather than specific body systems, assessment data may be recorded in more than one area. These divisions serve as the framework for data collection and direct the nurse to the corresponding nursing diagnosis labels in the second step of the nursing process. For this reason, the nurse is encouraged to keep an open mind during the assessment phase and to collect as much information as possible before choosing the nursing diagnosis label.

## ADULT MEDICAL/SURGICAL ASSESSMENT TOOL

### General Information

Name: \_\_\_\_\_

Age: \_\_\_\_\_ DOB: \_\_\_\_\_ Gender: \_\_\_\_\_ Race: \_\_\_\_\_

Admission Date: \_\_\_\_\_ Time: \_\_\_\_\_ From: \_\_\_\_\_

Reason for this admission (primary concern): \_\_\_\_\_

Cultural concerns (relating to healthcare decisions, religious concerns, pain, childbirth, family involvement, communication, etc): \_\_\_\_\_

Source of information: \_\_\_\_\_ Reliability (1–4 with 4 = very reliable): \_\_\_\_\_

### Activity/Rest

#### Subjective (Reports)

Occupation: \_\_\_\_\_

Leisure time/diversional activities: \_\_\_\_\_

Able to participate in usual activities/hobbies: \_\_\_\_\_

Ambulatory: \_\_\_\_\_ Gait (describe): \_\_\_\_\_

Activity level (sedentary to very active): \_\_\_\_\_

Regular exercise/type: \_\_\_\_\_

Muscle mass/tone/strength (e.g., normal, increased, decreased): \_\_\_\_\_ Change: \_\_\_\_\_

History of problems/limitations imposed by condition (e.g., immobility, can't transfer, weakness, breathlessness): \_\_\_\_\_

Feelings (e.g., exhaustion, restlessness, can't concentrate, dissatisfaction): \_\_\_\_\_

Developmental factors (e.g., delayed/age): \_\_\_\_\_

Sleep: Hours: \_\_\_\_\_ Naps: \_\_\_\_\_ Aids: \_\_\_\_\_

Insomnia: \_\_\_\_\_ Related to: \_\_\_\_\_

Difficulty falling asleep: \_\_\_\_\_

Difficulty staying asleep: \_\_\_\_\_

Rested on awakening: \_\_\_\_\_

Excessive grogginess: \_\_\_\_\_

Sleeps on more than one pillow: \_\_\_\_\_

Bedtime rituals: \_\_\_\_\_

Relaxation techniques: \_\_\_\_\_

Oxygen use (type): \_\_\_\_\_ When used: \_\_\_\_\_

Medications or herbals for/affecting sleep: \_\_\_\_\_

#### Objective (Exhibits)

Observed response to activity: Heart rate: \_\_\_\_\_

Rhythm (reg/irreg): \_\_\_\_\_

Blood pressure: \_\_\_\_\_

Respiration rate: \_\_\_\_\_

Pulse oximetry: \_\_\_\_\_

Mental status (i.e., cognitive impairment, withdrawn/lethargic): \_\_\_\_\_

Neuromuscular assessment:

Muscle mass/tone: \_\_\_\_\_

Posture (e.g., normal, stooped, curved spine): \_\_\_\_\_

Tremors: \_\_\_\_\_

(location): \_\_\_\_\_

ROM: \_\_\_\_\_

Strength: \_\_\_\_\_

Deformity: \_\_\_\_\_

Uses mobility aid (list): \_\_\_\_\_

### Circulation

#### Subjective (Reports)

History of/treatment for (date): High blood pressure: \_\_\_\_\_

Brain injury: \_\_\_\_\_ Stroke: \_\_\_\_\_

Heart problems/surgery: \_\_\_\_\_ Palpitations: \_\_\_\_\_

Syncope: \_\_\_\_\_ Rheumatic fever: \_\_\_\_\_

Cough/hemoptysis: \_\_\_\_\_ Blood clots: \_\_\_\_\_

Bleeding tendencies/episodes: \_\_\_\_\_ (location): \_\_\_\_\_

Pain in legs w/activity: \_\_\_\_\_

Extremities: Numbness: \_\_\_\_\_ (location): \_\_\_\_\_

Tingling: \_\_\_\_\_ (location): \_\_\_\_\_

Slow healing (describe): \_\_\_\_\_

Change in frequency/amount of urine: \_\_\_\_\_

History of spinal cord injury/dysreflexia episodes: \_\_\_\_\_

Medications/herbals: \_\_\_\_\_

#### Objective (Exhibits)

Color (e.g., pale, cyanotic, jaundiced, mottled, ruddy): \_\_\_\_\_

Skin: \_\_\_\_\_ Mucous membranes: \_\_\_\_\_ Lips: \_\_\_\_\_

Nail beds: \_\_\_\_\_ Conjunctiva: \_\_\_\_\_ Sclera: \_\_\_\_\_

Skin moisture (e.g., dry, diaphoretic): \_\_\_\_\_

BP: Lying: R \_\_\_\_\_ L \_\_\_\_\_ Sitting: R \_\_\_\_\_ L \_\_\_\_\_

Standing: R \_\_\_\_\_ L \_\_\_\_\_

Pulse pressure: \_\_\_\_\_ Auscultatory gap: \_\_\_\_\_

Pulses (palpated 1–4 strength): Carotid: \_\_\_\_\_ Temporal: \_\_\_\_\_

Jugular: \_\_\_\_\_ Radial: \_\_\_\_\_ Femoral: \_\_\_\_\_ Popliteal: \_\_\_\_\_

Post-tibial: \_\_\_\_\_ Dorsalis pedis: \_\_\_\_\_

Cardiac (palpation): Thrill: \_\_\_\_\_ Heaves: \_\_\_\_\_

Heart sounds (auscultation): Rate: \_\_\_\_\_ Rhythm: \_\_\_\_\_

Quality: \_\_\_\_\_ Friction rub: \_\_\_\_\_

Murmur (describe location/sounds): \_\_\_\_\_

Vascular bruit (location): \_\_\_\_\_ Jugular vein distention: \_\_\_\_\_

Breath sounds (location/describe): \_\_\_\_\_

Extremities: Temperature: \_\_\_\_\_ Color: \_\_\_\_\_

Capillary refill (1–3 sec): \_\_\_\_\_ Homans' sign: \_\_\_\_\_

Varicosities (location): \_\_\_\_\_

Distribution/quality of hair: \_\_\_\_\_

Edema (location/severity: mild, moderate, severe): \_\_\_\_\_

Trophic skin changes: \_\_\_\_\_ Nail abnormalities: \_\_\_\_\_

## Ego Integrity

### Subjective (Reports)

Relationship status: \_\_\_\_\_  
Expression of concerns (e.g., financial, lifestyle, relationship, or role changes): \_\_\_\_\_  
Stress factors: \_\_\_\_\_  
Usual ways of handling stress: \_\_\_\_\_  
Expression of feelings: Anger: \_\_\_\_\_ Anxiety: \_\_\_\_\_  
Fear: \_\_\_\_\_ Grief: \_\_\_\_\_ Helplessness: \_\_\_\_\_  
Hopelessness: \_\_\_\_\_ Powerlessness: \_\_\_\_\_  
Cultural factors/ethnic ties: \_\_\_\_\_  
Religious affiliation: \_\_\_\_\_ Active/practicing: \_\_\_\_\_  
Practices prayer/meditation: \_\_\_\_\_  
Religious/spiritual concerns: \_\_\_\_\_  
Desires clergy visit: \_\_\_\_\_  
Expression of sense of connectedness/harmony with self and others: \_\_\_\_\_  
Medications/herbals: \_\_\_\_\_

## Elimination

### Subjective (Reports)

Usual bowel elimination pattern: \_\_\_\_\_  
Character of stool (e.g., hard, soft, liquid): \_\_\_\_\_  
Stool color (e.g., brown, black, yellow, clay colored, tarry): \_\_\_\_\_  
Date of last BM and character of stool: \_\_\_\_\_  
History of bleeding: \_\_\_\_\_ Hemorrhoids/fistula: \_\_\_\_\_  
Constipation: acute: \_\_\_\_\_ or chronic: \_\_\_\_\_  
Diarrhea: acute: \_\_\_\_\_ or chronic: \_\_\_\_\_  
Bowel incontinence: \_\_\_\_\_  
Laxative: \_\_\_\_\_ (how often): \_\_\_\_\_  
Enema/suppository: \_\_\_\_\_ (how often): \_\_\_\_\_  
Usual voiding pattern and character of urine: \_\_\_\_\_  
Difficulty voiding: \_\_\_\_\_ Urgency: \_\_\_\_\_  
Frequency: \_\_\_\_\_ Retention: \_\_\_\_\_  
Bladder spasms: \_\_\_\_\_ Pain/burning: \_\_\_\_\_  
Urinary incontinence (type/time of day usually occurs): \_\_\_\_\_  
History of kidney/bladder disease: \_\_\_\_\_  
Diuretic use: \_\_\_\_\_ Other medications: \_\_\_\_\_  
Herbals: \_\_\_\_\_

## Food/Fluid

### Subjective (Reports)

Usual diet (type): \_\_\_\_\_  
Calorie, carbohydrate, protein, fat intake (g/day): \_\_\_\_\_  
# of meals daily: \_\_\_\_\_ Snacks (number/time consumed): \_\_\_\_\_  
Dietary pattern/content:  
B: \_\_\_\_\_  
L: \_\_\_\_\_  
D: \_\_\_\_\_  
Snacks: \_\_\_\_\_  
Last meal consumed/content: \_\_\_\_\_  
Food preferences: \_\_\_\_\_  
Food allergies/intolerances: \_\_\_\_\_  
Cultural or religious food preparation concerns/prohibitions: \_\_\_\_\_  
Usual appetite: \_\_\_\_\_ Change in appetite: \_\_\_\_\_  
Usual weight: \_\_\_\_\_  
Unexpected/undesired weight loss or gain: \_\_\_\_\_  
Nausea/vomiting: \_\_\_\_\_ (related to): \_\_\_\_\_  
Heartburn/indigestion: \_\_\_\_\_ (related to): \_\_\_\_\_ (relieved by): \_\_\_\_\_  
Chewing/swallowing problems: \_\_\_\_\_  
Gag/swallow reflex present: \_\_\_\_\_

### Objective (Exhibits)

Emotional status (check those that apply):  
Calm: \_\_\_\_\_ Anxious: \_\_\_\_\_  
Angry: \_\_\_\_\_ Withdrawn: \_\_\_\_\_  
Fearful: \_\_\_\_\_ Irritable: \_\_\_\_\_  
Restive: \_\_\_\_\_ Euphoric: \_\_\_\_\_  
Observed body language: \_\_\_\_\_  
Observed physiological responses (e.g., palpitations, crying, change in voice quality/volume): \_\_\_\_\_  
Changes in energy field:  
Temperature: \_\_\_\_\_  
Color: \_\_\_\_\_  
Distribution: \_\_\_\_\_  
Movement: \_\_\_\_\_  
Sounds: \_\_\_\_\_

### Objective (Exhibits)

Abdomen (auscultation): Bowel sounds (location/type): \_\_\_\_\_  
Abdomen (palpation): Soft/firm: \_\_\_\_\_  
Tenderness/pain (quadrant location): \_\_\_\_\_  
Distention: \_\_\_\_\_ Palpable mass/location: \_\_\_\_\_  
Size/girth: \_\_\_\_\_ CVA tenderness: \_\_\_\_\_  
Bladder palpable: \_\_\_\_\_ Overflow voiding: \_\_\_\_\_  
Residual urine per scan: \_\_\_\_\_  
Rectal sphincter tone (describe): \_\_\_\_\_  
Hemorrhoids/fistula: \_\_\_\_\_ Stool in rectum: \_\_\_\_\_  
Impaction: \_\_\_\_\_ Occult blood (+ or -): \_\_\_\_\_  
Presence/use of catheter or continence devices: \_\_\_\_\_  
Ostomy appliances (describe appliance and location): \_\_\_\_\_

### Objective (Exhibits)

Current weight: \_\_\_\_\_ Height: \_\_\_\_\_  
Body build: \_\_\_\_\_ Body fat %: \_\_\_\_\_  
Skin turgor (e.g., firm, supple, dehydrated): \_\_\_\_\_  
Mucous membranes (moist/dry): \_\_\_\_\_  
Edema: Generalized: \_\_\_\_\_  
Dependent: \_\_\_\_\_  
Feet/ankles: \_\_\_\_\_  
Periorbital: \_\_\_\_\_  
Abdominal/ascites: \_\_\_\_\_  
Jugular vein distention: \_\_\_\_\_  
Breath sounds (auscultate)/location: \_\_\_\_\_  
Faint/distant: \_\_\_\_\_ Crackles: \_\_\_\_\_ Wheezes: \_\_\_\_\_  
Condition of teeth/gums: \_\_\_\_\_ Appearance of tongue: \_\_\_\_\_  
Mucous membranes: \_\_\_\_\_  
Abdomen: Bowel sounds (quadrant location/type): \_\_\_\_\_  
Hernia/masses: \_\_\_\_\_  
Urine S/A or Chemstix: \_\_\_\_\_  
Blood glucose (Glucometer): \_\_\_\_\_

## Food/Fluid (continued)

### Subjective (Reports)

Facial injury/surgery: \_\_\_\_\_  
 Stroke/other neurological deficit: \_\_\_\_\_  
 Teeth: Normal: \_\_\_\_\_ Dentures (full/partial): \_\_\_\_\_  
 Loose/absent teeth/poor dental care: \_\_\_\_\_  
 Sore mouth/gums: \_\_\_\_\_  
 Dental hygiene practices: \_\_\_\_\_  
 Professional dental care/frequency: \_\_\_\_\_  
 Diabetes/type: \_\_\_\_\_ Controlled with diet/pills/insulin: \_\_\_\_\_  
 Vitamin/food supplements: \_\_\_\_\_  
 Medications/herbals: \_\_\_\_\_

## Hygiene

### Subjective (Reports)

Ability to carry out activities of daily living: \_\_\_\_\_  
 Independent/dependent (level 1 = no assistance needed to level 4 = completely dependent): \_\_\_\_\_  
 Mobility: \_\_\_\_\_ Assistance needed (describe): \_\_\_\_\_  
 Assistance provided by: \_\_\_\_\_  
 Equipment/prosthetic devices required: \_\_\_\_\_  
 Feeding: \_\_\_\_\_ Help with food preparation: \_\_\_\_\_  
 Help with eating utensils: \_\_\_\_\_  
 Hygiene: \_\_\_\_\_ Get supplies: \_\_\_\_\_ Wash body/body parts: \_\_\_\_\_  
 Regulate bath water temperature: \_\_\_\_\_ Get in/out alone: \_\_\_\_\_  
 Preferred time of personal care/bath: \_\_\_\_\_  
 Dressing: \_\_\_\_\_ Can select clothing: \_\_\_\_\_ Can dress self: \_\_\_\_\_  
 Needs assistance with (describe): \_\_\_\_\_  
 Toileting: \_\_\_\_\_ Can get to toilet/commode alone: \_\_\_\_\_  
 Needs assistance with (describe): \_\_\_\_\_

### Objective (Exhibits)

General appearance: Manner of dress: \_\_\_\_\_  
 Grooming/personal habits: \_\_\_\_\_  
 Condition of hair/scalp: \_\_\_\_\_  
 Body odor: \_\_\_\_\_  
 Presence of vermin (e.g., lice, scabies): \_\_\_\_\_

## Neurosensory

### Subjective (Reports)

History of brain injury, trauma, stroke (residual effects): \_\_\_\_\_  
 Fainting spells/dizziness: \_\_\_\_\_  
 Headaches (location/type/frequency): \_\_\_\_\_  
 Tingling/numbness/weakness (location): \_\_\_\_\_  
 Seizures: \_\_\_\_\_ History or new onset: \_\_\_\_\_  
 Type (e.g., tonic-clonic, partial): \_\_\_\_\_ Frequency: \_\_\_\_\_  
 Aura: \_\_\_\_\_ Postictal state: \_\_\_\_\_ How controlled: \_\_\_\_\_  
 Vision: Loss/changes in vision: \_\_\_\_\_ Date last exam: \_\_\_\_\_  
 Glaucoma: \_\_\_\_\_ Cataract: \_\_\_\_\_ Eye surgery (type/date): \_\_\_\_\_  
 Hearing loss: \_\_\_\_\_ Sudden or gradual: \_\_\_\_\_  
 Date last exam: \_\_\_\_\_  
 Sense of smell (changes): \_\_\_\_\_  
 Sense of taste (changes): \_\_\_\_\_  
 Other: \_\_\_\_\_

### Objective (Exhibits)

Mental status (note duration of change):  
 Oriented/disoriented: Person: \_\_\_\_\_ Place: \_\_\_\_\_  
 Time: \_\_\_\_\_ Situation: \_\_\_\_\_  
 Check all that apply: Alert: \_\_\_\_\_ Drowsy: \_\_\_\_\_ Lethargic: \_\_\_\_\_  
 Stupor: \_\_\_\_\_ Comatose: \_\_\_\_\_ Cooperative: \_\_\_\_\_ Agitated/restless: \_\_\_\_\_  
 Combative: \_\_\_\_\_ Follows commands: \_\_\_\_\_  
 Delusions (describe): \_\_\_\_\_ Hallucinations (describe): \_\_\_\_\_  
 Affect (describe): \_\_\_\_\_ Speech Pattern: \_\_\_\_\_  
 Memory: Recent: \_\_\_\_\_ Remote: \_\_\_\_\_  
 Pupil shape: \_\_\_\_\_ Size/reaction: R/L: \_\_\_\_\_  
 Facial droop: \_\_\_\_\_ Swallowing: \_\_\_\_\_  
 Hand grasp/release: R: \_\_\_\_\_ L: \_\_\_\_\_  
 Coordination: \_\_\_\_\_ Balance: \_\_\_\_\_ Walking: \_\_\_\_\_  
 Deep tendon reflexes (present/absent/location): \_\_\_\_\_  
 Tremors: \_\_\_\_\_ Paralysis (R/L): \_\_\_\_\_ Posturing: \_\_\_\_\_  
 Wears glasses: \_\_\_\_\_ Contacts: \_\_\_\_\_ Hearing aids: \_\_\_\_\_

## Pain/Discomfort

### Subjective (Reports)

Primary focus: \_\_\_\_\_ Location: \_\_\_\_\_  
 Intensity (use pain scale or pictures): \_\_\_\_\_  
 Quality (e.g., stabbing, aching, burning): \_\_\_\_\_  
 Radiation: \_\_\_\_\_ Duration: \_\_\_\_\_ Frequency: \_\_\_\_\_  
 Precipitating factors: \_\_\_\_\_  
 Relieving factors (including nonpharmaceuticals/therapies): \_\_\_\_\_  
 Associated symptoms (e.g., nausea, sleep problems): \_\_\_\_\_  
 Effect on daily activities: \_\_\_\_\_  
 Relationships: \_\_\_\_\_  
 Enjoyment of life: \_\_\_\_\_  
 Additional pain focus (describe): \_\_\_\_\_  
 Medications: \_\_\_\_\_ Herbals: \_\_\_\_\_

### Objective (Exhibits)

Facial grimacing: \_\_\_\_\_ Guarding affected area: \_\_\_\_\_  
 Expressive behavior (e.g., crying, withdrawal, anger): \_\_\_\_\_  
 Narrowed focus: \_\_\_\_\_  
 Vital sign changes (acute pain):  
 BP: \_\_\_\_\_  
 Pulse: \_\_\_\_\_  
 Respirations: \_\_\_\_\_  
 Photosensitivity: \_\_\_\_\_  
 Effect on lifestyle/employment: \_\_\_\_\_

## Respiration

### Subjective (Reports)

Dyspnea/related to: \_\_\_\_\_  
Precipitating factors: \_\_\_\_\_ Relieving factors: \_\_\_\_\_  
Airway clearance (e.g., spontaneous/device): \_\_\_\_\_  
Cough (e.g., hard, persistent, croupy): \_\_\_\_\_  
    Produces sputum (describe color/character): \_\_\_\_\_  
    Requires suctioning: \_\_\_\_\_  
History of (year): Bronchitis: \_\_\_\_\_ Asthma: \_\_\_\_\_  
    Emphysema: \_\_\_\_\_ Tuberculosis: \_\_\_\_\_  
    Recurrent pneumonia: \_\_\_\_\_  
Exposure to noxious fumes/allergens, infectious agents/diseases, poisons/pesticides: \_\_\_\_\_  
Smoker: \_\_\_\_ packs/day: \_\_\_\_\_ # pack-years: \_\_\_\_\_  
Cigars: \_\_\_\_ Smokeless tobacco: \_\_\_\_\_ Vapes: \_\_\_\_\_  
Use of respiratory aids: \_\_\_\_ Oxygen (type/frequency): \_\_\_\_\_  
Medications/herbals: \_\_\_\_\_

### Objective (Exhibits)

Respirations (spontaneous/assisted): \_\_\_\_\_ Rate: \_\_\_\_\_  
    Depth: \_\_\_\_\_ Chest excursion (e.g., equal/unequal): \_\_\_\_\_  
    Use of accessory muscles: \_\_\_\_\_  
    Nasal flaring: \_\_\_\_\_ Fremitus: \_\_\_\_\_  
Breath sounds (presence/absence; crackle, wheezes): \_\_\_\_\_  
    Egophony: \_\_\_\_\_  
Skin/mucous membrane color (e.g., pale, cyanotic): \_\_\_\_\_  
Clubbing of fingers: \_\_\_\_\_  
Sputum characteristics: \_\_\_\_\_  
Mentation (e.g., calm, anxious, restless): \_\_\_\_\_  
Pulse oximetry: \_\_\_\_\_

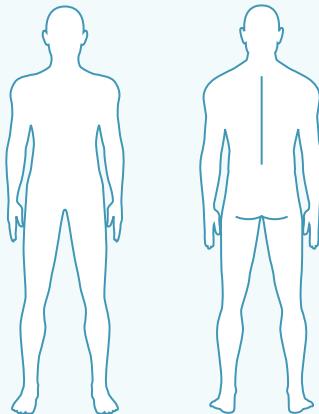
## Safety

### Subjective (Reports)

Allergies/sensitivity (medications, foods, environment, latex, iodine): \_\_\_\_\_  
Type of reaction: \_\_\_\_\_  
Blood transfusion/number: \_\_\_\_ Date: \_\_\_\_\_  
Reaction (describe): \_\_\_\_\_  
Exposure to infectious diseases (e.g., measles, influenza, pink eye): \_\_\_\_\_  
Exposure to pollution, toxins, poisons/pesticides, radiation:  
    (describe reactions): \_\_\_\_\_  
Geographic areas lived in/recent travel: \_\_\_\_\_  
Immunization history: Tetanus: \_\_\_\_ MMR: \_\_\_\_ Polio: \_\_\_\_  
    Influenza: \_\_\_\_ Pneumonia: \_\_\_\_ Hepatitis: \_\_\_\_ HPV: \_\_\_\_  
Altered/suppressed immune system (infection cause): \_\_\_\_\_  
History of sexually transmitted disease (date/type): \_\_\_\_\_  
    Testing: \_\_\_\_\_  
High-risk behaviors: \_\_\_\_\_  
Uses seat belt regularly: \_\_\_\_\_ Helmets: \_\_\_\_\_  
    Other safety devices: \_\_\_\_\_  
Workplace safety/health issues (describe): \_\_\_\_\_  
    Currently working: \_\_\_\_\_  
    Rate working conditions (e.g., safety, noise, heating, water, ventilation): \_\_\_\_\_  
History of accidental injuries: \_\_\_\_\_  
Fractures/dislocations: \_\_\_\_\_  
Arthritis/unstable joints: \_\_\_\_\_ Back problems: \_\_\_\_\_  
Skin problems (e.g., rashes, lesions, moles, breast lumps, enlarged nodes) (describe): \_\_\_\_\_  
Delayed healing (describe): \_\_\_\_\_  
Cognitive limitations (e.g., disoriented, confusion): \_\_\_\_\_  
Sensory limitations (e.g., impaired vision/hearing, detecting heat/cold, taste, smell, touch): \_\_\_\_\_  
Prostheses: \_\_\_\_\_ Ambulatory devices: \_\_\_\_\_  
Violence (episodes or tendencies): \_\_\_\_\_

### Objective (Exhibits)

Body temperature/method: (e.g., oral, temporal, tympanic): \_\_\_\_\_  
Skin integrity (mark location on diagram): Scars: \_\_\_\_\_  
    Bruises: \_\_\_\_\_ Rashes: \_\_\_\_\_ Abrasions: \_\_\_\_\_  
    Lacerations: \_\_\_\_\_ Ulcerations: \_\_\_\_\_ Blisters: \_\_\_\_\_  
    Drainage: \_\_\_\_\_ Burns [degree/%]: \_\_\_\_\_



Musculoskeletal: General strength: \_\_\_\_\_ Muscle tone: \_\_\_\_\_  
Gait: \_\_\_\_\_ ROM: \_\_\_\_\_ Paresthesia/paralysis: \_\_\_\_\_  
Results of testing (e.g., cultures, immune function, TB, hepatitis): \_\_\_\_\_

## Sexuality [Component of Social Interaction]

### Subjective (Reports)

Sexually active: \_\_\_\_\_ Monogamous: \_\_\_\_\_  
    Birth control method: \_\_\_\_\_ Use of condoms: \_\_\_\_\_  
Sexual concerns/difficulties (e.g., pain, relationship, role performance): \_\_\_\_\_  
Recent change in frequency/interest: \_\_\_\_\_

### Male: Subjective (Reports)

Penis: Circumcised: \_\_\_\_ Vasectomy (date): \_\_\_\_\_  
Prostate disorder: \_\_\_\_\_  
Practices self-exam: Breast: \_\_\_\_\_ Testicles: \_\_\_\_\_  
Last proctoscopic/prostate exam: \_\_\_\_\_ Last PSA/date: \_\_\_\_\_  
Medications/herbals: \_\_\_\_\_

### Objective (Exhibits)

Comfort level with subject matter: \_\_\_\_\_

### Objective (Exhibits)

Genitalia: Penis: Circumcised: \_\_\_\_\_ Warts/lesions: \_\_\_\_\_  
    Bleeding/discharge: \_\_\_\_\_ Testicles (e.g., lumps): \_\_\_\_\_  
    Breast examination: \_\_\_\_\_  
Test results: PSA: \_\_\_\_\_ STI: \_\_\_\_\_

## Sexuality [Component of Social Interaction] (continued)

### Female: Subjective (Reports)

Menstruation: Age at menarche: \_\_\_\_\_ Length of cycle: \_\_\_\_\_  
Duration: \_\_\_\_\_ Number of pads/tampons used/day: \_\_\_\_\_  
Last menstrual period: \_\_\_\_\_  
Bleeding between periods: \_\_\_\_\_  
Reproductive: Infertility concerns: \_\_\_\_\_  
Type of therapy: \_\_\_\_\_ Pregnant now: \_\_\_\_\_  
Para: \_\_\_\_\_ Gravida: \_\_\_\_\_ Due date: \_\_\_\_\_  
Menopause: \_\_\_\_\_ Last period: \_\_\_\_\_  
Hysterectomy (type/date): \_\_\_\_\_  
Problem with: Hot flashes: \_\_\_\_\_ Night sweats: \_\_\_\_\_  
Vaginal lubrication: \_\_\_\_\_ Vaginal discharge: \_\_\_\_\_  
Hormonal therapies: \_\_\_\_\_  
Osteoporosis medications: \_\_\_\_\_  
Breasts: Practices breast self-exam: \_\_\_\_\_  
Last mammogram: \_\_\_\_\_ Biopsy/surgery: \_\_\_\_\_  
Last PAP smear: \_\_\_\_\_

### Objective (Exhibits)

Breast examination: \_\_\_\_\_  
Genitalia: Warts/lesions: \_\_\_\_\_  
Vaginal bleeding/discharge: \_\_\_\_\_  
Test results: PAP smear: \_\_\_\_\_  
Mammogram: \_\_\_\_\_  
STI: \_\_\_\_\_

## Social Interactions

### Subjective (Reports)

Relationship status (check): Single: \_\_\_\_\_ Married: \_\_\_\_\_  
Living with partner: \_\_\_\_\_ Divorced: \_\_\_\_\_ Widowed: \_\_\_\_\_  
Years in relationship: \_\_\_\_\_ Perception of relationship: \_\_\_\_\_  
Concerns/stresses: \_\_\_\_\_  
Role within family structure: \_\_\_\_\_  
Number/age of children: \_\_\_\_\_  
Perception of relationship with family members: \_\_\_\_\_  
Extended family/availability: \_\_\_\_\_  
Other support person(s): \_\_\_\_\_  
Individuals living in home: \_\_\_\_\_  
Caregiver (to whom/how long): \_\_\_\_\_  
Ethnic/cultural affiliations: \_\_\_\_\_  
Strength of ethnic identity: \_\_\_\_\_  
Lives in ethnic community: \_\_\_\_\_  
Feelings of (describe): Mistrust: \_\_\_\_\_ Rejection: \_\_\_\_\_  
Unhappiness: \_\_\_\_\_ Loneliness/isolation: \_\_\_\_\_  
Problems related to illness/condition: \_\_\_\_\_  
Difficulties with communication (e.g., speech, another language, brain injury): \_\_\_\_\_  
Use of speech/communication aids (list): \_\_\_\_\_  
Interpreter needed: \_\_\_\_\_ Primary language: \_\_\_\_\_  
Genogram: Diagram on separate page

### Objective (Exhibits)

Communication/speech: Clear: \_\_\_\_\_  
Slurred: \_\_\_\_\_  
Unintelligible: \_\_\_\_\_  
Aphasic: \_\_\_\_\_  
Unusual speech pattern/impairment: \_\_\_\_\_  
Laryngectomy present: \_\_\_\_\_  
Verbal/nonverbal communication with family/SO(s): \_\_\_\_\_  
Family interaction (behavioral) pattern: \_\_\_\_\_

## Teaching/Learning

### Subjective (Reports)

Communication: Dominant language (specify): \_\_\_\_\_  
Second language: \_\_\_\_\_ Literate (reading/writing): \_\_\_\_\_  
Education level: \_\_\_\_\_  
Learning challenges (specify): \_\_\_\_\_  
Cognitive limitations: \_\_\_\_\_  
Culture/ethnicity: Where born: \_\_\_\_\_  
If immigrant, how long in this country: \_\_\_\_\_  
Health and illness beliefs/practices/customs: \_\_\_\_\_  
Which family member makes healthcare decisions/is spokesperson for client: \_\_\_\_\_  
Presence of advance directives: \_\_\_\_\_ Code status: \_\_\_\_\_  
Durable medical power of attorney: \_\_\_\_\_  
Designee: \_\_\_\_\_  
Health goals: \_\_\_\_\_  
Current health problem: \_\_\_\_\_  
Client understanding of problem: \_\_\_\_\_  
Special healthcare concerns (e.g., impact of religious/cultural practices): \_\_\_\_\_  
Healthcare decisions: \_\_\_\_\_  
Family involvement: \_\_\_\_\_

### Familial risk factors (indicate relationship):

Diabetes: \_\_\_\_\_ Thyroid (specify): \_\_\_\_\_  
Tuberculosis: \_\_\_\_\_ Heart disease: \_\_\_\_\_ Stroke: \_\_\_\_\_  
Hypertension: \_\_\_\_\_ Epilepsy/seizures: \_\_\_\_\_  
Kidney disease: \_\_\_\_\_ Cancer: \_\_\_\_\_  
Mental illness/depression: \_\_\_\_\_ Other: \_\_\_\_\_  
Prescribed medications: Drug: \_\_\_\_\_ Dose: \_\_\_\_\_  
Times (circle last dose): \_\_\_\_\_ Take regularly: \_\_\_\_\_  
Purpose: \_\_\_\_\_ Side effects/problems: \_\_\_\_\_  
Nonprescription drugs/frequency: OTC drugs: \_\_\_\_\_  
Vitamins: \_\_\_\_\_ Herbals: \_\_\_\_\_  
Street drugs: \_\_\_\_\_ Alcohol (amount/frequency): \_\_\_\_\_  
Tobacco: \_\_\_\_\_ Smokeless: \_\_\_\_\_ Vapes: \_\_\_\_\_  
Admitting diagnosis per provider: \_\_\_\_\_  
Reason for hospitalization/visit per client: \_\_\_\_\_  
History of current concern: \_\_\_\_\_

## Teaching/Learning (continued)

### Subjective (Reports)

Expectations of this hospitalization/visit: \_\_\_\_\_

Will admission cause any lifestyle changes (describe): \_\_\_\_\_

Previous illnesses and/or hospitalizations/surgeries: \_\_\_\_\_

Evidence of failure to improve: \_\_\_\_\_

Last complete physical exam: \_\_\_\_\_

### Discharge Plan Considerations

Projected length of stay (days or hours): \_\_\_\_\_

Anticipated date of discharge: \_\_\_\_\_

Date information obtained: \_\_\_\_\_

Resources available: Persons: \_\_\_\_\_

    Financial: \_\_\_\_\_

    Groups: \_\_\_\_\_

Community supports: \_\_\_\_\_

Areas that may require alteration/assistance: \_\_\_\_\_

    Food preparation: \_\_\_\_ Shopping: \_\_\_\_ Transportation: \_\_\_\_

    Ambulation: \_\_\_\_ Medication/IV therapy: \_\_\_\_

    Treatments: \_\_\_\_\_ Wound care: \_\_\_\_\_

    Supplies: \_\_\_\_\_ Durable medical equip: \_\_\_\_\_

    Self-care (specify): \_\_\_\_\_

    Homemaker/maintenance (specify): \_\_\_\_ Socialization: \_\_\_\_

    Physical layout of home (specify): \_\_\_\_\_

Anticipated changes in living situation after discharge: \_\_\_\_\_

    Living facility other than home (specify): \_\_\_\_\_

Referrals (date/source/services): Social Services: \_\_\_\_\_

    Rehab services: \_\_\_\_ Dietary: \_\_\_\_ Home care: \_\_\_\_\_

    Resp/O<sub>2</sub>: \_\_\_\_ Equipment: \_\_\_\_\_

    Supplies: \_\_\_\_\_ Other: \_\_\_\_\_

    Hospice: \_\_\_\_\_

 **Figure 1.2** Adult medical-surgical assessment tool. This is a suggested guide and tool for creating a database reflecting a nursing focus. Although the diagnostic divisions are alphabetized here for ease of presentation, they can be prioritized or rearranged in any manner to meet individual needs. In addition, this assessment tool can be adapted to meet the needs of specific client populations.

### Box 1.1 Nursing Diagnoses Organized According to Diagnostic Divisions

After data are collected and areas of concern or need identified, the nurse is directed to the Diagnostic Divisions to review the list of nursing diagnoses that fall within the individual categories. This will assist the nurse in choosing the specific diagnostic label to accurately describe the data. Then, with the addition of etiology or related/risk factors, as well as signs and symptoms or cues (defining characteristics), the client diagnostic statement emerges.

**Activity/Rest**—ability to engage in necessary or desired activities of life (work and leisure) and to obtain adequate sleep and rest

- Activity Intolerance
- Activity Intolerance, risk for
- Disuse Syndrome, risk for
- Diversional Activity Engagement, deficient
- Fatigue
- Insomnia
- Lifestyle, sedentary
- Mobility, impaired wheelchair
- Sleep, readiness for enhanced
- Sleep deprivation
- Sleep Pattern, disturbed
- Transfer Ability, impaired
- Walking, impaired

**Circulation**—ability to transport oxygen and nutrients necessary to meet cellular needs

- Adaptive Capacity, decreased intracranial
- Autonomic Dysreflexia

- Autonomic Dysreflexia, risk for
- Bleeding, risk for
- Blood Pressure, risk for unstable
- Cardiac Output, decreased and risk for
- Metabolic Imbalance Syndrome, risk for
- Shock, risk for
- Thromboembolism, risk for venous
- Tissue Perfusion, ineffective peripheral
- Tissue Perfusion, risk for decreased cardiac
- Tissue Perfusion, risk for ineffective cerebral
- Tissue Perfusion, risk for ineffective peripheral

**Ego Integrity**—ability to develop and use skills and behaviors to integrate and manage life experiences

- Activity Planning, ineffective
- Activity Planning, risk for ineffective
- Anxiety [mild, moderate, severe panic level]
- Body Image, disturbed
- Coping, defensive
- Coping, ineffective
- Coping, readiness for enhanced
- Death Anxiety
- Decision-Making, readiness for enhanced
- Decisional Conflict
- Denial, ineffective
- Emancipated Decision-Making, readiness for enhanced
- Emancipated Decision-Making, impaired
- Emancipated Decision-Making, risk for impaired
- Emotional Control, labile

**Box 1.1** Nursing Diagnoses Organized According to Diagnostic Divisions (continued)

- Energy Field, disturbed
  - Fear
  - Grieving
  - Grieving, complicated
  - Grieving, risk for complicated
  - Health Behavior, risk-prone
  - Hope, readiness for enhanced
  - Hopelessness
  - Human Dignity, risk for compromised
  - Impulse Control, ineffective
  - Mood Regulation, impaired
  - Moral Distress
  - Personal Identity, disturbed
  - Personal Identity, risk for disturbed
  - Post-Trauma Syndrome
  - Post-Trauma Syndrome, risk for
  - Power, readiness for enhanced
  - Powerlessness
  - Powerlessness, risk for
  - Rape-Trauma Syndrome
  - Relationship, ineffective
  - Relationship, readiness for enhanced
  - Relationship, risk for ineffective
  - Religiosity, impaired
  - Religiosity, readiness for enhanced
  - Religiosity, risk for impaired
  - Relocation Stress Syndrome
  - Relocation Stress Syndrome, risk for
  - Resilience, impaired
  - Resilience, readiness for enhanced
  - Resilience, risk for impaired
  - Self-Concept, readiness for enhanced
  - Self-Esteem, chronic low
  - Self-Esteem, risk for chronic low
  - Self-Esteem, risk for situational low
  - Self-Esteem, situational low
  - Sorrow, chronic
  - Spiritual Distress
  - Spiritual Distress, risk for
  - Spiritual Well-Being, readiness for enhanced
- Elimination**—ability to excrete waste products
- Constipation
  - Constipation, chronic functional
  - Constipation, perceived
  - Constipation, risk for
  - Constipation, risk for chronic functional
  - Diarrhea
  - Elimination, impaired urinary
  - Gastrointestinal Motility, dysfunctional
  - Gastrointestinal Motility, risk for dysfunctional
  - Incontinence, bowel
  - Incontinence, functional urinary
  - Incontinence, overflow urinary
  - Incontinence, reflex urinary
  - Incontinence, risk for urge urinary
  - Incontinence, stress urinary
  - Incontinence, urge urinary
  - Retention, [acute/chronic] urinary
- Food/Fluid**—ability to maintain intake of and utilize nutrients and liquids to meet physiological needs
- Blood Glucose Level, risk for unstable
  - Breast Milk Production, insufficient
  - Breastfeeding, ineffective
  - Breastfeeding, interrupted
  - Breastfeeding, readiness for enhanced
  - Dentition, impaired
  - Eating Dynamics, ineffective adolescent
  - Eating Dynamics, ineffective child
  - Eating Dynamics, ineffective infant
  - Electrolyte Imbalance, risk for
  - Failure to Thrive, adult
  - Feeding Pattern, ineffective infant
  - [Fluid Volume, deficient hypertonic or hypotonic]
  - Fluid Volume, deficient [isotonic]
  - Fluid Volume excess
  - Fluid Volume, risk for deficient
  - Fluid Volume, risk for imbalanced
  - Liver Function, risk for impaired
  - Mucous Membrane Integrity, impaired oral
  - Nausea
  - Nutrition: less than body requirements, imbalanced
  - Nutrition, readiness for enhanced
  - Obesity
  - Overweight
  - Overweight, risk for
  - Swallowing, impaired
- Hygiene**—ability to perform activities of daily living
- Self-Care, readiness for enhanced
  - Self-Care deficit: bathing
  - Self-Care deficit: dressing
  - Self-Care deficit: feeding
  - Self-Care deficit: toileting
  - Self-Neglect
- Neurosensory**—ability to perceive, integrate, and respond to internal and external cues
- Behavior, disorganized infant
  - Behavior, risk for disorganized infant
  - Behavior, readiness for enhanced organized infant
  - Confusion, acute
  - Confusion, risk for acute
  - Confusion, chronic
  - Memory, impaired
  - Neurovascular Dysfunction, risk for peripheral
  - [Sensory Perception, disturbed (specify: visual, auditory, kinesthetic, gustatory, tactile, olfactory)]
  - Stress Overload
  - Unilateral Neglect
- Pain/Discomfort**—ability to control internal/external environment to maintain comfort
- Chronic Pain Syndrome
  - Comfort, impaired
  - Comfort, readiness for enhanced
  - Pain, acute

(continues on page 10)

**Box 1.1** Nursing Diagnoses Organized According to Diagnostic Divisions (continued)

<ul style="list-style-type: none"><li>• Pain, chronic</li><li>• Pain, labor</li></ul>	<ul style="list-style-type: none"><li>• Thermal Injury, risk for</li><li>• Thermoregulation, ineffective</li><li>• Thermoregulation, risk for ineffective</li><li>• Tissue Integrity, impaired</li><li>• Tissue Integrity, risk for impaired</li><li>• Trauma, risk for physical</li><li>• Trauma, risk for vascular</li><li>• Violence, risk for other-directed</li><li>• Violence, risk for self-directed</li><li>• Wandering [specify sporadic or continual]</li></ul>
<b>Respiration</b> —ability to provide and use oxygen to meet physiological needs	<b>Sexuality</b> [component of ego integrity and social interaction]—ability to meet requirements/characteristics of male or female role
<ul style="list-style-type: none"><li>• Airway Clearance, ineffective</li><li>• Aspiration, risk for</li><li>• Breathing Pattern, ineffective</li><li>• Gas Exchange, impaired</li><li>• Ventilation, impaired spontaneous</li><li>• Ventilatory Weaning Response, dysfunctional</li></ul>	<ul style="list-style-type: none"><li>• Childbearing Process, ineffective</li><li>• Childbearing Process, readiness for enhanced</li><li>• Childbearing Process, risk for ineffective</li><li>• Female Genital Mutilation, risk for</li><li>• Sexual Dysfunction</li><li>• Sexuality Pattern, ineffective</li></ul>
<b>Safety</b> —ability to provide safe, growth-promoting environment	<b>Social Interaction</b> —ability to establish and maintain relationships
<ul style="list-style-type: none"><li>• Acute Substance Withdrawal Syndrome</li><li>• Acute Substance Withdrawal Syndrome, risk for</li><li>• Adverse Reaction to Iodinated Contrast Media, risk for</li><li>• Allergy Reaction, risk for</li><li>• Contamination</li><li>• Contamination, risk for</li><li>• Dry Eye, risk for</li><li>• Dry Mouth, risk for</li><li>• Falls, risk for</li><li>• Frail Elderly Syndrome</li><li>• Health Maintenance, ineffective</li><li>• Home Maintenance, impaired</li><li>• Hyperthermia</li><li>• Hyperbilirubinemia, neonatal</li><li>• Hyperbilirubinemia, risk for neonatal</li><li>• Hypothermia</li><li>• Hypothermia, risk for perioperative</li><li>• Infection, risk for</li><li>• Injury, risk for</li><li>• Injury, risk for corneal</li><li>• Injury, risk for urinary tract</li><li>• Latex Allergy Reaction</li><li>• Latex Allergy Reaction, risk for</li><li>• Maternal-Fetal Dyad, risk for disturbed</li><li>• Mobility, impaired bed</li><li>• Mobility, impaired physical</li><li>• Neonatal Abstinence Syndrome</li><li>• Occupational Injury, risk for</li><li>• Perioperative Positioning Injury, risk for</li><li>• Poisoning, risk for</li><li>• Pressure Ulcer, risk for</li><li>• Protection, ineffective</li><li>• Self-Mutilation</li><li>• Self-Mutilation, risk for</li><li>• Sitting, impaired</li><li>• Skin Integrity, impaired</li><li>• Skin Integrity, risk for impaired</li><li>• Standing, impaired</li><li>• Sudden infant Death, risk for</li><li>• Suffocation, risk for</li><li>• Suicide, risk for</li><li>• Surgical Recovery, delayed</li><li>• Surgical Recovery, risk for delayed</li><li>• Surgical Site Infection, risk for</li></ul>	<ul style="list-style-type: none"><li>• Attachment, risk for impaired</li><li>• Communication, impaired verbal</li><li>• Communication, readiness for enhanced</li><li>• Coping, compromised family</li><li>• Coping, disabled family</li><li>• Coping, ineffective community</li><li>• Coping, readiness for enhanced community</li><li>• Coping, readiness for enhanced family</li><li>• Family Processes, dysfunctional</li><li>• Family Processes, interrupted</li><li>• Family Processes, readiness for enhanced</li><li>• Immigration Transition, risk for complicated</li><li>• Loneliness, risk for</li><li>• Parenting, impaired</li><li>• Parenting, readiness for enhanced</li><li>• Parenting, risk for impaired</li><li>• Role Conflict, parental</li><li>• Role Performance, ineffective</li><li>• Role Strain, caregiver</li><li>• Role Strain, risk for caregiver</li><li>• Social Interaction, impaired</li><li>• Social Isolation</li></ul>
	<b>Teaching/Learning</b> —ability to incorporate and use information to achieve healthy lifestyle and optimal wellness
	<ul style="list-style-type: none"><li>• Development, risk for delayed</li><li>• Health, deficient community</li><li>• Health Literacy, readiness for enhanced</li><li>• Health Maintenance, ineffective</li><li>• Health Management, ineffective</li><li>• Health Management, ineffective family</li><li>• Knowledge, deficient</li><li>• Knowledge, readiness for enhanced</li></ul>

## THE PLAN OF CARE

A well-developed plan of care communicates the client's status to all members of the healthcare team involved in providing care. The plan of care (1) documents the client's past and present health status and current needs, (2) identifies problems solved and those yet to be solved, (3) notes patterns of client responses to interventions, and (4) may be personalized to provide information about successful approaches to problem-solving. In legal terms, the plan of care documents nurse intervention and client response in areas of liability, accountability, and quality improvement. Finally, the plan of care provides a mechanism to help ensure continuity of care when the client leaves one healthcare setting for another while still needing services.

The client plan of care contains not only the actions initiated by medical and nursing orders but also the coordination of care provided by all related healthcare disciplines. The nurse is often the person responsible for coordinating these various activities into the comprehensive functional plan, essential in providing holistic care for the client. Although independent nursing actions are an integral part of this process, collaborative actions are also implemented based on orders from all other disciplines participating in the care of the client.

We believe that because nursing is an essential part of collaborative practice, we have responsibility and accountability in every collaborative problem in which the nurse interacts with the client. Many factors influence whether an intervention is independent or requires collaboration. These factors include the educational preparation and expertise of the nurse, facility standing protocols, delegation of tasks, and the geographic area of care provision—for example, rural or urban, acute care, or community care settings.

## DOING IT

### Step 1—Assessment (Gathering Data)

The critical element for providing effectively planned nursing care is its relevance to concerns identified in client assessments. ANA's 2010 *Nursing: Scope and Standards of Practice* determined that client assessment is indicated in the following areas and abilities: physical, emotional, sexual, psychosocial, cultural, spiritual/transpersonal, cognitive, functional, age related, economic, and environmental. Nursing assessments, combined with the results of medical findings and diagnostic studies, are documented in the client database and form the foundation for development of the client's plan of care.

Interviewing the client and significant other(s) provides data through conversation and observation. This information includes the client's perceptions, that is, what the individual perceives to be a problem or need and typically what he or she wants to share. Data may be collected during one or more contact periods and should include all relevant information.

During information gathering, the nurse also exercises perceptual and observational skills, assessing the client through the senses of sight, hearing, touch, and smell. The duration and depth of any physical assessment session de-

pends on the current condition of the client and the urgency of the situation, but it usually includes inspection, palpation, percussion, and auscultation. Additionally, the nurse needs to be aware of medically determined diagnoses, results of diagnostic tests, and significant problems that require immediate physician intervention and/or initiation of specific nursing interventions.

### Step 2—Diagnosis (Analyzing the Data)

The nursing diagnosis is only as correct as current assessment allows because it is supported by currently collected data. It documents the client's situation in real time and must be updated periodically (sometimes frequently) to reflect changes as they occur in the client's condition. The combination of accurate need identification and accurate diagnostic labeling provides the basis for selecting nursing interventions.

From the specific data recorded in the database, signs and symptoms can be identified, the related or risk factors (etiology) determined, and an individualized client diagnostic statement formulated. The nurse may use one of several formats such as a “problem, etiology, and signs and symptoms (PES)” format to accurately represent the client's situation for a **problem-focused** diagnosis. For example, the diagnostic statement may read as follows: “ineffective peripheral Tissue Perfusion related to smoking, sedentary lifestyle, evidenced by decrease in peripheral pulses, capillary refill >3 seconds, paresthesia.” For a **risk or health promotion** diagnosis that does not have related factors, the diagnostic statement might read “risk for ineffective peripheral Tissue Perfusion as evidenced by insufficient knowledge of disease process, sedentary lifestyle, smoking” or “readiness for enhanced Health Management as evidenced by expressed desire to enhance management of risk factors and choices of daily living for meeting goals.” To use a **syndrome diagnosis**, at least two or more nursing diagnoses must be present from the identified defining characteristics for the diagnosis—for example, “Chronic Pain Syndrome as evidenced by impaired physical mobility, insomnia, fatigue.”

Unlike medical diagnoses (which describe disease conditions), nursing diagnoses change as the client progresses through various stages of illness and/or maladaptation to resolution of the problem or to the conclusion of the condition. Each decision the nurse makes is time dependent, and with additional information gathered at a later time, decisions may change. For example, the initial problems and needs for a client undergoing cardiac surgery may be “acute Pain, decreased Cardiac Output, risk for ineffective Breathing Pattern, and risk for Infection.” As the client progresses, problems and needs are likely to shift to “Activity Intolerance, deficient Knowledge, and Self-Care deficit.”

### Step 3—Planning (Choosing Outcomes and Interventions)

#### Desired Client Outcomes

The nurse identifies expected outcomes for a plan of care individualized for a specific client (ANA, 2010). These desired outcomes (sometimes called goals) are identified to facilitate

choosing appropriate interventions and to serve as evaluators of both nursing care and client response. Useful desired client outcomes must have the following characteristics:

1. Be specific
2. Be realistic or achievable
3. Be measurable
4. Indicate a definite time frame for achievement or review
5. Consider the client's desires and resources

Desired client outcomes are created by listing items and behaviors that can be measured (i.e., observed, reported, or documented). They are monitored to determine whether an acceptable outcome or goal has been achieved within a specified time frame.

Action verbs describe the client's behavior to be evaluated and time frames are used, for example, "client will ambulate, using cane, within 24 hours of surgery." Time frames are dependent on the client's projected or anticipated length of stay (or period of care) and consider the presence of complications or extenuating circumstances, such as age or debilitating disease process.

When outcomes are properly written, they provide direction for planning and validating the selected nursing interventions. Consider the two following client outcomes: "Client will identify individual nutritional needs within 36 hours" and "... formulate a dietary plan based on identified nutritional needs within 72 hours." Based on the clarity of these outcomes, the nurse can select nursing interventions to ensure that the client's dietary knowledge is assessed, individual needs identified, and nutritional education presented.

Continuing the work on naming what nursing does (as discussed in opening paragraphs of this chapter), a standardized nursing language that focused on outcomes was developed—Nursing Outcomes Classification (NOC), containing more than 540 outcomes (Morehead et al, ed. 6, 2018). NOC outcomes take a more standardized approach, with an outcome label such as *Ambulation* having 16 indicators identified and measured on a five-point Likert-type scale ranging from "severely compromised" to "not compromised." NOC outcomes have been linked with NANDA nursing diagnoses, and we operationalize NOC labels to a limited extent in this textbook.

### Interventions/Actions

Once the outcomes are identified, the nurse develops a plan that prescribes strategies and alternatives to achieve the expected outcomes (ANA, 2010). Nursing strategies are interventions and actions to be carried out to assist the client in achieving the stated desired client outcomes (e.g., movement toward health and independence). The expectation is that the prescribed behavior will benefit the client and family in a predictable way related to the identified problem or need and chosen outcomes.

Nursing interventions should be specific and clearly stated, beginning with an action verb indicating what the nurse is expected to do. Qualifiers expressing how, when, where, time, frequency, and amount provide the content of

the planned activity, for example, "Assist as needed with self-care activities each morning"; "Record respiratory and pulse rates before, during, and after activity"; and "Instruct family in postdischarge care."

Continuing the work on naming what nursing does (as discussed in opening paragraphs of this chapter), another standardized nursing language—Nursing Interventions Classification (NIC)—has been linked to NANDA-I nursing diagnoses. NIC has identified more than 550 (Butcher et al, 2018) direct and indirect interventions that are stated in general terms, such as *Respiratory Monitoring*. Each label has a varied number of activities that may be chosen to accomplish the intervention. These three languages—NANDA, NOC, and NIC—have been combined in some computerized clinical decision support programs. We have used NIC labels to a limited extent in this textbook to demonstrate a more complete blending of nursing diagnoses, outcomes, and interventions and operationalize them, especially for use in electronic health records.

To assist in visualizing this critical thinking process, a prototype client situation (Fig. 1.3) is provided as an example of data collection and construction of a plan of care. In the sample situation, we can see that as the client assessment database is reviewed, the nurse can identify the related or risk factors and defining characteristics for formulating the client diagnostic statements. Nursing interventions are based on needs identified by the client and the nurse during data collection. Timelines for outcomes reflect the anticipated length of stay for the client (thus potential discharge planning needs) and individual client-nurse expectations. Although not normally included in a plan of care, rationales are included in this sample for the purpose of explaining or clarifying the choice of interventions by assisting the student and practicing nurse in associating the pathophysiology and psychological principles with the selected nursing interventions.

Another way to conceptualize the client's care needs is to create a mind map, or concept map (Fig. 1.4). This learning tool was developed to help visualize the interconnectedness between various client symptoms, interventions, or problems as they impact each other. This design brings left-brained, linear problem-solving thinking together with the freewheeling, interconnected, creative right brain. Thus, the best parts of the traditional care plan (problem-solving and categorizing) are retained, but the linear and columnar nature of the traditional care plan is expressed in a design that uses the whole brain. Joining mind mapping and care planning enables the nurse to visualize a holistic view of a client, strengthening critical thinking skills and facilitating the creative process of planning client care.

Mind mapping starts with a figure drawn in the center of the page labeled with the main concept—the client. (This helps keep in mind that the client is the focus of the plan, not the medical diagnosis or condition.) From that central thought, other major ideas that relate to the client radiate out from the center like spokes of a wheel. Different concepts can be grouped together by geometric shapes, color coding, or placement on the page. Connections and interconnections

## Client Situation: Diabetes Mellitus

Mr. R.S., a client with type 2 diabetes for 8 years, presented to his physician's office with a nonhealing ulcer of 3 weeks' duration on his left foot. Screening studies done in the physician's office revealed blood glucose (BG) of 356/fingerstick and urine Chemstix of 2%. Because of distance from medical provider and lack of local community services, he is admitted to the hospital. Review Database for clues to possible Nursing Diagnosis choices.

### Admitting Physician's Orders

Culture/sensitivity and Gram's stain of foot ulcer  
 Random blood glucose on admission and fingerstick BG qid—call for BG>250  
 CBC, electrolytes, serum lipid profile, glycosylated Hb in a.m.  
 Chest x-ray and ECG in a.m.  
 Humulin R 10 units SC on admission  
 DiaBeta 10 mg, PO bid  
 Glucophage 500 mg, PO daily to start—will increase gradually  
 Humulin N 10 units SC q a.m. Begin insulin instruction for post-discharge self-care if necessary  
 Dicloxacillin 500 mg PO q6h, start after culture obtained  
 Percocet 2.5/325 mg 1 or 2 tabs every 6 hrs PRN pain  
 Diet—2400 calories, 3 meals with 2 snacks  
 Arrange consult with dietitian  
 Up in chair ad lib with feet elevated  
 Foot cradle for bed  
 Irrigate lesion L foot with NS tid, then cover with sterile dressing  
 Vital signs qid

### Client Assessment Database

Name: R.S. Informant: Client Reliability (Scale 1–4): 3 Age: 73 DOB: 5/3/45 Race: Caucasian  
 Gender: M Adm. date: 6/28/2018 Time: 7 p.m. From: Home

#### ACTIVITY/REST

- Subjective (Reports):** Occupation: Farmer  
 Usual activities/hobbies: reading, playing cards. "Don't have time to do much."  
 Anyway, I'm too tired most of the time to do anything after the chores."  
 Limitations imposed by illness: "Have to watch what I order if I eat out."  
 Sleep: Hours: 6 to 8 hr/night Naps: No Aids: No  
 Insomnia: "Not unless I drink coffee after supper."  
 Usually feels rested when awakens at 4:30 a.m. but feeling fatigued past several weeks
- Objective (Exhibits):** Observed response to activity: limps, favors L foot when walking  
 Mental status: Alert/active  
 Neuromuscular assessment: Muscle mass/tone: Bilaterally equal/firm  
 Posture: Erect ROM: Full all extremities  
 Strength: Equal 3 extremities/(favors L foot currently)

#### CIRCULATION

- Subjective (Reports):** History of slow healing: Lesion L foot, 3 weeks' duration  
 Extremities: Numbness/tingling: "My feet feel cold and tingly like sharp pins poking the bottom of my feet when I walk the quarter mile to the mailbox."  
 Cough/character of sputum: Occ./white  
 Change in frequency/amount of urine: Yes/voiding more lately
- Objective (Exhibits):** Peripheral pulses: Radials 3+; popliteal, dorsalis, post-tibial/pedal, all 1+  
 BP: R: Lying: 146/90 Sitting: 140/86 Standing: 138/90  
 L: Lying: 142/88 Sitting: 138/88 Standing: 138/84  
 Pulse: Apical: 86 Radial: 86 Quality: Strong Rhythm: Regular  
 Chest auscultation: few wheezes clear with cough, no murmurs/rubs  
 Jugular vein distention: 0  
 Extremities: Temperature: Feet cool bilaterally/legs warm  
 Color: Skin: Legs pale Capillary refill: Slow both feet (approx. 4 seconds)  
 Homans' sign: 0 Varicosities: Few enlarged superficial veins both calves  
 Nails: Toenails thickened, yellow, brittle  
 Distribution and quality of hair: Coarse hair to midcalf, none on ankles/toes  
 Color: General: Ruddy face/arms Mucous membranes/lips: Pink  
 Nailbeds: Blanch well Conjunctiva and sclera: White

## EGO INTEGRITY

### Subjective (Reports):

Report of stress factors: "Normal farmer's problems: weather, pests, bankers, etc."  
Ways of handling stress: "I get busy with the chores and talk things over with my livestock. They listen pretty good."  
Financial concerns: No supplemental insurance; needs to hire someone to do chores while here  
Relationship status: Married  
Cultural factors: Rural/agrarian, eastern European descent, "American, no ethnic ties"  
Religion: Protestant/practicing  
Lifestyle: Middle class/self-sufficient farmer  
Recent changes: No  
Feelings: "I'm in control of most things, except the weather and this diabetes now."  
Concerned re possible therapy change "from pills to shots."

### Objective (Exhibits):

Emotional status: generally calm, appears frustrated at times  
Observed physiological response(s): occasionally sighs deeply/frowns, fidgeting with coin, shoulders tense/shrugs shoulders, throws up hands

## ELIMINATION

### Subjective (Reports):

Usual bowel pattern: almost every p.m.  
Last BM: last night Character of stool: firm/brown  
Bleeding: 0 Hemorrhoids: 0 Constipation: occ.  
Laxative used: hot prune juice on occ.  
Urinary: Voiding more frequently, up 1 or 2 times nightly  
Character of urine: pale yellow

### Objective (Exhibits):

Abdomen tender: no Soft/firm: soft Palpable mass: 0  
Bowel sounds: active all 4 quads

## FOOD/FLUID

### Subjective (Reports):

Usual diet (type): 2400 calories (occ. "cheats" with dessert; "My wife watches it pretty closely.")  
No. of meals daily: 3/1 snack  
Dietary pattern: B: Fruit juice/toast/ham/decaf coffee  
L: Meat/potatoes/veg/fruit/milk D: ½ meat sandwich/soup/fruit/decaf coffee  
Snack: Milk/crackers at HS. Usual beverage: Skim milk, 2 to 3 cups decaf coffee, drinks "lots of water—several quarts"  
Last meal/intake: Dinner: Roast beef sandwich, vegetable soup, pear with cheese, decaf coffee  
Loss of appetite: "Never, but lately I don't feel as hungry as usual."  
Nausea/vomiting: 0 Food allergies: None  
Heartburn/food intolerance: Cabbage causes gas, coffee after supper causes heartburn  
Mastication/swallowing problems: 0  
Dentures: Partial upper plate—fits well  
Usual weight: 175 lb Recent changes: Has lost about 6 lb this month  
Diuretic therapy: No

### Objective (Exhibits):

Wt: 170 lb Ht: 5 ft 10 in Build: stocky  
Skin turgor: Good/leathery  
Condition of teeth/gums: Good, no irritation/bleeding noted  
Appearance of tongue: Midline, pink  
Mucous membranes: Pink, intact, moist  
Breath sounds: Few wheezes cleared with cough  
Bowel sounds: Active all 4 quads  
Urine Chemstix: 2% Fingerstick: 356 (Dr. office) 450 random BG on adm

## HYGIENE

### Subjective (Reports):

Activities of daily living: Independent in all areas  
Preferred time of bath: p.m.

### Objective (Exhibits):

General appearance: Clean, shaven, short-cut hair; hands, rough and dry; skin on feet dry, cracked, and scaly  
Scalp and eyebrows: Scaly white patches  
No body odor

**NEUROSENSORY****Subjective (Reports):**

Headache: "Occasionally behind my eyes when I worry too much."  
 Tingling/numbness: Feet, 4 or 5 times/week (as noted)  
 Eyes: Vision loss, farsighted, "Seems a little blurry now." Examination: 2 yr ago  
 Ears: Hearing loss R: "Some" L: No (has not been tested)  
 Nose: Epistaxis: 0 Sense of smell: "No problem."

**Objective (Exhibits):**

Mental status: Alert, oriented to person, place, time, situation  
 Affect: Concerned Memory: Remote/recent: Clear and intact  
 Speech: Clear/coherent, appropriate  
 Pupil reaction: PERRLA/small  
 Glasses: Reading Hearing aid: No  
 Handgrip/release: Strong/equal

**PAIN/DISCOMFORT****Subjective (Reports):**

Primary focus: L foot Location: Medial aspect, L heel  
 Intensity (0–10): 4 to 5 Quality: Dull ache with occ. sharp stabbing sensation  
 Frequency/duration: "Seems like all the time." Radiation: No  
 Precipitating factors: Shoes, walking How relieved: ASA, not helping  
 Other concerns: Sometimes has back pain following chores/heavy lifting, relieved by ASA/liniment rubdown; knees ache—uses topical heat ointment

**Objective (Exhibits):**

Facial grimacing: When lesion border palpated  
 Guarding affected area: Pulls foot away  
 Narrowed focus: No  
 Emotional response: Tense, irritated

**RESPIRATION****Subjective (Reports):**

Dyspnea: 0 Cough: Occ. morning cough, white sputum  
 Emphysema: 0 Bronchitis: 0 Asthma: 0 Tuberculosis: 0  
 Smoker: Filters pk/day: 1/2 No. yrs: 25+  
 Use of respiratory aids: 0

**Objective (Exhibits):**

Respiratory rate: 22 unlabored Depth: Good Symmetry: Equal, bilateral  
 Auscultation: Few wheezes, clear with cough  
 Cyanosis: 0 Clubbing of fingers: 0  
 Sputum characteristics: None to observe  
 Mentation/restlessness: Alert/oriented/relaxed

**SAFETY****Subjective (Reports):**

Allergies: 0 Blood transfusions: 0  
 Sexually transmitted disease: 0  
 Risk behaviors: Wears seat belt  
 Fractures/dislocations: L clavicle, 1960s, fell getting off tractor  
 Arthritis/unstable joints: "Some in my knees."  
 Back problems: Lower back pain 2 or 3 times/month  
 Vision impaired: Requires glasses for reading  
 Hearing impaired: Slightly (R), compensates by turning "good ear" toward speaker  
 Immunizations: Current flu/pneumonia 3 yrs ago/tetanus maybe 8 yrs ago

**Objective (Exhibits):**

Temperature: 99.4°F (37.4°C) tympanic  
 Skin integrity: Impaired L foot Scars: R inguinal, surgical  
 Rashes: 0 Bruises: 0 Lacerations: 0 Blisters: 0  
 Ulcerations: Medial aspect L heel, 2.5-cm diameter, approx. 3 mm deep, wound edges inflamed, draining small amount cream-color/pink-tinged matter, slight musty odor noted  
 Strength (general): Equal all extremities Muscle tone: firm  
 ROM: Good Gait: Favors L foot Paresthesia/paralysis: Tingling, prickly sensation in feet after walking  $\frac{1}{4}$  mile

**SEXUALITY: MALE****Subjective (Reports):**

Sexually active: Yes Use of condoms: No (monogamous)  
 Recent changes in frequency/interest: "I've been too tired lately."  
 Penile discharge: 0 Prostate disorder: 0 Vasectomy: 0

## SEXUALITY: MALE (continued)

- Subjective (Reports):** Last proctoscopic examination: 2 yr ago    Prostate examination: 1 yr ago  
Practice self-examination: Breast/testicles: No  
Problems/complaints: "I don't have any problems, but you'd have to ask my wife if there are any complaints."
- Objective (Exhibits):** Examination: Breast: No masses    Testicles: Deferred    Prostate: Deferred

## SOCIAL INTERACTIONS

- Subjective (Reports):** Marital status: Married 45 yr    Living with: Wife  
Report of problems: None  
Extended family: One daughter lives in town (30 miles away); one daughter married/grandson, living out of state  
Other: Several couples, he and wife play cards/socialize with 2 to 3 times/mo  
Role: Works farm alone; husband/father/grandfather  
Report of problems related to illness/condition: None until now  
Coping behaviors: "My wife and I have always talked things out. You know the 11th commandment is 'Thou shalt not go to bed angry.'"
- Objective (Exhibits):** Speech: Clear, intelligible  
Verbal/nonverbal communication with family/SO(s): Speaks quietly with wife, looking her in the eye; relaxed posture  
Family interaction patterns: Wife sitting at bedside, relaxed, both reading paper, making occasional comments to each other

## TEACHING/LEARNING

- Subjective (Reports):** Dominant language: English    Second language: 0    Literate: Yes  
Education level: 2-yr college  
Health and illness/beliefs/practices/customs: "I take care of the minor problems and see the doctor only when something's broken."  
Presence of advance directives: Yes—wife to bring in  
Durable medical power of attorney: Wife  
Familial risk factors/relationship:  
    Diabetes: Maternal uncle  
    Tuberculosis: Brother died, age 27  
    Heart disease: Father died, age 78, heart attack  
    Strokes: Mother died, age 81  
    High BP: Mother  
Prescribed medications:  
    Drug: DiaBeta dose: 10 mg bid  
    Schedule: 8 a.m./6 p.m., last dose 6 p.m. today  
    Purpose: Control diabetes  
    Takes medications regularly? Yes  
Home urine/glucose monitoring: "Only using Tes-Tape, stopped some months ago when I ran out. It was always negative, anyway. Don't like sticking my fingers."  
Nonprescription (OTC) drugs: Occ. ASA    Herbals/supplements: No  
Use of alcohol (amount/frequency): Socially, occ. beer  
Tobacco: 1/2 pk/day    Smokeless: No  
Admitting diagnosis (physician): Hyperglycemia with nonhealing lesion L foot  
Reason for hospitalization (client): "Sore on foot and the doctor is concerned about my blood sugar, and says I'm supposed to learn this fingerstick test now."  
History of current complaint: "Three weeks ago I got a blister on my foot from breaking in my new boots. It got sore so I lanced it but it isn't getting any better."  
Client's expectations of this hospitalization: "Clear up this infection and control my diabetes."  
Other relevant illness and/or previous hospitalizations/surgeries:  
    1986, R inguinal hernia repair; tonsils, age 5 or 6  
Evidence of failure to improve: Lesion L foot, 3 wk  
Last physical examination: Complete 1 yr ago, office follow-up 5 mo ago

## DISCHARGE CONSIDERATIONS (AS OF 6/28)

- Anticipated discharge: 7/1/18 (3 days)  
Resources: Self, wife

## DISCHARGE CONSIDERATIONS (AS OF 6/28) (continued)

Financial: "If this doesn't take too long to heal, we got some savings to cover things."

Community supports: Diabetic support group (has not participated)

Anticipated lifestyle changes: Become more involved in management of condition

Assistance needed: May require farm help for several days

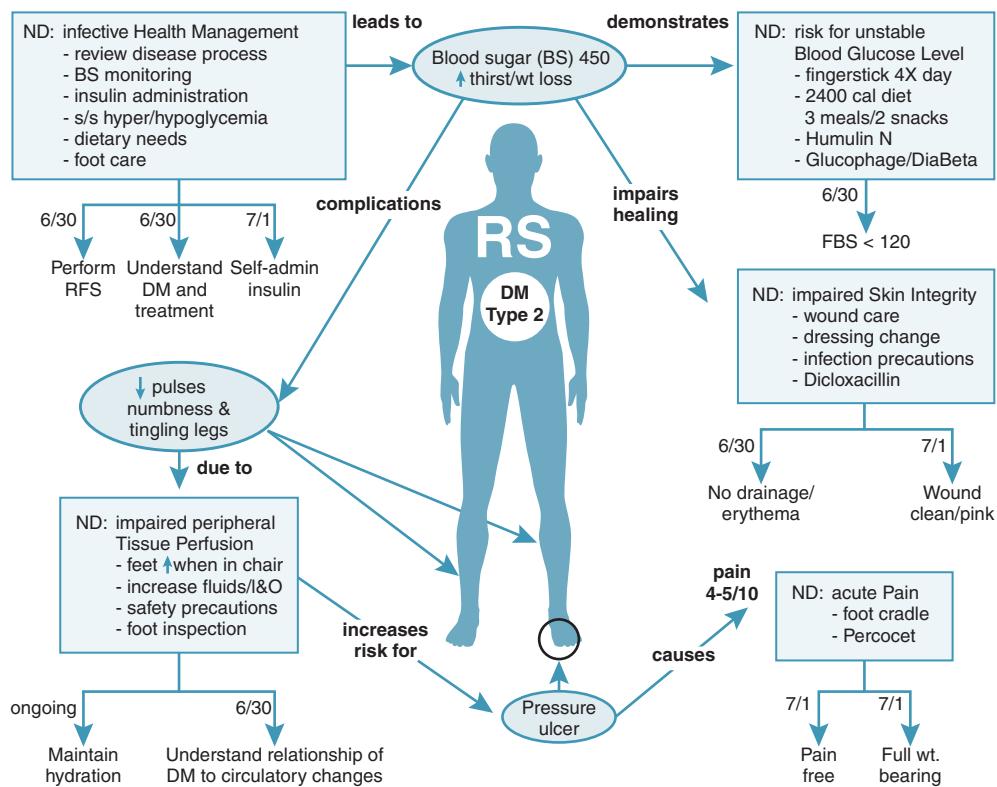
Teaching: Learn new medication regimen and wound care; review diet; encourage smoking cessation

Referral: Supplies: Downtown pharmacy or AARP

Equipment: Glucometer-AARP

Follow-up: Primary care provider 1 wk after discharge to evaluate wound healing and potential need for additional changes in diabetic regimen

**Figure 1.3** Client situation: Diabetes mellitus.



**Figure 1.4** Mind map for Mr. R.S.

between groups of ideas are represented by the use of arrows or lines, with defining phrases added that explain how the interconnected thoughts relate to one another. In this manner, many different pieces of information *about* the client can be connected directly *to* the client. When the plan is completed, there should be a clear nursing diagnosis (supported by subjective and objective evaluation assessment data), nursing interventions, and desired client outcome(s) all connected in a manner that shows there is a relationship between them. It is critical to understand that there is no preset order for assembling the pieces because one cluster is not more or less important than another (and one is not subsumed under another). However, it is important that the pieces are in the same order in each spoke. For example, if the first piece is assessment data, followed by the nursing diagnosis, then outcomes, and finally interventions, that order should be maintained throughout the map.

### Step 4—Implementation

To operationalize step 4 and implement the plan in a timely and cost-effective manner, first identify the priorities for providing client care. Review the plan for outcomes that are to be evaluated during your time of providing care (e.g., shift or day), followed by planned interventions that are sequential or time related, as well as those that can be combined to maximize nursing time and client effort. This is also the time to review the plan of care with the client/significant other to schedule activities and verify the client's responsibilities. In addition, legal and ethical concerns related to the interventions need to be considered. For example, the wishes of the client and family/significant others regarding what is being done need to be discussed and respected, as well as differences resolved where possible. Finally, it is important to provide an environment conducive to carrying out the planned interventions.

## Step 5—Evaluation and Documentation

### of Plans of Care

As nursing care is provided, ongoing assessment evaluates the client's response to therapy and progress toward accomplishing the desired outcomes. As care is provided, the nurse monitors and documents the client's response to the interventions and communicates this information to other healthcare providers as appropriate.

This activity serves as the feedback and control part of the nursing process through which the status of the individual client diagnostic statement is judged to be resolved, continuing, or requiring revision. Then the data are used to document nursing interventions and client response, as well as to reevaluate and revise the plan of care as needed.

This process is visualized in Figure 1.5. Observation of Mr. R.S.'s wound reveals that edges are clean and pink and drainage is scant. Therefore, he is progressing toward achieving wound healing; this problem will continue to be addressed, although no revision in the treatment plan is required at this time.

Another way to evaluate and document the client's progress (response to care) is by using clinical pathways. These pathways were originally developed as tools for pro-

viding care in case management systems and are now used in many settings. A clinical pathway is a type of abbreviated plan of care that is event oriented (task oriented) and provides outcome-based guidelines for goal achievement within a designated length of stay. The pathway incorporates agency and professional standards of care and may be interdisciplinary, depending on the care setting. As a rule, however, the standardized clinical pathways address a specific diagnosis, condition, or procedure, such as myocardial infarction, total hip replacement, or chemotherapy, and do not provide for inclusion of secondary diagnoses or complications, such as an asthmatic client in alcohol withdrawal. In short, if the client does not achieve the daily outcomes or goals of care, the variance is identified and a separate plan of care must be developed to meet the client's individual needs. Therefore, although clinical pathways are becoming more common in the clinical setting, they have limited value (in place of more individualized plans of care) as learning tools for students who are working to practice the nursing process, critical thinking, and a holistic approach to meeting client needs. A sample clinical pathway (Fig. 1.6) reflects Mr. R.S.'s primary diagnostic problem: nonhealing diabetic wound.

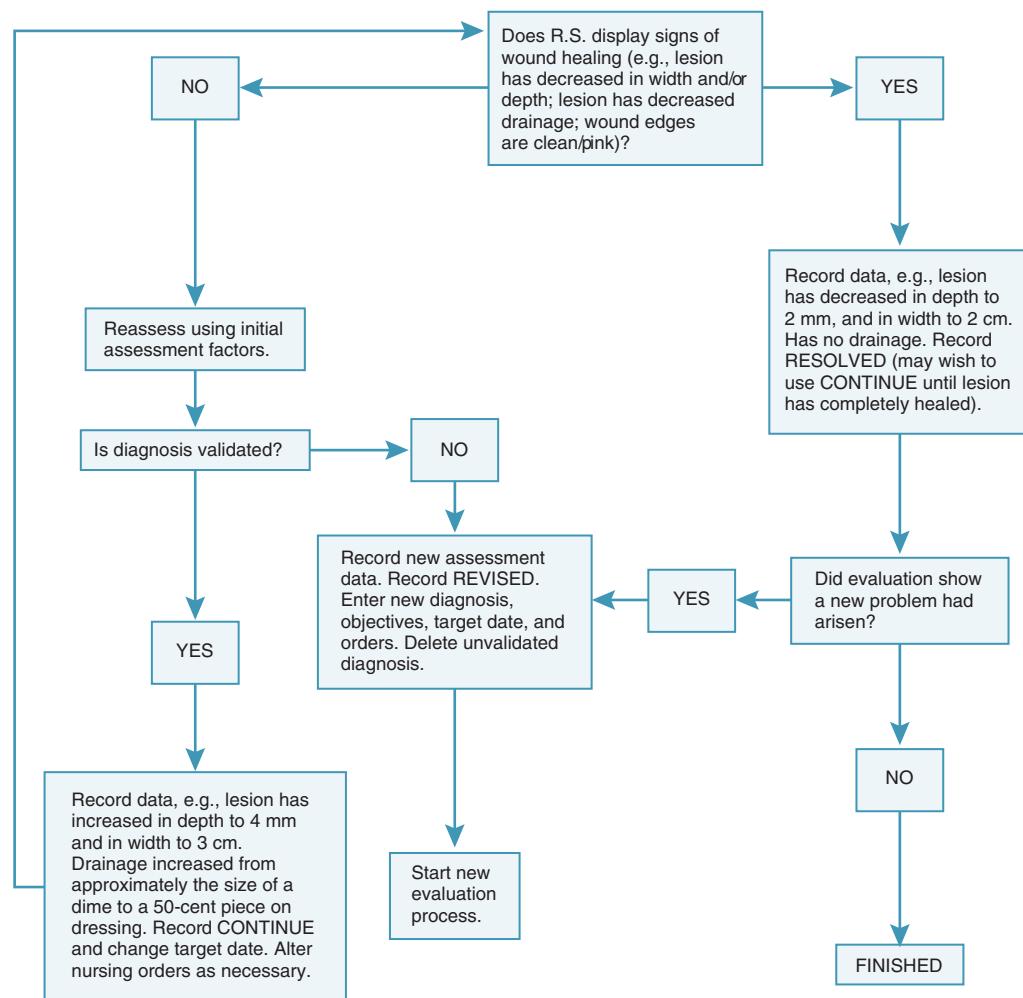


Figure 1.5 Outcome-based evaluation of the client's response to therapy (adapted from Newfield et al, 2016).

**CCP: Nonhealing Lesion—Diabetic.** ELOS: 3 Days—Variations from Designated Pathway Should Be Documented in Progress Notes

ND and Categories of Care	Adm Day 1 <u>6/28</u> 7 p.m.	Day 2 <u>6/29</u>	Day 3 <u>6/30</u>	Discharge <u>7/1</u>
Impaired Skin/ Tissue Integrity	<p>Actions/Goals:</p> <ul style="list-style-type: none"> <li>Verbalize understanding of condition</li> <li>Display blood glucose WNL (ongoing)</li> </ul> <p>Dietitian &amp; determine need for:</p> <ul style="list-style-type: none"> <li>Home care</li> <li>Physical therapy</li> <li>Visiting nurse</li> <li>CBC, electrolytes</li> <li>Glycosylated Hb, serum lipid profile</li> </ul>	<p>Actions/Goals:</p> <ul style="list-style-type: none"> <li>Be free of signs of dehydration</li> <li>Wound free of purulent drainage</li> <li>Verbalize understanding of treatment needs</li> </ul> <p>Perform self-care task No. 1 and 3 correctly</p> <p>Explain reason for actions</p>	<p>Actions/Goals:</p> <ul style="list-style-type: none"> <li>Wound edges show signs of healing process</li> <li>Perform self-care task No. 2 correctly</li> <li>Explain reason for actions</li> <li>Plan in place to meet discharge needs</li> </ul>	
Referrals				
Diagnostic studies	<p>Wound culture/sensitivity Gram's stain</p> <p>Random blood glucose</p> <p>Fingerstick BG hs</p>	<p>→ Fingerstick BG qid/call&gt;250</p> <p>Chest x-ray (if indicated)</p> <p>ECG (if indicated)</p>	<p>→ VS each shift</p> <p>→</p> <p>→</p>	<p>→ D/C</p> <p>→</p>
Additional assessments	<p>V/S qid</p> <p>I&amp;O/level of hydration daily</p> <p>Character of wound tid</p> <p>Level of knowledge and priorities of learning needs</p>	<p>→</p> <p>→</p> <p>→</p>		
Medications	<p>Observe for signs of antibiotic hypersensitivity reaction</p> <p>Antibiotic: <i>Dicloxacillin</i></p> <p>500 mg PO q6h</p> <p>Antidiabetic: <i>Humulin R insulin 10 units SC on adm</i></p>	<p>Antibiotic: same</p> <p>Antidiabetic: same</p> <p>Antibiotic: same</p> <p>Antidiabetic: same</p>		
Client education	<p>Provide: <i>Understanding Your Diabetes</i></p>	<p>Film <i>Living with Diabetes</i></p> <p>Demonstrate and practice tasks:</p> <ol style="list-style-type: none"> <li>1. Fingerstick BG</li> <li>2. Insulin administration</li> <li>3. Wound care</li> <li>4. Routine foot care</li> </ol>	<p>Group sessions: <i>Diabetic management</i></p>	<p>Practice self-care task No. 2: <i>insulin administration</i></p> <p>Review discharge instructions</p>
Additional nursing actions	<p>Up ad lib</p> <p>NS soaks/dressing change tid</p>		<p>→</p> <p>→</p>	<p>→</p> <p>→</p>

**CP: Nonhealing Lesion—Diabetic. ELOS: 3 Days—Variations from Designated Pathway Should Be Documented in Progress Notes**  
**(Continued)**

ND and Categories of Care	Adm Day 1 6/28 7 p.m.	Day 2 6/29	Day 3 6/30	Discharge 7/1
Acute Pain	Actions/Goals State pain relieved or minimized with 1 hr of analgesic administration (ongoing) Verbalize understanding of when to report pain and rating scale used Verbalize understanding of self-care measures No. 1 and 2 Explain reason for actions	Actions/Goals Verbalize understanding of self-care test No. 3 Explain reason for actions	Actions/Goals Able to participate in usual level: <i>ambulate full weight-bearing</i>	Actions/Goals State pain-free/controlled with medication Verbalize understanding of correct medication use
Additional assessments			→ → → →	→ → → Analgesic: same
Medications Allergies: -0- Client education		Analgesic: Percocet 2.5/325 mg PO 1 or 2 tabs q6h PRN Orient to unit/room Guidelines for self-report of pain and rating scale 0-10 Safety/comfort measures: 1 elevation of feet 2 proper footwear Bed cradle as indicated	Analgesic: same Safety/comfort measures: 3 prevention of injury	Review discharge medication instructions: dosage, route, frequency, side effects
Additional nursing actions				

● **Figure 1.6** Sample Clinical Pathway: Nonhealing diabetic wound.

**PLAN OF CARE: Mr. R.S.****Client Diagnostic Statement**

*impaired Skin Integrity* related to pressure over a bony prominence, as evidenced by acute pain, alteration in skin integrity—draining wound L foot.

**Outcome**

**Wound Healing: Secondary Intention (NOC) Indicators:**

**Client Will**

Be free of purulent drainage within 48 hours (6/30, 7 p.m.).

Display signs of healing with wound edges clean and pink within 60 hours (7/1, 7 a.m.).

ACTIONS/INTERVENTIONS	RATIONALE
<b>Wound Care NIC</b>	
Irrigate wound with room-temperature sterile normal saline (NS) tid.	Cleans wound without harming delicate tissues.
Assess wound with each dressing change. Obtain wound tracing on admission and at discharge.	Provides information about effectiveness of therapy and identifies additional needs.
Apply sterile dressing using paper tape.	Keeps wound clean, minimizes cross-contamination. Note: Adhesive tape may be abrasive to fragile tissues.
<b>Infection Control NIC</b>	
Follow wound precautions.	Use of gloves and proper handling of contaminated dressings reduces likelihood of spread of infection.
Obtain sterile specimen of wound drainage on admission.	Culture/sensitivity identifies pathogens and therapy of choice.
Administer dicloxacillin 500 mg per os (PO) q6h, starting at 10 p.m.	Treatment of infection and prevention of complications. Food interferes with drug absorption, requiring scheduling around meals.
Observe for signs of hypersensitivity: pruritus, urticaria, rash.	Although no history of penicillin reaction, it may occur at any time.

**PLAN OF CARE:****Client Diagnostic Statement**

*risk for unstable Blood Glucose Level* as evidenced by insufficient diabetes management and inadequate blood glucose monitoring (fingerstick 450/adm).

**Outcome**

**Blood Glucose Level (NOC) Indicators:**

**Client Will**

Demonstrate correction of metabolic state as evidenced by fasting blood sugar (FBS) less than 170 mg/dL within 36 hours (6/30, 7 a.m.).

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hyperglycemia Management NIC</b>	
Perform fingerstick blood glucose (BG) qid. Call for BG >250.	Bedside analysis of blood glucose levels is a more timely method for monitoring effectiveness of therapy and provides direction for alteration of medications such as additional regular insulin.

(continues on page 22)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer antidiabetic medications:	Treats underlying metabolic dysfunction, reducing hyperglycemia and promoting healing.
10 units Humulin N insulin subcutaneous (SC) every a.m. after fingerstick BG	Intermediate-acting preparation with onset of 2 to 4 hr, peak 6 to 12 hr, with a duration of 18 to 24 hr. Increases transport of glucose into cells and promotes the conversion of glucose to glycogen.
DiaBeta 10 mg PO bid	Lowers blood glucose by stimulating the release of insulin from the pancreas and increasing the sensitivity to insulin at the receptor sites.
Glucophage 500 mg PO daily. Note onset of side effects.	Glucophage lowers serum glucose levels by decreasing hepatic glucose production and intestinal glucose absorption and increasing sensitivity to insulin. By using in conjunction with DiaBeta, client may be able to discontinue insulin once target dosage is achieved (e.g., 2000 mg/d). An increase of 1 tablet per week is necessary to limit side effects of diarrhea, abdominal cramping, and vomiting, possibly leading to dehydration and prerenal azotemia.
Provide diet 2400 cal—three meals/two snacks.	Proper diet decreases glucose levels and insulin needs, prevents hyperglycemic episodes, can reduce serum cholesterol levels, and promotes satiation.
Schedule consultation with dietitian to restructure meal plan and evaluate food choices.	Calories are unchanged on new orders but have been redistributed to three meals and two snacks. Dietary choices (e.g., increased vitamin C) may enhance healing.

### PLAN OF CARE:

#### **Client Diagnostic Statement**

acute Pain related to physical injury agent (open wound L foot) as evidenced by self-report of intensity using standardized pain scale (4 to 5/10) and guarding behavior.

#### **Outcome**

#### **Pain Level (NOC) Indicators:**

#### **Client Will**

Report pain is minimized or relieved within 1 hr of analgesic administration (ongoing). Report absence or effective control of pain by discharge (7/1).

#### **Outcome**

#### **Pain: Disruptive Effects (NOC) Indicators:**

#### **Client Will**

Ambulate with ease, full weight-bearing by discharge (7/1).

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
Determine pain characteristics through client's description.	Establishes baseline for assessing improvement and changes.
Place foot cradle on bed; encourage use of loose-fitting slipper when up.	Avoids direct pressure to area of injury, which could result in vasoconstriction and increased pain.
Administer Darvocet-N 100 mg PO every 4 hr as needed. Document effectiveness.	Provides relief of discomfort when unrelieved by other measures.

**PLAN OF CARE:****Client Diagnostic Statement**

*ineffective peripheral Tissue Perfusion* related to insufficient knowledge of disease process and modifiable factors, as evidenced by decrease in peripheral pulses, alteration in skin characteristics [pale/cool feet], capillary refill 4 sec, paresthesia [of feet].

**Outcomes**

**Knowledge: Diabetes Management (NOC) Indicators:**

**Client Will**

Verbalize understanding of relationship between chronic disease (diabetes mellitus) and circulatory changes within 48 hr (6/30, 7 p.m.).

Demonstrate awareness of safety factors and proper foot care within 48 hr (6/30, 7 p.m.).

Maintain adequate level of hydration to maximize perfusion (ongoing), as evidenced by balanced intake/output, moist skin and mucous membranes, and capillary refill less than 4 sec (daily; ongoing).

ACTIONS/INTERVENTIONS	RATIONALE
<b>Circulatory Care: Arterial Insufficiency NIC</b>	
Elevate feet when up in chair. Avoid long periods with feet in dependent position.	Minimizes interruption of blood flow and reduces venous pooling.
Assess for signs of dehydration. Monitor intake/output. Encourage oral fluids.	Glycosuria may result in dehydration with consequent reduction of circulating volume and further impairment of peripheral circulation.
Instruct client to avoid constricting clothing and socks and ill-fitting shoes.	Compromised circulation and decreased pain sensation may precipitate or aggravate tissue breakdown.
Reinforce safety precautions regarding use of heating pads, hot water bottles, or soaks.	Heat increases metabolic demands on compromised tissues. Vascular insufficiency alters pain sensation, increasing risk of injury.
Recommend cessation of smoking.	Vascular constriction associated with smoking and diabetes impairs peripheral circulation.
Discuss complications of disease that result from vascular changes: ulceration, gangrene, and muscle or bony structure changes.	Although proper control of diabetes mellitus may not prevent complications, severity of effects may be minimized. Diabetic foot complications are the leading cause of nontraumatic lower-extremity amputations. Note: Skin dry, cracked, scaly; feet cool; and pain when walking a distance suggest mild to moderate vascular disease (autonomic neuropathy) that can limit response to infection, impair wound healing, and increase risk of bony deformities.
Review proper foot care as outlined in teaching plan.	Altered perfusion of lower extremities may lead to serious or persistent complications at the cellular level.

**PLAN OF CARE:****Client Diagnostic Statement**

*ineffective Health Management* related to insufficient knowledge of therapeutic regimen, perceived benefit/susceptibility or seriousness of condition as evidenced by failure to include treatment regimen in daily living [home glucose monitoring, foot care] and failure to take action to reduce risk factors.

**Outcomes**

**Knowledge: Diabetes Management (NOC) Indicators:**

**Client Will**

Perform procedure of home glucose monitoring correctly within 36 hr (6/30, 7 a.m.).

Verbalize basic understanding of disease process and treatment within 38 hr (6/30, 9 a.m.).

Explain reasons for actions within 38 hr (6/30, 9 a.m.).

Perform insulin administration correctly within 60 hr (7/1, 7 a.m.).

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> Determine client's level of knowledge, priorities of learning needs, and desire/need for including wife in instruction.	Establishes baseline and direction for teaching and planning. Involvement of wife, if desired, will provide additional resource for recall and understanding and may enhance client's follow-through.
Provide teaching guide, "Understanding Your Diabetes," 6/28 p.m. Show film <i>Living With Diabetes</i> , 6/29, 4 p.m., when wife is visiting. Include in group teaching session, 6/30 a.m. Review information and obtain feedback from client and wife.	Provides different methods for accessing and reinforcing information and enhances opportunity for learning and understanding.
Discuss factors related to and altering diabetic control, such as stress, illness, and exercise.	Drug therapy and diet may need to be altered in response to both short- and long-term stressors and changes in activity level.
Review signs and symptoms of hyperglycemia (e.g., fatigue, nausea, vomiting, polyuria, polydipsia). Discuss how to prevent and evaluate this situation and when to seek medical care. Have client identify appropriate interventions.	Recognition and understanding of these signs and symptoms and timely intervention will aid client in avoiding recurrences and preventing complications.
Review and provide information about necessity for routine examination of feet and proper foot care (e.g., daily inspection for injuries, pressure areas, corns, calluses; proper nail care; daily washing; application of good moisturizing lotion such as Eucerin, Keri, or Nivea bid). Recommend loose-fitting socks and properly fitting shoes (break new shoes in gradually), and avoid going barefoot. If foot injury or skin break occurs, wash with soap or dermal cleanser and water, cover with sterile dressing, inspect wound, and change dressing daily; report redness, swelling, or presence of drainage.	Reduces risk of tissue injury; promotes understanding and prevention of pressure ulcer formation and wound-healing difficulties.
<b>Teaching: Prescribed Medication NIC</b> Instruct regarding prescribed insulin therapy:	
Humulin N insulin, SC	May be a temporary treatment of hyperglycemia with infection or may be permanent combination with oral hypoglycemic agent.
Keep vial in current use at room temperature (if used within 30 days).	Intermediate-acting insulin generally lasts 18 to 28 hr, with peak effect 6 to 12 hr.
Store extra vials in refrigerator.	Cold insulin is poorly absorbed.
Roll bottle and invert to mix, or shake gently, avoiding bubbles.	Refrigeration prolongs the drug shelf-life by preventing wide fluctuations in temperature.
Choice of injection sites (e.g., across lower abdomen in Z pattern).	Vigorous shaking may create foam, which can interfere with accurate dose withdrawal and damage the insulin molecule. Note: New research suggests that gently shaking the vial may be more effective in mixing suspension. (Refer to facility procedure manual.)
Demonstrate and then observe client in drawing insulin into syringe, reading syringe markings, and administering dose. Assess for accuracy.	Provides for steady absorption of medication. Site is easily visualized and accessible by client, and Z pattern minimizes tissue damage.
Instruct in signs and symptoms of insulin reaction or hypoglycemia: fatigue, nausea, headache, hunger, sweating, irritability, shakiness, anxiety, or difficulty concentrating.	May require several instruction sessions and practice before client and wife feel comfortable drawing up and injecting medication.
	Knowing what to watch for and appropriate treatment such as $\frac{1}{2}$ cup grape juice for immediate response and snack within 30 min (e.g., one slice bread with peanut butter or cheese, or fruit and slice of cheese for sustained effect) may prevent or minimize complications.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review “sick day rules,” for example, call doctor if too sick to eat normally or stay active; take insulin as ordered. Keep record as noted in Sick Day Guide.	Understanding of necessary actions in the event of mild to severe illness promotes competent self-care and reduces risk of hyperglycemia or hypoglycemia.
Instruct client and wife in fingerstick glucose monitoring to be done four times per day until stable, then twice a day at rotating times, such as FBS and before dinner, or before lunch and at bedtime. Observe return demonstrations of the procedure.	Fingerstick monitoring provides accurate and timely information regarding diabetic control.

Recommend client maintain record or log of fingerstick testing, antidiabetic medication and insulin dosage/site, unusual physiological response, and dietary intake. Outline desired goals, for example, FBS 80 to 110, premeal 80 to 120.	Return demonstration verifies correct learning. Provides accurate record for review by caregivers for assessment of therapy effectiveness and needs.
Discuss other healthcare issues, such as smoking habits, self-monitoring for cancer (breasts and testicles), and reporting changes in general well-being.	Encourages client involvement, awareness, and responsibility for own health; promotes wellness. Note: Smoking tends to increase client's resistance to insulin.

# CHAPTER 2

## Cardiovascular

### HYPERTENSION: SEVERE

#### I. Pathophysiology

- a. Multifactorial
  - i. Complex interactions between the vasculature, kidneys, sympathetic nervous system, baroreceptors, renin-angiotensin-aldosterone system, and insulin resistance
- b. Mosaic theory
  - i. Genetic disposition
  - ii. Environmental: dietary Na<sup>+</sup>/fat intake, trace metals, stress, smoking
  - iii. Anatomical: abnormalities of vascular system
  - iv. Adaptive: e.g., regulation of intracellular Na<sup>+</sup> and Ca<sup>++</sup> by cell membrane ion pumps
  - v. Neural: variety of complex nerve mechanisms
  - vi. Endocrine: pheochromocytoma, primary aldosteronism
  - vii. Humoral: varied agents that constrict and dilate blood vessels
  - viii. Hemodynamic: blood volume or viscosity, intrarenal hemodynamics

#### II. Classification and Severity—(Scordo, 2015; American Heart Association ([AHA], 2014; Scordo & Pickett, 2015; Weber et al, 2014) (American College of Cardiology/American Heart Association [ACC/AHA], 2017)

- a. Normal adult blood pressure (BP)—less than 120/<80 mm Hg
- b. Elevated blood pressure—120–129/<80 mm Hg
- c. Hypertension stage 1—systolic blood pressure (SBP) 130–139 mm Hg or diastolic blood pressure (DBP) 80–89 mm Hg
- d. Hypertension stage 2—SBP ≥140 mm Hg or DBP ≥90 mm Hg

- e. Hypertensive crisis—SBP higher than 180 mm Hg or DBP higher than 120 mm Hg

#### III. Etiology

- a. Primary (essential), which accounts for approximately 90% to 95% of all cases, has no identifiable cause
- b. Secondary hypertension, which accounts for 2% to 10% of all cases, occurs because of an identifiable, sometimes correctable, pathological condition, such as kidney disorders, adrenal gland tumors, or primary aldosteronism; medications; drugs; or other chemicals.

#### IV. Statistics—(Centers for Disease Control and Prevention [CDC], National Center for Health Statistics, 2015; Davis, 2015; Mozaffarian et al, 2015)

- 1. Morbidity:
  - i. Between 2013 and 2014, 33.5% of adults ages 20 and over reportedly had hypertension (measured high blood pressure and/or taking antihypertensive medication).
  - ii. Men have a higher prevalence until about age 45; from age 45 to 64 years, the percentages are nearly equal between men and women. Beyond age 64 years, a higher percentage of women have hypertension than men (Mozaffarian et al, 2015).
  - iii. Uncontrolled hypertension occurs in almost half of adults (Davis, 2015).
- 2. Mortality (CDC, 2015a): High blood pressure was reported as a primary or contributing cause of death for more than 410,000 Americans in 2014.
- 3. Cost: In 2015, the CDC Vital Statistics Cooperative Program reported that high blood pressure costs the nation \$48.6 billion each year (total includes the cost of healthcare services, medications to treat high blood pressure, and missed days of work) (CDC, 2015a).

**G L O S S A R Y**

**Atrial hypertrophy:** Increased atrial volume and pressure.

**(DBP):** Diastolic blood pressure.

**Hypokalemia:** Low serum potassium.

**Resistant hypertension:** Blood pressure remains high despite treatment with different types of blood pressure medications. Some studies suggest that people with resistant hypertension have associated risk factors such as **diabetes, obstructive sleep apnea**, enlargement of the

heart chambers, and/or **chronic kidney disease** (Becker- man, 2015).

**Systemic vascular resistance (SVR):** An index of arterial compliance or constriction throughout the body; equal to BP divided by cardiac output.

**(SBP):** Systolic blood pressure.

**Target organ disease or damage (TOD):** Organ or system of organs that are primarily affected by hypertension, such as the heart, kidneys, and brain.

**CARE SETTING**

Although hypertension is usually treated in a community setting, complications or cardiovascular compromise may require inpatient care, especially when target organ disease (TOD) is present. Most interventions included here can be used in either setting.

**RELATED CONCERNS**

Cerebrovascular accident (CVA)/stroke, page 247

Myocardial infarction, page 72

Psychosocial aspects of care, page 835

Acute kidney injury, page 595

Renal failure: Chronic kidney disease, page 607

**CLIENT ASSESSMENT DATABASE****DIAGNOSTIC DIVISION  
MAY REPORT****\*\*CLIENT MAY NOT HAVE REPORTABLE SYMPTOMS****ACTIVITY/REST**

- Sedentary lifestyle (major risk factor for hypertension)
- Weakness, fatigue
- Shortness of breath

**MAY EXHIBIT**

- Elevated heart rate
- Change in heart rhythm
- Tachypnea
- Dyspnea with exertion

**CIRCULATION**

- History of elevated BP over time
- Presence of TOD, such as atherosclerotic, valvular, or coronary artery heart disease, including myocardial infarction (MI), angina, heart failure (HF), and cerebrovascular disease
- Episodes of palpitations, diaphoresis

- **Pulses:** Bounding carotid, jugular, radial pulsations
- Pulse disparities, particularly femoral delay as compared with radial or brachial pulsation and absence of or diminished popliteal, posterior tibial, pedal pulses
- **Apical pulse:** Point of maximal impulse (PMI) possibly displaced or forceful
- **Heart rate and rhythm:** Tachycardia, various dysrhythmias
- **Heart sounds:** Accentuated S<sub>2</sub> at base; S<sub>3</sub> in early HF; S<sub>4</sub>, which reflects rigid left ventricle and left ventricular hypertrophy; murmurs of valvular stenosis; vascular bruits audible over carotid, femoral, or epigastrium
- Jugular vein distension (JVD)
- **Extremities:** Discoloration of skin; cool temperature, indicating peripheral vasoconstriction; and slow or delayed capillary refill, indicating vasoconstriction
- **Skin:** Pallor, cyanosis, and diaphoresis, suggesting pulmonary congestion and hypoxemia, or flushing, suggesting pheochromocytoma

**EGO INTEGRITY**

- Multiple stress factors, such as relationship, financial, or job-related concerns

- Narrowed focus

(continues on page 28)

## CLIENT ASSESSMENT DATABASE (contd.)

### MAY REPORT (continued)

### MAY EXHIBIT (continued)

#### ELIMINATION

- Past or present renal insult, such as kidney infection, renovascular obstruction, or history of kidney disease

#### FOOD/FLUID

- Food preferences that are high calorie, high salt, high fat, and high cholesterol, such as fried foods, cheese, eggs, or licorice
- Low dietary intake of potassium, calcium, and magnesium
- Nausea, vomiting
- Recent weight changes
- Current or history of diuretic use

#### NEUROSENSORY

- History of numbness or weakness on one side of the body; transient ischemia attach (TIA) or stroke
- Fainting spells or dizziness
- Throbbing, suboccipital headaches, usually present on awakening and disappearing spontaneously after several hours
- Visual disturbances, such as diplopia and blurred vision
- Episodes of epistaxis

#### PAIN/DISCOMFORT

- Severe, throbbing occipital headaches located in suboccipital region, present on awakening and disappearing spontaneously after several hours
- Stiffness of neck, dizziness, and blurred vision
- Abdominal pain or masses, suggesting pheochromocytoma

#### RESPIRATION

- Dyspnea associated with activity or exertion
- Tachypnea, orthopnea, paroxysmal nocturnal dyspnea
- Cough with or without sputum production
- Smoking history (major risk factor)

#### SAFETY

- Transient episodes of numbness, unilateral paresthesias
- Lightheadedness with position change

#### SEXUALITY

- Postmenopausal (major risk factor)
- Erectile dysfunction (ED), which may be associated with hypertension or antihypertensive medications

#### TEACHING/LEARNING

- Familial risk factors, including hypertension, atherosclerosis, heart disease, diabetes mellitus, and cerebrovascular or kidney disease
- Ethnic or racial risk factors, such as increased prevalence in African American and Southeast Asian populations
- Use of birth control pills or other hormone replacement therapy
- Drug and alcohol use

- May have decreased urinary output, if kidney failure is present, or increased output, if taking diuretics

- Normal weight or obesity. *Note:* Being overweight is a significant risk factor for hypertension. Obesity and older age are two risk factors especially in clients of older age and resistant hypertension (Davis, 2015).
- Presence of edema
- Venous congestion, JVD
- Glycosuria—When patients have both hypertension and diabetes, their risk for cardiovascular disease doubles (AHA, 2016a)

- Mental status:** Changes in alertness, orientation, speech pattern and content, affect, thought process, or memory
- Motor responses:** Decreased strength, hand grip, and deep tendon reflexes
- Optic retinal changes:** From mild sclerosis and arterial narrowing to marked retinal and sclerotic changes with edema or papilledema, exudates, hemorrhage, and arterial nicking, although dependent on severity and duration of hypertension and resulting TOD

- Reluctance to move head, rubbing head, avoidance of bright lights and noise, wrinkled brow, clenched fists; grimacing and guarding behaviors

- Respiratory distress or use of accessory muscles
- Adventitious breath sounds, such as crackles or wheezes
- Pallor or cyanosis generally associated with advanced cardiopulmonary effects of sustained or severe hypertension

- Impaired coordination or gait

**MAY REPORT (continued)**

- Use of herbal supplements to manage BP, such as garlic, hawthorn, black cohosh, celery seed, coleus, and evening primrose

**MAY EXHIBIT (continued)****DISCHARGE PLAN CONSIDERATIONS**

- May require assistance with self-monitoring of BP as well as periodic evaluation of and alterations in medication therapy
- Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES**

TEST WHY IT IS DONE	WHAT IT TELLS ME
<b>BLOOD TESTS</b>	
• <b>Blood urea nitrogen (BUN) and creatinine (Cr):</b> BUN measures the amount of urea nitrogen in the blood. Cr measures the amount of creatinine in blood or urine.	Provides information about renal perfusion and function and can reveal cause if hypertension is related to kidney dysfunction.
• <b>Glucose:</b> Measures the amount of glucose in the blood at the time of sample collection.	Hyperglycemia may result from elevated catecholamine levels and insulin resistance, which increases BP.
• <b>Serum potassium:</b> Potassium is an electrolyte that helps regulate the amount of fluid in the body, stimulate muscle contraction, and maintain a stable acid-base balance.	Hypokalemia may indicate the presence of primary aldosteronism as a possible cause of hypertension or it may be a side effect of diuretic therapy.
• <b>Lipid panel, including total lipids, high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol, total cholesterol, triglycerides:</b> The group of tests that make up a lipid profile has been shown to be good indicators of risk for heart attack or stroke.	A predisposition for or presence of atheromatous plaque is indicated by the following: HDL levels that are less than 40 mg/dL in men and less than 50 mg/dL in women, triglycerides that are more than 150 mg/dL, and an increase in small-particle LDL. One recent study reported a strong association of hypertension with elevated cholesterols, well as insulin resistance in hypothyroid adults (Purohit & Mathur, 2013).
• <b>Thyroid studies:</b> Blood test and scan to evaluate thyroid function; most commonly used laboratory test is the measurement of thyroid-stimulating hormone (TSH).	Hypothyroidism and triiodothyronine (T3) deficiency have been found to be associated with peripheral vasoconstriction, which is also associated with hypertension (Stabouli et al., 2010).
• <b>Serum/urine aldosterone level:</b> May be done to assess for primary aldosteronism as cause of hypertension.	Elevated in primary aldosteronism.
• <b>Renin:</b> An enzyme that activates the renin-angiotensin system and screens for essential, renal, or renovascular hypertension.	Elevated in renovascular and malignant hypertension and salt-wasting disorders.
• <b>C-reactive protein (CRP):</b> A member of the class of acute phase reactants. Serum levels rise dramatically during inflammatory processes occurring in the body.	CRP is an indicator of vascular inflammation and can indicate atherosclerotic disease that causes renal artery disease and hypertension.
<b>OTHER DIAGNOSTIC STUDIES</b>	
• <b>Electrocardiogram (ECG):</b> Record of the electrical activity of the heart that can demonstrate conduction disturbances, enlarged heart, and chamber strain patterns.	Broad, notched P wave is one of the earliest signs of hypertensive heart disease.
• <b>Kidney and renography nuclear scan (also called renogram):</b> Assists in diagnosing renal disorders.	Determines if hypertension is due to kidney disease.
• <b>Urine creatinine clearance:</b> Determines extent of nephron damage in known kidney disease.	Reduced in hypertensive patient with renal damage.
• <b>Uric acid:</b> Measures end-product of purine metabolism, providing one index of renal function.	Hyperuricemia has been implicated as a risk factor for the development of hypertension.

## NURSING PRIORITIES

1. Maintain or enhance cardiovascular functioning.
2. Prevent complications.
3. Provide information about disease process, prognosis, and treatment regimen.
4. Support active client control of condition.

## DISCHARGE GOALS

1. BP within acceptable limits for individual.
2. Cardiovascular and systemic complications prevented or minimized.
3. Disease process, prognosis, and therapeutic regimen understood.
4. Necessary lifestyle or behavioral changes initiated.
5. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: risk for decreased Cardiac Output

#### Risk Factors May Include

Altered afterload [e.g., increased systemic vascular resistance]  
Altered contractility [e.g., ventricular hypertrophy or rigidity; myocardial ischemia]

#### Possibly Evidenced By

(Not applicable; presence of signs and symptoms establishes an actual diagnosis)

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Circulation Status NOC

Maintain BP within individually acceptable range.  
Demonstrate stable cardiac rhythm and rate within normal range.  
Participate in activities that reduce BP and cardiac workload.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Hypertension Management NIC

##### Independent

Measure BP in both arms. Take three readings, 3 to 5 minutes apart while client is at rest, then sitting, and then standing for initial evaluation. Use correct cuff size and accurate technique. Take note of elevations in systolic as well as diastolic readings.

Serial measurements using correct equipment provide a more complete picture of vascular involvement and scope of problem. Progressive diastolic readings above 120 mm Hg are considered first accelerated, then malignant (very severe). Systolic hypertension also is an established risk factor for cerebrovascular disease and ischemic heart disease even when diastolic pressure is not elevated. In younger client with normal systolic readings, elevated diastolic numbers may indicate prehypertension.

Note presence and quality of central and peripheral pulses.

Bounding carotid, jugular, radial, and femoral pulses may be observed and palpated. Pulses in the legs and feet may be diminished, reflecting effects of vasoconstriction and venous congestion.

Auscultate heart tones and breath sounds.

$S_4$  is commonly heard in severely hypertensive clients because of the presence of atrial hypertrophy. Development of  $S_3$  indicates ventricular hypertrophy and impaired cardiac functioning. Presence of crackles or wheezes may indicate pulmonary congestion secondary to developing or chronic heart failure.

Observe skin color, moisture, temperature, and capillary refill time.

Presence of pallor; cool, moist skin; and delayed capillary refill time may be due to peripheral vasoconstriction or reflect cardiac decompensation and decreased output.

Observe for dependent and generalized edema.

May indicate onset of heart or kidney failure.

Provide calm, restful surroundings, minimize environmental activity and noise. Consider limiting the number of visitors or length of visitation.

Helps reduce sympathetic stimulation and promotes relaxation.

Maintain activity restrictions (such as bedrest or chair rest) during crisis situation and schedule periods of uninterrupted rest; assist client with self-care activities as needed.

Reduces physical stress and tension that affect BP and the course of hypertension.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide comfort measures, such as back and neck massage or elevation of head.	Decreases discomfort and may reduce sympathetic stimulation.
Instruct in relaxation techniques, guided imagery, and distractions, if client is interested and able to participate.	Can reduce stressful stimuli and produce calming effect, thereby reducing BP.
Monitor response to medications that control BP.	Response to drug therapy is dependent on both the individual drugs and their synergistic effects. Because of potential side effects and drug interactions, it is important to use the smallest number and lowest dosage of medications possible.
<b>Collaborative</b>	
Administer medications as indicated.	
Angiotensin-converting enzyme inhibitors (ACEIs), such as enalapril (Vasotec), fosinopril (Monopril), trandolapril (Mavik), diovan (Teveten)	ACEIs may be first-line drugs in early hypertension treatment and are considered first-line drugs for clients with documented congestive heart failure (CHF), diabetes, and those at risk for renal failure (Davis, 2015).
Angiotensin II receptor blockers (ARBs), such as candesartan (Atacand), valsartan (Diovan), losartan (Cozaar), and irbesartan (Avapro)	ARBs block the action of angiotensin II. As a result, blood vessels dilate and BP is reduced. Note: For people of African or Caribbean family origin, an ARB may be preferred over an ACEI in combination with a CCB (from 2011 guidelines per Davis, 2015).
Calcium channel blockers (CCBs), such as nifedipine (Adalat), diltiazem (Cardizem), amlodipine (Norvasc), nicardipine (Cardene)	Calcium channel blockers work by slowing the movement of calcium into the cells of the heart and blood vessel walls, which makes it easier for the heart to pump and widens blood vessels. As a result, the heart doesn't have to work as hard, and blood pressure lowers. Can be used to treat hypertension.
Diuretics, for example, thiazide (e.g., bendroflumethiazide [Naturetin], hydrochlorothiazide [HCTZ]) or thiazide-like diuretics (e.g., chlortalidone [Thalidone]; indapamide [Lozal]) and loop diuretics, such as furosemide (Lasix), bumetanide (Bumex)	Diuretics may be offered for uncomplicated hypertension and may be used alone or in association with other drugs to reduce BP in clients with relatively normal renal function. Note: Loop diuretics are less commonly used for routine treatment of hypertension but are especially useful in the presence of edema associated with congestive heart failure.
Beta blockers, such as acebutolol (Sectral), atenolol (Tenormin), metoprolol (Lopressor), bisoprolol (Zibeta), nadolol (Corgard), carvedilol (Coreg), propranolol (Inderal), labetalol (Tandate), timolol (Blocarden)	Beta blockers are not a preferred initial therapy for hypertension but may be considered in appropriate populations, such as those with an intolerance or contraindication to ACEIs and ARBs; women of childbearing potential; and clients with heart failure and cardiovascular disease.
Combination drugs, such as amlodipine and benazepril (Lotrel), hydralazine and hydrochlorothiazide (Vaseretic), nadolol and bendroflumethiazide (Corzide), hydralazine and hydrochlorothiazide (Apresazide)	Combination treatment means another class of blood pressure medication is added as a drug in order to increase treatment effectiveness. This is sometimes referred to as “stepped” therapy. There are also combination antihypertensives such as beta blockers and diuretics: ACEIs and ARBs or diuretics, etc. Note: Studies show that many people obtain better blood pressure control with combination treatment than with one drug (Beckerman, 2015).
Direct-acting parenteral vasodilators, such as diazoxide (Hyperstat), nitroprusside (Nitropress), and labetalol (Normodyne)	These are given intravenously (IV) for management of hypertensive emergencies.
Implement dietary restrictions, as indicated, such as reducing sodium and calories, and avoiding refined carbohydrates, high-fat foods, and highly processed foods.	Limiting sodium and sodium-rich processed foods can help manage fluid retention and, with associated hypertensive response, decrease myocardial workload. A balanced diet lower in calories, fat, and sodium and rich in calcium, potassium, and magnesium may help lower BP.
Prepare for surgery when indicated.	When hypertension is due to pheochromocytoma, removing the tumor corrects the condition.

## NURSING DIAGNOSIS: Activity Intolerance

### May Be Related To

Generalized weakness  
Imbalance between oxygen supply and demand

### Possibly Evidenced By

Reports fatigue; feeling weak  
Abnormal heart rate or BP response to activity  
Exertional discomfort or dyspnea  
ECG changes reflecting ischemia, arrhythmias

### Desired Outcomes/Evaluation Criteria—Client Will

#### Endurance NOC

Participate in necessary and desired activities.  
Report a measurable increase in activity tolerance.  
Demonstrate a decrease in physiological signs of intolerance.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Energy Management NIC

##### Independent

Assess the client's response to activity, noting pulse rate more than 20 beats per minute faster than resting rate; marked increase in BP (systolic increases more than 40 mm Hg or diastolic increases more than 20 mm Hg) during and after activity, dyspnea or chest pain, excessive fatigue and weakness, and diaphoresis, dizziness, and syncope.

Changes in baseline are helpful in assessing physiological responses to the stress of activity and, if present, are indicators of overexertion.

Instruct client in energy-conserving techniques, such as using chair when showering, sitting to brush teeth or comb hair, and carrying out activities at a slower pace.

Energy-saving techniques reduce the energy expenditure, thereby assisting in equalization of oxygen supply and demand.

Encourage progressive activity and self-care when tolerated.  
Provide assistance as needed.

Gradual activity progression prevents a sudden increase in cardiac workload. Provide assistance only as needed, which encourages independence in performing activities.

## NURSING DIAGNOSIS: Acute Pain

### May Be Related To

Physical agent [increased cerebral vascular pressure]

### Possibly Evidenced By

Verbal/coded report  
Positioning to avoid pain  
Self-focus

### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Control NOC

Report pain or discomfort is relieved or controlled.  
Verbalize methods that provide relief.  
Follow prescribed pharmacological regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<b>Independent</b>	
Determine specifics of pain—location (e.g., suboccipital region), characteristics (e.g., throbbing, neck stiffness, blurred vision), intensity (0 to 10, or similar scale), onset (e.g., present on awakening), and duration (e.g., disappears spontaneously after being up and about). Note nonverbal cues (e.g., reluctance to move head, rubbing head, avoidance of bright lights/noise).	Facilitates diagnosis of problem and initiation of appropriate therapy. Helpful in evaluating effectiveness of therapy.
Encourage and maintain bedrest during acute phase, if indicated.	Minimizes stimulation and promotes relaxation.
Provide or recommend nonpharmacological measures for relief of headache, such as placing a cool cloth to forehead; back and neck rubs; quiet, dimly lit room; relaxation techniques, such as guided imagery and distraction; and diversional activities.	Measures that reduce cerebral vascular pressure and that slow or block sympathetic response are effective in relieving headache and associated complications.
Eliminate or minimize vasoconstricting activities that may aggravate headache, such as straining at stool, prolonged coughing, and bending over.	Activities that increase vasoconstriction accentuate the headache in the presence of increased cerebral vascular pressure.
Assist client with ambulation, as needed.	Dizziness and blurred vision frequently are associated with vascular headache. Client may also experience episodes of postural hypotension, causing weakness when ambulating.
<b>Collaborative</b>	
Administer analgesics, as indicated.	Reduce or control pain and decrease stimulation of the sympathetic nervous system.
Administer antianxiety agents, such as lorazepam (Ativan), alprazolam (Xanax), and diazepam (Valium).	May aid in the reduction of tension and discomfort that is intensified by stress.

## NURSING DIAGNOSIS: Overweight

### May Be Related To

Energy expenditure below energy intake based on standard assessment  
Portion sizes larger than recommended  
High frequency of restaurant or fried foods  
Average daily physical activity is less than recommended for gender and age

### Possibly Evidenced By

Adult BMI greater than 25 kg/m<sup>2</sup>  
Sedentary lifestyle  
Dysfunctional eating patterns

### Desired Outcomes/Evaluation Criteria—Client Will

#### Knowledge: Treatment Regimen NOC

Identify correlation between hypertension and obesity.

#### Weight-Loss Behavior NOC

Demonstrate appropriate changes in lifestyle and behaviors, including eating patterns, food quantity and quality, to attain desirable body weight with optimal maintenance of health.  
Initiate and maintain individually appropriate exercise program.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Weight-Reduction Assistance</b> NIC <i>Independent</i>	
Assess client's understanding of direct relationship between hypertension and obesity.	Obesity is an added risk with hypertension because of the disproportion between fixed aortic capacity and increased cardiac output associated with increased body mass. Reduction in weight may reduce or eliminate the need for drug therapy needed to control BP. Note: Research suggests that losing just 10 pounds can help lower blood pressure 8 to 15 points (Mayo Clinic Staff, 2015a).
Discuss necessity for decreased caloric intake and limited intake of fats, salt, and sugar, as indicated.	Faulty eating habits contribute to atherosclerosis and obesity that can predispose to hypertension and subsequent complications, such as stroke, kidney disease, and heart failure. Excessive salt intake expands the intravascular fluid volume and may damage kidneys, which can further aggravate hypertension.
Determine client's desire to lose weight.	Motivation for weight reduction is internal. The individual must want to lose weight or the program most likely will not succeed.
Review usual daily caloric intake and dietary choices.	Identifies current strengths and weaknesses in dietary program. Aids in determining individual need for adjustment and teaching.
Establish a realistic weight-reduction plan with the client, such as weight loss of 1 to 2 pounds per week.	Slow reduction in weight is associated with fat loss with muscle sparing and generally reflects a change in eating habits.
Encourage client to maintain a diary of food intake, including when and where eating takes place and the circumstances and feelings around which the food was eaten.	Provides a database for both the adequacy of nutrients eaten and the relationship of emotion to eating. Helps focus attention on factors that client can control or change.
Instruct and assist client in appropriate food selections, such as implementing a diet rich in fruits, vegetables, and low-fat dairy foods referred to as the Dietary Approaches to Stop Hypertension (DASH) diet. Help the client identify—and thus avoid—foods high in saturated fat, such as butter, cheese, eggs, ice cream, and meat, and those that are high in cholesterol, such as whole dairy products, shrimp, and organ meats.	Moderation and use of low-fat products in place of total abstinence from certain food items may prevent client's sense of deprivation and enhance commitment to achieving health goals. Avoiding foods high in saturated fat and cholesterol is important in preventing progressing atherogenesis. The DASH diet, in conjunction with exercise, weight loss, and limits on salt intake, may reduce or even eliminate the need for drug therapy in early stages of hypertension (Mayo Clinic Staff, 2015a).
<i>Collaborative</i>	
Refer to dietitian or weight management programs, as indicated.	Can provide additional counseling and assistance with meeting individual dietary needs.

## NURSING DIAGNOSIS: Ineffective Coping

### May Be Related To

Situational crisis  
Insufficient sense of control  
Inadequate resources  
Ineffective tension release strategies  
Inadequate level of confidence in ability to cope

### Possibly Evidenced By

Reports inability to deal with situation or ask for help  
Ineffective coping strategies  
Inadequate problem-solving  
Destructive behavior toward self [overeating/smoking/failing to take medications], or use of forms of coping that impedes adaptive behavior

**NURSING DIAGNOSIS:** **Ineffective Coping** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Coping NOC**

- Identify ineffective coping behaviors and consequences.  
 Verbalize awareness of own coping abilities and strengths.  
 Identify potential stressful situations and steps to avoid or modify them.  
 Meet psychological needs, as evidenced by identification of options and use of resources.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Coping Enhancement NIC</b>	
<i>Independent</i>	
Assess effectiveness of coping strategies by observing behaviors, such as ability to verbalize feelings and concerns, and willingness to participate in the treatment plan.	Adaptive mechanisms are necessary to appropriately alter one's lifestyle, deal with the chronicity of hypertension, and integrate prescribed therapies into daily living.
Note reports of sleep disturbances, increasing fatigue, impaired concentration, irritability, decreased tolerance of headache, and inability to cope or problem-solve.	Manifestations of maladaptive coping mechanisms may be indicators of repressed anger and may contribute to hypertension.
Assist client to identify specific stressors and possible strategies for coping with them.	Recognition of stressors is often the first step in altering one's response to the stressor.
Include client in planning of care and encourage maximum participation in treatment plan and with the multidisciplinary team.	Involvement provides client with an ongoing sense of control, improves coping skills, and enhances commitment to achieving health goals. Ongoing intensive assessment and management by a team can promote timely adjustments to therapeutic regimen.
Encourage client to evaluate life priorities and personal goals. Ask questions such as, "Is what you are doing getting you what you want?"	Focuses client's attention on reality of present situation relative to client's goals. Strong work ethic, need for "control," and outward focus may have led to lack of attention to personal needs.
Assist client to identify and begin planning for necessary lifestyle changes. Assist to adjust, rather than abandon, personal and family goals.	Necessary changes should be realistically prioritized so client can avoid being overwhelmed and feeling powerless.

**NURSING DIAGNOSIS:** **ineffective Health Management****May Be Related To**

- Complexity of healthcare system or therapeutic regimen  
 Economically disadvantaged  
 Perceived seriousness of condition, susceptibility, benefit, or barrier  
 Insufficient knowledge of therapeutic regimen

**Possibly Evidenced By**

- Failure to take action to reduce risk factors  
 Failure to include treatment regimen in daily living  
 Unexpected acceleration of illness symptoms

**Desired Outcomes/Evaluation Criteria—Client Will****Health-Promoting Behavior NOC**

- Verbalize understanding of disease process and need and desire to change actions to achieve agreed-upon health goals.  
 Demonstrate behaviors and changes in lifestyle necessary to maintain therapeutic regimen.  
 Identify drug side effects and possible complications that necessitate medical attention.  
 Maintain BP within individually acceptable parameters.  
 Describe reasons for therapeutic actions and treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Assist client in identifying modifiable risk factors, such as obesity; diet high in sodium, saturated fats, and cholesterol; sedentary lifestyle; smoking; alcohol intake of more than two ounces per day on a regular basis; and a stressful lifestyle.	These risk factors contribute to hypertension and cardiovascular and renal disease.
Problem-solve with client to identify ways in which appropriate lifestyle changes can be made to reduce modifiable risk factors.	Changing “comfortable or usual” behavior patterns can be very difficult and stressful. Support, guidance, and empathy can enhance client’s success in accomplishing his or her health goals.
Discuss importance of eliminating smoking and assist client in formulating a plan to quit smoking. Refer to smoking cessation program or healthcare provider for helpful medications.	Nicotine increases catecholamine discharge, resulting in increased heart rate, BP, vasoconstriction, and myocardial workload, and reduces tissue oxygenation.
Reinforce the importance of adhering to treatment regimen and keeping follow-up appointments.	Lack of engagement in the treatment plan is a common reason for failure of antihypertensive therapy. Therefore, ongoing evaluation for client participation is critical to successful treatment. When client understands causative factors and consequences of inadequate intervention and is motivated to achieve health, the client typically participates in treatment interventions.
Instruct in and demonstrate BP self-monitoring technique, if needed. Observe client/significant other (SO) return demonstration. Evaluate client’s hearing, visual acuity, manual dexterity, and coordination.	Monitoring BP at home is reassuring to client because it provides visual feedback to determine treatment outcomes and helps promote early detection of deleterious changes.
Help client develop a simple, convenient schedule for taking medications.	Individualizing schedule to fit client’s personal habits may make it easier to get in the habit of including antihypertensives in healthcare management activities.
Explain prescribed medications along with their rationale, dosage, and expected and adverse side effects, such as the following:	Adequate information and understanding about side effects can enhance client’s commitment to the treatment plan. For instance, mood changes, initial weight gain, and dry mouth are common and often subside with time.
<b>Diuretics:</b> Take daily or larger dose in the early morning.	Scheduling doses early in the day minimizes nighttime urination.
Weigh self on a regular schedule and record.	Primary indicator of effectiveness of diuretic therapy.
Avoid or limit alcohol intake.	The combined vasodilating effect of alcohol and the volume-depleting effect of a diuretic greatly increase the risk of orthostatic hypotension.
Notify physician if unable to tolerate food or fluid.	Dehydration can develop rapidly if intake is poor and client continues to take a diuretic
<b>Antihypertensives:</b> Take prescribed dose on a regular schedule; avoid skipping, altering, or making up doses; and do not discontinue without notifying the healthcare provider. Review potential side effects and drug interactions, and discuss need for informing healthcare provider about onset of adverse effects such as erectile dysfunction (ED).	Because clients often cannot feel the difference the medication is making in BP, it is critical that there be understanding about the medication’s actions and side effects. For example, abruptly discontinuing a drug may cause rebound hypertension, leading to severe complications, or medication may need to be altered to reduce adverse effects. Note: Many drugs used to treat hypertension have been linked to ED. Drugs may need to be changed or dose adjusted.
Rise slowly from a lying to standing position, sitting for a few minutes before standing. Sleep with the head slightly elevated. Suggest frequent position changes and leg exercises when lying down.	Measures reduce potential for orthostatic hypotension associated with the use of vasodilators and diuretics.
Recommend avoiding hot baths, steam rooms, and saunas, especially with concomitant use of alcoholic beverages.	Prevents vasodilation with potential for dangerous side effects of syncope and hypotension.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct client to consult healthcare provider before taking other prescription or over-the-counter (OTC) medications.	Any drug that contains a sympathetic nervous stimulant may increase BP or counteract effects of antihypertensive medications.
Instruct client, as indicated, about increasing intake of foods and fluids high in potassium, such as oranges, bananas, figs, dates, tomatoes, potatoes, raisins, apricots, Gatorade, and fruit juices, and foods and fluids high in calcium, such as low-fat milk, yogurt, or calcium supplements.	Some diuretics can deplete potassium levels. Dietary potassium is a desirable means of correcting deficits and may be more palatable to the client than drug supplements. Correcting mineral deficiencies can also affect BP.
Review the signs and symptoms that require the client to notify the healthcare provider, such as headache present on awakening that does not abate; sudden and continued increase of BP; chest pain; shortness of breath; irregular or increased pulse rate; significant weight gain (2 lb/d or 5 lb/wk); peripheral or abdominal swelling; visual disturbances; frequent, uncontrollable nosebleeds; depression or emotional lability; severe dizziness or episodes of fainting; muscle weakness or cramping; nausea or vomiting; or excessive thirst.	Early detection and reporting of developing complications, decreased effectiveness of drug regimen, or adverse reactions allow for timely intervention.
Explain rationale for prescribed dietary regimen—usually a diet low in sodium, saturated fat, and cholesterol.	Excess saturated fats, cholesterol, sodium, alcohol, and calories have been defined as nutritional risks in hypertension. A diet low in fat and high in polyunsaturated fat reduces BP, possibly through prostaglandin balance in both normotensive and hypertensive people.
Help client identify sources of sodium intake, such as table salt, salty snacks, processed meats and cheeses, sauerkraut, sauces, canned soups and vegetables, baking soda, baking powder, and monosodium glutamate. Emphasize the importance of reading ingredient labels of foods and OTC drugs.	A moderately low-salt diet may be sufficient to control mild hypertension or reduce or eliminate the need for drug therapy to control BP.
Encourage foods rich in essential fatty acids, such as salmon, cod, mackerel, and tuna.	Omega-3 fatty acids in fish tend to relax artery walls, reducing blood pressure. They also make blood thinner and less likely to clot.
Encourage client to establish a regular exercise program, incorporating aerobic exercise within client's capabilities. Stress the importance of avoiding isometric activity.	Besides helping to lower BP, aerobic activity aids in toning the cardiovascular system. Isometric exercise can increase serum catecholamine levels, further elevating BP.
Demonstrate application of ice pack to the back of the neck and pressure over the distal third of nose, and recommend that client lean head forward if nosebleed occurs.	Nasal capillaries may rupture as a result of excessive vascular pressure. Cold temperature and pressure constrict capillaries to slow or halt bleeding. Leaning forward reduces the amount of blood that is swallowed.
Provide information regarding community resources, and support client in making lifestyle changes. Initiate referrals, as indicated.	Community resources, such as the American Heart Association, "coronary clubs," stop smoking clinics, alcohol or drug rehabilitation, weight-loss programs, stress management classes, and counseling services, may be helpful in client's efforts to initiate and maintain lifestyle changes.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **risk for Activity Intolerance**—risk for circulatory problem or respiratory condition, physical deconditioning, age
- **Overweight**—energy expenditure below energy intake based on standard assessment, portion sizes larger than recommended, average daily physical activity is less than recommended for gender and age
- **ineffective Health Management**—complexity of therapeutic regimen, economic difficulties, perceived seriousness
- **Sexual Dysfunction**—altered body function (activity intolerance, side effects of medications)
- **readiness for enhanced family Coping**—SO(s) moves in direction of health promotion

# HEART FAILURE: CHRONIC

## I. Pathophysiology

- a. Remodeling of the myocardium (as a structural response to injury) changes the heart from an efficient football shape to an inefficient basketball shape, making coordinated contractility difficult.
  - i. Ventricular dilation (systolic dysfunction) results in poor contractility and inadequate emptying of chamber.
  - ii. Ventricular stiffening (diastolic dysfunction) impairs ability of chamber to relax and receive and eject blood.
- b. Failure of the left and/or right chambers of the heart results in insufficient output to meet metabolic needs of organ and tissues.
- c. Cardiac-related elevation of pulmonary or systemic venous pressures leads to organ congestion.
- d. Backward heart failure (HF): Passive engorgement of the veins caused by elevated systemic venous pressure or a “backward” rise in pressure proximal to the failing cardiac chambers (right ventricular failure).
- e. Forward HF: Decreased cardiac output with reduced forward flow into the aorta, systemic circulation (inadequate renal blood flow leads to sodium and water retention), and increasing pulmonary venous pressure results in fluid accumulation in alveoli (left ventricular failure).
- f. Myocardial muscle dysfunction associated with left ventricular hypertrophy (LVH) causes decreased cardiac output, activating neurohormones.
- g. Elevated circulating or tissue levels of neurohormones, norepinephrine, angiotensin II, aldosterone, endothelin, vasopressin, and cytokines cause sodium retention and peripheral vasoconstriction, increasing hemodynamic stresses on the ventricle.

## II. Classification

- a. Stages (American College of Cardiology/American Heart Association [ACC/AHA], 2013; Oberg & Guarneri, 2016). Guidelines include specific recommendations for each stage.
  - i. Stage A—high risk for HF associated with such conditions as hypertension, diabetes, and obesity. Treatment is focused on comorbidities and reduction of cardiotoxic agents (e.g., tobacco/other drug use).

- ii. Stage B—presence of structural heart disease, causing damage, such as LVH or previous myocardial infarction (MI), but is asymptomatic. Treatment is focused on retarding the progression of ventricular remodeling and delaying the onset of HF symptoms.
- iii. Stage C—clients with past or current HF symptoms associated with structural heart disease and damage, such as advanced ventricular remodeling. Treatment is focused on modifying fluid and dietary intake and drug therapies as well as nonpharmacological measures, such as biventricular pacing and valvular or revascularization surgery, to improve left ventricular function and client’s functional abilities.
- iv. Stage D—refractory advanced HF symptoms at rest or with minimal exertion and frequently requiring intervention in the acute setting. Treatment is focused on promoting clinical stability, including supportive therapy to sustain life, such as left ventricular assist device, continuous intravenous (IV) inotropic therapy, experimental surgery or drugs, a heart transplant, or end-of-life or hospice care.

## III. Etiology

### a. Multifactorial

- i. Complex clinical syndrome resulting from any structural or functional cardiac disorder that impairs the ability of the ventricle to fill with or eject blood (ACC/AHA, 2013).
- ii. Risk factors and comorbidities—hypertension; obesity; diabetes; coronary artery disease (CAD); peripheral and cerebrovascular disease; valvular heart disease with onset of atrial fibrillation (AF); sleep disorders such as sleep apnea; history of exposure to cardiotoxins, for example, chemotherapy, alcohol, and cocaine; family history of cardiomyopathy.

## IV. Statistics

- a. Morbidity: 5.7 million Americans have HF (American Heart Association [AHA] Statistical Update, 2016).
- b. Mortality: The number of any-mention deaths attributable to HF in the United States in 2013 was approximately 300,000 (American Heart Association News, 2015).
- c. Cost: Direct and indirect costs estimated to be \$30.7 billion annually in 2012 (AHA, 2015a).

## G L O S S A R Y

**Angiotensin-converting enzyme inhibitor (ACEI) (also called ACE inhibitor):** Medication that blocks the action of the angiotensin-converting enzyme in the lungs so that angiotensin I is not converted into angiotensin II. The production of this powerful blood vessel constrictor is thereby prevented and blood vessels remain dilated, which results in lower blood pressure.

**Angiotensin receptor blocker (ARB):** Medication that blocks the chemical receptors for angiotensin II on the small arteries. Therefore, the angiotensin cannot cause these arteries to constrict, which lowers blood pressure.

**Ascites:** Accumulation of fluid in the abdominal cavity can be associated with increased blood pressure in the veins draining the liver, with impaired drainage in the lymph system, and with low levels of albumin and other proteins in the blood.

**Bendopneia:** Shortness of breath that occurs while bending over at the waist. Phrase coined by researchers in a Texas study that found this symptom in individuals with advanced forms of heart failure. The presence of bendopneia was more commonly experienced by those who had significant fluid retention, as well as elevated cardiac pressures (Thibodeau et al, 2014).

**G L O S S A R Y** (continued)

**Cardiac remodeling:** The left ventricular chamber dilates and becomes more spherical. This condition increases the stress on the myocardial walls and depresses cardiac performance. Remodeling often precedes symptoms and may contribute to worsening of symptoms despite treatment (Paul & Hice, 2014).

**Heart failure (HF):** A clinical syndrome characterized by inadequate systemic perfusion to meet the body's metabolic demands because of impaired cardiac pump function owing to a weakened or thickened heart muscle. Heart failure may be left-sided (systolic) or right-sided (diastolic) (Oberg & Guarneri, 2016).

**Heart sounds:**  $S_1$  corresponds to the closure of mitral and tricuspid valves.  $S_2$  corresponds to closure of the aortic

and pulmonary valves.  $S_3$ , heard mid-diastolic at the apex, is a low-pitched gallop or blowing sound sometimes called a ventricular gallop and is a common sign of left ventricular failure or distension in adults.

**Positive hepatojugular reflex:** An elevation of venous pressure, visible in the jugular veins and measurable in the veins of the arm, which is produced by firm pressure with the flat hand over the abdomen in active or impending congestive heart failure.

**Pulsus alternans:** Alternating weak and strong beats of the pulse associated with weak left ventricular function.

**Pulse pressure:** Difference between systolic and diastolic blood pressures.

**CARE SETTING**

Although generally managed at the community level, an in-client stay may be required for periodic exacerbation of failure or development of complications.

**RELATED CONCERNS**

Acute coronary syndrome, page 54

Myocardial infarction, page 72

Hypertension: severe, page 26

Cardiac surgery, page 98

Dysrhythmias, page 85

Aortic aneurysms, page 110

Psychosocial aspects of care, page 835

**CLIENT ASSESSMENT DATABASE****DIAGNOSTIC DIVISION  
MAY REPORT****MAY EXHIBIT****ACTIVITY/REST**

- Fatigue, exhaustion progressing throughout the day
- Inability to perform normal daily activities, such as making bed, climbing stairs, and so on
- Exercise intolerance
- Dyspnea at rest or with exertion
- Insomnia, inability to sleep flat

- Limited exercise tolerance
- Fatigue
- Restlessness, mental status changes, such as anxiety and lethargy
- Vital sign changes with activity

**CIRCULATION**

- History of hypertension, recent or past MIs, multiple MIs, previous episodes of HF, valvular heart disease, cardiac surgery, endocarditis, systemic lupus erythematosus, anemia, septic shock
- Feeling that heart is skipping, fluttering, pounding, or “stopping”
- Swelling of feet, legs, abdomen, or “belt too tight”

- **Blood pressure (BP)** May be low with cardiac pump failure; in normal range with mild or chronic HF; or high with fluid overload, left-sided HF, and increased systemic vascular resistance (SVR)
- **Pulses:** Peripheral pulses diminished; central pulses may be bounding, for example, visible jugular, carotid, abdominal pulsations, pulse pressure narrow, reflecting reduced ventricular stroke volume
- Pulsus alternans may be noted
- **Heart rate and rhythm:** Tachycardia; dysrhythmias such as atrial fibrillation, premature ventricular contractions, heart blocks
- **Apical pulse:** Point of maximal intensity (PMI) diffuse and displaced to the left

(continues on page 40)

**CLIENT ASSESSMENT DATABASE (contd.)****MAY REPORT (continued)****MAY EXHIBIT (continued)****EGO INTEGRITY**

- Anxiety, apprehension, fear
- Depression
- Stress related to illness or financial concerns (job, cost of medical care)

**ELIMINATION**

- Decreased voiding, dark urine
- Night voiding

**FOOD/FLUID**

- History of diet high in salt and processed foods, fat, sugar, and caffeine
- Loss of appetite, anorexia
- Nausea, vomiting
- Significant weight gain (may not respond to diuretic use)
- Tight clothing or shoes
- Use of diuretics

**HYGIENE**

- Fatigue, weakness, exhaustion during self-care activities

- **Heart sounds:** S<sub>1</sub> and S<sub>2</sub> possibly softened; S<sub>3</sub> gallop rhythm diagnostic of congestive HF; S<sub>4</sub> can occur with hypertension; systolic and diastolic murmurs can indicate the presence of valvular stenosis or insufficiency, causing or exacerbating heart failure.

- Skin tissue color pale, ashen, dusky, or cyanotic
- Nail beds pale or cyanotic, with slow capillary refill
- Edema dependent, generalized, or pitting, especially in extremities
- Bulging neck veins (jugular vein distention [JVD])
- Liver enlarged and palpable; positive hepatojugular reflex may be present in right-sided HF

- Various behavioral manifestations, for example, anxiety, anger, fear, irritability
- Studies have shown that older adults (especially) may experience depression along with coronary heart disease and heart failure and associated decreased functional abilities (Sin et al, 2015)

- Decreased daytime urination and increased nighttime urination (nocturia)

- Rapid or continuous weight gain
- Abdominal distention, suggesting ascites or liver engorgement
- Generalized edema, including whole-body or lower extremity swelling—edema generalized, dependent, pitting, brawny

**NEUROSENSORY**

- Weakness
- Dizziness
- Fainting episodes

- Appearance indicative of neglect of personal care

- Lethargy, confusion, disorientation
- Behavior changes, irritability

**PAIN/DISCOMFORT**

- Chest pain
- Chronic or acute angina
- Right upper abdominal pain (right-sided HF)
- Generalized muscle aches and pains

- Restlessness
- Narrowed focus and withdrawal
- Guarding behavior

**RESPIRATION**

- Dyspnea with exertion or rest
- Nocturnal dyspnea that interrupts sleep (also sometimes called paroxysmal nocturnal dyspnea [PND]) relieved by sitting up or standing. This symptom is often present in exacerbations of heart failure (Fogoros, 2017a).
- Sleeping sitting up or with several pillows
- Cough with or without sputum production, especially when recumbent
- Use of respiratory aids, for example, oxygen or medications

- Tachypnea
- Shallow, labored breathing
- Gasping for air, often coughing, and feeling a compelling need to get out of bed (PND)
- Use of accessory muscles, nasal flaring
- Moist cough with left-sided HF (congestive)
- Dry persistent cough
- Sputum may be blood-tinged, pink, and frothy (pulmonary edema)

**MAY REPORT (continued)****SAFETY****SOCIAL INTERACTION**

- Decreased participation in usual social activities

**TEACHING/LEARNING**

- Family history of developing HF at young age (genetic form)
- Family risk factors, such as heart disease, hypertension, diabetes
- Use or misuse of cardiac medications
- Use of vitamins, herbal supplements, for example, niacin, coenzyme Q10, garlic, ginkgo, black hellebore, dandelion, or aspirin
- Recent or recurrent hospitalizations
- Evidence of failure to improve

**DISCHARGE PLAN CONSIDERATIONS**

- Assistance with shopping, transportation, self-care needs, homemaker and maintenance tasks
- Alteration in medication use or therapy
- Changes in physical layout of home
- May need oxygen at home

► Refer to section at end of plan for postdischarge considerations.

**MAY EXHIBIT (continued)**

- Breath sounds may be diminished, with bibasilar crackles and wheezes
- Mentation may be diminished; lethargy, restlessness present
- Pallor or cyanosis

- Changes in mentation and confusion
- Loss of strength or muscle tone
- Increasing risk for falls
- Skin excoriations, rashes

- Many factors impact patient understanding and implementation of self-management, including health literacy (the average HF patient has low health literacy), cognitive impairment, learning ability, language barriers, readiness to learn/sense of priority, influence of illness, the need to learn a large volume of information within a short period of time, and healthcare provider education training.

**DIAGNOSTIC STUDIES****TEST****WHY IT IS DONE****WHAT IT TELLS ME****BLOOD TESTS**

- Atrial natriuretic peptide (ANP):** Hormone secreted from right atrial cells when pressure increases.
- Beta-type natriuretic peptide (BNP):** Neurohormone secreted from the cardiac ventricles as a response to ventricular volume and fluid overload.

Increased in congestive HF.

The level of BNP in the blood increases when symptoms of HF worsen and decreases when symptoms of HF improve to stable condition. Elevation of BNP correlates with both the severity of symptoms and the prognosis in congestive HF. A level of BNP that is greater than 100 pg/mL is predictive of HF and increased risk of sudden death and 1-year mortality (Kociol et al, 2011). Note: A variation of BNP, called N-terminal BNP, also is useful in diagnosing heart failure and in some laboratories is used instead of BNP (Mayo Clinic Staff, 2014).

(continues on page 42)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li>• <b>Liver enzyme tests, alanine aminotransferase (ALT) and aspartate aminotransferase (AST) (formally referred to as SGPT and SGOT):</b> To determine degree of end-organ involvement.</li> <li>• <b>Erythrocyte sedimentation rate (ESR):</b> Shows the alteration of blood proteins caused by inflammatory and necrotic processes.</li> <li>• <b>Bleeding and clotting times:</b> Clotting factors, prothrombin time (PT), partial thromboplastin time (PTT), platelets.</li> <li>• <b>Electrolytes (sodium, potassium, chloride, magnesium, calcium):</b> Elements or chemicals needed for the body and heart to work properly.</li> <li>• <b>Arterial blood gas (ABG):</b> Measures arterial pH, PCO<sub>2</sub>, and PO<sub>2</sub>. Evaluates respiratory function and provides a measure for determining acid-base balance.</li> <li>• <b>Albumin and transferrin, total protein:</b> Plasma proteins exert oncotic pressure needed to keep fluid in the capillaries.</li> <li>• <b>Thyroid studies:</b> Blood test and scan to evaluate thyroid function. The most commonly used laboratory screening test is the measurement of thyroid-stimulating hormone (TSH).</li> <li>• <b>Blood urea nitrogen (BUN) and creatinine:</b> BUN levels reflect the balance between production and excretion of urea. Creatine is an end-product of creatinine metabolism and must be cleared from blood via the kidneys.</li> </ul>	<p>Elevated in liver congestion, which may be present in right-sided HF.</p> <p>May be elevated, indicating acute systemic inflammatory reaction, especially if viral infection is cause of HF.</p> <p>Identifies those at risk for excessive clot formation and identifies therapeutic range for anticoagulant therapy.</p> <p>Electrolytes may be altered because of fluid shifts and decreased renal function associated with HF and medications (e.g., diuretics, ACE inhibitors) used in HF treatment.</p> <p>Left ventricular failure is characterized by mild respiratory alkalosis (early); respiratory acidosis, with hypoxemia; and increased PCO<sub>2</sub>, with decompensated HF.</p> <p>May be decreased as a result of reduced protein intake (nutritional) or reduced protein synthesis (congested liver associated with HF).</p> <p>Increased thyroid activity suggests thyroid hyperactivity as precipitator of HF. Hypothyroidism can also cause or exacerbate HF.</p> <p>Elevated BUN suggests decreased renal perfusion as may occur with HF or as a side effect of prescribed medications (e.g., diuretics and ACE inhibitors). Elevation of both BUN and creatinine is typical in HF.</p>
<ul style="list-style-type: none"> <li>• <b>Chest x-ray:</b> Evaluates organs and structures within the chest.</li> <li>• <b>Electrocardiogram (ECG):</b> Record of the electrical activity of the heart.</li> <li>• <b>Echocardiography (also called two-dimensional echocardiogram or Doppler ultrasound):</b> Evaluates the left ventricle, including size, valvular function, wall thickness, and pumping action as measured by the ejection fraction (EF).</li> <li>• <b>Stress test (also called exercise treadmill or exercise ECG):</b> Raises heart rate and BP by means of exercise; heart rate can also be raised pharmacologically using such drugs as dobutamine or dipyridamole.</li> <li>• <b>Cardiac angiography (also called cardiac catheterization):</b> Assesses patency of coronary arteries, reveals abnormal heart and valve size or shape, and evaluates ventricular contractility. Pressures can be measured within each chamber of the heart and across the valves.</li> </ul>	<p>May demonstrate calcification in valve areas or aorta, causing blood flow obstruction, or cardiac enlargement, indicating HF.</p> <p>An abnormal ECG can point out the underlying cause of HF, such as ventricular hypertrophy, valvular dysfunction, ischemia, and myocardial damage patterns.</p> <p>May reveal enlarged chamber dimensions or alterations in valvular and ventricular function and structure. EF is reduced (less than 50%), indicating systolic dysfunction, or “preserved” (normal is 50% to 65%), indicating diastolic dysfunction. (AHA, 2017).</p> <p>Helps detect valvular heart disease ventricular remodeling and structural anomalies and problems with coronary circulation affecting heart function.</p> <p>Abnormal pressures indicate problems with ventricular function, helping to identify valvular stenosis or insufficiency and differentiating right-sided versus left-sided HF.</p>
<b>NURSING PRIORITIES</b> <ol style="list-style-type: none"> <li>1. Improve myocardial contractility and systemic perfusion.</li> <li>2. Reduce fluid volume overload.</li> <li>3. Prevent complications.</li> <li>4. Provide information about disease and prognosis, therapy needs, and prevention of recurrences.</li> </ol>	<b>DISCHARGE GOALS</b> <ol style="list-style-type: none"> <li>1. Cardiac output adequate for individual needs.</li> <li>2. Complications prevented or resolved.</li> <li>3. Optimum level of activity and functioning attained.</li> <li>4. Disease process, prognosis, and therapeutic regimen understood.</li> <li>5. Plan in place to meet needs after discharge.</li> </ol>

**NURSING DIAGNOSIS:** **decreased Cardiac Output****May Be Related To**

Altered contractility (such as valvular defects and ventricular aneurysm)  
 Alteration in heart rate, rhythm  
 Altered afterload (e.g., systemic vascular resistance)

**Possibly Evidenced By**

Altered heart rate/rhythm: Bradycardia, tachycardia, arrhythmias, ECG changes  
 Variations in blood pressure readings (hypotension, hypertension)  
 Decreased peripheral pulses  
 $S_3$ ,  $S_4$  heart sounds  
 Orthopnea, crackles, jugular vein distension, edema, weight gain  
 Skin color changes, clammy skin  
 Oliguria

**Desired Outcomes/Evaluation Criteria—Client Will****Cardiac Pump Effectiveness NOC**

Display vital signs within acceptable limits, dysrhythmias absent or controlled, and no symptoms of failure, for example, hemodynamic parameters within acceptable limits and urinary output adequate.  
 Report decreased episodes of dyspnea and angina.

**Self-Management: Heart Failure NOC**

Participate in activities that reduce cardiac workload.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hemodynamic Regulation NIC</b> <i>Independent</i>	
Auscultate apical pulse; assess heart rate, rhythm, and document dysrhythmia if telemetry available.	Tachycardia is usually present, even at rest, to compensate for decreased ventricular contractility. Premature atrial contractions (PACs), paroxysmal atrial tachycardia (PAT), PVCs, multifocal atrial tachycardia (MAT), and AF are common dysrhythmias associated with HF, although others may also occur. Note: Intractable ventricular dysrhythmias unresponsive to medication suggest ventricular aneurysm.
Note heart sounds.	$S_1$ and $S_2$ may be weak because of diminished pumping action. Gallop rhythms are common ( $S_3$ and $S_4$ ), produced as blood flows into noncompliant, distended chambers. Murmurs may reflect valvular incompetence and stenosis.
Palpate peripheral pulses.	Decreased cardiac output may be reflected in diminished radial, popliteal, dorsalis pedis, and posttibial pulses. Pulses may be fleeting or irregular to palpation, and pulsus alternans may be present.
Monitor BP	In early, moderate, or chronic HF, BP may be elevated because of increased SVR. In advanced HF, the body may no longer be able to compensate, and profound or irreversible hypotension may occur. Note: Many clients with HF have consistently low systolic BP (80 to 100 mm Hg) due to their disease process and the medications they take.
Inspect skin for pallor and cyanosis.	Pallor is indicative of diminished peripheral perfusion secondary to inadequate cardiac output, vasoconstriction, and anemia. Cyanosis may develop in refractory HF. Dependent areas are often blue or mottled as venous congestion increases.

(continues on page 44)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor urine output, noting decreasing output and dark or concentrated urine.	Kidneys respond to reduced cardiac output by retaining water and sodium. Urine output is usually decreased during the day because of fluid shifts into tissues but may be increased at night because fluid returns to circulation when client is recumbent.
Note changes in sensorium, for example, lethargy, confusion, disorientation, anxiety, and depression.	May indicate inadequate cerebral perfusion secondary to decreased cardiac output.
Encourage rest, semi-recumbent in bed or chair. Assist with physical care, as indicated.	Physical rest should be maintained during acute or refractory HF to improve efficiency of cardiac contraction and to decrease myocardial oxygen consumption and workload.
Provide quiet environment, explain medical and nursing management, help client avoid stressful situations, listen and respond to expressions of feelings or fears.	Physical and psychological rest helps reduce stress, which can produce vasoconstriction, elevating BP and increasing heart rate and work.
Provide bedside commode. Have client avoid activities eliciting a vasovagal response, for instance, straining during defecation and holding breath during position changes.	Commode use decreases work of getting to bathroom or struggling to use bedpan. Vasovagal maneuver causes vagal stimulation followed by rebound tachycardia, which further compromises cardiac function and output.
Elevate legs, avoiding pressure under knee. Encourage active and passive exercises. Increase ambulation and activity as tolerated.	Decreases venous stasis and may reduce incidence of thrombus and embolus formation.
Check for calf tenderness; diminished pedal pulse; and swelling, local redness, or pallor of extremity.	Reduced cardiac output, venous pooling and stasis, and enforced bedrest increase risk of thrombophlebitis.
Withhold digoxin, as indicated, and notify physician if marked changes occur in cardiac rate or rhythm or signs of digoxin toxicity occur.	Incidence of toxicity is high (20%) because of narrow margin between therapeutic and toxic ranges. Digoxin may have to be discontinued in the presence of toxic drug levels, a slow heart rate, or low potassium level. (Refer to CP: Dysrhythmias; ND: risk for Poisoning [Digoxin Toxicity].)
<b>Collaborative</b>	
Administer supplemental oxygen, as indicated.	Increases available oxygen for myocardial uptake to combat effects of hypoxia and ischemia.
Administer medications, as indicated, for example:	A variety of medications (usually a combination of a diuretic, an ACEI, or ARB and beta blocker) may be used to increase stroke volume, improve contractility, and reduce congestion. Note: New first-line drugs that have recently been approved for treatment of heart failure include sacubitril/valsartan (Entresto) and ivabradine (Corlanor). These drugs are given to improve outcomes in certain types of heart failure associated with low ventricular output or to clients who are unable to respond well to beta blockers (Husar, 2016).
Loop diuretics, such as furosemide (Lasix), ethacrynic acid (Edecrin), and bumetanide (Bumex); thiazide and thiazide-like diuretics, such as hydrochlorothiazide (HCTZ) and metolazone (Zaroxolyn)	Diuretics, in conjunction with restriction of dietary sodium and fluids, often lead to clinical improvement in clients with stages I and II HF. In general, type and dosage of diuretic depend on cause and degree of HF and state of renal function. Preload reduction is most useful in treating clients with a relatively normal cardiac output accompanied by congestive symptoms. Loop diuretics block chloride reabsorption, thus interfering with the reabsorption of sodium and water.
ACE inhibitors, such as enalapril (Vasotec), captopril (Capoten), lisinopril (Prinivil), quinapril (Accupril), ramipril (Altace), and moexipril (Univasc)	ACE inhibitors represent first-line therapy to control HF by decreasing ventricular filling pressures and SVR while increasing cardiac output with little or no change in BP and heart rate.
ARBs (also known as angiotensin II receptor antagonists), such as candesartan (Atacand), losartan (Cozaar), eprosartan (Teveten), irbesartan (Avapro), and valsartan (Diovan)	Antihypertensive and cardioprotective effects are attributable to selective blockade of AT <sub>1</sub> (angiotensin II) receptors and angiotensin II synthesis. Note: ARBs used in combination with ACE inhibitors and beta blockers are thought to have decreased hospitalizations for HF clients.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Vasodilators, such as nitrates (Nitro-Dur, Isordil); arteriodilators such as hydralazine (Apresoline); combination drugs, such as prazosin (Minipress) and nesiritide (Natrecor)	Vasodilators are used to increase cardiac and renal output, reducing circulating volume (preload and afterload), and decreasing SVR, thereby reducing ventricular workload. Note: Nesiritide is used in acutely decompensated congestive HF and has been used with digoxin, diuretics, and ACE inhibitors. Parenteral vasodilators are reserved for clients with severe HF or those unable to take oral medications.
$\beta$ -adrenergic receptor antagonists (also called beta blockers), carvedilol (Coreg), bisoprolol (Zebeta), metoprolol (Lopressor, Toprol), nebivolol (Bystolic), acebutolol (Sectral), atenolol (Tenormin), betaxolol (Kerlone), carteolol (Cartrol), esmolol (Brevibloc), penbutolol (Levatol), nadolol (Corgard), and pindolol (Visken)	Useful in the treatment of HF by blocking the cardiac effects of chronic adrenergic stimulation. Many clients experience improved activity tolerance and EF.
Inotropic agents, such as amrinone (Inocor), milrinone (Primacor), and vesnarinone (Arkin-Z)	These medications are useful for short-term treatment of HF unresponsive to cardiac glycosides, vasodilators, and diuretics in order to increase myocardial contractility and produce vasodilation.
Digoxin (Lanoxin)	Digoxin is no longer used routinely in HF but may be prescribed for symptomatic individuals with late-stage HF on maximal medication therapy (Suter et al, 2012). Note: In 2015, the American Geriatrics Society (AGS) stated that digoxin is to be “avoided as first-line therapy for heart failure . . . and may be associated with increased mortality” (AGS, 2015).
Antianxiety agents and sedatives	Allays anxiety and breaks the feedback cycle of anxiety to catecholamine release to anxiety. Promotes rest and relaxation, reducing oxygen demand and myocardial workload.
Anticoagulants, such as low-dose heparin, and warfarin (Coumadin), or antiplatelet agents, for example, low-dose aspirin, clopidogrel (Plavix), and tirofiban (Aggrastat)	May be used prophylactically to prevent thrombus and embolus formation in the presence of risk factors, such as venous stasis, enforced bedrest, cardiac dysrhythmias, and history of previous thrombotic episodes.
Administer IV solutions, restricting total amount, as indicated. Avoid saline solutions.	Because of existing elevated left ventricular pressure, client may not tolerate increased fluid volume (preload). Clients with HF also excrete less sodium, which causes fluid retention and increases myocardial workload.
Monitor and replace electrolytes, as indicated.	Fluid shifts and use of diuretics can alter electrolytes (especially potassium and chloride), which affect cardiac rhythm and contractility.
Monitor serial ECG and chest x-ray changes.	ST-segment depression and T-wave flattening can develop because of increased myocardial oxygen demand, even if no CAD is present. Chest x-ray may show enlarged heart and changes of pulmonary congestion.
Measure cardiac output and other functional parameters, as indicated.	Cardiac index, preload and afterload, contractility, and cardiac work can be measured noninvasively by using thoracic electrical bioimpedance (TEB) technique. TEB is useful in determining effectiveness of therapeutic interventions and response to activity.
Prepare for insertion and maintain pacemaker or pacemaker/defibrillator, if indicated.	May be necessary to correct bradydysrhythmias unresponsive to drug intervention, which can aggravate congestive failure and produce pulmonary edema. Note: Biventricular pacemaker and cardiac defibrillators are designed to provide resynchronization for the heart by simultaneous electrical activation of both the right and left sides of the heart, thereby creating a more effective and efficient pump.

(continues on page 46)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Prepare for surgery, such as valve replacement, angioplasty, and coronary artery bypass grafting (CABG), as indicated:	HF due to ventricular aneurysm or valvular dysfunction may require aneurysmectomy or valve replacement to improve myocardial contractility and function. Revascularization of cardiac muscle by CABG may be done to improve cardiac function.
Cardiomyoplasty	Cardiomyoplasty, an experimental procedure in which the latissimus dorsi muscle is wrapped around the heart and electrically stimulated to contract with each heartbeat, may be done to augment ventricular function while the client is awaiting cardiac transplantation or when transplantation is not an option. Note: Cellular cardiomyoplasty is a developing therapy that uses stem cells or progenitor cells for injured heart to improve cardiac function and mitigate heart failure. A significant improvement in cardiac function, metabolism, and perfusion has been observed in clinical trials; however, the procedure requires further study (Lamb et al, 2015).
Assist with and maintain mechanical circulatory support system, such as intra-aortic balloon pump (IABP) or left-ventricular assist device (LVAD), when indicated.	An IABP may be inserted into the aorta as a temporary support to the failing heart in the critically ill client with potentially reversible HF. A short (external) or long-term (implanted) LVAD may also be used, sometimes as a bridge to transplantation. A growing use of the LVAD is in so-called destination therapy (DT). The DT population typically includes individuals with end-stage heart failure and poor predictive survival in their current medical state. These people are also noneligible for transplantation, usually due to advanced age, significant comorbidities, or psychosocial issues contraindicating transplant. Clients who undergo LVAD implantation live the rest of their lives with the device in place.

## NURSING DIAGNOSIS: Activity Intolerance

### May Be Related To

Imbalance between oxygen supply and demand

Generalized weakness

Sedentary lifestyle

### Possibly Evidenced By

Reports fatigue, feeling weak

Abnormal blood pressure/heart rate in response to activity

Exertional dyspnea

### Desired Outcomes/Evaluation Criteria—Client Will

#### Endurance NOC

Participate in desired activities; meet own self-care needs.

Achieve measurable increase in activity tolerance, evidenced by reduced fatigue and weakness and by vital signs within acceptable limits during activity.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Energy Management NIC</b> <i>Independent</i> Check vital signs before and immediately after activity during acute episode or exacerbation of HF, especially if client is receiving vasodilators, diuretics, or beta blockers.	Orthostatic hypotension can occur with activity because of medication effect (vasodilation), fluid shifts (diuresis), or compromised cardiac pumping function.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Document cardiopulmonary response to activity. Note tachycardia, dysrhythmias, dyspnea, diaphoresis, and pallor.	Compromised myocardium and inability to increase stroke volume during activity may cause an immediate increase in heart rate and oxygen demands, thereby aggravating weakness and fatigue.
Assess level of fatigue, and evaluate for other precipitators and causes of fatigue, for example, HF treatments, pain, cachexia, anemia, and depression.	Fatigue because of advanced HF can be profound and is related to hemodynamic, respiratory, and peripheral muscle abnormalities. Fatigue is also a side effect of some medications (e.g., beta blockers). Other key causes of fatigue should be evaluated and treated as appropriate and desired.
Evaluate accelerating activity intolerance.	May denote increasing cardiac decompensation rather than overactivity.
Provide assistance with self-care activities, as indicated. Intersperse activity with rest periods.	Meets client's personal care needs without undue myocardial stress or excessive oxygen demand.
<b>Collaborative</b> Implement graded cardiac rehabilitation and activity program.	Strengthens and improves cardiac function under stress if cardiac dysfunction is not irreversible. Gradual increase in activity avoids excessive myocardial workload and oxygen consumption.

NURSING DIAGNOSIS: <b>excess Fluid Volume</b>
<b>May Be Related To</b> Compromised regulatory mechanism (reduced glomerular filtration rate, increased antidiuretic hormone [ADH] production, and sodium and water retention) Excess sodium intake
<b>Possibly Evidenced By</b> Orthopnea, S <sub>3</sub> heart sound Oliguria, increase in central venous pressure, positive hepatojugular reflex Weight gain over short period of time; edema Blood pressure changes Pulmonary congestion, adventitious breath sounds
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>
<b>Fluid Overload Severity NOC</b> Demonstrate stabilized fluid volume with balanced intake and output, breath sounds clear or clearing, vital signs within acceptable range, stable weight, and absence of edema. Verbalize understanding of individual dietary and fluid restrictions.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Management NIC</b>	
<b>Independent</b>	
Monitor urine output, noting amount and color, as well as time of day when diuresis occurs.	Urine output may be scanty and concentrated (especially during the day) because of reduced renal perfusion. Recumbency favors diuresis; therefore, urine output may be increased at night or during bedrest.
Monitor 24-hour intake and output (I&O) balance.	Diuretic therapy may result in sudden or excessive fluid loss, creating a circulating hypovolemia, even though edema and ascites remain in the client with advanced HF or CHF.
Maintain chair rest or bedrest in semi-Fowler's position during acute phase.	Recumbency increases glomerular filtration and decreases production of ADH, thereby enhancing diuresis.
Establish fluid intake schedule if fluids are medically restricted, incorporating beverage preferences when possible. Give frequent mouth care and ice chips as part of fluid allotment.	Involving client in therapy regimen may enhance sense of control and cooperation with restrictions.

(continues on page 48)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Weigh daily.	Documents changes in or resolution of edema in response to therapy. A gain of 5 lb represents approximately 2 L of fluid. Conversely, diuretics can result in rapid and excessive fluid shifts and weight loss.
Assess for distended neck and peripheral vessels. Inspect dependent body areas for edema with and without pitting; note presence of generalized body edema (anasarca).	Excessive fluid retention may be manifested by venous engorgement and edema formation. Peripheral edema begins in feet and ankles, or dependent areas, and ascends as failure worsens. Pitting edema is generally obvious only after retention of at least 10 lb of fluid. Increased vascular congestion—associated with right-sided HF—eventually results in systemic tissue edema.
(Refer to ND: risk for impaired Skin Integrity.)	Edema formation, slowed circulation, altered nutritional intake, and prolonged immobility or bedrest are cumulative stressors that affect skin integrity and require close supervision and preventive interventions.
Auscultate breath sounds, noting decreased and adventitious sounds, for example, crackles and wheezes. Note presence of increased dyspnea, tachypnea, orthopnea, paroxysmal nocturnal dyspnea, and persistent cough.	Excess fluid volume often leads to pulmonary congestion. Symptoms of pulmonary edema may reflect acute left-sided HF. With right-sided HF, respiratory symptoms of dyspnea, cough, and orthopnea may have slower onset but are more difficult to reverse.
Investigate reports of sudden extreme dyspnea and air hunger, need to sit straight up, sensation of suffocation, and feelings of panic or impending doom.	May indicate development of complications, such as pulmonary edema or embolus, which differs from orthopnea or paroxysmal nocturnal dyspnea in that it develops much more rapidly and requires immediate intervention.
Monitor BP and central venous pressure (CVP) (if available).	Hypertension and elevated CVP suggest fluid volume excess and may reflect developing or increasing pulmonary congestion, HF.
Assess bowel sounds. Note complaints of anorexia, nausea, abdominal distention, and constipation.	Visceral congestion, occurring in progressive HF, can alter gastrointestinal function.
Provide small, frequent, easily digestible meals.	Reduced gastric motility can adversely affect digestion and absorption. Small, frequent meals may enhance digestion and prevent abdominal discomfort.
Measure abdominal girth, as indicated.	In progressive right-sided HF, fluid may shift into the peritoneal space, causing increasing abdominal girth (ascites).
Palpate abdomen. Note reports of right upper-quadrant pain or tenderness.	Advancing HF leads to venous congestion, resulting in abdominal distention, liver engorgement (hepatomegaly), and pain. This can alter liver function and impair or prolong drug metabolism.
Note increased lethargy, hypotension, and muscle cramping.	These are signs of potassium and sodium deficits that may occur because of fluid shifts and diuretic therapy.

#### Fluid/Electrolyte Management NIC

##### Collaborative

Administer medications, as indicated, for example:

Diuretics, such as furosemide (Lasix), bumetanide (Bumex), and torsemide (Demadex)

Potassium-sparing thiazides such as spironolactone (Aldactone), amiloride (Midamor), and triamterene (Direnium)

Potassium supplements, such as K-Dur, K-Lor, and Micro-K

Increases rate of urine flow and may inhibit reabsorption of sodium and chloride in the renal tubules.

Promotes diuresis without excessive potassium losses.

Replaces potassium that is lost as a common side effect of diuretic therapy, which can adversely affect cardiac function.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Maintain fluid and sodium restrictions, as indicated.	Fluid restriction is not a general recommendation, but fluids should be restricted to less than 2 L/day in patients who have significant hyponatremia (<130 mEq/L). Fluid restriction may also be considered when patients have difficulty controlling fluid retention despite high diuretic doses and sodium restriction (Heart Failure Society of America [HFS], 2010).
Consult with dietitian.	May be necessary to provide diet acceptable to client that meets caloric needs within sodium restriction.
Monitor chest x-ray.	Reveals changes indicative of increase or resolution of pulmonary congestion.
Monitor complete blood count (CBC) and electrolytes, especially potassium and sodium.	Hyponatremia and anemia may be signs of disease progression. Hypokalemia is a common adverse effect of diuretic treatment, and hyperkalemia may complicate therapy with ACE inhibitors, ARBs, and aldosterone antagonists (Suter et al, 2012).
Assist with other therapies such as dialysis, or ultrafiltration, as indicated.	Although not frequently used, mechanical fluid removal rapidly reduces circulating volume, especially in pulmonary edema refractory to other therapies.

### NURSING DIAGNOSIS: risk for impaired Gas Exchange

#### Possibly Evidenced By

Ventilation-perfusion imbalance [such as in altered blood flow, increased vascular resistance; heart failure]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status: Gas Exchange NOC

Demonstrate adequate ventilation and oxygenation of tissues by ABG values and oximetry within client's usual parameters, and be free of symptoms of respiratory distress.

Participate in treatment regimen (e.g., breathing exercise, effective coughing, use of oxygen) within level of ability and situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Airway Management NIC</b>	
<i>Independent</i>	
Auscultate breath sounds, noting crackles and wheezes.	Reveals presence of pulmonary congestion or collection of secretions, indicating need for further intervention.
Instruct client in effective coughing and deep breathing.	Clears airways and facilitates oxygen delivery.
Encourage frequent position changes.	Helps prevent atelectasis and pneumonia.
Maintain chair rest and bedrest in a semi-Fowler's position, with head of bed elevated 20 to 30 degrees.	Reduces oxygen consumption and demands and promotes maximal lung inflation.
<i>Collaborative</i>	
Monitor and graph serial ABG values and pulse oximetry.	Hypoxemia can be severe during pulmonary congestion. Compensatory acid-base changes are usually present in chronic HF.
Administer supplemental oxygen, as indicated.	Increases alveolar oxygen concentration, which may correct or reduce tissue hypoxemia.
Administer medications, as indicated, such as diuretics, such as furosemide (Lasix)	Diuresis helps reduce pulmonary congestion, enhancing gas exchange.

**NURSING DIAGNOSIS:** risk for chronic Pain**Possibly Evidenced By**

Chronic physical disease or condition  
Altered ability to continue previous activities

**Desired Outcomes/Evaluation Criteria—Client Will****Pain Control NOC**

Verbalize and demonstrate relief or control of pain or discomfort.  
Demonstrate and initiate behavioral modifications of lifestyle and appropriate use of therapeutic interventions.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Chronic NIC</b> <i>Independent</i> Assess for presence of pain.	Pain may or may not be reported as a symptom associated with heart failure. Some studies indicate that pain (as a separate entity) has been understudied in this population. Unexpected sources of pain related to HF and the medications used to manage it include visceral ischemia, musculoskeletal fatigue, ascites-related pain, and skin breakdown secondary to prolonged edema (Evangelista et al, 2009). One recent study found that chronic noncardiac pain is reported by 76% of people with chronic heart failure (McDonald et al, 2015).
Note coexisting condition(s).	Many HF clients are elderly and have multiple chronic conditions, such as angina, arthritis, gout, back pain, claudication, and neuropathies.
Assess for lifestyle effects of heart failure as well as pain, such as deconditioning, severe fatigue, weight loss or gain, sleep difficulties, and depression.	Pain issues should be addressed and managed, when present, even though it may not be possible to determine if pain is a result of the HF itself (associated with underperfused organs) or be related to other conditions.
Provide anticipatory guidance.	In client with HF in which pain is common, educating client and significant other (SO) about when, where, and how to seek interventions or treatment may reduce limitations imposed by pain. If pain is present, pain management should be initiated.
<i>Collaborative</i> Assist with treatment of underlying or coexisting conditions. Administer analgesics, as indicated.	Promotes general well-being. Promotes rest and relaxation and may enhance ability to engage in desired activities.

**NURSING DIAGNOSIS:** risk for impaired Skin Integrity**Possibly Evidenced By**

Impaired circulation; alteration in sensation  
Alteration in fluid volume including presence of edema; alteration in skin turgor  
Inadequate nutrition (associated with alteration in metabolism; obesity or emaciation)  
Mechanical factor (e.g., shearing forces, pressure, physical immobility)

**Desired Outcomes/Evaluation Criteria—Client Will****Risk Control: Pressure NOC**

Maintain skin integrity.  
Demonstrate behaviors or techniques to prevent skin breakdown.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pressure Ulcer Prevention NIC</b>	
<b>Independent</b>	
Inspect skin, noting skeletal prominences, presence of edema, and areas of altered circulation and pigmentation.	Skin is at risk because of impaired peripheral circulation, obesity or emaciation, edema, physical immobility, and alterations in nutritional status.
Encourage and instruct in frequent position changes in bed and chair. Assist with active or passive range of motion (ROM) exercises.	Reduces pressure on tissues, improving circulation and reducing time any one area is deprived of full blood flow.
Provide and instruct in good skin care (e.g., shower instead of bath, washing areas thoroughly using mild soap, drying gently and lubricating with lotion or emollient).	Excessive dryness or moisture damages skin and hastens breakdown.
Provide skin care to incontinent client. Change continence pads/brief/diapers as needed. Cleanse perineal areas daily and after each incontinence event. Apply skin-protectant ointment to area as needed.	Meticulous cleansing and care of skin of the incontinent client can prevent or minimize skin breakdown.
Encourage early and ongoing mobilization.	Promotes circulation and reduces risks associated with immobility.
Check fit of shoes or slippers and change as needed.	Dependent edema may cause shoes to fit poorly, thereby increasing risk of pressure and skin breakdown on feet.
Avoid intramuscular route for medication administration.	Interstitial edema and impaired circulation impede drug absorption and predispose to tissue breakdown and development of infection.
<b>Collaborative</b>	
Provide alternating pressure, air- or water-filled mattress, and elbow and heel protectors.	Reduces pressure to sensitive/fragile skin and may improve circulation.
Consult with nutritionist if indicated regarding nutrients and vitamins that aid in tissue repair and skin health.	Client with heart failure is often elderly and debilitated. Supplements may be needed to promote general well-being and healthy skin/tissue.

## NURSING DIAGNOSIS: **ineffective Health Management**

### May Be Related To

Complexity of therapeutic regimen or healthcare system  
Insufficient knowledge or excessive demands of therapeutic regimen  
Economic demands; insufficient support

### Possibly Evidenced By

Reports difficulty with prescribed regimen  
Failure to include treatment regimen in daily living  
Failure to take action to reduce risk factors  
Unexpected acceleration of illness symptoms

### Desired Outcomes/Evaluation Criteria—Client Will

#### **Self-Management: Heart Failure NOC**

Identify relationship of ongoing therapies (treatment program) to reduction of recurrent episodes and prevention of complications.  
List signs and symptoms that require immediate intervention.  
Identify own stress and risk factors and some techniques for handling them.  
Initiate necessary lifestyle and behavioral changes.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Discuss normal heart function. Include information regarding client's variance from normal function. Explain difference between heart attack and HF and that client has a chronic condition that requires long-term management (if heart failure is not acute and resolvable).	Knowledge of disease process and expectations can facilitate client's participation in management of HF, including prescribed treatment regimen if teaching is individualized to the client.
Reinforce treatment rationale. Include SO and family members in teaching as appropriate, especially for complicated regimens such as management of technology, for example, implantable cardioverter-defibrillator (ICD) or LVAD, dobutamine infusion home therapy when client does not respond to customary combination therapy or cannot be weaned from dobutamine, or in those awaiting heart transplant.	Client may believe it is acceptable to alter postdischarge regimen when feeling well and symptom free or when feeling below par, which can increase the risk of exacerbation of symptoms. Understanding of regimen, medications, technology, and restrictions may augment cooperation with control of symptoms. Home IV therapy requires a significant commitment by caregivers to operate and troubleshoot infusion pump, change dressing for peripherally inserted central catheter (PICC) line, and monitor I&O and signs and symptoms of HF.
Encourage developing a regular home exercise program and provide guidelines for activity, including sexual activity.	Promotes maintenance of muscle tone and organ function for overall sense of well-being. Changing sexual habits (e.g., sex in morning when well rested, client on top, inclusion of other physical expressions of affection) may be difficult but provides opportunity for continuing satisfying sexual relationship.
Discuss importance of being as active as possible without becoming exhausted and need for rest between activities.	Keeping as active as possible is important in maintaining strength and function, as well as mood. However, excessive physical activity or overexertion can further weaken the heart, exacerbating failure, and necessitates adjustment of exercise program.
Discuss importance of sodium limitation. Provide list of sodium content of common foods that are to be avoided or limited. Encourage reading of labels on food and drug packages.	Dietary intake of sodium of more than 2 g/day can offset effect of diuretic. Most common source of sodium is table salt and obviously salty foods, although canned soups and vegetables, luncheon meats, and dairy products also may contain high levels of sodium.
Refer to dietitian for counseling specific to individual needs and dietary customs.	May be helpful in meeting client's nutrition needs, especially in the presence of obesity (major risk factor for developing HF), diabetes, or presence of nausea and vomiting and resulting wasting syndrome (cardiac cachexia). Eating six small meals and using liquid dietary supplements and vitamin supplements can limit inappropriate weight loss.
Review medications, purpose, and side effects. Provide both oral and written instructions, including (and not limited to) taking medicine as directed, contacting healthcare provider if you think your medicine is not helping, or if you have adverse side effects. Keep an updated list of the medicines, vitamins, and herbs you take. Carry your medicine list with you to medical appointments and keep on person (if possible) in case of an emergency.	Understanding therapeutic needs, ways to properly manage medication regimen, and importance of prompt reporting of side effects can prevent occurrence of drug-related complications. Anxiety may block comprehension of input or details, and client and SO may refer to written material at later date to refresh memory.
Recommend taking diuretic early in morning.	Provides adequate time for drug effect before bedtime to prevent or limit interruption of sleep.
Instruct and receive return demonstration of ability to take and record pulse and BP, and when to notify healthcare provider, for example, about parameters above or below preset rate and changes in rhythm or regularity.	Promotes self-monitoring of condition and response to therapies. Early detection of changes allows for timely intervention and may prevent complications, such as digoxin toxicity.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Explain and discuss client's role in control of risk factors, such as smoking and alcohol abuse, and precipitating or aggravating factors, such as high-salt diet, inactivity or overexertion, and exposure to extremes in temperature.	Adds to body of knowledge and permits client to make informed decisions regarding control of condition and prevention of recurrence or complications. Smoking potentiates vasoconstriction; sodium intake promotes water retention and edema formation. Improper balance between activity and rest and exposure to temperature extremes may result in exhaustion, increased myocardial workload, and increased risk of respiratory infections. Alcohol can depress cardiac contractility. Limitation of alcohol use to social occasions or maximum of one drink per day may be tolerated unless cardiomyopathy is alcohol induced, which requires complete abstinence.
Review signs and symptoms that require immediate medical attention, such as rapid and significant weight gain, increased swelling in legs and feet, shortness of breath, increased fatigue, cough, hemoptysis, and fever.	Self-monitoring increases client responsibility in health maintenance and aids in prevention of complications such as pulmonary edema, pneumonia. Weight gain of more than 3 lb in 1 week requires medical evaluation or adjustment of diuretic therapy. Note: Client should weigh daily in morning without clothing, after voiding and before eating.
Provide opportunities for client and SO to ask questions, discuss concerns, and make necessary lifestyle changes.	Chronicity and recurrent, debilitating nature of HF often exhausts coping abilities and supportive capacity of both client and SO, leading to depression.
Address caregiver's concerns and needs. Refer for support, assistance, and resources, as indicated.	Caregiver burden can exhaust SO's coping capabilities and health, especially when client has advanced HF, has a ventricular assist device, or is awaiting heart transplantation.
Discuss general health risks, such as infection, and recommend avoidance of crowds and individuals with respiratory infections and obtaining yearly influenza immunization and pneumonia immunization.	This population is at increased risk for infection because of circulatory compromise, potential immunosuppression, and chronicity of disease.
Emphasize importance of reporting signs and symptoms of digoxin toxicity (as indicated): development of gastrointestinal and visual disturbances, changes in pulse rate and rhythm, and worsening of HF.	Early recognition of developing complications and involvement of healthcare provider may prevent toxicity and hospitalization.
Identify community resources or support groups and visiting home health nurse, as indicated.	May need additional assistance with self-monitoring and home management, especially when HF is progressive.
Discuss importance of advance directives and of communicating plan and wishes to family and primary care providers.	Up to 50% of all deaths from HF are sudden, with many occurring at home, possibly without significant worsening of symptoms. The presumption is that sudden cardiac death is produced by a lethal cardiac arrhythmia, as well as structural and functional changes in the heart (Tomaselli & Zipes, 2004). If client chooses to refuse life-support measures, an alternative contact person (rather than 911) needs to be designated should cardiac arrest occur.

**POTENTIAL CONSIDERATIONS** following discharge from care setting (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Activity Intolerance**—imbalance between oxygen supply and demand, generalized weakness
- **excess Fluid Volume**—compromised regulatory mechanism, diuretic use, individual fluid and salt intake
- **risk for impaired Skin Integrity**—physical immobilization, changes in skin turgor, impaired circulation, edema
- **ineffective Health Management**—complexity of therapeutic regimen, economic difficulties, perceived seriousness
- **impaired Home Maintenance**—disease (chronic, debilitating condition), insufficient finances, inadequate support systems
- **Self-Care Deficit [specify]**—weakness, fatigue, decreased motivation

# ACUTE CORONARY SYNDROME (ACS)

Acute coronary syndrome (ACS) is an umbrella term for a situation where the blood supply to the heart muscle is suddenly blocked, producing a variety of clinical symptoms compatible with myocardial ischemia, and precipitating a medical emergency.

ACS includes (1) unstable angina (UA), (2) non-ST-segment elevation myocardial infarction (NSTEMI), and (3) ST-segment elevation myocardial infarction (STEMI).

## I. Pathophysiology (American Heart Association [AHA], 2015a; Fogoros, 2016a; Mayo Clinic, 2016b)

- a. The disorder is characterized by a narrowing of coronary arteries due to atherosclerotic plaque, damaging the internal linings of coronary arteries. This condition is known as coronary artery disease (CAD).
- b. As the process progresses, oxygen transport to the heart muscle is restricted, resulting in myocardial ischemia and pain.
- c. Hard plaque causes hardened arteries, whereas soft plaque can cause formation of blood clots, either of which can restrict blood flow. There can be plaque rupture or clot formation, causing a sudden reduction of blood flow and a partial or complete occlusion of the coronary artery.
- d. Angina (chest pain) is characteristic of ACS. Pain may or may not radiate to jaw, neck, back, or arm. Anginal equivalents may include dyspnea, diaphoresis, nausea, and lightheadedness. Pain may be accompanied by changes in vital signs, decreased oxygen saturation ( $\text{SaO}_2$ ), or cardiac dysrhythmias.
- e. Women often present with atypical symptoms, such as “indigestion,” palpitations, nausea, numbness in the hands, and discomfort (not necessarily pain) and not necessarily in the chest. Other women have reported shortness of breath, pressure or pain in the lower chest or upper abdomen, dizziness, lightheadedness or fainting, upper back pressure, or extreme fatigue (AHA, 2015b).

## II. Types of ACS (Fogoros, 2016a)

- a. Unstable angina (UA)
  - i. May be new onset of pain with exertion or at rest, or acceleration in frequency, duration, or intensity of chest pain.
  - ii. Occurs in no regular pattern, usually lasts longer (15 minutes), not generally relieved with rest or medications.
  - iii. Electrocardiographic (ECG) manifestations include ST-segment depression and inverted T waves. These changes are transient and not always detected.
  - iv. Cardiac biomarkers are not elevated.
- b. Non-ST-segment elevation myocardial infarction (NSTEMI)
  - i. Pain and angina equivalents may be much the same as in UA or may be of longer duration and more intense.

- ii. ECG manifestations include ST-segment depression and inverted T waves, which may persist after resolution of ischemia and pain.
- iii. Cardiac biomarkers are elevated.

## c. ST-segment elevation myocardial infarction (STEMI)

- i. ECG manifestations include ST-segment elevation in two adjoining leads (diagnostic of STEMI) and abnormal Q waves that appear because of alterations in electrical conductivity of the infarcted myocardial cells.
- ii. The imbalance between oxygen supply and demand is severe enough to cause tissue necrosis, and the client requires emergency revascularization.

d. Note: Both NSTEMI and unstable angina can be considered “incomplete” heart attacks. These two forms of ACS need similar, aggressive medical management to reduce the likelihood that they will progress to a STEMI (often called a “completed” MI) (Fogoros, 2016a).

## III. Etiology (Fogoros, 2016a; Go et al, 2013; Mayo Clinic Staff, 2016a; Scordo & Pickett, 2017)

- a. Coronary artery disease (CAD) common cause with plaque formation narrowing vessels and pieces of plaque breaking off, creating emboli, and coronary artery obstruction.
- b. Risk factors—age (older than 45 for men, and 55 for women).
- c. Presence of “metabolic syndrome” (see Glossary).
- d. Being overweight or obese, lack of physical activity, smoking.
- e. Type 2 diabetes and family history of chest pain, heart disease, or stroke.

## IV. Statistics (Mozaffarian et al, 2015)

- a. Morbidity: Based on 2013 mortality data, there are an estimated 85.6 million Americans living with some form of cardiovascular disease. Of these, more than 43 million are estimated to be over the age of 60.
- b. Mortality: From 2003 to 2013, death rates attributable to cardiovascular disease (CVD) declined 28.8% yet still accounted for almost one of every three deaths in the United States. There were 614,348 deaths from heart disease in 2014. Heart disease accounted for 24.5% of all deaths in males and 22.3% of all deaths in females (Heron, 2016 [data are for 2014]).
- c. Cost: The estimated direct and indirect costs of cardiovascular diseases and stroke for 2011 to 2012 were \$316.6 billion (Mozaffarian et al, 2015). Note: Compiling accurate costs of the various treatments for coronary artery diseases is problematic because of absence of standardization of costs across the United States, as well as the wide variety of individual treatments. For example, one consumer information website (updated 2017) listed a range of \$11,298 to \$36,221 for an average heart stent placement surgery in Oregon. At a hospital in Wisconsin, placement of one cardiac stent that is coated with long-release medication carries a median hospital charge of \$41,228 (“Heart Stent Cost,” 2017).

## G L O S S A R Y

**Angioplasty:** See Percutaneous coronary interventions (PCIs), below.

**Cardiac biomarkers:** Substances that are released into the blood when the heart is damaged or stressed. Measurement of these biomarkers is used to help diagnose, monitor, and manage people with suspected ACS and cardiac ischemia. The current biomarker test of choice for detecting heart damage is troponin (see below). Other cardiac biomarkers (e.g., CK, CK-MB, myoglobin) are less specific for the heart and may also be elevated in skeletal muscle injury, liver disease, or kidney disease (Lab Tests Online, 2015).

**Coronary artery disease (CAD):** Disease in which there is a narrowing or blockage of the coronary arteries that carry blood and oxygen to the heart muscle.

**Metabolic syndrome:** A cluster of metabolic disorders that increases risk for cardiovascular disease, especially when three or more conditions are present: (1) abdominal obesity (waist circumference of 40 inches or above in men and 35 inches or above in women), (2) triglyceride level of >150 mg/dL, (3) HDL cholesterol of less than 40 mg/dL in men or less than 50 mg/dL in women, (4) systolic blood pressure of 130 mm Hg or greater or diastolic blood pressure of 85 mm Hg or greater, and (5) fasting glucose of 100 mg/dL or greater.

**Myocardial infarction (MI):** An occlusion or blockage of arteries supplying the muscles of the heart, resulting in injury or necrosis of the heart muscle (heart attack).

**Occlusive thrombus:** Blood clot that completely blocks a coronary artery.

**Percutaneous coronary interventions (PCIs), also known as angioplasty:** A nonsurgical procedure used to treat stenotic coronary arteries of the heart found in coronary heart disease. During PCI, a cardiologist feeds a deflated balloon or other device on a catheter from the inguinal femoral artery or radial artery up through blood vessels

until it reaches the site of blockage in the heart. X-ray imaging is used to guide the catheter threading. At the blockage, the balloon is inflated to open the artery, allowing blood to flow. A stent is often placed at the site of blockage to permanently open the artery.

**Non-ST-segment elevation myocardial infarction**

**(NSTEMI):** Development of heart muscle necrosis without the ECG change of ST-segment elevation, resulting from an acute interruption of blood supply to a part of the heart and demonstrated by an elevation of cardiac markers (CK-MB or troponin) in the blood. NSTEMI involves less than full-thickness damage of heart muscle and is, therefore, a less severe type of heart attack than STEMI (see below) (“NSTEMI,” 2017).

**ST-segment elevation myocardial infarction (STEMI):**

Occurs by complete occlusion of a major coronary artery that produces an entire thickness damage of heart muscle (transmural). This damage of heart muscle produces an ECG change of ST-segment elevation.

**Troponin (also known as cardiac-specific troponin I**

**[cTn I] and troponin T [cTn T]:** Blood test used to help diagnose a heart attack, to detect and evaluate mild to severe heart injury, and to distinguish chest pain that may be due to other causes.

**Unstable angina (UA):** Chest pain produced when the heart muscle is not getting enough blood flow is considered “unstable” when it no longer follows the predictable patterns typical of “stable angina.” Unstable angina is called “unstable” for two reasons: (1) symptoms occur in a more random and unpredictable fashion, and (2) it is most often caused by the actual rupture of a plaque in a coronary artery, resulting in clot formation, with impairment of free blood flow to tissues. The imminent risk of a complete myocardial infarction is very high in unstable angina. Such a condition is quite “unstable” and for this reason is a medical emergency (Fogoros, 2011b).

## CARE SETTING

Client may have a short hospitalization during acute stage for stabilization and possible cardiac revascularization. The client who has sustained a STEMI or is judged to be at intermediate or high risk for MI will be hospitalized for further evaluation and therapeutic intervention.

## RELATED CONCERNS

Angina: chronic/stable, page 64

Cardiac surgery, page 98

Dysrhythmias, page 85

Myocardial infarction, page 72

Psychosocial aspects of care, page 835

## CLIENT ASSESSMENT DATABASE

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Sedentary lifestyle
- Weakness, feeling incapacitated after exercise
- Fatigue
- Activities and sleep disrupted by pain

### MAY EXHIBIT

- Exertional dyspnea

(continues on page 56)

**CLIENT ASSESSMENT DATABASE (contd.)****MAY REPORT (continued)****MAY EXHIBIT (continued)****CIRCULATION**

- History of heart disease, hypertension in self
- Palpitations

- Tachycardia, dysrhythmias
- Blood pressure (BP) may be normal, elevated, or decreased
- Heart sounds may be normal, late S<sub>4</sub> or transient late systolic murmur may be evident during pain
- Moist, cool, pale skin in presence of vasoconstriction
- Orthostatic blood pressure changes

**EGO INTEGRITY**

- Stressors of work, family, others, and financial concerns

- Apprehension, uneasiness

**FOOD/FLUID**

- Nausea, “heartburn,” or epigastric distress
- Diet high in cholesterol and fats, salt, caffeine, liquor

**NEUROSENSORY**

- History of dizziness, fainting spells, transient numbness, tingling in extremities

*Note:* Ischemia anywhere in the body can produce transient neurological symptoms.

**PAIN**

- Note:* Reports of pain location and severity differ between men and women.
- Substernal or anterior chest pain that may radiate to jaw, neck, shoulders, and upper extremities, often to left side more than right. Women may report pain between shoulder blades, back pain.
  - **Quality:** Varies from transient and mild to moderate, heavy pressure, tightness, squeezing, burning. Women may report dull aching pain.
  - **Duration:** Usually more than 15 minutes
  - **Precipitating factors:** May be unpredictable or occur during rest or sleep
  - **Relieving factors:** Pain may not be responsive to relief mechanisms, such as rest and antianginal medications

- Placing fist over midsternum
- Rubbing left arm, muscle tension
- Autonomic responses, for example, tachycardia, blood pressure changes

**RESPIRATION**

- Exertional dyspnea, which may resolve with rest or pain relief
- Smoking history

- Increased rate and rhythm, alteration in depth

**TEACHING/LEARNING**

- Family history or risk factors of CAD: obesity, sedentary lifestyle, hypertension, stroke, diabetes, smoking, and hyperlipidemia
- Use or misuse of cardiac, antihypertensive, and over-the-counter (OTC) drugs

**DISCHARGE PLAN CONSIDERATIONS**

- Assistance with physical care, medication management, homemaker or maintenance tasks

## DIAGNOSTIC STUDIES

TEST	WHY IT IS DONE	WHAT IT TELLS ME
<b>DIAGNOSTIC STUDIES</b>		
• <b>Electrocardiogram (ECG):</b>	Record of the electrical activity of the heart to detect dysrhythmias, to identify any myocardial ischemia present or any damage to myocardial tissue from the past.	In the emergency setting, ECG is the most important diagnostic test. It may show changes during symptoms and in response to treatment; confirms a cardiac basis for symptoms. It also may demonstrate preexisting structural or ischemic heart disease (left ventricular hypertrophy, Q waves). ECG changes associated with unstable angina (UA) include ST-segment depression, transient ST-segment elevation, and T-wave inversion or some combination of these factors (Coven et al, 2016). <i>Note:</i> Unstable angina may be associated with new electrocardiographic changes but can be present in the absence of ECG changes (Manesh et al, 2017).
• <b>Echocardiography (also called two-dimensional echocardiogram and Doppler ultrasound):</b>	Provides visual of working heart and structures.	May play an important role in the setting of ACS as it identifies regional wall motion abnormalities associated with myocardial ischemia. An echocardiogram can also help in defining the extent of an infarction when muscle damage occurs.
• <b>Cardiac catheterization with angiography:</b>	Assesses patency of coronary arteries, reveals abnormal heart and valve size or shape, and evaluates ventricular contractility.	Cardiac catheterization defines coronary anatomy and the extent of a client's disease. Client in early stages of an acute heart attack or client with intractable angina (despite medication) should immediately undergo cardiac catheterization and stent placement to stop damage to heart muscle and/or to stabilize plaque (Coven et al, 2016; Fogoros, 2016a).
• <b>Coronary computed tomography angiography (CTA) (also called CT angiography or fast CT):</b>	High-resolution, three-dimensional pictures of the moving heart and great vessels.	Scanners can do a full cardiac scan in 10 seconds and produce high-resolution images that allow fine details of coronary arteries to be seen. This technology allows for noninvasive and early diagnosis of CAD and thus earlier treatment before the coronary arteries become more or completely occluded.
• <b>Chest x-ray:</b>	Documents heart size and visualizes infiltrates that may be present in the lung.	Helps in assessing cardiomegaly and pulmonary edema, or it may reveal complications of ischemia, such as pulmonary edema.
<b>BLOOD TESTS</b>		
• <b>Cardiac enzymes, including troponin I and troponin T. Also CK-MB:</b>	Substances released from heart muscle when it is damaged.	Cardiac-specific troponins are not detectable in the blood of healthy individuals; therefore, they provide high specificity for detecting injury to cardiac contractile muscle. Troponins are also more sensitive than CK-MB for myocardial necrosis and therefore improve early detection of small myocardial infarctions. <i>Note:</i> Some research has supported the use of point-of-care testing for cardiac troponin (PoCT-cTn). Results are rapidly available and can be used to rule out or rule in ACS, thereby facilitating timely treatment (Chew et al, 2011; Li et al, 2014).
• <b>C-reactive protein (CRP):</b>	A marker for inflammation.	Growing numbers of studies suggest that elevation of high-sensitive CRP (hs-CRP) levels predict clinical outcomes in ACS and may be used in conjunction with troponin I or T levels to identify high-risk patients for more aggressive management with antiplatelet agents and statins (Shrivastava et al, 2015).
• <b>Metabolic profile, including blood glucose electrolytes BUN/Cr</b>		Important for client with new-onset angina. Close monitoring of potassium and magnesium levels is important in client with ACS because low levels may predispose to ventricular dysrhythmias. Creatinine levels must be considered before using an angiotensin-converting enzyme (ACE) inhibitor and particularly if cardiac catheterization is considered.

(continues on page 58)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li><b>Serum lipids, including total lipids, lipoprotein electrophoresis, isoenzymes, cholesterols (HDL, LDL, very low-density lipoprotein [VLDL]), triglycerides, and phospholipids:</b> A group of tests that make up a lipid profile.</li><li><b>Coagulation studies, including partial thromboplastin time (PTT), activated partial thromboplastin time (aPTT), and platelets:</b> Injury to a vessel wall or the tissue initiates the coagulation cascade and formation of a thrombus.</li></ul>	<p>The presence of lipid abnormalities increases the risk of CAD.</p> <p><i>Note:</i> Recently, an elevated triglyceride (Tg) has been identified as an <i>independent</i> risk factor for development of coronary artery disease (Van Leeuwen &amp; Bladh, 2015).</p> <p>Thrombus formation can potentiate ischemic damage to the myocardium as blood flow is blocked.</p>

## NURSING PRIORITIES

1. Relieve or control pain.
2. Prevent or minimize development of myocardial complications.
3. Provide information about disease process, prognosis, and treatment.
4. Support client or significant other (SO) in initiating necessary lifestyle or behavioral changes.

## DISCHARGE GOALS

1. Desired activity level achieved, with return to activity baseline, and self-care needs met with minimal or no pain.
2. Remains free of complications.
3. Disease process, prognosis, and therapeutic regimen understood.
4. Participates in treatment program and behavioral changes.
5. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: acute Pain

#### May Be Related To

Biological agents (tissue ischemia, increased cardiac workload and oxygen consumption, decreased myocardial blood flow)

#### Possibly Evidenced By

Verbal/coded reports of pain

Expressive behaviors (such as moaning, crying, pacing, or restlessness)

Diaphoresis; changes in blood pressure, heart rate, respiratory rate, pupillary dilation

Self-focus

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Level NOC

Report pain is relieved or controlled.

Demonstrate relief of pain as evidenced by stable vital signs and absence of muscle tension and restlessness.

## ACTIONS/INTERVENTIONS

## RATIONALE

### Pain Management: Acute NIC

#### Independent

Instruct client to notify nurse immediately when chest pain occurs.

Pain and decreased cardiac output may stimulate the sympathetic nervous system to release excessive amounts of norepinephrine, which increases platelet aggregation, and release of thromboxane A2. This potent vasoconstrictor causes coronary artery spasm, which can precipitate, complicate, and prolong an anginal attack. Unbearable pain may cause vasovagal response, thus decreasing BP and heart rate.

Identify precipitating event, if any; identify frequency, duration, intensity, and location of pain.

Helps differentiate chest pain and aids in evaluating possible progression or process. Pain associated with UA, NSTEMI, and STEMI is usually intense, occurs unpredictably, may last a longer period of time, and is not usually relieved by nitroglycerine (NTG) or rest.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Evaluate reports of pain in jaw, neck, shoulder, arm, or hand (typically on left side).	Cardiac pain may radiate; for example, pain is often referred to more superficial sites served by the same spinal cord nerve level.
Assess and document client response and effects of medication.	Provides information about progression of coronary blockage. Aids in evaluating effectiveness of interventions and may indicate need for change in therapeutic regimen.
Monitor vital signs every 5 minutes during initial pain attack.	BP may initially rise because of sympathetic stimulation and then fall if cardiac output is compromised. Tachycardia also develops in response to sympathetic stimulation and may be sustained as a compensatory response if cardiac output falls.
Monitor heart rate and rhythm.	Client with unstable angina has an increased risk of acute life-threatening dysrhythmias, which occur in response to ischemic changes and stress hormones. (Refer to ND: risk for decreased Cardiac Output.)
Place client at complete rest during anginal episodes.	Reduces myocardial oxygen demand to minimize risk of tissue injury and necrosis.
Elevate head of bed if client is short of breath.	Facilitates gas exchange to decrease hypoxia and resultant shortness of breath.
Observe for associated symptoms, such as dyspnea, nausea, vomiting, dizziness, palpitations, and desire to urinate.	Decreased cardiac output (which may occur during ischemic myocardial episode) stimulates sympathetic or parasympathetic nervous system, causing a variety of vague sensations that client may not identify as related to anginal episode.
Stay with client who is experiencing pain or appears anxious.	Anxiety releases catecholamines, which increase myocardial workload and can escalate or prolong ischemic pain. Presence of nurse can reduce feelings of fear and helplessness.
Maintain quiet, comfortable environment; restrict visitors as necessary.	Mental or emotional stress increases myocardial workload.
<b>Collaborative</b>	
Collaborate in treatment of condition.	Initial therapy for ACS should focus on stabilizing the client's condition, relieving ischemic pain, and providing anti-thrombotic therapy to reduce myocardial damage and prevent further ischemia. (Refer to NDs: risk for decreased cardiac Tissue Perfusion, and risk for decreased Cardiac Output, for discussion of additional medications.)
Provide supplemental oxygen.	Increases oxygen available for myocardial uptake to relieve ischemic pain.
Administer analgesics, such as morphine sulfate (MS) or fentanyl (Duragesic) by appropriate route.	Potent opioid analgesic may be used in acute angina because of its beneficial side effects. Such effects include peripheral vasodilation and reduced myocardial workload; sedation, which produces relaxation; and interrupted flow of vasoconstricting catecholamines, thereby effectively relieving severe chest pain.
Administer antianginal medication(s) promptly, as indicated, for example:	
Sublingual and/or IV nitroglycerin	Nitrates do not improve mortality. However, they provide symptomatic relief by means of several mechanisms, including coronary vasodilation, improved collateral myocardial blood flow, and reduction of cardiac workload (Fogoros, 2016a).
Calcium channel blockers, such as bepridil (Vascor), amlodipine (Norvasc), nicardipine (Cardene), nifedipine (Procardia), felodipine (Plendil), isradipine (DynaCirc), and diltiazem (Cardizem)	Produce relaxation of coronary vascular smooth muscle, dilate coronary arteries, and decrease peripheral vascular resistance.

## NURSING DIAGNOSIS: risk for decreased cardiac Tissue Perfusion

### Possibly Evidenced by Risk Factors of

Hypoxemia, hypertension; coronary artery spasm  
Elevated C-reactive protein; hyperlipidemia  
Family history of cardiac disease

### Desired Outcomes/Evaluation Criteria—Client Will

#### Cardiac Pump Effectiveness NOC

Demonstrate adequate coronary perfusion as appropriate (e.g., vital signs within client's normal range; free of chest pain or discomfort).

Participate in behaviors and activities that reduce the workload of the heart.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Hemodynamic Regulation NIC

##### Independent

Maintain bedrest or chair rest in position of comfort during acute episode.

Decreases oxygen consumption and demand, reducing myocardial workload and risk of decompensation.

Monitor vital signs and cardiac rhythm.

Tachycardia and changes in blood pressure (hypotension or hypertension) may be present because of pain, anxiety, hypoxemia, and circulating stress hormones. ECG changes reflecting ischemia and dysrhythmias indicate need for additional evaluation and therapeutic intervention.

Auscultate breath sounds and heart sounds.

$S_3$ ,  $S_4$  may occur with cardiac decompensation or pulmonary complication.

Monitor for and document effects of and adverse response to medications, noting BP, heart rate, and rhythm (especially when giving combination of calcium antagonists, beta blockers, and nitrates).

Desired effect is to decrease myocardial oxygen demand by decreasing cardiac stress. Drugs with negative inotropic properties can decrease perfusion to an already ischemic myocardium.

Encourage immediate reporting of pain for prompt administration of medications, as indicated.

Timely interventions can reduce oxygen consumption and myocardial workload and may prevent or minimize cardiac complications.

Assess for signs and symptoms of heart failure.

Angina is only a symptom of underlying pathology causing myocardial ischemia. Progression of disorder may compromise cardiac function to point of decompensation.

##### Collaborative

Monitor serial ECG, noting ST-segment changes associated with ischemia.

Ischemia associated with NSTEMI or UA may cause transient ST-segment depression or elevation and T-wave inversion. Serial tracings verify ischemic changes, which may disappear when client is pain free. They also provide a baseline against which to compare later pattern changes. If ST-segment is elevated or other ECG changes occur over a short time, STEMI myocardial infarction is most likely evolving. Refer to CP: Myocardial Infarction.

Administer supplemental oxygen as needed.

Increases oxygen available for myocardial uptake to improve contractility and reduce ischemia.

Monitor pulse oximetry or arterial blood gases (ABGs), as indicated.

Oxygen saturation may decrease as oxygen demands increase for heart muscle and systemic circulation. Monitoring determines adequacy of respiratory function and  $O_2$  therapy.

Administer medications, as indicated, for example:

Statins, such as atorvastatin (Lipitor), simvastatin (Zocor), and others

Statins may be given emergently to lower circulating cholesterol and to stabilize plaque deposits, reducing the likelihood of plaque rupture (Mayo Clinic Staff, 2016a).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Beta blockers, such as metoprolol (Lopressor), nadolol (Corgard), and esmolol (Brevibloc)	Beta blockers have antiarrhythmic and antihypertensive properties, as well as the ability to reduce ischemia. They minimize the imbalance between myocardial supply and demand by reducing afterload and wall stress (Coven et al, 2016; Mayo Clinic Staff, 2016a).
Antiplatelet therapy, including aspirin (Anacin, Bayer aspirin)	Aspirin remains a first-line therapy for managing patients with UA/NSTEMI and is often given in prehospital transport or emergency room (Anderson, 2013; Mayo Clinic Staff, 2016a).
Other drugs (such as ticagrelor [Brilinta], clopidogrel [Plavix], and prasugrel [Effient])	Aspirin plus an anticoagulant (e.g., heparin) may be followed by a second antiplatelet agent (e.g., clopidogrel, ticagrelor) or an intravenous glycoprotein IIb/IIIa agent before angiography (Anderson, 2013; Vallerand et al, 2017).
Glycoprotein IIb/IIIa receptor antagonists such as abciximab (ReoPro), eptifibatide (Integrilin), and tirofiban (Aggrastat)	These agents prevent the binding of fibrinogen, thereby blocking platelet aggregation, and in combination with aspirin are considered standard antiplatelet therapy for client at high risk for unstable angina. Tirofiban has been approved for use in combination with heparin for patients with UA who are being treated medically and for patients undergoing PCI (Coven et al, 2016).
Anticoagulants, such as heparin, and low-molecular-weight heparins (LMWHs), such as enoxaparin (Lovenox) and dalteparin (Fragmin)	An IV bolus of heparin, followed by continuous infusion, is recommended to help reduce risk of subsequent MI by reducing the thrombotic complications of plaque rupture for clients diagnosed with intermediate or high-risk UA. Use of low-molecular-weight heparins is increasing because they are more predictable, have fewer adverse effects, and do not require anticoagulation monitoring (Anderson, 2013; Vallerand et al, 2017).
Prepare for interventions such as angioplasty (with or without intracoronary stent placement) or bypass/grafting, as indicated.	Angioplasty, also called percutaneous coronary intervention (PCI) or transluminal coronary angioplasty (PTCA), is a procedure carried out to improve coronary blood flow. Angioplasty opens coronary arteries narrowed or blocked by atherosclerotic plaque and may be used to relieve symptoms of ACS or to reduce heart damage during or after a heart attack. Intracoronary stents may be placed to provide structural support within the coronary artery and improve the odds of long-term patency. Some stents (called drug-eluting stents) are coated with slow-releasing drugs to prevent fibrosis that, together with clots, could block the stented artery, a process called restenosis (Beckerman, 2016).

## NURSING DIAGNOSIS: risk for decreased Cardiac Output

### Possibly Evidenced by

Alteration in heart rate or rhythm  
Altered contractility, stroke volume  
Altered preload

### Desired Outcomes/Evaluation Criteria—Client Will

#### Cardiac Pump Effectiveness NOC

Maintain hemodynamic stability, such as BP, cardiac output within normal range, adequate urinary output, decreased frequency or absence of dysrhythmias.  
Report/demonstrate decreased episodes of dyspnea and angina.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Cardiac Care: Acute NIC</b>	
<b>Independent</b>	
Obtain blood pressure (BP) readings. Compare both arms and obtain lying, sitting, and standing pressures when able.	Hypotension may occur related to ventricular dysfunction, hypoperfusion of the myocardium, and vagal stimulation. However, hypertension is also a common phenomenon, possibly related to pain, anxiety, catecholamine release, and preexisting vascular problems.
Monitor heart rate and rhythm. Document dysrhythmias.	Dysrhythmias, especially premature ventricular contractions or heart blocks, can compromise cardiac function or increase ischemic damage. Acute or chronic atrial flutter or fibrillation may be seen with coronary artery involvement and may or may not be pathological.
Auscultate heart sounds. Note development of S <sub>3</sub> and S <sub>4</sub> .	S <sub>4</sub> may be associated with myocardial ischemia, ventricular stiffening, and pulmonary or systemic hypertension. S <sub>3</sub> is usually associated with heart failure, but it may also be noted with left ventricular overload that can accompany infarction in STEMI.
Auscultate breath sounds.	Crackles reflect pulmonary congestion; may develop because of depressed myocardial function.
Have emergency equipment and medications available.	Sudden coronary occlusion, lethal dysrhythmias, extension of infarct, and unrelenting pain are situations that may precipitate cardiac arrest, requiring immediate life-saving therapies or transfer to the critical care unit (CCU).
<b>Collaborative</b>	
Administer supplemental oxygen, as indicated.	Increases amount of oxygen available for myocardial uptake, reducing ischemia and resultant cellular irritation and dysrhythmias.
Review serial ECGs, noting onset or resolution of dysrhythmias.	Provides information regarding progression or resolution of ischemia and status of coronary perfusion.
Review chest x-ray.	May reflect pulmonary edema related to ischemia and ventricular dysfunction.
Monitor laboratory data, such as cardiac enzymes, arterial blood gases (ABGs), and electrolytes.	Enzymes monitor resolution or extension of infarction. Presence of hypoxia indicates need for supplemental oxygen. Electrolyte imbalances, such as hypo- or hyperkalemia, adversely affect cardiac rhythm and contractility.
Maintain IV or saline-lock access, as indicated.	Patent line is important for administration of fluids to support circulation and to administer emergency drugs in the presence of persistent lethal dysrhythmias or chest pain.
Administer medications, as indicated:	
Angiotensin-converting enzyme inhibitors (ACEIs) such as benazepril (Lotensin), enalapril (Vasotec), and lisinopril (Zestril)	Given to expand blood vessels, allowing heart to work more easily and efficiently, and improving cardiac output/systemic perfusion.
Angiotensin receptor blockers (ARBs), such as isosartan (Cozaar), valsartan (Diovan), and irbesartan (Avapro)	Helps lower blood pressure, alone or in combination with other agents, in order to reduce systemic vascular resistance and improve organ perfusion.
Antidysrhythmic drugs (refer to CP: Dysrhythmias)	Dysrhythmias are usually treated symptomatically but have the potential for becoming lethal; therefore, must be monitored diligently and treated promptly.
Refer to CP: Myocardial Infarction for additional interventions.	If STEMI is occurring, many more supportive interventions may be needed.

<b>NURSING DIAGNOSIS:</b> <b>deficient Knowledge regarding condition, postprocedural care, potential complications</b>	
<b>May Be Related To</b>	
Insufficient information Alteration in cognitive functioning or memory Insufficient knowledge of resources	
<b>Possibly Evidenced By</b>	
Insufficient knowledge Inaccurate follow-through of instruction Development of preventable complication	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Self-Management: Coronary Artery Disease NOC</b>	
Verbalize understanding of condition, postprocedure needs, and potential complications. Identify individual risk factors. Initiate necessary lifestyle changes.	
ACTIONS/INTERVENTIONS	RATIONALE
<b>Cardiac Risk Management NIC</b>	
<i>Independent</i>	
Reinforce explanation of ACS incident, associated procedures and treatment provided, and self-care needs.	Individually specific information creates knowledge base for management of condition.
Begin with information client already knows and move to what client does not know, progressing from simple to complex. Use short simple sentences and concepts initially. Repeat and summarize as needed. Avoid giving too much information in one setting.	This client has often come into acute care because of a sudden-onset chest pain and experienced all the chaos of a life-threatening medical emergency. In addition to the “brain fog” of being very sick initially, the client is subjected to overwhelming demands of major healthcare decisions in a short period. Teaching must be geared to the client’s cognitive and physical abilities of the moment.
Deal with client’s/family’s anxiety or other strong emotions.	Anxiety can interfere with ability to learn or retain information. The nurse may need to adjust timing or sequence of teaching to improve client/family retention comprehension.
Provide written information or guidelines for client/caregiver to refer to as needed.	Reinforces the learning process and allows client to proceed at own pace.
Encourage identification and reduction of individual risk factors such as smoking, alcohol consumption, and obesity.	These behaviors and lifestyle factors have direct adverse effects on cardiovascular function, may impede recovery, and increase risk for complications.
Discuss appropriate activity/exercise guidelines and limitations (e.g., avoiding long periods of standing; not lifting heavy objects).	Individual capabilities and expectations depend on type of procedure performed, location of the catheter insertion (e.g., femoral or radial artery), underlying cardiac function, and prior physical conditioning.
Remind client to rest as needed. Encourage setting of realistic goals for activities and/or cardiac rehabilitation.	These needs vary per individual. Client may feel weak and fatigued after procedure (typical) or be feeling effects of recent ACS and ongoing heart issues.
Review medication regimen, including new drugs as well as drugs client was taking prior to incident. Discuss schedule for taking each medication, as well special instructions (e.g., don’t take NSAIDs while on anticoagulants).	Treatment regimen may be complex with numerous drugs, addition of/removal of certain medications, etc. The age and severity of client’s current illness can interfere with full understanding of treatment.
Provide medication list in writing. Discuss expected drug effects, as well as potential side effects and interactions. Review potential problems that need reporting.	Helps client/caregiver understand medication plan, and know when to contact a healthcare professional.
Emphasize importance of checking with physician before taking OTC drugs.	OTC drugs may potentiate or negate effects of prescribed medications.

(continues on page 64)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss use of herbals such as ginseng, garlic, ginkgo, hawthorn, and bromelain, as indicated.	Some herbals can affect bleeding and clotting, especially when added to medications such as Plavix or Coumadin, which increase bleeding. Others, such as hawthorn, can increase the effects of certain heart medications.
Review catheter insertion site care and reportable symptoms, as needed.	Instructions may include such things as when to take the dressing off, what the site may look like (e.g., bruised, swollen, slightly pink), when to shower/bathe, and use of lotions/ointments.
Emphasize symptoms to be reported to physician, particularly recurrence of chest pain, development of hematoma, or bleeding at catheter site; changes in response to medications.	Knowledge of expectations can not only avoid undue concern for insignificant events but also prevent delay in treatment of worrisome symptoms.
Identify services and resources available after discharge.	Provides for ongoing monitoring, continuation of prescribed therapies, and support for lifestyle changes.

**POTENTIAL CONSIDERATIONS** following discharge from care setting (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **acute Pain**—biological agents (decreased myocardial blood flow, tissue ischemia)
- **Activity Intolerance**—imbalance between oxygen supply and demand, sedentary lifestyle
- **ineffective Health Management**—complexity of therapeutic regimen, perceived barriers, economic difficulties

## ANGINA: CHRONIC/STABLE

- I. **Pathophysiology** (Fihn et al, 2012; Mayo Clinic Staff, 2016c; National Guideline Clearinghouse [NCG], 2012; Roth, 2015)
  - a. Chronic/stable angina is an episodic clinical manifestation of ischemic heart disease due to transient myocardial ischemia. May be called “angina pectoris,” “stable ischemic heart disease” (SIHD), or “ischemic heart disease” (IHD).
  - b. Stable means no increase in frequency or severity of attacks over a prolonged period of time.
  - c. Usually presents as chest discomfort precipitated by stress or exertion that rapidly resolves with rest or nitrates.
  - d. Pain follows a trackable, predictable pattern (e.g., occurs when climbing stairs, during exposure to cold, after heavy meals, when feeling rushed or angry) and is similar in nature to previous chest pain.
  - e. Most commonly caused by atherosclerotic coronary artery disease (CAD).
  - f. Atypical presentations of angina are more common in women than in men. Heart disease in men is more often due to blockages in the coronary arteries, referred to as **obstructive** CAD. Women more frequently develop heart disease within the very small arteries that branch out from the coronary arteries. This is referred to as **microvascular disease** (MVD) and occurs particularly in younger women (American Heart Association [AHA], 2015b)
  - g. Many people experience anginal attacks despite revascularization and pharmacological antianginal treatments. This is sometimes classified as refractory angina. See Glossary (Mannheimer et al, 2002).
- II. **Etiology** (Mozaffarian et al, 2016; NCG, 2012; Snow et al, 2004)
  - a. Conditions that create increased myocardial oxygen demand (including hyperthyroidism, hyperthermia, stimulant use (e.g., cocaine and others), valvular disease such as aortic stenosis, and severe uncontrolled hypertension
  - b. Conditions that create diminished myocardial oxygen supply, such as anemia, or hypoxemia secondary to pulmonary disease
- III. **Diagnosis and Management**
  - a. A diagnosis of stable angina can be based on clinical assessment alone or with the addition of diagnostic testing such as stress testing.
  - b. Management of stable angina includes (1) lifestyle changes (a key aspect of angina management), namely in the areas of diet, exercise, smoking, diabetes, hypertension, and psychological issues, and (2) medical therapy, the aim of which is to help reduce symptoms and prevent cardiovascular events (Bellchambers et al, 2016; Montalescot et al, 2013).
  - c. Complications of angina pectoris include unstable angina, MI, cardiogenic shock, heart failure, cardiac arrest, and death.
- IV. **Statistics:**
  - a. Prevalence: Stable angina affects more than 8 million people in the United States each year (Mozaffarian et al, 2016). The prevalence of chronic stable angina (as reported in 2010) increases with age for women but peaks between 55 and 65 years of age for men and then declines (Lloyd-Jones et al, 2010).

- b. Morbidity: A recent study reported that patients with stable CAD and angina have higher rates of future cardiovascular events compared with patients without angina, especially heart failure, cardiovascular hospitalization, and coronary revascularization (Eisen et al, 2016).
- c. Mortality: There were 614,348 deaths from heart disease in 2014 (includes ischemic heart disease, inclusive of but not specifically angina) (Heron, 2016)). Cost: Direct and indirect costs of coronary artery disease were estimated to have topped \$177 billion in 2010 (includes but is not specific to angina) (Kohan & Annex, 2015).

## G L O S S A R Y

- Angina:** Chest pain or discomfort that occurs if an area of heart muscle doesn't get enough oxygen-rich blood. Angina isn't a disease; it's a symptom of an underlying heart problem, usually **coronary heart disease** (National Institutes of Health [NIH], 2011a).
- Angioplasty (also called percutaneous transluminal coronary angioplasty or PTCA or percutaneous coronary intervention [PCI]):** Procedure that increases coronary blood flow by compression of atherosomatous lesions and dilation of the vessel lumen in an occluded coronary artery.
- Cardiovascular disease (CVD):** Diseases of the heart and blood vessels.
- Coronary artery disease (CAD):** A disease in which there is a narrowing or blockage of the coronary

arteries that carry blood and oxygen to the heart muscle.

**Hypertension (HTN):** High blood pressure.

**Metabolic syndrome:** Name for a group of risk factors (e.g., fasting hyperglycemia and insulin resistance, hypertension, central obesity, decreased high-density lipoprotein [HDL] and elevated low-density lipoprotein [LDL] cholesterol, elevated triglycerides) that raises the risk of heart disease.

**Refractory angina:** A chronic condition characterized by the presence of angina caused by coronary insufficiency in the presence of CAD, which is not amenable to a combination of medical therapy, angioplasty, or coronary bypass surgery in a patient with evidence of ischemia (Mannheimer et al, 2002).

## CARE SETTING

Client may be seen in community physician offices or emergency department. Clients judged to be at intermediate or high risk for MI are often hospitalized for further evaluation and therapeutic intervention.

## RELATED CONCERNS

- Acute coronary syndrome, page 54  
 Cardiac surgery, page 98  
 Dysrhythmias, page 85  
 Myocardial infarction, page 72  
 Psychosocial aspects of care, page 835

## CLIENT ASSESSMENT DATABASE

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- Sedentary lifestyle
- Weakness, feeling incapacitated after exercise
- Fatigue
- Activities and sleep disrupted by pain

- Exertional dyspnea

#### CIRCULATION

- History of heart disease in self or family (especially early age onset)
- Hypertension in self or family
- History of MI or revascularization procedure

- Tachycardia, dysrhythmias
- Blood pressure (BP) normal, elevated, or decreased
- Heart sounds may be normal, late S<sub>4</sub>, or transient late systolic murmur that may be evident during pain

#### EGO INTEGRITY

- Stressors of work, family, others, and financial concerns

- Apprehension, uneasiness

#### FOOD/FLUID

- Diet high in cholesterol and fats, salt, caffeine, liquor

(continues on page 66)

## CLIENT ASSESSMENT DATABASE (contd.)

### MAY REPORT (continued)

### MAY EXHIBIT (continued)

#### PAIN

**Note:** Individual with chronic stable angina is usually not surprised by pain episodes as they tend to be similar in character and precipitated by predictable factors.

- Substernal or anterior chest pain that may radiate to jaw, neck, shoulders, and upper extremities, often to left side more than right. Women may report pain between shoulder blades, back pain.
- **Quality:** Varies from transient and mild to moderate; may describe heavy pressure, tightness, squeezing, burning. Women may report dull aching pain.
- **Duration:** Usually less than 15 minutes
- **Precipitating factors:** Physical exertion or great emotion, such as anger or sexual arousal; exercise in weather extremes
- **Relieving factors:** Pain usually responsive to relief mechanisms, such as rest and antianginal medications

#### RESPIRATION

- Dyspnea associated with activity
- Smoking currently or in the past

Pain that is outside of client's usual experience can be indicative of developing a complication.

- Facial grimacing, restlessness
- Placing fist over midsternum
- Rubbing left arm, muscle tension
- Autonomic responses; for example, tachycardia, blood pressure changes

If pain is unrelieved by usual means or is worsening, prompt medical evaluation is indicated.

- Increased rate and rhythm, alteration in depth

#### SAFETY

- History of falls, fainting spells, or lightheadedness

#### SEXUALITY

- Chest pain during sex

#### TEACHING/LEARNING

- Family history or risk factors of CAD: obesity, sedentary lifestyle, hypertension, stroke, diabetes, smoking, hyperlipidemia
- Use or misuse of cardiac, antihypertensive, and over-the-counter (OTC) drugs
- History of hormone replacement therapy (HRT) in postmenopausal women
- Use of vitamins or herbal supplements, such as niacin, coenzyme Q10, ginger, bilberry, comfrey, garlic, or L-carnitine
- Use or misuse of alcohol or illicit drug use, such as cocaine or amphetamines

#### DISCHARGE PLAN CONSIDERATIONS

- Assistance with homemaker or maintenance tasks
- Changes in physical layout of home

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****TEST  
WHY IT IS DONE****WHAT IT TELLS ME****BLOOD TESTS**

- Cardiac enzymes, including troponin I and cardiac troponin T, CPK, CK and CK-MB, LDH, and isoenzymes LD<sub>1</sub>, LD<sub>2</sub>:** Substances released from heart muscle when it is damaged.
- Serum lipids, including total lipids, lipoprotein electrophoresis, isoenzymes, cholesterols (HDL, LDL, very low-density lipoprotein [VLDL]), triglycerides (TGs), phospholipids:** A group of tests that make up a lipid profile.
- C-reactive protein (CRP):** A marker for inflammation.
- Electrocardiogram (ECG):** Record of the electrical activity of the heart to detect dysrhythmias, to identify electrolyte imbalance, to identify any myocardial ischemia present or any damage to myocardial tissue from the past.
- Exercise or pharmacological stress electrocardiography (also called stress test, exercise treadmill, or exercise ECG):** Raises heart rate and blood pressure using exercise. The heart can also be stressed with drugs such as dobutamine or persantine.
- Myocardial perfusion imaging (MPI) scans, which may include stress MPI and single-photon emission computed tomography (SPECT):** Scans the heart using radioactive dyes to show areas of increased metabolic activity and decreased blood flow.
- Calcium scoring (also called coronary artery calcium scoring computed tomography, or CT, scan):** Ultrafast CT scan that measures the amount of calcium in the coronary arteries.

Usually within normal limits. Any elevation indicates myocardial damage.

The presence of lipid abnormalities can increase the risk of CAD and complications. *Note:* Recent studies suggest that elevated triglyceride is an independent risk **factor** for development of CAD (Scordo & Pickett, 2017; Van Leeuwen & Bladh, 2015). CRP levels have been shown to predict risk of both recurrent ischemia and death among those with stable and unstable angina (Jiang et al, 2011).

Often normal when patient at rest or when pain free; depression of the ST-segment or T-wave inversion signifies ischemia. Dysrhythmias and heart block may also be present. Significant Q waves are consistent with a prior MI.

Can determine whether pain episodes correlate to ECG or change during exercise or activity. *Note:* Stress imaging (not exercise ECG) is recommended in (1) client with previous cardiac catheterization and (2) client with a previous revascularization now showing significant change in anginal pattern suggestive of ischemia (Snow et al, 2004; Belleza, 2016).

MPI is the most widely used imaging test for the evaluation of suspected myocardial ischemia. SPECT can assess cardiovascular risk with a high degree of accuracy, measuring both ventricular function and relative regional perfusion at rest and with stress.

Elevated calcium scoring in a client with other risk factors, such as family history, hypertension, diabetes, or hypercholesterolemia, is an indication of some level of CAD.

**NURSING PRIORITIES**

1. Relieve or control pain.
2. Prevent or minimize development of myocardial complications.
3. Provide information about disease process, prognosis, and treatment.
4. Support client or significant other (SO) in initiating necessary lifestyle or behavioral changes.

**DISCHARGE GOALS**

1. Desired activity level achieved, with a return to activity baseline, and self-care needs met with minimal or no pain.
2. Remains free of complications.
3. Disease process, prognosis, and therapeutic regimen understood.
4. Participates in treatment program and behavioral changes.
5. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS: acute Pain****Related to:**

Biological injury agent (e.g., tissue ischemia)

**Possibly Evidenced By**

Self-report of pain characteristics and intensity

Guarding behavior; positioning to ease pain

Changes in physiological parameter (e.g., blood pressure, heart, and respiratory rate)

(continues on page 68)

**NURSING DIAGNOSIS:** **acute Pain** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Pain Level NOC**

Report relief of chest pain.

Demonstrate relief of pain as evidenced by stable vital signs and absence of muscle tension and restlessness.

Report decrease in frequency, severity of anginal pain, or equivalents over time (specify).

**ACTIONS/INTERVENTIONS****RATIONALE****Pain Management: Acute NIC****Independent**

Perform thorough pain assessment with each reported pain episode, using appropriate pain scale, when client is in acute healthcare setting. Discuss pain episodes client has been experiencing when client is reporting in from home/community (e.g., phone call to office). Identify precipitating event, if any; identify frequency, duration, intensity, and location of pain.

Ascertain if client has any angina equivalents.

Helpful in identifying changes from client's usual angina discomfort, which has certain typical characteristics in location, duration, or intensity. If nature of angina is changing, angina may become unstable or new-onset coronary occlusion may be occurring.

Monitor for changes in vital signs during pain episode if it is different from usual pattern of angina.

Patient with stable angina may report typical and regularly recurrent symptoms (pain equivalent) rather than chest pain. For example, older patients, those with diabetes, and women often have fatigue and shortness of breath as angina equivalents rather than outright pain (NIH, 2011a & 2011b).

Evaluate heart rate and rhythm, as indicated.

BP may initially rise because of sympathetic stimulation and then fall if cardiac output is compromised. Tachycardia also develops in response to sympathetic stimulation and may be sustained as a compensatory response if cardiac output falls.

Assess and document client response to and effects of usual medication. Evaluate need for change in medication regimen.

Client with changes may now have unstable angina, with an increased risk of acute life-threatening dysrhythmias, which occur in response to ischemic changes and stress.

Encourage client to maintain pain diary documenting frequency, severity, duration, precipitating factors.

Client with established CAD and/or history of cardiac reperfusion procedures will likely be on a regimen of various medications, including beta blockers, ACE inhibitors, and other drugs, including nitrates, for control of persistent angina discomfort.

**Collaborative**

Collaborate in treatment and monitoring of underlying conditions and status of stable angina, as indicated.

Management may include changes in medications (e.g., antianginals, antihypertensive, diabetic medications) or may require evaluation for/treatment of new-onset heart problems. Guideline recommendations in 2012 noted that patients with stable ischemic heart disease should receive periodic follow-up at least annually to (1) evaluate symptoms and clinical function; (2) observe for complications of stable angina, including heart failure and dysrhythmias; and (3) monitor risk factors and adequacy of/adherence to recommended lifestyle changes and medical therapy (Qaseem et al, 2012).

Provide supplemental oxygen, as indicated.

Increases oxygen available for myocardial uptake and reversal of ischemia. Patient may benefit from periodic oxygen therapy such as during exercise or when dyspnea is occurring.

Administer medications as indicated, for example, antiplatelet agents (such as aspirin or clopidogrel [Plavix])

Guideline recommendations for prevention of complications (including MI and death) include 75 to 162 mg daily, continued indefinitely in the absence of contraindications in patients with stable angina (NGC, 2012). Other antiplatelet medications may also be used.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Antianginal medication(s) as indicated, for example: Nitrates: NTG sublingual (Nitrostat, NitroQuick), metered-dose spray (Nitrolingual, Nitromist), transdermal patch (Minitran, Nitrodisc), and isosorbide (Isordil, Imdur)	Nitrate can be used as chronic therapy to help prevent episodes of angina. The biggest problem is “tolerance,” where chronic exposure to nitrates causes a diminished effect, and the antianginal effect of the drug disappears. Nitrate tolerance can be prevented by scheduling dosing in such a way as to guarantee daily nitrate-free intervals. If client is still experiencing pain after following prescribed nitrate use, further assessment of chest pain and additional interventions may be required.
Miscellaneous anti-ischemic agents (e.g., ranolazine [Ranexa])	Cardioselective anti-ischemic agent for chronic angina unresponsive to other antianginal treatments (Alaeddini, 2016).
Beta blockers, such as atenolol (Tenormin), carteolol (Cartrol), labetalol (Toprol, Lopressor), and bisoprolol (Zebeta)	The benefits provided by beta blockers have made them the drugs of first choice in treating patients with CAD and angina. In client with angina, beta blockers are effective in improving the amount of exercise that can be performed without developing ischemia or angina. Also, beta blockers are the only antianginal drugs that have been shown to lower the risk of having another myocardial infarction in patients who have already had a heart attack (Fogoros, 2011b).
Calcium channel blockers, such as diltiazem (Cardizem, Dilacor), amlodipine (Norvasc), and verapamil (Calan, Covera)	By reducing calcium influx into muscle cells, calcium channel blockers cause the muscle cells to “relax.” This relaxing effect results in the dilation of blood vessels and a reduced force of contraction of the heart muscle. In treating angina, the most commonly used calcium blockers are the longer-acting forms of diltiazem and verapamil, Norvasc, or Plendil.
Review ECG, as indicated.	Ischemia during an anginal attack may cause transient ST-segment depression or elevation and T-wave inversion. Serial tracings verify ischemic changes, which may disappear when client is pain free or may reveal a new-onset cardiac blockage.
Prepare for/assist with additional diagnostic studies, procedures, or interventions, as indicated. (Refer to CPs: Acute Coronary Syndrome; Cardiac Surgery, for related interventions.)	If angina is atypical or unrelenting, complications may be occurring, such as MI, new-onset occlusion, coronary artery restenosis, or blockage of stent in client who has had past revascularization procedures. Note: Revascularization may be required (usually CABG) when testing confirms myocardial ischemia due to left main coronary artery disease or symptomatic three-vessel disease, especially in those with left ventricular dysfunction.

### NURSING DIAGNOSIS: risk for Activity Intolerance

#### Possibly Evidenced by

Circulatory problem [imbalance between oxygen supply and demand]  
Altered heart rate, rhythm  
Physical deconditioning (weakness, sedentary lifestyle; aging) [side effects of medications]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Cardiac Pump Effectiveness NOC

Demonstrate increased activity tolerance.  
Report or display decreased episodes of dyspnea, angina, and dysrhythmias.  
Participate in behaviors and activities that reduce the workload of the heart.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hemodynamic Regulation</b> <span style="background-color: #e0f2f1; padding: 2px 5px;">NIC</span>	
<b>Independent</b>	
Evaluate client's level of physical activity when not experiencing angina.	Provides a baseline for determining activity tolerance and future needs. Note: Client may be frail from age, comorbid conditions, or has self-limited activities to avoid anginal episodes.
Monitor vital signs and cardiac rhythm.	Tachycardia and changes in blood pressure (hypotension or hypertension) may be present because of pain, anxiety, hypoxemia, and reduced cardiac output. ECG changes reflecting ischemia and dysrhythmias indicate need for additional evaluation and therapeutic intervention.
Assess BP before, during, and after activities, as indicated.	Helps in identifying actions/activities that can affect blood pressure. Changes in or timing of activities and medications may improve client's tolerance.
Provide for and encourage adequate rest periods interspersed with activity. Assist with or perform self-care activities, as indicated.	Rest between activities conserves energy and reduces cardiac workload.
Remind client to keep antianginal pills close by or on person or to use prophylactically when indicated.	Patient with stable and predictable angina can help manage anginal responses to desired/required activities.
Note and discuss with client emotional response to limitations. Offer additional support/referrals as indicated.	Depression over the inability to perform desired activities can be a source of stress to both client/caregiver.
Evaluate need for support at home.	Client might benefit from certain services (e.g., homemaker, shopping, laundry, additional care assistance) to cope with limitations and conserve energy.
Assess for signs and symptoms of heart failure.	Angina is only a symptom of underlying pathology causing myocardial ischemia. Disease may compromise cardiac function to the point of decompensation.
<b>Collaborative</b>	
Administer supplemental oxygen as needed.	Increases oxygen available for myocardial uptake to reduce ischemia and improve activity tolerance.
Monitor chest x-ray.	Identifies new or worsening congestive heart failure (often associated with refractory angina).
Administer/remind client to take medications, as indicated. Refer to ND: acute Pain, above.	Adherence to medication regimen is important for managing symptoms or well-being, reducing the risk of preventable complications.

## NURSING DIAGNOSIS: **ineffective Health Management**

### May Be Related To

Complexity or insufficient knowledge of therapeutic regimen  
Perceived barriers, economic difficulties  
Family pattern of healthcare

### Possibly Evidenced By

Reports difficulty with prescribed regimen  
Failure to include treatment regimen in daily living or to take action to reduce risk factors  
Ineffective choices in daily living for meeting health goals  
Unexpected acceleration of illness symptoms

### Desired Outcomes/Evaluation Criteria—Client Will

#### Knowledge: Coronary Artery Disease Management

NOC  
Verbalize understanding of condition, disease process, and potential complications.  
Verbalize understanding of and participate in therapeutic regimen.  
Initiate necessary lifestyle changes.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Cardiac Risk Management</b> <b>NIC</b>	
<i>Independent</i>	
Discuss the pathophysiology of condition. Emphasize need for preventing and managing anginal attacks.	Clients with stable angina need to learn why it occurs and what they can do to manage it. This focus on therapeutic management aims to reduce the likelihood of MI, heart failure, and sudden death and to promote a heart-healthy lifestyle.
Encourage avoidance of factors or situations that may precipitate anginal episodes, such as emotional stress, extensive or intense physical exertion, use of recreational drugs, ingestion of a large or heavy meal (especially close to bedtime), and exposure to extremes of environmental temperature.	This is a crucial step in limiting or preventing anginal attacks.
Review importance of cessation of smoking, weight control, dietary changes, and exercise.	Knowledge of the significance of risk factors provides client with the opportunity to make needed changes.
Review significance of cholesterol and triglyceride levels in heart disease and address the benefits of lowering lipid levels and triglycerides. Emphasize importance of periodic laboratory measurements and use of cholesterol-lowering (statins) drugs.	In patients with stable angina, an intensive lipid-lowering therapy has shown to provide significant clinical benefit and improve prognosis (LaRosa et al, 2005). Many patients will require both pharmacologic and nonpharmacologic interventions to reach target goals: (1) LDL: less than 100 mg/dL for all patients, ideal less than 70 mg/dL, especially for high-risk patients; (2) HDL: 40 mg/dL or greater; and (3) triglycerides: less than 150 mg/dL (NGC, 2013; Scordo & Pickett, 2017).
Encourage client to follow prescribed reconditioning or cardiac rehabilitation program.	Fear of triggering attacks may cause client to avoid participation in activity that has been prescribed to enhance recovery. Cardiac rehabilitation programs provide a phased approach to increasing client's activity and exercise tolerance.
Demonstrate how and encourage client to monitor own pulse and BP during and after activities, when appropriate, and to schedule and simplify activities and take rest periods.	Allows client to identify those activities that can be modified to avoid cardiac stress and stay below the anginal threshold.
Ask client/caregiver about client's emotional status. Discuss means of acquiring support (e.g., counseling, medications) as needed/desired.	This patient may be anxious, feel emotional and out of control of situation, and overwhelmed by self-care requirements. These factors can bring on or worsen depression. Many studies have correlated depression with heart disease. Predictors of depression include remote history of depression, female sex, and more symptomatic angina (Szpakowski et al, 2016).
Discuss impact of condition on desired lifestyle and activities, including work, driving, sexual activity, and hobbies. Provide information, privacy, or consultation, as indicated.	Client may be reluctant to resume or continue certain activities because of fear of anginal attack or death. If symptoms have worsened or the client has decreased physical activity to avoid precipitating angina, then he or she should be reevaluated and treated accordingly. Note: Erectile dysfunction (ED) can be a sign of CAD or diabetes in men. Use of Viagra, or similar drugs, is contraindicated with nitrates, which are usually used for angina.
Review prescribed medications for control and prevention of anginal attacks. (Refer to ND: acute Pain in this care plan, and CP: Acute Coronary Syndrome, ND risk for decreased cardiac Tissue Perfusion for discussion of drugs.)	Angina is a complicated condition that often requires the use of many drugs to decrease myocardial workload, improve coronary circulation, and control the occurrence of attacks.
Emphasize importance of checking with physician before taking OTC drugs.	OTC drugs may potentiate or negate effects of prescribed medications.
Discuss use of herbals such as ginseng, garlic, ginkgo, hawthorn, and bromelain, as indicated.	Some herbals, such as ginkgo, ginseng, and bromelain, can affect bleeding and clotting, especially when added to medications such as Plavix or Coumadin, which increase bleeding. Others, such as hawthorn, can increase the effects of certain heart medications.

(continues on page 72)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review symptoms to be reported to physician, particularly an increase in frequency and duration of attacks and changes in response to medications.	Knowledge of expectations can avoid undue concern for insignificant events or prevent delay in treatment of worrisome symptoms.
Discuss importance of follow-up appointments (e.g., physician evaluation, laboratory monitoring, etc.).	Angina is a symptom of CAD that can be progressive, should be monitored, and may require occasional adjustment of treatment regimen.
Encourage client to wear medical alert bracelet or necklace.	Alerts care providers of client's diagnosis when an emergency occurs.
Recommend that SO/caregivers have ready access to emergency phone numbers and encourage them to take CPR classes.	Helps family to be prepared for emergency actions when needed.

**POTENTIAL CONSIDERATIONS** following discharge from care setting (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **risk for decreased cardiac Tissue Perfusion**—coronary artery spasm
- **Activity Intolerance**—imbalance between oxygen supply and demand, sedentary lifestyle
- **ineffective Denial**—lack of control of life situation, anxiety
- **interrupted Family Processes**—situational transition or crisis, shift in health status of family member
- **impaired Home Maintenance**—impaired functioning, inadequate support systems, unfamiliarity with neighborhood resources

## MYOCARDIAL INFARCTION

### I. Pathophysiology

- a. Marked reduction or loss of blood flow through one or more of the coronary arteries, resulting in cardiac muscle ischemia, and over a finite period, resulting in necrosis.
- b. Occurs most often due to coronary artery disease (CAD).
- c. Cellular ischemia and necrosis can affect the heart's rhythm, pumping action, and blood circulation.
- d. Other problems may also ensue, such as heart failure, life-threatening arrhythmias, and death.
- e. Delay in seeking treatment is the largest barrier to receiving therapy quickly.

### II. Classification

- a. Types of myocardial infarction (MI) can be identified on the electrocardiogram (ECG).
  - i. ST-segment elevation (also called STEMI)
  - ii. Non-ST elevation (NSTEMI)
- b. Location of MI can be identified on the ECG.
  - i. Anterior wall of the ventricle
  - ii. Inferior wall of the ventricle
  - iii. Posterior wall of the ventricle
  - iv. Lateral wall of the ventricle
- c. Infarcts are usually classified by size.
  - i. Microscopic (focal necrosis)
  - ii. Small (<10% of the left ventricle)
  - iii. Medium (10% to 30% of the left ventricle)
  - iv. Large (>30% of the left ventricle)

- d. Point of time can be identified on the ECG by the Q wave and the client's history.

- i. Acute or evolving infarction is characterized by the presence of polymorphonuclear leukocytes unless the interval between the onset of infarction and death is brief (e.g., 6 hours), minimal, or no polymorphonuclear leukocytes may be seen.
- ii. Old or healed infarction is manifested as scar tissue without cellular infiltration, a process usually requiring 5 to 6 weeks or more.

### III. Etiology

- a. A common cause of coronary artery disease (CAD) is plaque buildup on the wall of the arteries, causing narrowing of the blood vessels and increased risk of pieces of plaque breaking off, creating emboli.
- b. Nonatherosclerotic causes include the following: coronary occlusion secondary to vasculitis, ventricular hypertrophy, coronary artery emboli (secondary to cholesterol, air, or the products of sepsis), coronary trauma, drug use (e.g., cocaine, amphetamines), aortic dissection and aneurysms of coronary arteries, factors that increase oxygen requirement (e.g., heavy exertion, fever, hyperthyroidism), and factors that decrease oxygen delivery (e.g., hypoxemia of severe anemia, carbon monoxide poisoning, or acute pulmonary disorders) (Zafari & Abdou, 2017).
- c. Risk factors—age, being overweight or obese, smoking, hyperlipidemia, family history.
- d. Greater risk in presence of kidney problems, peripheral arterial disease, or prior MI.

**IV. Statistics**

- a. Morbidity: About 750,000 people in the United States have heart attacks each year (Benjamin et al, 2017).
- b. Mortality: Coronary heart disease is the most common type of heart disease, killing about 365,000 people in the United States in 2014 (Mozaffarian et al, 2016).
- c. Acute myocardial infarction (MI) is associated with a 30% mortality rate; about 50% of the deaths occur prior to arrival at the hospital. Additional 5% to 10% die within the first year after their myocardial infarction (Zafari & Abdou, 2017). CAD is a leading killer of both men and women in the United States.
- d. Cost: MI (\$11.5 billion) and coronary heart disease (CHD) (\$10.4 billion) were 2 of the 10 most expensive hospital principal discharge diagnoses in 2011 (Pfuntner et al, 2013).

**G L O S S A R Y**

**Atherosclerosis:** Abnormal accumulation of lipid deposits and fibrous tissue within the arterial walls and lumen.

**Cardiac biomarkers:** Substances that are released into the blood when the heart is damaged or stressed. Measurement of these biomarkers is used to help diagnose, monitor, and manage people with suspected cardiac ischemia. The current biomarker test of choice for detecting heart damage is troponin (see below). Other cardiac biomarkers (e.g., CK, CK-MB, myoglobin) are less specific for the heart and may also be elevated in skeletal muscle injury, liver disease, or kidney disease (Lab Tests Online, 2015).

**Coronary artery bypass graft (CABG):** Surgical procedure in which a blood vessel from another part of the body is grafted onto the occluded coronary artery above and below the occlusion in such a way that blood flow bypasses the blockage.

**Coronary artery disease (CAD):** Narrowing or blockage of the arteries and vessels that provide oxygen and nutrients to the heart, caused by atherosclerosis. The resulting blockage restricts blood flow to the heart. When the blood flow is completely cut off, the result is a heart attack (also called a myocardial infarction, MI).

**Ejection fraction (EF):** An EF is a percentage of blood that is pumped out of the heart during each beat. In a healthy heart, each beat should pump out at least 50% of the blood in the left ventricle. A EF range between 50% and 75% indicates the heart is pumping well and able to deliver an adequate supply of blood to the body and brain. Poor pumping and a low EF can occur if the heart muscle has been damaged due to a heart attack, a diseased heart valve, or heart failure.

**Myocardial infarction (MI, also called acute MI, or AMI):** An occlusion or blockage of arteries supplying the

muscles of the heart, resulting in injury or necrosis of the heart muscle (heart attack).

**Non-ST-segment elevation myocardial infarction (NSTEMI)**

(NSTEMI): Development of heart muscle necrosis without the ECG change of ST-segment elevation, resulting from an acute interruption of blood supply to a part of the heart and demonstrated by an elevation of cardiac markers (CK-MB or troponin) in the blood. NSTEMI involves less than full-thickness damage of heart muscle and is, therefore, a less severe type of heart attack than STEMI (see below) (“NSTEMI,” 2017).

**Percutaneous coronary interventions (PCIs):** A nonsurgical procedure used to treat the stenotic coronary arteries found in coronary heart disease. During PCI, a cardiologist feeds a deflated balloon or other device on a catheter from the femoral artery or radial artery up through blood vessels until it reaches the site of blockage in the heart. X-ray imaging is used to guide the catheter threading. At the blockage, the balloon is inflated to open the artery, allowing blood to flow. A stent is often placed at the site of blockage to permanently open the artery.

**ST-segment elevation myocardial infarction (STEMI):**

Occurs by complete occlusion of a major coronary artery that produces an entire thickness damage of heart muscle (transmural). This damage of heart muscle produces an ECG change of ST-segment elevation.

**Stent:** Woven mesh that provides structural support to a coronary vessel, preventing its closure.

**Thrombolytic:** Agent or process that breaks down blood clots.

**Troponin (also known as cardiac-specific troponin I [cTn I] and troponin T [cTn T]):**

Blood test used to help diagnose a heart attack, to detect and evaluate mild to severe heart injury, and to distinguish chest pain that may be due to other causes.

**CARE SETTING**

Myocardial infarctions are treated in the emergency room, inpatient acute hospital, critical care unit (CCU), intensive care unit (ICU), step-down unit, or medical unit.

**RELATED CONCERNs**

Acute coronary syndrome, page 54

Angina: chronic/stable, page 64

Dysrhythmias, page 85

Heart failure: chronic, page 38

Psychosocial aspects of care, page 835

Venous thromboembolism (VTE): deep vein thrombosis (DVT) and pulmonary embolism (PE), page 120

## CLIENT ASSESSMENT DATABASE

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- History of sedentary lifestyle, sporadic exercise schedule
- Weakness, fatigue, intolerance to usual activities
- Women often report unusual fatigue

- Chest pain with activity or rest
- Tachycardia, dyspnea with rest or activity
- Fatigue with normal daily activities

#### CIRCULATION

- History of previous MI, CAD, heart failure, hypertension, diabetes mellitus, hypercholesterolemia

- **Color:** Pallor or cyanosis; mottling of the skin, nail beds, mucous membranes, and lips
- **Blood pressure (BP):** May be increased or decreased; orthostatic changes may occur
- **Pulses:** May be normal, full, bounding, or having a weak or thready quality with delayed capillary refill
- Tachycardia, bradycardia, other irregularities may be noted
- **Heart sounds:** S<sub>3</sub> and S<sub>4</sub>, reflecting a pathological condition such as cardiac failure, decreased ventricular contractility, or compliance
- Murmurs reflecting valvular insufficiency or papillary muscle dysfunction
- Friction rub (suggests pericarditis)
- **Edema:** Signs of jugular vein distention (JVD), peripheral edema, dependent edema, generalized edema

#### EGO INTEGRITY

- Denial of significance of symptoms and presence of condition
- Fear of dying, feelings of impending doom
- Anger at inconvenience of illness and the “unnecessary” attention and hospitalization
- Worry about family, employment, finances, childcare, elders at home, and pets at home

- Withdrawal, anxiety, lack of eye movements
- Irritability, anger, combative behavior; may refuse emergent care
- Focus on self and pain

#### FOOD/FLUID

- History of/current obesity
- Diet high in cholesterol, saturated fats, salt, caffeine
- Nausea, vomiting, belching, heartburn

- Vomiting
- Decreased urine output
- Poor skin turgor, dry or diaphoretic skin

#### NEUROSENSORY

- History of dizziness, fainting spells, falling

- Weakness
- Mentation changes such as disorientation, poor memory, changes in thought processes

#### PAIN/DISCOMFORT

\*\*\*Reports of pain location and severity differ between men and women. Pain is sometimes absent in postoperative clients, those with prior stroke or heart failure, diabetes, hypertension, or an older person.

- Sudden onset of chest pain unrelieved by rest or nitroglycerin (common symptom, particularly in men)
- **Location:** Substernal or anterior chest pain that may radiate to jaw, neck, shoulders, and upper extremities, often to left side more than right. Women may report pain between shoulder blades, back pain.

(May have atypical location, such as pain in epigastric or abdominal area, elbow, jaw, back, neck, between shoulder blades, or throat)

- **Quality:** Crushing, constricting, squeezing, heavy, steady pain. Women may report dull aching pain.

- **Intensity:** Usually a 10 on a scale of 0 to 10 or the “worst pain ever experienced”

**MAY REPORT (continued)****MAY EXHIBIT (continued)**

- **Duration:** Usually more than 15 minutes
- **Precipitating factors:** May or may not be associated with activity or increased stress
- **Relieving factors:** Pain is not responsive to relief mechanisms, such as rest and antianginal medications

**RESPIRATION**

- Recent history of dyspnea with or without exertion, nocturnal dyspnea, unable to sleep flat
- Recent history of cough with or without sputum production
- History of smoking, chronic respiratory disease

**SOCIAL INTERACTION**

- Recent history of stressors such as work, family, financial, caretaking
- Difficulty coping with recent or current stressors
- May be worried about current hospitalization's effect on self and family and question coping abilities

**SEXUALITY**

- Postmenopausal; history of hormone replacement therapy
- Erectile dysfunction (ED): May be associated with hypertension or antihypertensive medications

**TEACHING/LEARNING**

- Family history of heart disease, MI, diabetes, stroke, hypertension, peripheral vascular disease, hypercholesterolemia
- Use of tobacco; may express desire or attempts at smoking cessation
- Use of alcohol or other drugs
- Use or misuse of cardiac medications, over-the-counter (OTC) preparations
- Use of vitamins and herbal supplements such as vitamin E, ginseng, garlic, ginkgo, hawthorn, bromelain

**DISCHARGE PLAN CONSIDERATIONS**

- May require assistance with activities of daily living (ADLs), food preparation, shopping, transportation, homemaking or maintenance tasks, modifications of physical layout of home

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****TEST****WHY IT IS DONE****WHAT IT TELLS ME****DIAGNOSTIC STUDIES**

- **Electrocardiogram (ECG):** Record of the electrical activity of the heart to detect dysrhythmias, to identify any myocardial ischemia present or any damage to myocardial tissue from the past.

In the emergency setting, the ECG is the most important diagnostic test. High probability of myocardial infarction is indicated by ST-segment elevation greater than 1 mm in two anatomically contiguous leads (indicates acute MI in 90% of people, as confirmed by serial measurements of cardiac biomarkers) or by the presence of new Q waves (Kumar & Cannon, 2009). A new-onset left bundle branch block (LBBB) in ECG is also considered as STEMI (“NSTEMI,” 2017).

(continues on page 76)

## DIAGNOSTIC STUDIES (contd.)

### WHY IT IS DONE (continued)

- **Cardiac catheterization:** Assesses patency of coronary arteries, reveals abnormal heart and valve size or shape, and evaluates ventricular contractility. May be combined with angiography (a procedure performed to view blood vessels after injecting them with a radiopaque dye that outlines them on x-ray).
- **Echocardiogram:** Sound waves produce images of the heart, including structures and blood circulation.
- **Chest x-ray:** Procedure used to evaluate organs and structures within the chest.

### BLOOD TESTS

- **Cardiac enzymes, including troponin I and troponin T, also possibly CPK, CK, and CK-MB:** Substances released from heart muscle when it is damaged.
- **Complete blood count (CBC), including red blood cell (RBC) and white blood cell (WBC) counts, hemoglobin/hematocrit (Hgb/Hct), platelets**
- **Metabolic profile, including blood glucose, electrolytes, and BUN/Cr**
- **Serum lipids, including total lipids, lipoprotein electrophoresis, isoenzymes, cholesterols (HDL, LDL, very low-density lipoprotein [VLDL]), triglycerides (Tg), phospholipids:** A group of tests that make up a lipid profile.
- **Coagulation studies, including partial thromboplastin time (PTT), activated partial thromboplastin time (aPPT), and platelets:** Injury to a vessel wall or the tissue initiates the coagulation cascade and formation of a thrombus.
- **Pulse oximeter oxygen saturation or arterial blood gases (ABGs):** Assessment of levels of oxygen ( $\text{PaO}_2$ ) and carbon dioxide ( $\text{PaCO}_2$ ).

### WHAT IT TELLS ME (continued)

- Cardiac catheterization defines coronary anatomy and the extent of a client's disease. Client with intractable angina (despite medication) should immediately undergo cardiac catheterization and possibly angiography with revascularization interventions (Coven et al, 2016; Fogoros, 2016a). (Refer to CP: Acute Coronary Syndrome for related interventions.)
- Note:* A left ventricular ejection fraction (LVEF, or simply EF) of 50% or lower in the setting of acute MI demonstrates loss of ventricular pumping ability due to myocardial damage, dysrhythmias, and/or valvular involvement. Reduced EF is associated with greater mortality among patients with coronary artery disease and predicts increased risks of early all-cause mortality, as well as sudden cardiac death after acute MI (Mankad, 2017; Miller et al, 2012).
- Regional ventricular wall motion abnormalities are suggestive of a myocardial infarction. *Note:* Echocardiogram is a common noninvasive method used to assess ejection fraction if cardiac catheterization is delayed.
- Visualize changes in heart size and any infiltrates that may be present in the lung.
- Cardiac-specific troponins are not detectable in the blood of healthy individuals; therefore, they provide high specificity for detecting injury to cardiac muscle. Troponins are also more sensitive than CK-MB for myocardial necrosis and therefore improve early detection of small myocardial infarctions.
- May be done to rule out anemia as a cause of decreased myocardial oxygen supply and/or prior to giving thrombolytics.
- Elevated white blood cell count (leukocytosis) is also common but not universal, signifying an acute inflammatory state.
- The platelet count is necessary if a IIb/IIIa agent is considered or may become dangerously low after the use of heparin.
- Important for client with new-onset angina. Close monitoring of potassium and magnesium levels is important because low levels may predispose to dysrhythmias. Creatinine levels must be considered before using an angiotensin-converting enzyme (ACE) inhibitor and particularly if cardiac catheterization is considered.
- The presence of lipid abnormalities increases the risk of CAD.
- Note:* Recently, an elevated triglyceride (Tg) has been identified as an independent risk factor for development of coronary artery disease (Van Leeuwen & Bladh, 2015).
- Thrombus formation can potentiate ischemic damage to the myocardium as blood flow is blocked.
- Should be monitored constantly in early stages of MI. Hypoxemia may result from pulmonary congestion, atelectasis, or ventilatory impairment secondary to complications of MI.

**NURSING PRIORITIES**

1. Relieve pain.
2. Reduce myocardial workload.
3. Prevent, detect, and assist in treatment of life-threatening dysrhythmias or complications.
4. Promote cardiac health and self-care.

**DISCHARGE GOALS**

1. Chest pain absent or controlled.
2. Heart rate and rhythm sufficient to sustain adequate cardiac output and tissue perfusion.
3. Achievement of activity level sufficient for basic self-care.
4. Anxiety reduced and managed.
5. Disease process, treatment plan, and prognosis understood.
6. Plan in place to meet needs after discharge, including follow-up appointments.

**NURSING DIAGNOSIS:** **acute Pain****May Be Related To**

Biological agents (tissue ischemia, increased cardiac workload and oxygen consumption, decreased myocardial blood flow)

**Possibly Evidenced By**

Verbal/coded reports of pain

Expressive behaviors (such as moaning, crying, pacing, self-focus, or restlessness)

Diaphoresis; changes in blood pressure, heart rate, respiratory rate, pupillary dilation

**Desired Outcomes/Evaluation Criteria—Client Will****Pain Level NOC**

Verbalize relief or control of chest pain within appropriate period for administered medications.

Demonstrate relief of pain as evidenced by stable vital signs and absence of muscle tension and restlessness.

**ACTIONS/INTERVENTIONS****RATIONALE****Pain Management: Acute NIC***Independent*

Monitor and document characteristics of pain, noting verbal reports, nonverbal cues, for example, moaning, crying, restlessness, diaphoresis, clutching chest, rapid breathing, and hemodynamic response (BP and heart rate changes).

Variation of appearance and behavior of clients in pain may present a challenge in assessment. For example, men and women consistently present differently or an individual may present differently from one episode to another. However, most clients with an acute MI appear ill, distracted, and focused on pain. Respirations may be increased because of pain and associated anxiety. Release of stress-induced catecholamines increases heart rate and BP.

Obtain full description of pain from client, including location, intensity (using 0 to 10 or similar scale), duration, characteristics (dull or crushing), and radiation. Assist client to quantify pain by comparing it to other experiences.

Pain is a subjective experience and must be described by client. Provides baseline for comparison to aid in determining effectiveness of therapy, resolution, or progression of problem.

Note history of previous angina, anginal equivalent, or MI pain. Discuss family history if pertinent.

May differentiate current pain from preexisting patterns as well as identify complications, such as extension of infarction, pulmonary embolus, or pericarditis.

Instruct client to report pain immediately.

Delays in reporting pain hinder pain relief and may necessitate increased dosage of medication to achieve relief. In addition, severe pain may induce shock by stimulating the sympathetic nervous system, thereby creating further damage and interfering with diagnostics and relief of pain.

Observe for associated symptoms, such as dyspnea, nausea, vomiting, dizziness, palpitations, and desire to urinate.

Decreased cardiac output (which may occur during ischemic myocardial episode) stimulates sympathetic or parasympathetic nervous system, causing a variety of vague sensations that client may not identify as related to current situation.

Monitor vital signs every 5 minutes during initial pain attack.

BP may initially rise because of sympathetic stimulation and then fall if cardiac output is compromised. Tachycardia also develops in response to sympathetic stimulation and may be sustained as a compensatory response if cardiac output falls.

(continues on page 78)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor heart rate and rhythm.	Client with MI has an increased risk of acute life-threatening dysrhythmias (especially during first 24 hours), which occurs in response to ischemic changes and stress hormones.
Place client at complete rest during initial evaluation and treatment of MI.	Reducing myocardial oxygen demand and stress-related catecholamine reactions is beneficial in achieving relief of ischemic pain.
Allow for uninterrupted periods of rest and sleep.	
Maintain quiet, comfortable environment; restrict visitors as necessary.	
Schedule lab tests, EKGs, x-rays, and other diagnostic tests to be done within the same time frame, where possible.	
Elevate head of bed if client is short of breath.	Facilitates gas exchange to decrease hypoxia and associated ischemic pain.
Stay with client who is experiencing pain or appears anxious.	Anxiety typically accompanies severe chest pain and may increase due to unfamiliarity of the surroundings and procedures. Refer to ND: Anxiety (specify level) following.
Check vital signs before and after administration of opioid medication.	Hypotension and respiratory depression can occur because of opioid administration. These problems may increase myocardial damage in the presence of ventricular insufficiency.
<b>Collaborative</b>	
Administer supplemental oxygen by appropriate route.	Increases amount of oxygen available for myocardial uptake and thereby may relieve discomfort associated with tissue ischemia.
Administer medications, as indicated; for example:	
Antianginals, such as nitroglycerin (Nitro-Bid, Nitrostat, Nitro-Dur), isosorbide dinitrate (Isordil), and mononitrate (Imdur)	Nitrates do not improve mortality. However, they provide symptomatic relief by means of several mechanisms, including coronary vasodilation, improved collateral myocardial blood flow, and reduction of cardiac workload (Fogoros, 2016a).
Analgesics, such as morphine sulfate (MS) or fentanyl (Duragesic), by appropriate route	Potent opioid analgesic may be used in acute chest pain/ evolving MI because of beneficial side effects. Such effects include peripheral vasodilation, reduced myocardial workload; sedation (which produces relaxation); and interrupted flow of vasoconstricting catecholamines, thereby effectively relieving severe chest pain.

## NURSING DIAGNOSIS: risk for decreased cardiac Tissue Perfusion

### Possibly Evidenced by

Hypoxemia, hypertension; coronary artery spasm  
Elevated C-reactive protein; hyperlipidemia  
Family history of cardiac disease

### Desired Outcomes/Evaluation Criteria—Client Will

#### Cardiac Pump Effectiveness NOC

Demonstrate adequate coronary perfusion as appropriate (e.g., vital signs within client's normal range; free of chest pain or discomfort).  
Participate in behaviors and activities that reduce the workload of the heart.

\*\*\*Refer to CP: ACUTE CORONARY SYNDROME (ACS), ND: risk for decreased cardiac Tissue Perfusion for related nursing and collaborative interventions.

**NURSING DIAGNOSIS:** risk for decreased Cardiac Output**Possibly Evidenced by**

- Alteration in heart rate or rhythm
- Altered contractility [infarcted myocardial muscle], diminished stroke volume
- Altered preload [e.g., decreased venous return]
- Altered afterload [e.g., systemic vascular resistance]

**Desired Outcomes/Evaluation Criteria—Client Will****Cardiac Pump Effectiveness NOC**

Maintain hemodynamic stability, such as vital signs and cardiac output within normal range, adequate urinary output, decreased frequency or absence of dysrhythmias; absence of venous stasis complications.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Cardiac Care: Acute NIC</b>	
<i>Independent</i>	
Monitor mental status. Investigate sudden changes or continued alterations in mentation, such as anxiety, confusion, lethargy, and stupor.	Cerebral perfusion is directly related to cardiac output and is influenced by electrolyte and acid-base variations, hypoxia, and systemic emboli.
Inspect for pallor, cyanosis, mottling, and cool or clammy skin.	Systemic vasoconstriction resulting from diminished cardiac output may be evidenced by decreased skin perfusion and diminished pulses.
Monitor respirations, noting work of breathing.	Cardiac pump failure and ischemic pain may precipitate respiratory distress.
Auscultate breath sounds.	Crackles reflect pulmonary congestion; may develop because of depressed myocardial function.
Evaluate quality and equality of pulses.	Decreased cardiac output results in diminished, weak, or thready pulses. Irregularities suggest dysrhythmias, which may require further evaluation and monitoring.
Auscultate heart sounds. Note development of S <sub>3</sub> and S <sub>4</sub> .	S <sub>4</sub> may be associated with myocardial ischemia, ventricular stiffening, and pulmonary or systemic hypertension. S <sub>3</sub> is usually associated with heart failure, but it may also be noted with left ventricular overload that can accompany infarction in STEMI.
Note presence of murmurs and rubs.	Indicates disturbances of normal blood flow within the heart, such as incompetent valve, septal defect, or vibration of papillary muscle and chordae tendineae (complication of MI). Presence of rub with an infarction is also associated with inflammation, such as pericardial effusion and pericarditis.
Obtain frequent BP readings. Monitor hemodynamic pressures when invasive lines/devices are available.	Hypertension is a common phenomenon initially, possibly related to pain, anxiety, catecholamine release, or preexisting vascular problems. However, with right ventricular MI or severe left ventricular dysfunction, hypotension and cardiogenic shock can be seen.
Monitor heart rate and rhythm. Document dysrhythmias.	Heart rate and rhythm can be affected by the presence of coronary artery blockage, myocardial necrosis, impairment of ventricular contractility, electrolyte and acid-base imbalances, and circulating catecholamines. Common dysrhythmias that may develop in STEMI are ventricular tachycardia or fibrillation, premature ventricular ectopics, atrial tachycardia or fibrillation, and atrioventricular block and sinus bradycardia. Note: Life-threatening dysrhythmias are a major cause of death during the first 24 hours after an attack. (Refer to CP: Dysrhythmias.)

(continues on page 80)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor output, noting changes in urine output. Record urine specific gravity, as indicated. Calculate fluid balance.	Decreased output may reflect systemic perfusion problems and may reflect heart failure. Inotropic drugs may be needed for support of circulation or additional fluids to enhance circulating volume and kidney function. Note: Specific gravity measurements reflect hydration status and renal function.
Observe for sudden or progressing changes in vital signs, such as hypotension, diminished mentation, cool clammy skin, or weight gain, swelling of extremities, and progressive shortness of breath.	Signs of poor ventricular function and/or impending complications, including cardiogenic shock or congestive heart failure.
Elevate legs when in sitting position and avoid prolonged sitting when extremities are edematous.	Helps reduce venous congestion, thus reducing risk of thromboembolic complications due to venous stasis.
Apply antiembolic hose or sequential compression devices as indicated, being sure they are individually fitted and appropriately applied.	These enhance venous return to promote cardiac output and systemic circulation, thus reducing risk of venous stasis complications.
Have emergency equipment and medications available.	Sudden coronary occlusion, lethal dysrhythmias, extension of infarct, and unrelenting pain are situations that may precipitate cardiac arrest, requiring immediate life-saving therapies or transfer to CCU.
<b>Collaborative</b>	
Administer supplemental oxygen by appropriate route, as indicated.	Supplemental oxygen is indicated for patients who are breathless, hypoxic (oxygen saturation <90%), or who present with heart failure (Cabello et al, 2013; Zafari & Abdou, 2017).
Measure cardiac output and other functional parameters as appropriate.	Cardiac index, preload and afterload, contractility, and cardiac work can be measured noninvasively with thoracic electrical bioimpedance (TEB) technique. Useful in evaluating response to therapeutic interventions and identifying need for more aggressive or emergency care.
Review serial ECGs.	Provides information regarding progression or resolution of infarction, status of ventricular function, electrolyte balance, and effect of drug therapies.
Monitor laboratory data, such as cardiac enzymes, arterial blood gases (ABGs), and electrolytes, and blood urea nitrogen (BUN), creatinine, and coagulation studies (prothrombin time [PT], activated prothrombin time [aPTT], clotting times).	Enzymes monitor resolution or extension of infarction. Presence of hypoxia indicates need for supplemental oxygen. Electrolyte imbalances, such as hypo- or hyperkalemia, adversely affect cardiac rhythm and contractility. BUN and creatinine are indicators of organ perfusion and function. Abnormalities in coagulation may occur as a result of therapeutic measures, such as heparin or Coumadin use and some cardiac drugs.
Maintain IV or saline-lock access, as indicated.	Patent line is important for administration of fluids to support circulation and to administer emergency drugs in the presence of persistent lethal dysrhythmias or chest pain.
Administer fluids, diuretics, inotropic drugs, vasopressors, and/or vasodilators as indicated.	These treatments support systemic circulation and organ function.
Assist with reperfusion interventions, as indicated:	As a rule, initial therapy is directed toward restoration of perfusion as soon as possible to salvage as much myocardium as possible. Early mechanical intervention (PCI, PTCA, surgery) or pharmacologic reperfusion should be performed as soon as possible for patients with clinical presentation of STEMI (Zafari & Abdou, 2017).
Percutaneous coronary interventions (PCIs), including percutaneous transluminal coronary angioplasty (PTCA), with or without stenting	Regarding STEMI, PCI may be performed either as a primary intervention or after thrombolysis failure. The advantage of performing primary PTCA in MI is the ability to achieve reperfusion of the infarcted vessel with a lower risk of bleeding than that associated with thrombolytic therapy.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assist with medical therapies as indicated:	Certain classes of medications may be given short-term or long-term in both STEMI and NSTEMI, including nitrates, thrombolytics, antiplatelet agents, anticoagulants, beta blockers, angiotensin-converting enzyme (ACE) inhibitors, and angiotensin receptor blockers (ARBs).
Thrombolytic agents, for example, streptokinase (Streptase); tissue plasminogen activator (tPA) and recombinant forms (alteplase [Activase], reteplase [Retavase], tenecteplase [TNKase]) (Rivera-Bou et al, 2016)	Thrombolytic (clot-buster) therapy prevents the formation of thrombi associated with myocardial infarction and has been shown to improve survival rates by 29% in STEMI (Reed et al, 2016). Later-generation drugs have clot sensitivity without causing a systemic lytic state and should be administered as soon as possible after onset of acute MI.
Antiplatelet agents, including aspirin (ASA), and P2Y <sub>12</sub> inhibitors	In initial management, inhibition of the coagulation cascade is essential to limit thrombus propagation in patient with acute MI, whether managed invasively or conservatively. Giving aspirin as soon as possible inhibits platelet activity at the site of plaque rupture—a key mechanism in the unfolding acute MI. Note: Aspirin is a mainstay blood thinner and may be combined with newer anticoagulants (P2Y <sub>12</sub> inhibitors like clopidogrel [Plavix] or prasugrel [Effient]). This is often referred to as dual antiplatelet therapy (DAPT) (Reed et al, 2016). Note: DAPT is also a long-term therapy after PCI stent placement.
Beta blockers	Beta-adrenergic blockers are of benefit when given intravenously within 4 hours of the onset of pain and continued on a long-term basis. The American Heart Association (AHA) recommends the initiation of beta blockers to all patients with STEMI, unless beta blockers are contraindicated (Zafari & Abdou, 2017).
Angiotensin-converting enzyme (ACE) inhibitors	ACE inhibitors are useful for long-term therapy and also appear to benefit client who has no evidence of hypotension if administration is begun within the first 24 hours after the onset of MI. May be given to reduce risk of developing heart failure in client with diminished ventricular EF and in those with hypertension, diabetes, or chronic kidney disease, unless contraindicated (Reed et al, 2016).
Angiotensin receptor blockers (ARBs)	Helps lower blood pressure, alone or in combination with other agents, in order to reduce systemic vascular resistance and improve organ perfusion.
Antidysrhythmic drugs (refer to CP: Dysrhythmias)	Dysrhythmias are usually treated symptomatically. Early inclusion of ACE inhibitor therapy, especially in the presence of large anterior MI, ventricular aneurysm, or heart failure, enhances ventricular output, increases survival, and may slow progression of heart failure.
Prepare for surgery, as indicated. (Refer to CP: Cardiac Surgery.)	Emergent or urgent CABG surgery may be indicated if angioplasty fails or client develops mechanical complications, such as a ventricular septal defect or left ventricular or papillary muscle rupture.
Assist with insertion and maintain pacemaker or automatic internal cardiac defibrillator (AICD) when used. (Refer to CP: Dysrhythmias.)	Pacing may be a temporary support measure during acute phase or may be needed permanently if infarction severely damages conduction system, impairing systolic function. Use of AICD is currently advocated in client who had ventricular fibrillation or tachycardia resulting in arrest.

## NURSING DIAGNOSIS: risk for Activity Intolerance

### Possibly Evidenced by

Circulatory problem [imbalance between oxygen supply and demand]  
Altered heart rate, rhythm  
Physical deconditioning (weakness, sedentary lifestyle; aging) [side effects of medications]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Cardiac Pump Effectiveness NOC

Demonstrate increased activity tolerance.  
Report or display decreased episodes of dyspnea, angina, and dysrhythmias.  
Participate in behaviors and activities that reduce the workload of the heart.

\*\*\*\*Refer to CP: Angina, Chronic/Stable, ND: risk for Activity Intolerance for related nursing and collaborative interventions.

## NURSING DIAGNOSIS: Anxiety [specify level]

### May Be Related To

Situational crisis; environment  
Major change (e.g., threat to or change in health, economic status; threat of death)

### Possibly Evidenced By

Fearful attitude  
Apprehension, increased tension, restlessness, facial tension  
Uncertainty, feelings of inadequacy  
Reports concern due to change in life events  
Focus on self, worried

### Desired Outcomes/Evaluation Criteria—Client Will

#### Anxiety Self-Control NOC

Recognize and verbalize feelings.  
Identify causes and contributing factors.  
Verbalize reduction of anxiety or fear.  
Demonstrate positive problem-solving skills.  
Identify and use resources appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction NIC</b> <i>Independent</i> Identify and acknowledge client's perception of threat or situation. Encourage expressions of, and avoid denying feelings of, anger grief, sadness, and fear.	Coping with the pain and emotional trauma of an MI is difficult. Client may fear death or be anxious about immediate environment. Ongoing anxiety related to concerns about impact of heart attack on future lifestyle, matters left unattended or unresolved, and effects of illness on family may be present in varying degrees for some time and may be manifested by symptoms of depression.
Note presence of hostility, withdrawal, and denial— inappropriate affect or refusal to comply with medical regimen.	Research into survival rates between personality types in individuals and the impact of denial has been ambiguous; however, studies show some correlation between degree and expression of anger or hostility and an increased risk for MI.
Maintain confident manner, without false reassurance.	Client and SO may be affected by the anxiety or uneasiness displayed by health team members. Honest explanations can alleviate anxiety.
Orient client and SO to routine procedures and expected activities. Promote participation when possible.	Predictability and information can decrease anxiety for client.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Observe for verbal and nonverbal signs of anxiety, and stay with client. Intervene if client displays destructive behavior.	Client may not express concern directly, but words or actions may convey sense of agitation, aggression, and hostility. Intervention can help client regain control of own behavior.
Accept but do not reinforce use of denial. Avoid confrontations.	Denial can be beneficial in decreasing anxiety but can postpone dealing with the reality of the current situation. Confrontation can promote anger and increase use of denial, reducing cooperation, and possibly impeding recovery.
Answer all questions factually. Provide consistent information; repeat as indicated.	Accurate information about the situation reduces fear, strengthens nurse-client relationship, and assists client and SO to deal realistically with situation. Attention span may be short, and repetition of information helps with retention.
Encourage client and SO to communicate with one another, sharing questions and concerns.	Sharing information elicits support and comfort and can relieve tension of unexpressed worries.
Provide privacy for client and SO.	Allows needed time for personal expression of feelings; may enhance mutual support and promote more adaptive behaviors.
Provide rest periods and uninterrupted sleep time and quiet surroundings, with client controlling type and number of external stimuli.	Conserves energy and enhances coping abilities.
Support normality of grieving process, including time necessary for resolution.	Can provide reassurance that feelings are normal response to situation and perceived changes. Helps client and SO identify realistic goals, thereby reducing risk of discouragement in face of the reality of limitations of condition and pace of recuperation.
Encourage independence, self-care, and decision making within accepted treatment plan.	Increased independence from staff promotes self-confidence and reduces feelings of abandonment that can accompany transfer from coronary unit and discharge from hospital.
Encourage discussion about postdischarge expectations.	Helps client and SO identify realistic goals, thereby reducing risk of discouragement in face of the reality of limitations of condition and pace of recuperation.

***Collaborative***

Administer antianxiety or hypnotics, as indicated, such as alprazolam (Xanax) and lorazepam (Ativan).

Promotes relaxation and rest and reduces feelings of anxiety.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding cause and treatment of condition, self-care, and discharge needs**
**May Be Related To**

Insufficient information or interest in learning, information misperception  
Insufficient knowledge of resources  
Lack of recall

**Possibly Evidenced By**

Reports the problem  
Inaccurate follow-through of instructions  
Development of preventable complications

**Desired Outcomes/Evaluation Criteria—Client Will****Knowledge: Cardiac Disease Management NOC**

Verbalize understanding of condition, potential complications, individual risk factors.  
Verbalize understanding of therapeutic regimen.  
List desired action and possible adverse side effects of medications.

(continues on page 84)

**NURSING DIAGNOSIS:** **deficient Knowledge regarding cause and treatment of condition, self-care, and discharge needs** (continued)**Self-Management: Cardiac Disease NOC**

Correctly perform necessary procedures and explain reasons for actions.  
Keep follow-up appointments.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Individual NIC</b> <i>Independent</i> Assess client and SO level of knowledge and ability or desire to learn.	Necessary for creation of individual instruction plan. Reinforces expectation that this will be a “learning experience.” Verbalization identifies misunderstandings and allows for clarification.
Be alert to signs of avoidance, such as changing subject away from information being presented or extremes of behavior, such as withdrawal or euphoria.	Natural defense mechanisms, such as anger or denial of significance of situation, can block learning, affecting client’s response and ability to assimilate information. Changing to a less formal or structured style may be more effective until client and SO are ready to accept or deal with current situation.
Present information in varied learning formats, such as programmed books, audiovisual tapes, question-and-answer sessions, and group activities.	Using multiple learning methods enhances retention of material.
<b>Cardiac Care: Rehabilitation NIC</b> Reinforce explanations of risk factors, dietary and activity restrictions, medications, and symptoms requiring immediate medical attention.	Provides opportunity for client to retain information and to assume control and participate in rehabilitation program.
Review activity limitations, such as refraining from strenuous activities until first checking with provider. Avoid exertion in extreme heat or cold. Stop any activity if chest pain, unusual shortness of breath, dizziness, lightheadedness, or nausea occurs.	During healing phase, restrictions may be needed to limit amount of myocardial workload and oxygen consumption.
Explain rationale of dietary regimen, diet low in sodium, saturated fats, and cholesterol.	Excess saturated fats, cholesterol, calories, and sodium increase BP and risk for heart disease. Excess of cholesterol builds plaque in arteries.
Instruct client to consult healthcare provider before taking other prescription or OTC medications.	Many drugs may contain sympathetic nervous stimulants and may increase BP or counteract other medications.
Discuss use of herbals, such as ginseng, garlic, ginkgo, hawthorn, and bromelain, as indicated.	Use of supplements or herbal remedies can result in alterations in blood clotting, especially when anticoagulant therapy, such as Plavix or ASA, is prescribed. Hawthorn can increase the effect of certain cardiac medications.
Encourage identification and reduction of individual risk factors, such as smoking and alcohol consumption and obesity.	These behaviors and chemicals have direct adverse effects on cardiovascular function and may impede recovery and increase risk for complications.
Warn against isometric activity, Valsalva’s maneuver, and activities requiring arms positioned above head.	These activities greatly increase cardiac workload and myocardial oxygen consumption and may adversely affect myocardial contractility and output.
Review programmed increases in levels of activity. Educate client regarding resumption of activities, such as walking, work, and recreational and sexual activity. Provide guidelines for gradually increasing activity and instruction regarding target heart rate and pulse taking, as appropriate.	Gradual increase in activity increases strength and prevents overexertion, may enhance collateral circulation, and promotes return to normal lifestyle. Note: Sexual activity can be safely resumed once client can accomplish activity equivalent to climbing two flights of stairs without adverse cardiac effects.
Identify alternative activities for “bad weather” days, such as measured walking in house or shopping mall.	Provides for continuing daily activity program.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review signs and symptoms requiring reduction in activity and notification of healthcare provider. Differentiate between increased heart rate that normally occurs during various activities and worsening signs of cardiac stress: chest pain, dyspnea, palpitations, increased heart rate lasting more than 15 minutes after cessation of activity, and excessive fatigue the following day.	Pulse elevations beyond established limits, development of chest pain, or dyspnea may require changes in exercise and medication regimen.
Emphasize importance of follow-up care, and identify community resources and support groups, such as cardiac rehabilitation programs, “coronary clubs,” and smoking cessation clinics.	Reinforces that this is an ongoing or continuing health condition for which support and assistance are available after discharge. Note: After discharge, client may encounter limitations in physical functioning and often incurs difficulty with emotional, social, and role functioning, requiring ongoing support.
Recommend client receive annual influenza and periodic pneumonia vaccination unless otherwise contraindicated.	Helps protect against viral and bacterial cardiorespiratory illnesses that can negatively impact client’s heart health.
Emphasize importance of contacting physician if chest pain, change in anginal pattern, or other symptoms recur.	Timely evaluation and intervention may prevent complications.
Stress importance of reporting development of fever in association with diffuse or atypical chest pain (pleural, pericardial) and joint pain.	Post-MI complication of pericardial inflammation (Dressler syndrome) requires further medical evaluation and intervention.
Encourage client and SO to share concerns and feelings. Discuss signs of pathological depression versus transient feelings frequently associated with major life events. Recommend seeking professional help if feelings of depression persist.	Depressed clients have a greater risk of dying 6 to 18 months following a heart attack (Glassman, 2007). Timely intervention may be beneficial. Note: Selective serotonin reuptake inhibitors (SSRIs), such as paroxetine (Paxil), have been found to be as effective as tricyclic antidepressants but with significantly fewer adverse cardiac complications.

**POTENTIAL CONSIDERATIONS** following discharge from care setting (dependent on client’s age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Activity Intolerance**—imbalance between oxygen supply and demand
- **Grieving**—loss of significant object (e.g., general well-being, required changes in lifestyle)
- **Decisional Conflict**—multiple or divergent sources of information; support system deficit
- **interrupted Family Processes**—situational transition or crisis; shift in health status of a family member
- **impaired Home Maintenance**—disease/illness, impaired functioning, inadequate support systems, unfamiliarity with neighborhood resources

## DYSRHYTHMIAS

### I. Pathophysiology

- a. Abnormal formation or conduction of the electrical impulses within the heart. Dysrhythmias are usually classified as originating from above the atrioventricular (AV) node (supraventricular) or below, from the ventricle. They are fast, slow, or irregular; and persistent or intermittent.
- b. Bradyarrhythmias: decreased intrinsic pacemaker function or block in conduction, often at AV junction or His-Purkinje system
- c. Tachyarrhythmias: caused by reentry, often due to enhanced or abnormal automaticity
  - i. Causes abnormalities of the heart rate, rhythm, or both
  - ii. Change in conduction may alter pumping action of heart, affecting blood pressure and perfusion of body organs.

### II. Classification: Types of Dysrhythmias (Wedro, 2016)

- a. Named according to the site of origination and the mechanism of conduction involved:
  - i. Sinus or sinoatrial (SA) node
  - ii. AV node
  - iii. Involved heart chamber—atrial or ventricular
  - iv. Between the atria and ventricles—supraventricular or junctional dysrhythmias
- b. Differentiated by rate
  - i. Slow: bradycardia, pulse below 60 in adult
  - ii. Fast: tachycardia, pulse above 100 in adult
- c. Rhythm disturbances can be regular (e.g., sinus tachycardia) or irregular (e.g., atrial fibrillation).

(continues on page 86)

### III. Etiology

- a. Primary cardiac disorder: coronary artery disease (CAD), myocardial infarction (MI), heart valve dysfunction, coronary artery bypass (CABG) surgery, or valve replacement surgery
- b. Systemic conditions: hypothyroidism and hyperthyroidism; fever and dehydration; sepsis; shock states (hypovolemic, cardiogenic); anemia; pulmonary diseases; brain injury;

catecholamine release, such as occurs in intense emotional stress or vigorous exercise; anxiety disorders and panic attacks

- c. Electrolyte imbalances, such as with potassium
- d. Effects of drugs and drug toxicity, such as with digoxin, aminophylline, atropine, and caffeine
- e. Illicit drug use, such as cocaine, methamphetamines

## COMMON DYSRHYTHMIAS (BYRG, 2016; WEDRO, 2016)

### Tachycardias

#### I. Sinus Tachycardia

- a. Sinus node creates rate that is faster than normal (greater than 100).
- b. Associated with physiological or psychological stress; medications, such as catecholamines, aminophylline, atropine, stimulants, and illicit drugs; enhanced automaticity; and autonomic dysfunction.

#### II. Atrial Flutter

- a. Occurs in the atrium and creates regular atrial rates between 250 and 400. Because AV node cannot keep up with conduction of all these impulses, not all atrial impulses are conducted into the ventricle, causing a block at the AV node (usually 2:1 or 3:1).
- b. Approximately 60% of patients with atrial flutter have coronary artery disease (CAD) or hypertensive heart disease while 30% have no underlying cardiac disease (Ali, 2017).

#### III. Atrial Fibrillation (AF)

- a. Rapid, irregular twitching of the atrial musculature with an atrial rate of 300 to 600 and a ventricular rate of 120 to 200 if untreated. The atria do not beat and pump blood to the ventricles. Instead, blood flows into the ventricles by gravity alone. This lack of atrial kick can decrease the heart's efficiency and cardiac output by 10% to 15% (Wedro, 2016).
- b. Associated with advanced age, thyroid disorders, obesity, pulmonary disorders, alcohol ingestion ("holiday heart syndrome"), hypertension, diabetes, sleep apnea, coronary artery or valvular disease, or after open heart surgery.

#### IV. Paroxysmal Supraventricular Tachycardia (PSVT, also called SVT)

- a. Pathways in the AV node or atrium allow an altered conduction of electricity, causing a regular and fast rate of sometimes more than 150 to 200.
- b. Ventricle, sensing the electrical activity coming through the AV node, beats along with each stimulation.
- c. Rarely a life-threatening event, but most people feel uncomfortable when PSVT occurs.

#### V. Ventricular Tachycardia (VT)

- a. Rapid heartbeat initiated within the ventricles, characterized by three or more consecutive premature ventricular beats with elevated and regular heart rate (such as 160 to 240 beats per minute).
- b. Heart rate sustained at a high rate causes symptoms such as weakness, fatigue, dizziness, fainting, or palpitations.
- c. Potentially lethal disruption of normal heartbeat that can degenerate to ventricular fibrillation.

### VI. Ventricular Fibrillation (VF)

- a. Aside from myocardial ischemia, other causes of ventricular fibrillation may include severe weakness of the heart muscle, electrolyte disturbances, drug overdose, and poisoning.
- b. Electrical signal is sent from the ventricles at a very fast and erratic rate, impairing the ability of ventricles to fill with blood and pump it out, markedly decreasing cardiac output and resulting in very low blood pressure and loss of consciousness.
- c. Sudden death will occur if VF not corrected.

### Bradycardias

#### I. Sinus Bradycardia

- a. Rarely symptomatic until heart rate drops below 50, then fainting or syncope may be reported.
- b. Causes include hypothyroidism, athletic training, sleep, vagal stimulation, increased intracranial pressure, MI, hypovolemia, hypoxia, acidosis, hypokalemia and hyperkalemia, hyperglycemia, hypothermia, toxins, tamponade, tension pneumothorax, thrombosis (cardiac or pulmonary), and trauma.
- c. Medications, such as beta blockers, calcium channel blockers, and amiodarone, also slow the heart.

#### II. Sick Sinus Syndrome (SSS)

- a. Variety of conditions affecting SA node function, including bradycardia, sinus arrest, sinoatrial block, episodes of tachycardia, and carotid hypersensitivity.
- b. Signs and symptoms related to cerebral hypoperfusion.
- c. May be associated with rapid rate (tachycardia) or alternate between too fast and too slow (bradycardia-tachycardia syndrome). A long pause (asystole) may occur between heartbeats, especially after an episode of tachycardia.

#### III. Heart Blocks

- a. First-degree AV block
  - i. Asymptomatic; usually an incidental finding on electrocardiogram (ECG)
- b. Second-degree AV (type I and type II)
  - i. Usually asymptomatic, although some clients can feel irregularities (palpitations) of the heartbeat, or syncope may occur, which usually is observed in more advanced conduction disturbances such as Mobitz II AV block.
  - ii. Medications affecting AV node function, such as digoxin, beta blockers, and calcium channel blockers, may contribute.
- c. Third-degree AV block (also called complete heart block)
  - i. May be associated with acute MI, either causing the block or related to reduced cardiac output from bradycardia in the setting of advanced atherosclerotic CAD.

- ii. Symptomatic with fatigue, dizziness, and syncope and possible loss of consciousness.
- iii. Can be life-threatening, especially if associated with heart failure.

### Other Dysrhythmias

#### I. Premature Atrial Complex (PAC)

- a. Electrical impulse starts in the atrium before the next normal impulse of the sinus node.
- b. Causes include caffeine, alcohol, and nicotine use; stretched atrial myocardium; anxiety; hypokalemia; and hypermetabolic states (pregnancy) or may be related to atrial ischemia, injury, or infarction.

#### II. Premature Ventricular Contraction (PVC)

- a. Electrical signal originates in the ventricles, causing them to contract before receiving the electrical signal from the atria.
- b. PVCs not uncommon and are often asymptomatic.
- c. Increase to several per minute may cause symptoms such as weakness, fatigue, dizziness, fainting, or palpitations.
- d. Irritability of the heart demonstrated by frequent and/or multiple back-to-back PVCs can lead to VF.

### III. Long QT Syndrome (LQTS) (Mayo Clinic Staff, 2016d; National Heart, Lung, and Blood Institute [NHLB], 2011)

- a. May be inherited or acquired.
- b. Of the seven types of inherited LQTS, three are common:
  - i. In types 1 and 2, the flow of potassium through ion channels in heart cells is abnormal. This may occur when client exercises or experiences strong emotions and can cause a rapid, uncontrollable heart rhythm that can be fatal if it's not quickly brought under control.
  - ii. In type 3, problems usually occur when the heart beats slower than normal, such as during sleep.
- c. Acquired types may be medication induced or have other causes:
  - i. Medications may include (or are not limited to) antihistamines, diuretics, some antiarrhythmia agents, certain antidepressants, and cholesterol-lowering drugs.
  - ii. Other causes include severe vomiting and diarrhea, eating disorders (e.g., bulimia), and where sodium or potassium losses affect electrical activity of the heart.

### G L O S S A R Y

**Arrhythmias (also called dysrhythmias):** Heart rhythm disturbances classified by rate (normal, tachycardia, bradycardia), mechanism (automaticity, reentry, fibrillation), and site of origin (atrial, ventricular, junctional).

*Note:* “Heart rhythm disorders are often referred to as cardiac arrhythmias (cardiac = heart; a = lack of) but this is technically incorrect, since in most cases there is a heart rhythm, but it is abnormal. Cardiac dysrhythmia (dys = abnormal or faulty + rhythm) might be a better term” (Wedro, 2016).

**AV node:** The electrical relay station between the atria (the upper) and the ventricles (the lower chambers of the heart).

**Bigeminal pulse:** Irregular strong beat alternating with weak beat.

**Bradycardias:** Abnormally slow rhythms may be ascribed to two general mechanisms—failure of the sinoatrial (SA) node to generate impulses, such as in sinus bradycardia, or failure of the impulses to conduct normally to the ventricles, such as in heart blocks.

**Pacemaker:** A system that sends electrical impulses to the heart in order to set the heart rhythm. The pacemaker can be the natural pacemaker of the heart or it can be an artificial electronic device.

**Palpitations:** Sensation that the heart is beating too quickly, too slowly, beating irregularly, or skipping a beat. An increased awareness of the heartbeat and palpitations can result from many dysrhythmias. Palpitations associated with dizziness, near-syncope, or syncope suggest tachyarrhythmia and are potentially more serious.

**Pulse deficit:** Difference between apical pulse and radial pulse.

**Pulsus alternans:** Regular strong beat, alternating with weak beat.

**Sinoatrial (SA) node:** One of the major elements in the cardiac conduction system that controls the heart rate. The SA node generates electrical impulses and conducts them throughout the muscle of the heart, stimulating the heart to contract and pump blood.

**Sudden cardiac death (also known as sudden cardiac arrest [SCA]):** A sudden, unexpected death caused by loss of heart function. Most sudden cardiac deaths are caused by dysrhythmias, such as ventricular fibrillation (VF). The only treatment is defibrillation with an electrical shock.

**Tachycardias:** Rapid heart rates originating from either the atrium or the ventricle.

### CARE SETTINGS

Generally, minor dysrhythmias are monitored and treated in the community setting; however, potential life-threatening situations (including heart rates above 150 beats per minute) may require a short inpatient stay.

### RELATED CONCERNs

Acute coronary syndrome, page 54

Angina, chronic/stable, page 64

Heart failure: chronic, page 38

Myocardial infarction, page 72

Psychosocial aspects of care, page 835

## CLIENT ASSESSMENT DATABASE

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- Generalized weakness
- Exertional fatigue

#### CIRCULATION

- History of previous or acute MI (90% to 95% experience dysrhythmias), cardiac surgery, cardiomyopathy, rheumatic heart disease and heart failure (HF), valvular heart disease, long-standing hypertension, use of pacemaker

• **Pulse:** Fast, slow, or irregular; palpitations, skipped beats

- Changes in heart rate/blood pressure (BP) with activity or exercise
- BP changes (hypertension or hypotension) during episodes of dysrhythmia
- Pulses may be irregular, for example, skipped beats, pulsus alternans, bigeminal pulse
- Pulse deficit
- **Heart sounds:** Irregular rhythm, extra sounds, dropped beats
- Skin color and moisture changes, such as pallor, cyanosis, diaphoresis (HF, shock)
- Edema dependent, generalized, jugular vein distention (JVD) (in presence of HF)
- Urine output decreased if cardiac output is severely diminished

#### EGO INTEGRITY

- Feeling nervous (certain tachydysrhythmias), sense of impending doom
- Stressors related to current medical problems

- Anxiety, fear, withdrawal, anger, irritability, crying
- Denial of health problems

#### FOOD/FLUID

- Loss of appetite, anorexia
- Food intolerance (with certain medications)
- Nausea or vomiting
- Changes in weight

- Weight gain or loss
- Edema
- Changes in skin moisture or turgor
- Lung sounds have crackles

#### NEUROSENSORY

- Dizzy spells, sudden fainting
- Headaches
- Numbness or tingling of fingers or toes

- Mental status or sensorium changes, such as disorientation, confusion, loss of memory; changes in usual speech pattern and consciousness, stupor, coma
- Behavioral changes, such as combativeness, lethargy, hallucinations
- Pupil changes (equality and reaction to light)
- Loss of deep tendon reflexes with life-threatening dysrhythmias (VT, severe bradycardia)

#### PAIN/DISCOMFORT

- Chest pain (mild to severe) that may or may not be relieved by antianginal medication

- Distraction behaviors, such as restlessness

#### RESPIRATION

- Shortness of breath
- Chronic lung disease
- History of or current tobacco use

- Changes in respiratory rate and depth during dysrhythmia episode
- **Breath sounds:** Adventitious sounds such as crackles, rhonchi, or wheezing, indicating respiratory complications, such as left-sided heart failure (pulmonary edema) or pulmonary thromboembolic phenomena
- Coughing with or without sputum production
- Abnormal pulse oximetry or blood gases

**MAY REPORT (continued)****MAY EXHIBIT (continued)****SAFETY**

- Fever
- Skin: Rashes (medication reaction)
- Loss of muscle tone and strength

**TEACHING/LEARNING**

- Familial risk factors, such as heart disease, stroke
- Use or misuse of prescribed medications, such as heart medications, anticoagulants, or over-the-counter (OTC) medications, for example, cough syrup, analgesics containing aspirin (ASA), and decongestants
- Use of vitamins and herbal supplements for heart rhythm, such as belladonna, camphor, dong quai, ginseng, goldenseal
- Stimulant abuse, including caffeine and nicotine; street drugs, including cocaine derivatives, methamphetamines, ecstasy, inhalants
- Lack of understanding about disease process and therapeutic regimen
- Evidence of failure to improve, such as recurrent or intractable dysrhythmias that are life-threatening

**DISCHARGE PLAN CONSIDERATIONS**

- Alteration of medication use and therapy
- Anticoagulant or digitalis toxicity precautions
- Teaching regarding pacemaker or other device

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES (AMERICAN HEART ASSOCIATION [AHA], 2016B)**

<b>TEST</b>	<b>WHY IT IS DONE</b>	<b>WHAT IT TELLS ME</b>
	<ul style="list-style-type: none"> <li>• <b>Electrocardiogram (ECG):</b> Records electrical activity of the heart (snapshot view of one point in time).</li> </ul>	Measures how long it takes for impulses to travel through the atria, the conduction system, and the ventricles. Identifies when hypoxia (e.g., due to coronary artery obstruction or myocardial muscle damage) and imbalance of electrolytes (e.g., potassium, magnesium, and calcium) are affecting cardiac rhythm and contractility. <i>Note:</i> Exercise ECG reveals dysrhythmias occurring only when client is not at rest (can be diagnostic for cardiac cause of syncope).
	<ul style="list-style-type: none"> <li>• <b>Holter monitor:</b> Extended ECG tracing (24 hours to weeks).</li> </ul>	May be used to determine which dysrhythmias occur intermittently or may be causing specific symptoms (e.g., sudden fainting [syncope] or bradycardia only when client is at rest). May also be used to evaluate pacemaker function, antidysrhythmic drug effect, or effectiveness of cardiac rehabilitation.
	<ul style="list-style-type: none"> <li>• <b>Trans-telephonic event monitor:</b> (may be either implantable [loop memory] or external [transient symptoms event] recorder).</li> </ul>	Helps diagnose why a person may be having palpitations or fainting spells, especially if these symptoms don't happen often. Results are transmitted telephonically or downloaded to a remote computer for rapid interpretation.
	<ul style="list-style-type: none"> <li>• <b>Signal-averaged ECG (SAECG):</b> Multiple ECG tracings are obtained over a period of approximately 20 minutes evaluating several hundred cardiac cycles.</li> </ul>	May be done to detect subtle cardiac abnormalities that increase risk for dysrhythmias or for further evaluation of dysrhythmias noted on resting ECG.

(continues on page 90)

## DIAGNOSTIC STUDIES (contd.)

### WHY IT IS DONE (continued)

- **Transthoracic echocardiography (TTE):** Employs ultrasound waves to show heart's size, structure, and motion.

### STUDIES THAT MAY BE USED TO PROVOKE/REPRODUCE DYSRHYTHMIAS

- **Electrophysiological (EP) mapping:** Test that records the spread of electrical activity with each heartbeat and maps the electrical pathways of the heart.
- **Stress tests (e.g., treadmill exercise or pharmacological-induced stress test)**
- **Tilt table test:** Shows heart rate and blood pressure response to change in position from lying down to standing up.

### BLOOD TESTS

- **Electrolytes:** Substances that, in solution, conduct an electric current and are decomposed by its passage. Sodium, potassium, calcium, and magnesium are common electrolytes.
- **Drug screen:** Laboratory procedure that checks blood or urine sample for presence or therapeutic levels of certain medications or drugs of abuse.

### WHAT IT TELLS ME (continued)

Can help identify irregularities that can lead to sudden cardiac death in patients at risk, such as those with hypertrophic cardiomyopathy.

Can rapidly provide visual information about dysrhythmia's location and effect on cardiac function.

EP study is valuable for provoking known but infrequent dysrhythmias and for unmasking or triggering suspected dysrhythmias. This diagnostic tool then becomes a treatment modality (e.g., induced tachycardia can usually be stopped by rapid pacing via the electrode catheters).

Provokes dysrhythmias and makes diagnosis easier. A treadmill test may be used for stable client whose suspected dysrhythmias are clearly exercise related. Drug-induced testing helps identify dysrhythmias that may be from ischemia in client who cannot physically perform treadmill.

An infrequently utilized test but may be done to find cause for recurrent syncope by reproducing symptoms under controlled conditions.

Imbalance of electrolytes, such as potassium, magnesium, and calcium, adversely affects cardiac rhythm and contractility.

May reveal therapeutic or toxic levels of prescription medications, suggest interaction of drugs, or detect presence of street drugs that can affect or contribute to dysrhythmias.

### NURSING PRIORITIES

1. Prevent or treat life-threatening dysrhythmias.
2. Support client and significant other (SO) in dealing with anxiety and fear of potentially life-threatening situation.
3. Assist in identification of cause or precipitating factors.
4. Review information regarding condition, prognosis, and treatment regimen.

### DISCHARGE GOALS

1. Free of life-threatening dysrhythmias and complications of impaired cardiac output and tissue perfusion.
2. Anxiety reduced and managed.
3. Disease process, therapy needs, and prevention of complications understood.
4. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: risk for decreased Cardiac Output

#### Possibly Evidenced By

Alteration in heart rate or rhythm  
Altered contractility

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Cardiac Pump Effectiveness NOC

Maintain or achieve adequate cardiac output as evidenced by BP and pulse within normal range, adequate urinary output, palpable pulses of equal quality, and usual level of mentation.

Display reduced frequency or absence of dysrhythmia(s).

Participate in activities that reduce myocardial workload.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Dysrhythmia Management NIC</b>	
<b>Independent</b>	
Palpate radial, carotid, femoral, and dorsalis pedis pulses, noting rate, regularity, amplitude (full or thready), and symmetry. Document presence of pulsus alternans, bigeminal pulse, or pulse deficit.	Differences in equality, rate, and regularity of pulses are indicative of the effect of altered cardiac output on systemic and peripheral circulation.
Auscultate heart sounds, noting rate, rhythm, presence of extra heartbeats, and dropped beats.	Specific dysrhythmias are more clearly detected audibly than by palpation. Hearing extra heartbeats or dropped beats helps identify dysrhythmias in the unmonitored client.
Monitor vital signs. Assess adequacy of cardiac output and tissue perfusion, noting significant variations in BP, pulse rate equality, respirations, changes in skin color and temperature, level of consciousness and sensorium, and urine output during episodes of dysrhythmias.	Although not all dysrhythmias are life-threatening, immediate treatment may be required to terminate dysrhythmia in the presence of alterations in cardiac output and tissue perfusion.
Determine type of dysrhythmia and document with rhythm strip if cardiac or telemetry monitoring is available:	Useful in determining need and type of intervention required.
Sinus tachycardia	Tachycardia can occur in response to stress, pain, fever, infection, coronary artery blockage, valvular dysfunction, hypovolemia, hypoxia, or because of decreased vagal tone or increased sympathetic nervous system activity associated with the release of catecholamines. Although it generally does not require treatment, persistent tachycardia may worsen underlying pathology in clients with ischemic heart disease because of shortened diastolic filling time and increased oxygen demands. These clients may require medications.
Sinus bradycardia	Bradycardia is common in clients with acute MI (especially anterior and inferior) and is the result of excessive parasympathetic activity, blocks in conduction to the SA or AV nodes, or loss of automaticity of the heart muscle. Clients with severe heart disease may not be able to compensate for a slow rate by increasing stroke volume; therefore, decreased cardiac output, HF, and potentially lethal ventricular dysrhythmias may occur.
Atrial dysrhythmias, such as PACs, atrial flutter, AF, and atrial supraventricular tachycardia (SVT) (i.e., paroxysmal atrial tachycardia [PAT], multifocal atrial tachycardia [MAT])	PACs can occur as a response to ischemia and are normally harmless but can precede or precipitate AF. Acute and chronic atrial flutter or fibrillation (the most common dysrhythmia) can occur with coronary artery or valvular disease and may or may not be pathological. Rapid atrial flutter or fibrillation reduces cardiac output because of incomplete ventricular filling (shortened cardiac cycle) and increased oxygen demand.
Ventricular dysrhythmias, such as premature ventricular contractions (PVCs) or ventricular premature beats (VPBs), ventricular tachycardia (VT), and ventricular flutter and fibrillation (VF)	PVCs or VPBs reflect cardiac irritability and are commonly associated with MI, digoxin toxicity, coronary vasospasm, and misplaced temporary pacemaker leads. Frequent, multiple, or multifocal PVCs result in diminished cardiac output and may lead to potentially lethal dysrhythmias, such as VT or sudden death or cardiac arrest from ventricular flutter or VF. Note: Intractable ventricular dysrhythmias unresponsive to medication may reflect ventricular aneurysm. Polymorphic VT ( <i>torsades de pointes</i> ) is recognized by inconsistent shape of QRS complexes and is often related to use of certain medications.

(continues on page 92)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Heart blocks	Reflect altered transmission of impulses through normal conduction channels (slowed, altered) and may be the result of MI or CAD with reduced blood supply to SA or AV nodes, drug toxicity, and sometimes cardiac surgery. Progressing heart block is associated with slowed ventricular rates, decreased cardiac output, and potentially lethal ventricular dysrhythmias or cardiac standstill.
Provide calm and quiet environment. Review reasons for limitation of activities during acute phase.	Reduces stimulation and release of stress-related catecholamines, which can cause or aggravate dysrhythmias and vasoconstriction, increasing myocardial workload.
Demonstrate and encourage use of stress management behaviors such as relaxation techniques; guided imagery; and slow, deep breathing.	Promotes client participation in exerting some sense of control in a stressful situation.
Investigate reports of chest pain, documenting location, duration, intensity (0 to 10 scale), and relieving or aggravating factors. Note nonverbal pain cues, such as facial grimacing, crying, and changes in BP and heart rate.	Reasons for chest pain are variable and depend on underlying cause. However, chest pain may indicate ischemia due to altered electrical conduction, decreased myocardial perfusion, or increased oxygen need, such as impending or evolving MI.
Be prepared to initiate cardiopulmonary resuscitation (CPR), as indicated.	Development of life-threatening dysrhythmias requires prompt intervention to prevent ischemic damage or death.
<b>Collaborative</b>	
Monitor laboratory studies, such as the following:	
Electrolytes	Imbalance of electrolytes, such as potassium, magnesium, and calcium, adversely affects cardiac rhythm and contractility.
Medication and drug levels	Reveal therapeutic and toxic level of prescription medications or street drugs that may affect or contribute to presence of dysrhythmias.
Administer supplemental oxygen, as indicated.	Increases amount of oxygen available for myocardial uptake, reducing irritability caused by hypoxia.
Prepare for and assist with diagnostic and treatment procedures such as EP studies, radiofrequency ablation (RFA), and cryoablation (CA).	Treatment for several tachycardia dysrhythmias, including SVT, atrial flutter, Wolff-Parkinson-White (WPW) syndrome, AF, and VT, is often carried out as first-line treatment via heart catheterization or angiographic procedures. After rhythm is confirmed with EP study, the client will then often have either an RFA or a CA to terminate or disrupt the dysfunctional pattern. Medications may be tried first or added after ablation for increased treatment success. Note: Catheter ablation has a success rate of 95% and recurrence rate of less than 5%. It is the preferred treatment for symptomatic patients with WPW syndrome (Helton, 2015).
Insert and maintain intravenous (IV) access.	Patent access line may be required for administration of emergency drugs.
Administer medications, as indicated, for example:	
Potassium	Correction of hypokalemia may be sufficient to terminate some ventricular dysrhythmias. Note: Potassium imbalance is the number one cause of AF.
Antidysrhythmics, such as the following:	Antiarrhythmic drugs are used to (1) decrease or increase conduction velocity, (2) alter the excitability of cardiac cells, and (3) suppress abnormal excitability (automaticity). (“Antiarrhythmic Agents,” 2000–2017; Levine, 2014; “Vaughn’s Summaries,” update 2017.)
Class I drugs	Class I drugs block sodium ( $\text{Na}^+$ ) channels and are subdivided.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Class Ia, such as disopyramide (Norpace), procainamide (Procanabid), quinidine (Cardioquin)	These drugs increase action potential duration, and effective refractory period and decrease membrane responsiveness, prolonging both QRS complex and QT interval. This also results in decreasing myocardial conduction velocity and excitability in the atria, ventricles, and accessory pathways. They suppress ectopic focal activity. Useful for treatment of atrial and ventricular premature beats and repetitive dysrhythmias, such as atrial tachycardias and atrial flutter and AF. Note: Class Ia antiarrhythmics are used less often now because of their modest effectiveness and adverse effects (Helton, 2015).
Class Ib, such as lidocaine (Xylocaine), phenytoin (Dilantin, Phenytek), and mexiletine (Mexitil)	These drugs slow conduction by depressing SA node automaticity and decreasing conduction velocity through the atria, ventricles, and Purkinje's fibers. The result is prolongation of the PR interval and lengthening of the QRS complex. They suppress and prevent all types of ventricular dysrhythmias.
Class Ic, such as flecainide (Tambocor), propafenone (Rhythmol), and moricizine (Ethmozine)	These drugs inhibit the voltage-dependent sodium channels and prolong the depolarization phase, thus increasing conduction velocity, and have little effect on the repolarization phase. This makes them useful in the treatment of atrial flutter or fibrillation in clients with structurally normal hearts. Note: Flecainide increases risk of drug-induced dysrhythmias post-MI. Propafenone can worsen or cause new dysrhythmias, a tendency called the "proarrhythmic effect."
Class II drugs (most used), such as atenolol (Tenormin), carvedilol (Coreg), propranolol (Inderal), nadolol (Corgard), acebutolol (Sectral), and esmolol (Brevibloc)	Beta blockers have antiadrenergic properties and decrease automaticity. They reduce the rate and force of cardiac contractions, which in turn decrease cardiac output, blood pressure, and peripheral vascular resistance. Therefore, they are useful in the treatment of dysrhythmias caused by SA and AV node dysfunction, including SVTs, atrial flutter, and AF. Note: These drugs may exacerbate bradycardia and cause myocardial depression, especially when combined with drugs that have similar properties.
Class III drugs, such as bretylium tosylate (Bretylol), amiodarone (Pacerone, Cordarone), dofetilide (Tikosyn), sotalol (Betapace), and ibutilide (Corvert)	These drugs are potassium channel blockers; they prolong the refractory period and action potential duration, consequently prolonging the QT interval. They decrease peripheral resistance and increase coronary blood flow. They have antianginal and antiadrenergic properties. They are used to terminate VF and other life-threatening ventricular dysrhythmias and sustained ventricular tachyarrhythmias, especially when lidocaine and procainamide are not effective.
Class IV drugs, such as amlodipine (Norvasc), verapamil (Adalat, Calan), and diltiazem (Cardizem, Tiazac)	Calcium channel blockers slow conduction time through the AV node, prolonging PR interval to decrease ventricular response in SVTs, atrial flutter, and AF. Calan and Cardizem may be used for bedside conversion of acute AF.
Class V drugs, such as electrolytes (e.g., magnesium, potassium), isoproterenol (Isuprel), adenosine (Adenocard); inotropic agents (digoxin [Lanoxin, Digitek])	Miscellaneous drugs have antiarrhythmic effects using various mechanisms and are chosen for specific circumstances. For example, isoproterenol may be used to treat certain types of heart block, digitalis (may be used alone to improve cardiac pumping force and ejection fraction), or in combination with other antidysrhythmic drugs to reduce ventricular rate in the presence of uncontrolled or poorly tolerated atrial tachycardias or atrial flutter and AF.

(continues on page 94)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Prepare for and assist with elective cardioversion.	May be used in AF after trials of first-line drugs—such as atenolol, metoprolol, diltiazem, and verapamil—have failed to control heart rate or in certain unstable dysrhythmias to restore normal heart rate or relieve symptoms of heart failure.
Assist with insertion and maintain pacemaker (external or temporary, internal or permanent) function.	Temporary pacing may be necessary to accelerate impulse formation in bradydysrhythmias, synchronize electrical impulsivity, or override tachydysrhythmias and ectopic activity to maintain cardiovascular function until spontaneous pacing is restored or permanent pacing is initiated. These devices may include atrial and ventricular pacemakers and may provide single-chamber or dual-chamber pacing.
Prepare for procedures, such as PCIs, including angiography with possible angioplasty and stent placement; catheter or surgical ablation; or surgery, such as aneurysmectomy or CABG, as indicated.	Treatment may include revascularization procedures such as stenting or CABG, indicated to enhance circulation to myocardium and conduction system. Ablation therapy destroys a small spot of heart tissue and creates an electrical block along the pathway that stops the dysrhythmia and redirects electrical conduction pathways. Resection of ventricular aneurysm may be required to correct intractable ventricular dysrhythmias unresponsive to medical therapy.
Prepare for placement of ICD when indicated.	This device may be surgically implanted in those clients with recurrent, life-threatening ventricular dysrhythmias (such as might occur with long QT syndrome [LQTS]), or other dysrhythmias unresponsive to tailored drug therapy (NHLB, 2011). The latest generation of devices can provide multilevel or “tiered” therapy, that is, antitachycardia and anti-bradycardia pacing, cardioversion, or defibrillation, depending on how each device is programmed.

### NURSING DIAGNOSIS: risk for Poisoning [Digitalis toxicity]

#### Possibly Evidenced By

Inadequate knowledge of pharmacological agents; inadequate knowledge of poisoning prevention  
Reduced vision, cognitive limitations  
[Limited range of therapeutic effectiveness]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Knowledge: Medication NOC

Verbalize understanding of individual prescription, how it interacts with other drugs or substances, and importance of maintaining prescribed regimen.  
Recognize signs of digoxin overdose and developing heart failure, and identify what to report to physician.

#### Cardiac Pump Effectiveness NOC

Be free of signs of toxicity; display serum drug level within individually acceptable range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Medication Management NIC</b> <i>Independent</i> Evaluate client need for/use of digitalis.	Incidence of digitalis toxicity has declined because of reduced digitalis usage, improvement in drug formulation, increased awareness in drug-to-drug interactions, increased availability of other drugs to treat heart failure, and techniques like catheter ablation therapy for supraventricular tachycardias. However, digitalis toxicity rates remain relatively stable. Note: One study, which used data from the National Electronic Injury Surveillance System—Cooperative Adverse Drug Event Surveillance Project, the National Ambulatory Medical Care Survey, and the National Hospital Ambulatory Medical Care Survey, estimated that 1% of emergency department visits for adverse drug events in patients aged 40 years or older resulted from digoxin toxicity, with this figure rising to 3.3% for patients aged 85 years or older (See et al, 2014).
Instruct client not to change dose for any reason, not to omit dose—unless instructed to, based on pulse rate—not to increase dose or take extra doses, and to contact physician if more than one dose is omitted.	Alterations in drug regimen can reduce therapeutic effects, result in toxicity, and cause complications.
Advise client that digoxin may interact with <b>many</b> other drugs and that physician should be informed that digoxin is taken whenever new medications are prescribed. Advise client not to use OTC drugs, such as laxatives, antidiarrheals, antacids, cold remedies, diuretics, and herbals, without first checking with the pharmacist or healthcare provider.	Knowledge may help prevent dangerous drug interactions.
Review importance of dietary and supplemental intake of potassium, calcium, and magnesium.	Maintaining electrolytes at normal ranges may prevent or limit development of toxicity and correct many associated dysrhythmias.
Provide information and have the client and SO verbalize understanding of toxic signs and symptoms to report to the healthcare provider.	Nausea, vomiting, diarrhea, unusual drowsiness, confusion, very slow or very fast irregular pulse, thumping in chest, double or blurred vision, yellow or green tint or halos around objects, flickering color forms or dots, altered color perception, and worsening HF—such as dependent or generalized edema, dyspnea, decreased amount or frequency of voiding—indicate need for prompt evaluation and intervention. Note: In severe or refractory heart failure, altered cardiac binding of digoxin may result in toxicity even with previously appropriate drug doses.
Discuss necessity of periodic laboratory evaluations, as indicated: Serum digoxin level	Drug levels are evaluated in conjunction with clinical manifestations and ECG to determine individual's response.
Electrolytes, blood urea nitrogen (BUN), creatinine, and liver function studies	Digoxin has a narrow therapeutic serum range (0.6–1.3 to 2.6 ng/mL). Levels associated with toxicity overlap between therapeutic and toxic ranges and are dependent on individual response. Note: Cardiac glycosides (includes digoxin) accounted for 2.6% of toxic plant exposures in the United States in 2008 (Bronstein et al, 2009).
	Abnormal levels of potassium, calcium, or magnesium increase the heart's sensitivity to digoxin. Impaired kidney function can cause digoxin (mainly excreted by the kidney) to accumulate to toxic levels. Digoxin levels (mainly excreted by the bowel) are affected by impaired liver function.

(continues on page 96)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b>	
Review ECG, noting rate and rhythm.	Alterations in cardiac rate and rhythm from digitalis toxicity may simulate almost every known type of dysrhythmia (Patel & James, 2017). Effective management relies on early recognition that a dysrhythmia may be related to digitalis intoxication.
Assist in providing supportive therapy, as indicated.	Depending on the severity of the toxicity, treatment ranges from simply holding or discontinuing to treatment with IV fluids, oxygenation and support of ventilatory function, and correction of electrolyte imbalances.
Administer medications, as appropriate, for example:	
Digoxin immune Fab (Digibind)	Digibind is currently considered first-line treatment for severe digoxin toxicity accompanied by significant dysrhythmias (e.g., severe bradyarrhythmia, second- or third-degree heart block, ventricular tachycardia or fibrillation) from digitalis. Onset of action ranges from 20 to 90 minutes; complete response generally occurs within several hours (Patel & James, 2017).
Evaluate serum electrolyte levels (especially potassium, magnesium, and calcium) and renal and hepatic functions periodically during detoxification therapy. Replace electrolytes as prescribed.	Hypokalemia, hypomagnesemia, or hypercalcemia may make the patient more susceptible to digitalis toxicity.
Prepare client for transfer to critical care unit (CCU), as indicated, such as for dangerous dysrhythmias, exacerbation of heart failure.	In the presence of digoxin toxicity, clients frequently require intensive monitoring until therapeutic levels have been restored. Because all digoxin preparations have long serum half-lives, stabilization can take several days.

## NURSING DIAGNOSIS: **ineffective Health Management**

### May Be Related To

Complexity of/insufficient knowledge of therapeutic regimen

### Possibly Evidenced By

Reports difficulty with prescribed regimen

Failure to take action to reduce risk factors

[Unexpected acceleration of disease condition]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Self-Management: Dysrhythmias **NOC**

Verbalize understanding of therapeutic regimen.

List desired action and possible adverse side effects of medications.

Demonstrate behaviors and changes in lifestyle necessary to maintain therapeutic regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Individual <b>NIC</b></b>	
<b>Independent</b>	
Assess client and SO level of knowledge and ability and desire to learn.	Necessary for creation of individual instruction plan. Reinforces expectation that this will be a “learning experience.” Verbalization identifies misunderstandings and allows for clarification.
Be alert to signs of avoidance, such as changing subject away from information being presented or extremes of behavior (withdrawal or euphoria).	Natural defense mechanisms, such as anger or denial of significance of situation, can block learning, affecting client’s response and ability to assimilate information. Changing to a less formal or structured style may be more effective until client and SO are ready to accept and deal with current situation.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Present information in varied learning formats, for example, programmed books, audiovisual tapes, question-and-answer sessions, and group activities.	Multiple learning methods may enhance retention of material.
Provide information in written form for client and SO to take home.	Follow-up reminders may enhance client's understanding and cooperation with the desired regimen. Written instructions are a helpful resource when client is not in direct contact with healthcare team.
<b>Teaching: Disease Process</b> Explain and reinforce specific dysrhythmia problem and therapeutic measures to client and SO.	Ongoing and updated information (such as whether the problem is resolving or may require long-term control measures) can decrease anxiety associated with the unknown and prepare client and SO to make necessary lifestyle adaptations. Educating the SO may be especially important if client is elderly, visually or hearing impaired, or unable or even unwilling to learn or follow instructions. Repeated explanations may be needed because anxiety and bulk of new information can block or limit learning.
Reinforce explanations of risk factors, dietary and activity restrictions, medications, and symptoms requiring immediate medical attention.	Provides opportunity for client to retain information and to assume control and participate in rehabilitation program.
Encourage identification and reduction of individual risk factors, such as smoking and alcohol consumption and obesity.	These behaviors and chemicals have direct adverse effect on cardiovascular function and may impede recovery and increase risk for complications.
Identify adverse effects and complications of specific dysrhythmias, such as fatigue, dependent edema, progressive changes in mentation, vertigo, and psychological manifestations.	Dysrhythmias may decrease cardiac output, manifested by symptoms of developing cardiac failure and altered cerebral perfusion. Tachydysrhythmias may also be accompanied by debilitating anxiety and feelings of impending doom.
Instruct and document teaching regarding medications. Include the desired action, how and when to take the drug, what to do if a dose is forgotten (dosage and usage information), and expected side effects or possible adverse reactions or interactions with other prescribed and OTC drugs or substances (alcohol, tobacco, herbal remedies), as well as what and when to report to the healthcare provider.	Information necessary for client to make informed choices and to manage medication regimen. Note: Use of herbal remedies in conjunction with drug regimen may result in adverse effects, for example, cardiac stimulation and impaired clotting, necessitating evaluation of product for safe use.
Review signs and symptoms of digitalis toxicity with patient and family, where indicated.	Teaching is tailored for individual situation (e.g., reason for digoxin toxicity is unknown [as in person with heart failure confused about dosing] or patient is just beginning digoxin therapy). Reportable symptoms may include (and not be limited to) fatigue, headache, weakness; blurred vision, yellow or green vision; new or worsening dysrhythmias; anorexia, nausea, vomiting, diarrhea (Vallerand et al, 2017).
Encourage development of regular exercise routine, avoiding overexertion. Identify signs and symptoms requiring immediate cessation of activities, such as dizziness, lightheadedness, dyspnea, and chest pain.	When dysrhythmias are properly managed, normal activity should not be affected. Exercise program is useful in improving overall cardiovascular well-being.
Review individual dietary needs and restrictions, such as potassium and caffeine.	Depending on specific problem, client may need to increase dietary potassium, such as when potassium-depleting diuretics are used. Caffeine may be limited to prevent cardiac excitation.
Demonstrate proper pulse-taking technique. Recommend weekly checking of pulse for 1 full minute or daily recording of pulse before medication and during exercise as appropriate. Identify situations requiring immediate medical intervention, for example, dizziness or irregular heartbeat, fainting, and chest pain.	Continued self-observation or monitoring provides for timely intervention to avoid complications. Medication regimen may be altered or further evaluation may be required when heart rate varies from desired rate or pacemaker's preset rate.

(continues on page 98)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review safety precautions, techniques to evaluate and maintain pacemaker or ICD function, when indicated.	Promotes self-care, provides for timely interventions to prevent serious complications.
Review symptoms requiring medical intervention; for example, report pulse rate below set limit for demand pacing or less than low-limit rate for rate-adaptive pacers and prolonged hiccups.	Instructions or concerns depend on function and type of device as well as client's condition and presence or absence of family or caregivers.
Recommend wearing medical alert bracelet or necklace and carrying pacemaker ID card.	Allows for appropriate evaluation and timely intervention, especially if client is unable to respond in an emergency situation.
Discuss monitoring and environmental safety concerns in presence of pacemaker or ICD; for example, microwave ovens and other electrical appliances (including electric blankets, razors, radio/TV) can be safely operated if they are properly grounded and in good repair. There is no problem with metal detectors, although pacemaker may trigger sensitive detectors. Cordless phones are safe, although cellular phones held directly over pacemaker may cause interference; it is recommended that client not carry phone in shirt pocket when phone is on. High-voltage areas, magnetic fields, and radiation can interfere with optimal pacemaker function, so client should avoid high-tension electric wires, arc welding, and large industrial magnets, such as demolition sites and magnetic resonance imaging (MRI).	Aids in clarifying misconceptions and fears and encourages client to be proactive in avoiding potentially harmful situations.

**POTENTIAL CONSIDERATIONS** following discharge from care setting (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Activity Intolerance**—imbalance between oxygen supply and demand
- **Ineffective Health Management**—complexity of therapeutic regimen, decisional conflicts, economic difficulties, inadequate number of cues to action

## CARDIAC SURGERY: CORONARY ARTERY BYPASS GRAFT (CABG), AND VALVE REPLACEMENT: POSTOPERATIVE CARE—

**I. Purpose:** To maximize cardiac output by improving blood flow and myocardial muscle function. Procedures are carried out on patients with coronary artery and/or valvular disorders to improve their quality of life and to reduce cardiac-related mortality.

**II. Types**

- a. Reparative: Closure of atrial or ventricular septal defect or repair of stenotic mitral valve; reparative surgeries more likely to produce cure or prolonged improvement
- b. Reconstructive: Coronary artery bypass grafting (CABG), restructure of incompetent valve leaflets
- c. Substitutional: Valve replacement, heart transplant

**III. Procedures**

- a. **Procedures requiring use of cardiopulmonary bypass (CPB)**
  - i. **Coronary artery bypass grafting (CABG)** is the most common type of open heart surgery in the United States (Bilal et al, 2014; Diodato & Chedrawy, 2014). Traditional CABG surgery requires a large incision dividing the breastbone and use of the heart-lung machine.

During CABG, a healthy artery or vein from the body is connected (grafted) into one or more blocked coronary arteries, creating a new path for blood flow to the heart muscle. Grafts usually come from the client's own arteries (e.g., internal mammary artery [IMA] or internal thoracic artery [ITA]) or veins located in the legs (saphenous vein). CABG may be performed as an emergency procedure in the context of an ST-segment elevation MI (STEMI) where it has not been possible to perform percutaneous coronary intervention (PCI) or where PCI has failed and there is persistent pain and ischemia threatening a significant area of myocardium.

- ii. **Port-access coronary artery bypass (PACAB)** is a minimally invasive option in certain conditions, such as single bypass from left mammary artery to left anterior descending coronary artery. PACAB combines the benefits of conventional CABG (use of the heart-lung machine and cardioplegia) with minimally invasive direct coronary bypass (MIDCAB). The patient is

hooked to the heart-lung machine without opening the chest, and the procedure is carried out using modified instruments to fashion the connection between the graft and coronary artery inside the chest cavity.

- iii. **Aortic or mitral valve repair and replacement.** The aortic valve and the mitral valve are the most commonly replaced valves. Valves may be mechanical (synthetic materials) or tissue (human or animal donor tissue). The procedure chosen will depend on the valve that needs replacement, the severity of symptoms, and the risk of surgery. With limited-access techniques for valve repair or replacement, the sternum does not need to be opened to gain access to the heart. For example, an aortic valve can be replaced through a small incision between the ribs on the side of the chest or through a 3-inch incision made in the middle of the chest. The mitral valve can be repaired or replaced through a 3-inch incision between the ribs, on the side of the chest. Robotic-assisted surgery may be employed (American Heart Association [AHA], 2016c; Texas Heart Institute, 2016).
- b. **Procedures that do not require the use of a CPB machine (sometimes called beating heart surgery [BHS]).**
  - i. **Off-pump coronary artery bypass (OPCAB)** requires full sternotomy or limited access incisions. Surgeons use special equipment to hold parts of the beating heart still while they are constructing bypass grafts. Meanwhile, the rest of the heart keeps pumping blood to the body.
  - ii. **Minimally invasive direct coronary bypass (MIDCAB)** requires that several small incisions are made in the chest to access only the sections of coronary arteries that require grafts. *Note:* The limited number of small incisions made using MIDCAB

makes it hard to treat more than two coronary arteries during the same surgery.

- c. **Robotic-assisted coronary artery bypass (RACAB),** also called closed-chest heart surgery, may or may not require cardiopulmonary bypass. Robotic surgeries have been used for several different heart-related procedures, including valve surgery, coronary artery bypass, cardiac tissue ablation, heart defect repair, and tumor removal.
- d. **Endoscopic coronary bypass (ECAB)** enables the performance of bypass surgery in difficult spaces using a port access, which may be video and robotic assisted. This procedure is rare and typically reserved for one vessel revascularization.
- e. **Transmyocardial laser revascularization (TMR)** uses lasers to create channels in heart muscle to improve direct blood flow. This treatment is aimed at improving blood flow to areas of the heart that were not treated by angioplasty or surgery. A special carbon dioxide ( $\text{CO}_2$ ) laser is used to create small channels in the heart muscle, improving blood flow to the heart muscle.

#### IV. Statistics

- a. Nearly 400,000 coronary artery bypass graft (CABG) surgery procedures are performed annually in the United States (Go et al, 2014). In 2010, 106,000 valve replacements were performed in the United States (Go et al, 2013).
- b. One-year mortality is similar between CABG and percutaneous coronary interventions (PCI), but 5-year survival is significantly better for CABG (Go et al, 2013; Verma et al, 2013).
- c. Cost: According to the Centers for Disease Control and Prevention (CDC), National Centers for Health Statistics (2014) reporting for 2012 total hospital costs for heart bypass were \$6,170,000, with total hospital costs for heart valve replacement at \$5,481,000.

#### G L O S S A R Y

**Anastomosis:** Surgical connection created between tubular structures, such as blood vessels, that are grafted into the coronary arteries to create a bypass channel for circulation around a blocked artery.

**Cardioplegia:** The intentional and temporary cessation of cardiac activity, primarily for cardiac surgery.

**Cardiopulmonary bypass (CPB) (also called heart-lung machine):** Mechanical means of circulating and oxygenating the blood through the body when it's diverted from the heart and lungs. The heart's beating is stopped so the surgeon can perform the bypass procedure on a still heart.

**Coronary artery bypass grafting (CABG):** Procedure in which one or more blocked coronary arteries are bypassed by a blood vessel graft to restore normal blood flow to the heart. These grafts usually come from the client's own arteries and veins located in the leg (saphenous vein), internal mammary artery (IMA), or internal thoracic artery (ITA). The graft goes around the blocked artery (or arteries) to create new pathways for oxygen-rich blood to flow to the heart.

**Minimally invasive direct coronary bypass (MIDCAB):** Requires a smaller incision and may be done for CABG and some valve remodeling and replacement procedures.

**Off-pump coronary artery bypass (OPCAB) (also called off-pump coronary revascularization):** Off-pump

procedures can offer certain advantages in low-risk populations, such as decreased cost, reduced length of stay, reduced postoperative complications, and avoidance of blood transfusions. They also reduce surgical trauma to the client as well as risk of stroke and kidney failure.

**Percutaneous transmyocardial revascularization (PTMR) (also called transmyocardial laser revascularization, or TMR):** Laser surgery that opens tiny new pathways within the heart muscle to treat the symptoms of angina in a client who cannot withstand more conventional treatments such as bypass surgery or balloon angioplasty.

**Robotic-assisted coronary artery bypass (RACAB):**

Surgeon views the procedure on a video screen, uses a robot to perform the bypass, and has no direct contact with the client.

**Sternotomy:** Surgical incision made in the breastbone (mediastinum).

**Totally endoscopic coronary artery bypass (TECAB):**

Robotic-assisted procedure in which small-port incisions are made in intercostal spaces. TECAB is performed on the beating heart using a stabilization device that holds the anastomosis site steady and removes the need for CPB.

## CARE SETTING

Client is cared for at inpatient acute hospital on a surgical or post-intensive care unit (ICU) step-down unit.

## RELATED CONCERNS

- Angina, chronic/stable, page 64
- Dysrhythmias, page 85
- Heart failure, page 38
- Myocardial infarction, page 72
- Pneumothorax/hemothorax, page 169
- Psychosocial aspects of care, page 835
- Surgical interventions, page 873

## CLIENT ASSESSMENT DATABASE

\*\*\*\*The preoperative data presented here depend on the specific disease process and underlying cardiac condition and reserve.

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- Exercise intolerance
- Generalized weakness, fatigue
- Inability to perform expected or usual life activities
- Insomnia and sleep disturbances

- Abnormal heart rate, blood pressure (BP) changes with activity
- Exertional dyspnea
- Electrocardiogram (ECG) changes and dysrhythmias with activity

#### CIRCULATION

- History of recent or acute MI (three or more), vessel coronary artery disease, valvular heart disease, hypertension
- Current use of antithrombotic drugs, including those that inhibit the production of clotting factors in the liver, such as warfarin (Coumadin); those that interfere with blood clotting by blocking thrombin activity, such as heparin and lepirudin (Refludan); and antiplatelet drugs, such as aspirin, clopidogrel (Plavix), tirofiban (Aggrastat), and eptifibatide (Integritilin), which keep platelets from aggregating into clots. *Note:* Cardiac patients taking these drugs preoperatively require various interventions to ensure their safety for CPB and to reduce postoperative bleeding complications.
- Recent use of over-the-counter (OTC) drugs, such as NSAIDs, and dietary supplements, such as vitamin E, garlic, ginseng, and ginkgo (can inhibit clotting)

- Variations in BP, heart rate, and rhythm
- Abnormal heart sounds: S<sub>3</sub>/S<sub>4</sub>, murmurs
- Pallor and cyanosis of skin or mucous membranes
- Cool and clammy skin
- Edema, jugular vein distention (JVD)
- Diminished peripheral pulses
- Restlessness and other changes in mentation or sensorium (severe cardiac decompensation)

#### EGO INTEGRITY

- Feeling frightened, apprehensive, or helpless
- Distress over current events
- Fear of death or eventual outcome of surgery or possible complications
- Fear about changes in lifestyle and role functioning

- Apprehension, restlessness
- Facial or general tension
- Withdrawal and lack of eye contact
- Focus on self, irritability, anger, crying

#### FOOD/FLUID

- Change in weight
- Loss of appetite
- Nausea or vomiting
- Change in urine frequency or amount

- Weight gain or loss
- Dry skin, poor skin turgor
- Postural hypotension
- Edema—generalized, dependent, pitting

#### NEUROSENSORY

- Fainting spells, vertigo

- Changes in orientation or usual response to stimuli

#### PAIN/DISCOMFORT

- Chest pain, angina

**CLIENT ASSESSMENT DATABASE (contd.)****MAY REPORT (continued)****MAY EXHIBIT (continued)****RESPIRATION**

- Shortness of breath

- Dyspnea
- Abnormal breath sounds, such as crackles
- Productive cough

**SAFETY****TEACHING/LEARNING**

- Familial risk factors of diabetes, heart disease, hypertension, strokes
- Use of various cardiovascular drugs
- Failure to improve

**POSTOPERATIVE ASSESSMENT****PAIN/DISCOMFORT**

- Incisional discomfort
- Pain or paresthesia of shoulders, arms, hands, legs
  
- **Respiration:** Inability to cough or take a deep breath
  
- **Safety:** Oozing or bleeding from chest or donor site incisions

- Guarding of incisional areas
- Facial mask of pain, grimacing
- Distraction behaviors, moaning, restlessness
- Changes in BP, pulse, respiratory rate
- Decreased chest expansion
- Dyspnea—normal response to thoracotomy
- Areas of diminished or absent breath sounds (atelectasis)
- Changes in arterial blood gas (ABG) levels or pulse oximetry

**TEACHING/LEARNING**

- Modifiable risk factors for sternal wound infection, such as obesity, diabetes, and smoking
- Postoperative incision care to minimize or prevent infection

**DISCHARGE PLAN CONSIDERATIONS**

- Short-term assistance with food preparation, shopping, transportation, self-care needs, and homemaker and home maintenance tasks

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES (POSTOPERATIVE)****TEST****WHY IT IS DONE****WHAT IT TELLS ME****BLOOD TESTS**

- **Hemoglobin (Hgb) and hematocrit (Hct):** To identify red blood cell (RBC) and fluid replacement needs.

Whether heart surgery is performed on or off CPB equipment, clients develop moderate hemodilution from the fluids given perioperatively, thus lowering the Hct and platelet count. A low Hgb reduces oxygen-carrying capacity and indicates need for RBC replacement. Elevation of Hct suggests dehydration and need for fluid replacement.

(continues on page 102)

## DIAGNOSTIC STUDIES (POSTOPERATIVE) (contd.)

### WHY IT IS DONE (continued)

- **Coagulation studies:** Various studies may be done, such as platelet count and bleeding and clotting time.
- **Electrolytes:** A substance that, in solution, conducts an electric current and is decomposed by its passage. Sodium (Na), potassium (K<sup>+</sup>), and calcium (Ca) are common electrolytes.
- **Arterial blood gases (ABGs):** Assessment of levels of oxygen (PaO<sub>2</sub>) and carbon dioxide (PaCO<sub>2</sub>).
- **Blood urea nitrogen (BUN) and creatinine (Cr):** Elevated BUN can occur with dehydration, shock due to blood loss, or any condition that decreases blood flow to the kidneys.
- **Glucose:** Blood glucose levels should be controlled in all patients with diabetes to avoid hyperglycemia perioperatively.
- **Cardiac enzyme and isoenzymes troponin I (cTnI) and troponin T (cTnT):** Contractile proteins with nearly absolute myocardial tissue specificity, as well as high sensitivity. Troponins increase within 3 to 4 hours of myocardial injury.

### WHAT IT TELLS ME (continued)

Post-CPB bleeding is caused by various factors, including hemodilution, heparin use, platelet dysfunction due to exposure to the bypass pump, disseminated intravascular coagulation, and induced hypothermia (Shea, 2016). Patients placed on CPB equipment are more likely to bleed excessively than those who have off-bypass cardiac surgery. Risk increases further if the patient remains on bypass for more than 2.5 hours (Steiner & Despotis, 2007).

Imbalances—hyperkalemia or hypokalemia, hypernatremia or hyponatremia, and hypocalcemia—can affect cardiac function and fluid balance.

Verifies oxygenation status, effectiveness of respiratory function, and acid-base balance.

Provides good evidence of the filtering function of the kidneys and a measure of the degree of systemic hydration.

Fluctuations may occur because of preoperative nutritional status, presence of organ dysfunction, and impact of IV infusions.

Elevated in the presence of acute, recent, or perioperative myocardial infarction (MI).

## OTHER DIAGNOSTIC STUDIES

- **Chest x-ray:** Evaluates organs and structures within the chest.

Reveals heart size and position, pulmonary vasculature, and changes indicative of pulmonary complications, such as atelectasis or pulmonary edema. Verifies condition of valve prosthesis and sternal wires, position of pacing leads, and intravascular or cardiac lines.

Identifies changes in electrical and mechanical function such as might occur in immediate postoperative phase, acute or perioperative MI, valve dysfunction, and pericarditis.

## NURSING PRIORITIES

1. Support hemodynamic stability and ventilatory function.
2. Promote relief of pain and discomfort.
3. Promote healing.
4. Provide information about postoperative expectations and treatment regimen.

## DISCHARGE GOALS

1. Activity tolerance adequate to meet self-care needs.
2. Pain alleviated or managed.
3. Complications prevented or minimized.
4. Incisions healing.
5. Postdischarge medications, exercise, diet, and therapy understood.
6. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: risk for decreased Cardiac Output

#### Possibly Evidenced by

- Alteration in heart rate or rhythm
- Altered preload [e.g., decreased venous return]
- Altered afterload [e.g., systemic vascular resistance]

**NURSING DIAGNOSIS:** **risk for decreased Cardiac Output** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Cardiac Pump Effectiveness NOC**

Maintain hemodynamic stability, such as vital signs and cardiac output within normal range, adequate urinary output, decreased frequency or absence of dysrhythmias; absence of venous stasis complications.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hemodynamic Regulation NIC</b>	
<i>Independent</i>	
Monitor and document trends in heart rate and BP, especially noting hypertension. Be aware of specific systolic and diastolic limits defined for client.	Tachycardia is a common response to discomfort, inadequate blood or fluid replacement, and the stress of surgery. However, sustained tachycardia increases cardiac workload and can decrease effective cardiac output. Hypotension may result from fluid deficit, dysrhythmias, heart failure, and shock. Hypertension can occur (fluid excess or preexisting condition), placing stress on suture lines of new grafts and changing blood flow or pressure within heart chambers and across valves, with increased risk for various complications.
Monitor and document cardiac dysrhythmias.	Hypothermia, electrolyte and metabolic disturbances, manual manipulation of the heart, and myocardial ischemia may be factors in postoperative dysrhythmias. The incidence of atrial fibrillation (AF) ranges from 15% to 30% depending on many factors, including preoperative history and medications and type of surgery performed (El-Chami, 2013).
Observe client response to dysrhythmias, such as drop in BP, chest pain, and dyspnea.	Decreased cardiac output and hemodynamic compromise that occur with dysrhythmias require prompt intervention.
Observe for bleeding from incisions and chest tube (if in place).	Helps identify bleeding complications that can reduce circulating volume, organ perfusion, and cardiac function.
Observe for changes in usual mental status, orientation, and body movement or reflexes, such as onset of confusion, disorientation, restlessness, reduced response to stimuli, and stupor.	May indicate decreased cerebral blood flow or systemic oxygenation because of diminished cardiac output—sustained or severe dysrhythmias, low BP, heart failure, or thromboembolic phenomena, including perioperative stroke.
Record skin temperature and color and quality and equality of peripheral pulses.	Warm, pink skin and strong, equal pulses are general indicators of adequate cardiac output.
Measure and document intake and output (I&O) and calculate fluid balance.	Useful in determining fluid needs or identifying fluid excesses, which can compromise cardiac output and oxygen consumption.
Schedule uninterrupted rest and sleep periods. Assist with self-care activities as needed.	Prevents fatigue or exhaustion and excessive cardiovascular stress.
Monitor graded activity program. Note client response; vital signs before, during, and after activity; and development of dysrhythmias.	Regular exercise stimulates circulation and promotes feeling of well-being. Progression of activity depends on cardiac tolerance.
Inspect for JVD, peripheral or dependent edema, congestion in lungs, shortness of breath, and change in mental status.	May be indicative of acute or chronic heart failure.
Investigate reports of angina or severe chest pain accompanied by restlessness, diaphoresis, and ECG changes.	Although not a common complication of CABG, perioperative or postoperative MI can occur.
Investigate and report profound hypotension and unresponsiveness to fluid challenge, tachycardia, distant heart sounds, and stupor or coma.	Development of cardiac tamponade can rapidly progress to cardiac arrest because of the heart's inability to fill adequately for effective cardiac output. Note: This is a relatively rare, life-threatening complication that usually occurs in the immediate postoperative period but can occur later in the recovery phase.

(continues on page 104)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Review serial ECGs.	Most frequently done to follow the progress in normalization of electrical conduction patterns and ventricular function after surgery or to identify complications such as perioperative MI.
Measure cardiac output and other functional parameters, as indicated.	Useful in evaluating response to therapeutic interventions and identifying need for more aggressive or emergency care.
Monitor Hgb, Hct, and coagulation studies, such as activated prothrombin time (aPTT), international normalized ratio (INR), activated clotting time (ACT), and platelet count.	Help to identify bleeding or clotting problems associated with the surgery. Note: Diverting the client's blood through the CPB machine activates the clotting cascade and decreases the number (as well as the function) of platelets. Hemodilution occurs when the client's blood mixes with the crystalloid solution used to prime the CPB machine. Because blood is being diluted, the Hct drops, as does the concentration of coagulation factors, fibrinogen, and platelets. In addition, the use of hypothermia during surgery to decrease tissue oxygen requirements slows down the process of clotting and decreases platelet function.
Administer intravenous (IV) fluids or blood products as needed.	Clients who have surgery on CPB equipment are more likely to bleed excessively than those who have off-bypass cardiac surgery. RBC replacement is often indicated to restore and maintain adequate circulating volume and enhance oxygen-carrying capacity. IV fluids may be discontinued before discharge from the ICU or may remain in place for fluid replacement and emergency cardiac medications.
Administer supplemental oxygen as appropriate.	Promotes maximal oxygenation to reduce cardiac workload and aid in resolving myocardial irritability and dysrhythmias.
Administer electrolytes and medications, as indicated, such as potassium, antidysrhythmics, inotropic agents, diuretics, and anticoagulants.	Client needs are variable, depending on type of surgery, client's response to surgical intervention, and preexisting conditions, such as general health and type of heart disease. Electrolytes, antidysrhythmics, and other heart medications may be required on a short-term or long-term basis to maximize cardiac contractility and output.
Maintain surgically placed pacing wires (atrial or ventricular) and initiate pacing if indicated.	May be required to support cardiac output in presence of conduction disturbances (severe dysrhythmias) that compromise cardiac function.

## NURSING DIAGNOSIS: acute Pain

### May Be Related To

Injuring physical agents—surgical incisions, tissue inflammation, edema formation, intraoperative nerve trauma

### Possibly Evidenced By

Verbal/coded reports of pain

Guarding behavior

Expressive behaviors—restlessness, irritability

Changes in heart rate, blood pressure, respiratory rate

### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Level NOC

Verbalize relief or absence of pain.

Demonstrate relaxed body posture and ability to rest and sleep appropriately.

#### Pain Control NOC

Differentiate surgical discomfort from angina or preoperative heart pain.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<b>Independent</b>	
Note type and location of incision(s).	Many CABG clients do not experience severe discomfort in chest incision and may complain more often of donor site incision discomfort. Newer procedures, such as MIDCAB, require smaller chest and leg incisions, with less significant pain. Severe pain in either area should be investigated further for possible complications.
Encourage client to report type, location, and intensity of pain, rating it on a scale. Note associated symptoms. Ascertain how this compares with preoperative chest pain.	Pain is perceived, manifested, and tolerated individually. It is important for client to differentiate incisional pain from other types of chest pain, such as angina or discomfort from chest tubes.
Observe for anxiety, irritability, crying, restlessness, and sleep disturbances.	These nonverbal cues may indicate the presence or degree of pain being experienced.
Monitor vital signs.	Heart rate usually increases with acute pain, although a bradycardic response can occur in a severely diseased heart. BP may be elevated slightly with incisional discomfort but may be decreased or unstable if chest pain is severe or myocardial damage is occurring.
Identify and promote position of comfort, using adjuncts as necessary.	Pillows or blanket rolls are useful in supporting extremities, maintaining body alignment, and splinting incisions to reduce muscle tension and promote comfort.
Provide comfort measures, such as back rubs and position changes; assist with self-care activities; and encourage diversional activities, as indicated.	May promote relaxation, redirect attention, and reduce analgesic dosage or frequency.
Schedule care activities to balance with adequate periods of sleep and rest.	Rest and sleep are vital for cardiac healing (balance between oxygen demand and consumption) and can enhance coping with stress and discomfort.
Identify and encourage use of behaviors such as guided imagery, distractions, visualizations, and deep breathing.	Relaxation techniques aid in management of stress, promote sense of well-being, may reduce analgesic needs, and promote healing.
Tell client to request analgesics as soon as discomfort becomes noticeable.	Presence of pain causes muscle tension, which can impair circulation, slow healing process, and intensify pain.
Medicate before procedures and activities, as indicated.	Client participation in respiratory treatments, ambulation, and procedures, such as removal of chest tubes, pacemaker wires, and sutures, are facilitated by maximum analgesic blood level.
Investigate reports of pain in unusual areas—for instance, calf of leg or abdomen—or vague complaints of discomfort, especially when accompanied by changes in mentation, vital signs, and respiratory rate.	May be an early manifestation of developing complication, such as thrombophlebitis, infection, and gastrointestinal dysfunction.
Note reports of pain or numbness in ulnar area (fourth and fifth digits) of the hand, often accompanied by pain and discomfort of the arms and shoulders. Tell client that the problem usually resolves with time.	Indicative of a stretch injury of the brachial plexus because of the position of the arms during surgery. No specific treatment is currently useful.
<b>Collaborative</b>	
Administer analgesic medications (e.g., opioids, NSAIDs) by appropriate route (e.g., IV, patch, by mouth) as indicated.	Provides for control of pain and inflammation and reduces muscle tension, which improves client comfort and promotes healing. Note: IV narcotics will be used during the immediate postoperative period. Oral narcotics will most likely still be required for some time after extubation. Narcotic-induced respiratory depression is a risk during this time, requiring vigilant monitoring of client's respiratory status.

**NURSING DIAGNOSIS:** risk for ineffective Breathing Pattern**Possibly Evidenced By**

Pain  
Musculoskeletal impairment [surgical incision; chest tube]

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Ventilation NOC**

Maintain an effective respiratory pattern free of cyanosis and other signs and symptoms of hypoxia, with breath sounds equal bilaterally, lung fields clearing.  
Display complete re-expansion of lungs with absence of pneumothorax and hemothorax.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b> <i>Independent</i> Evaluate respiratory rate and depth. Note respiratory effort; for example, presence of dyspnea, use of accessory muscles, and nasal flaring.	Client responses are variable. Respiratory rate and effort may be altered by pain, fear, fever, blood or fluid loss, accumulation of secretions, hypoxia, or gastric distention. Respiratory suppression can occur from long time under anesthesia or heavy use of opioid analgesics. Early recognition and treatment of abnormal ventilation may prevent complications.
Auscultate breath sounds. Note areas of diminished or absent breath sounds and presence of adventitious sounds, such as crackles or rhonchi.	Breath sounds are often diminished in lung bases for a period after surgery because of normally occurring atelectasis. Loss of active breath sounds in an area of previous ventilation may reflect collapse of the lung segment, especially if chest tubes have recently been removed. Crackles or rhonchi may be indicative of fluid accumulation due to interstitial edema, pulmonary edema, or infection, or partial airway obstruction with pooling of secretions.
Observe chest excursion. Investigate decreased expansion or lack of symmetry in chest movement.	Air or fluid in the pleural space prevents complete expansion (usually on one side) and requires further assessment of ventilation status.
Observe character of cough and sputum production.	Frequent coughing may simply be throat irritation from operative endotracheal tube (ET) placement or can reflect pulmonary congestion. Purulent sputum suggests onset of pulmonary infection.
Inspect skin and mucous membranes for cyanosis.	Cyanosis of lips, nail beds, or earlobes or general duskeness may indicate a hypoxic condition due to heart failure or pulmonary complications. General pallor, commonly present in the immediate postoperative period, may indicate anemia from blood loss or insufficient blood replacement or RBC destruction from CPB pump.
Elevate head of bed, place in upright or semi-Fowler's position. Assist with early ambulation and increased time out of bed.	Enhances respiratory function and lung expansion. Effective in preventing and resolving pulmonary congestion.
Encourage client participation in and responsibility for deep-breathing exercises, use of adjuncts (e.g., incentive spirometer), and coughing, as indicated.	Aids in lung re-expansion and maintaining patency of small airways, especially after removal of chest tubes. Coughing is not necessary unless wheezes and rhonchi are present, indicating retention of secretions.
Demonstrate and reinforce splinting chest with pillows during deep breathing or coughing.	Reduces incisional tension, promotes maximal lung expansion, and may enhance effectiveness of cough effort.
Explain that coughing and respiratory treatments will not loosen or damage grafts or reopen chest incision.	Provides reassurance that injury will not occur and may enhance cooperation with therapeutic regimen.
Encourage maximal fluid intake within cardiac reserves.	Adequate hydration helps liquefy secretions, facilitating expectoration.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Medicate with analgesic before respiratory treatments, as indicated.	Allows for easier chest movement and reduces discomfort related to incisional pain, facilitating client cooperation with and effectiveness of respiratory treatments.
Record response to deep-breathing exercises or other respiratory treatment, noting breath sounds before and after treatment, as well as cough and sputum production.	Documents effectiveness of therapy or need for more aggressive interventions.
Investigate and report respiratory distress, diminished or absent breath sounds, tachycardia, severe agitation, and drop in BP.	Although not a common complication, hemothorax or pneumothorax may occur following removal of chest tubes and requires prompt intervention.
<b>Collaborative</b>	
Review chest x-ray reports, pulse oximetry, and laboratory studies (such as ABGs, Hgb), as indicated.	Monitors effectiveness of respiratory therapy and documents developing complications. A blood transfusion may be needed if blood loss is the reason for respiratory hypoxemia.
Instruct in and encourage use of incentive spirometer.	Maximizes lung inflation, reduces atelectasis, and prevents pulmonary complications.
Administer supplemental oxygen by cannula or mask, as indicated.	Enhances oxygen delivery to the lungs for circulatory uptake, especially in the presence of reduced and altered ventilation.
Assist with reinsertion of chest tubes or thoracentesis if indicated.	Re-expands lung by removal of accumulated blood and air and restoration of negative pleural pressure.

### NURSING DIAGNOSIS: impaired Skin/Tissue Integrity

#### May Be Related To

Surgical procedure

#### Possibly Evidenced By

Disruption of skin surface/damaged tissue [surgical incisions, puncture wounds]

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Wound Healing: Primary Intention NOC

Demonstrate behaviors and techniques to promote healing and prevent complications.

Display timely wound healing.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Incision Site Care NIC</b>	
<b>Independent</b>	
Inspect all incisions. Evaluate healing progress. Review expectations for healing with client.	Healing begins immediately, but complete healing takes time. Chest incision heals first (minimal muscle tissue), but donor site incision requires more time (more muscle tissue, longer incision, slower circulation). As healing progresses, the incision lines may appear dry, with crusty scabs. Underlying tissue may look bruised and feel tense, warm, and lumpy, suggesting resolving hematoma.
Suggest wearing soft cotton shirts and loose-fitting clothing, leaving incisions open to air as much as possible, covering and padding portion of incisions as necessary.	Reduces suture line irritation and pressure from clothing. Leaving incisions open to air promotes healing process and may reduce risk of infection.
Have client shower in warm water, washing incisions gently. Instruct client to avoid tub baths until approved by physician.	Keeps incision clean and promotes circulation and healing. Note: Climbing out of tub requires use of arms and pectoral muscles, which can put undue stress on sternotomy.
Encourage ankle exercises and elevation of legs when sitting in chair.	Promotes circulation and reduces edema to improve tissue healing.

(continues on page 108)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review normal signs of healing, such as itching along wound line, bruising, slight redness, and scabbing.	Helps client understand expected progression of healing and recognize signs of complications or nonhealing requiring further evaluation and intervention.
Instruct to watch for and report to physician places in incision that do not heal; reopening of healed incision; bloody or purulent drainage; localized area that is swollen with redness, feels increasingly painful, and is hot to touch; and temperature greater than 101.5°F (38.6°C) for longer than 24 hours.	Superficial infections and deep sternal wound infection (mediastinitis) occur infrequently but can have a profound effect on patient morbidity, length of stay, and cost of care. Note: This complication affects approximately 1% to 2% of cardiac surgery patients (Mueller & Dacey, 2015).
Promote adequate nutritional and fluid intake.	Helps maintain circulating volume for tissue perfusion and meets cellular energy requirements to facilitate tissue regeneration and healing process.
<b>Collaborative</b> Obtain specimen of wound drainage, as indicated. Administer antimicrobials and local treatments, as indicated.	If infection occurs, local and systemic treatments may be required.

NURSING DIAGNOSIS:	<b>deficient Knowledge regarding condition, postoperative care, self-care, and discharge needs</b>
<b>May Be Related To</b>	Insufficient information or interest in learning Insufficient knowledge of resources
<b>Possibly Evidenced By</b>	Insufficient knowledge Inaccurate follow-through of instructions Development of preventable complications
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Self-Management: Cardiac Disease NOC</b>	Participate in learning process. Assume responsibility for own learning. Begin to ask questions and look for information.
<b>Knowledge: Treatment Regimen NOC</b>	Verbalize understanding of condition, prognosis, and potential complications. Describe reasons for therapeutic actions.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Individual NIC</b> <i>Independent</i> Reinforce surgeon's explanation of surgical procedure, providing diagram as appropriate.	Provides individually specific information, creating knowledge base for subsequent learning regarding home management. Length of rehabilitation and prognosis are dependent on type of surgical procedure, preoperative physical condition, and duration and severity of any complications.
Discuss importance of changes in memory or mentation and plans for follow-up with appropriate healthcare providers if client has long-term mental status changes.	Mental status changes after heart surgery have long been reported, including confusion, delirium, seizures, coma, prolonged alteration in mental status, combativeness, and agitation. Many of these changes are transient, occurring in the immediate postoperative period, and client's recovery is complete. Some clients may have slower recovery time or have new-onset and/or worsening mental status. It is believed that some changes can be associated with manipulation of the large blood vessels during heart surgery, as well as preexisting cerebrovascular disease and other comorbidities (Fogoros, 2017b).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Cardiac Care: Rehabilitation NIC</b>	
Reinforce continuation of breathing exercises, incentive spirometry, and coughing with splinting incision.	Promotes alveolar ventilation, reducing risk of lung congestion.
Discuss routine and prophylactic medications and OTC drug use. Emphasize importance of checking with physician before adding any drugs. Reinforce need for routine laboratory tests, outpatient education, and community resources if client with valve replacement will be taking warfarin (Coumadin).	Depending on type of valve replacement (i.e., synthetic), lifelong anticoagulant therapy may be indicated. Potential for drug interactions must be considered before adding therapeutic agents to regimen. Note: Using herbal products, such as ginkgo, garlic, and vitamins, can alter coagulation and have an adverse effect when taken with anticoagulants.
Review prescribed cardiac rehabilitation or exercise program and progress to date. Assist client and significant other (SO) to set realistic goals.	Individual capabilities and expectations depend on type of surgery, underlying cardiac function, and prior physical conditioning. Note: Obesity is a predictor of hospital readmission and may require additional interventions.
Encourage participation in home routines, such as self-care and cooking. Suggest alternating rest periods with activity and light tasks with heavy tasks. Avoid heavy lifting and isometric and strenuous upper-body exercise.	Prevents excessive fatigue and exhaustion. Scheduling rest periods and short naps several times a day enhances coping abilities, reduces nervousness (common in this phase), and promotes healing. Note: Strenuous use of arms can place undue stress on sternotomy.
Problem-solve with client and SO ways to continue progressive activity program during temperature extremes and high wind or pollution days, such as walking predetermined distance within own house, in local indoor shopping mall, or on exercise track.	Having a plan forestalls giving up exercise because of interferences such as weather.
Reinforce physician's time limitations about lifting, driving, returning to work, resuming sexual activity, and exercising that involves upper extremities.	These restrictions are present until after the first postoperative office visit for assessment of sternum healing.
Assist client and SO to develop strategies for dealing with changes during recovery period, such as shifting responsibilities to other family members, friends, or neighbors; acquiring temporary assistance for housekeeping; and investigating avenues for financial assistance.	Planning for changes that may occur or be required promotes sense of control and accomplishment without loss of self-esteem.
Discuss issues concerning resumption of sexual activity, such as comparison of stress of sexual intercourse with other activities:	Concerns about sexual activity often go unexpressed, but clients usually desire information about what to expect. In general, client can safely engage in sex when activity level has advanced to point at which client can climb two flights of stairs, which is about the same amount of energy expenditure.
Position recommendations	Client should avoid positions that restrict breathing (sexual activity increases oxygen demand and consumption). Client with sternotomy should not support self or partner with arms (breast bone healing, support muscles stretched).
Expectations of sexual performance	Impotence appears to occur with some regularity in post-operative cardiac surgery clients. Although etiology is unknown, condition usually resolves in time without specific intervention. If situation persists, it may require further evaluation.
Appropriate timing; for example, avoid sexual intercourse following heavy meal, during periods of emotional distress, when client is fatigued or exhausted	Timing of activity may reduce occurrence of complications or angina.
Pharmacological considerations	Some clients may benefit from prophylactic use of antianginal medications for sexual activity.
Identify services and resources available after discharge. Provide telephone contact number or schedule follow-up calls as appropriate. Include referral names for home-care services, as indicated.	Facilitates transition to home and provides for ongoing monitoring, continuation of prescribed therapies, and opportunity to discuss concerns and alleviate anxiety.

**POTENTIAL CONSIDERATIONS** following discharge from care setting (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Activity Intolerance**—generalized weakness, sedentary lifestyle
- **Impaired Skin/Tissue Integrity**—mechanical factors (surgical incisions, puncture wounds)
- **risk for Infection**—broken skin, traumatized tissue, invasive procedures, decreased hemoglobin
- **Self-Care deficit [specify]**—discomfort, weakness, fatigue
- **risk for ineffective Role Performance**—physical illness, body image alteration, fatigue, pain
- **Impaired Home Maintenance**—illness, impaired functioning, inadequate support systems, unfamiliarity with neighborhood resources

## AORTIC ANEURYSMS (ABDOMINAL AND THORACIC)

**I. Pathophysiology:** Aortic aneurysms (AAs) occur when a weakness develops in part of the wall of the aorta. Any type of aneurysm can lead to circulatory problems (e.g., slowing or blocking of blood flow to tissues and organs with resultant ischemia and potential for tissue damage/organ failure, blood clotting aberrations, and heightened risk of death). Dilation of an abdominal aneurysm becomes significant when the aortic diameter exceeds 3 cm. Surgery is usually recommended when an abdominal aneurysm is growing rapidly, or size exceeds 5 to 5.5 cm (Mayo Clinic Staff, 2016e).

- a. Three basic pathological conditions are usually found (Gale Encyclopedia of Medicine, 2008):
  - i. If all three layers of the vessel are affected and weakness develops along an extended area of the vessel, the weakened area will appear as a large, bulging region (*fusiform aneurysm*).
  - ii. If weakness develops between the inner and outer layers of the aortic wall, a bulge results as blood from the interior of the vessel is pushed around the damaged region in the wall and collects between these layers (*dissecting aneurysm [DA]* because one layer is separated from another).
  - iii. If damage occurs to only the middle (muscular) layer of the vessel, a sack-like bulge can form (*saccular aneurysm*).
- b. Aneurysms can form in any section of the aorta but are most common in the belly area (abdominal aortic aneurysm [AAA]).
- c. Thoracic aorta aneurysm (TAA) form in the upper body. These can be **ascending** or **descending** aneurysms.
  - i. Thoracic ascending aortic aneurysms (TAAAs) involve just the aorta proper or include the aortic arch, and can affect blood flow to the head and heart muscle and coronary arteries. Ascending aortic aneurysms tend to cause anterior chest pain, whereas arch aneurysms more likely cause pain radiating to the neck.
  - ii. Descending thoracic aneurysms and thoracoabdominal aneurysms may compress the trachea or bronchus and cause dyspnea, stridor, wheezing, or cough. Descending thoracic aneurysms more likely cause back pain.
  - iii. Thoracic aneurysms are often asymptomatic until an acute (and often catastrophic) complication occurs.

**II. Etiology:** Etiology is multifactorial and may include:

- a. The condition occurs in individuals with multiple risk factors. Risk factors include smoking; chronic obstructive pulmonary disease (COPD); hypertension; atherosclerosis; male gender; age over 60; Caucasian race; high body mass index (BMI); congenital heart anomalies (e.g., bicuspid aortic valve); genetic factors (e.g., Marfan syndrome or type IV Ehlers-Danlos syndrome); family history (especially first-degree relatives); stimulant (e.g., cocaine or methamphetamine) abuse; recent cardiac catheterization or cardiac surgery, especially when surgical complications occur; and pregnancy (especially in women over 40 in third trimester) (Bellomo & Cichminski, 2013; Braverman et al, 2012; Strauss & Davis, 2014; Tseng & Bush, 2016).
- b. Aging results in changes in collagen and elastin, which lead to weakening of the aortic wall and aneurysmal dilation.
- c. Abdominal aneurysms are usually caused by atherosclerosis but can also occur because of trauma (e.g., shearing forces) or infection (CDC, 2016).
- d. Traumatic dissections can occur anywhere in the aorta due to shearing from deceleration (such as might occur in motor vehicle crash or fall from height) (Tseng & Bush, 2016).

**III. Classifications (Bellomo & Cichminski, 2013; Fogoros, 2016b)**

- a. Stanford classification is widely used for types of dissection.
  - i. Type A: Dissection of ascending aorta, requiring surgical intervention
  - ii. Type B: Dissection of descending aorta, most often treated medically with monitoring and prescribed medications
- b. DeBakey classification is based on site of origin.
  - i. Type I: Originates in ascending aorta and progresses at least to aortic arch and often beyond.
  - ii. Type II: Originates in and is confined to ascending aorta.
  - iii. Type III: Originates in descending aorta and can extend distally (away from origin) or rarely proximally (remains close to point of origin).

**IV. Complications of Aortic Dissection (White et al, 2013)**

- a. Common: Sudden death, cardiac tamponade, peripheral or mesenteric ischemia due to branch vessel dissection; myocardial ischemia due to coronary artery blockage or dissection; neurological complications (e.g., stroke, partial paralysis)

- b. Less common (not a complete list): Left hemothorax, pleural effusion; superior vena cava syndrome; airway obstruction, vocal cord paralysis; hematemesis; spinal cord injury; renal vascular hypertension

#### V. Statistics

- a. Mortality: Aortic aneurysms were the primary cause of 9,863 deaths in the United States in 2014 (CDC, 2016).
  - i. Aneurysmal rupture is one of the 15 leading causes of death in most lists (Tseng & Bush, 2016).
  - ii. Up to 50% of patients with ruptured abdominal aortic aneurysms do not reach the hospital, and those who do survive to the operating room have a mortality rate as high as 50% (Aggarwal et al, 2011).
  - iii. Early morbidity and mortality are related to bleeding, neurologic injury (e.g., stroke), cardiac failure, and

pulmonary failure (e.g., acute respiratory distress syndrome [ARDS]) (Tseng & Bush, 2016).

- b. Cost: No recent figures of overall costs in the United States are found, partly owing to the number of reports regarding a particular type of aneurysm and its particular treatment. For example: One clinical trial carried out between 2002 and 2008 (and *comparing costs between endovascular and open abdomen repair of ascending aortic aneurysms*) reported that “total mean health care costs did not differ significantly between the 2 groups (endovascular group, \$142 745; open repair group, \$153 533)” (Lederle et al, 2016). Another recent study found that “the adjusted mean cost difference for **emergent** versus **elective care** was \$8741.22 (30% increase) for *abdominal aortic aneurysm repair*” (Haider et al, 2015).

#### G L O S S A R Y

**Aorta:** Largest blood vessel of the body. Is composed of four parts: (1) ascending aorta (supplies coronary arteries and aortic valve), (2) aortic arch (brings blood to head, neck, and arms), (3) descending thoracic aorta (supplies blood to ribs and some chest structures), and (4) abdominal aorta (most major organs receive blood from branches of the abdominal aorta). The walls of the aorta have three layers: (1) inner (also known as the *intima*, a thin layer closest to blood flow); (2) middle (also called *media*), which provides the aorta its strength and elasticity; and (3) outer (also called *adventitia*), which provides structure and support. The intima is the portion that swells and forms a bulge (aneurysm) when the media weakens (Bellomo & Cichminski, 2013; Hiratzka et al, 2010).

**Aortic aneurysm (AA):** Balloon-like bulge in aorta resulting in aortic dilation. Risk factors include (1) direct mechanical forces on the aortic wall, such as hypertension, and (2) factors that affect the composition of the aortic wall (e.g., connective tissue disorders) (Green & Kron, 2003; Strauss & Davis, 2014). Symptomatic abdominal aortic aneurysms

(AAAs) that are not dissected are often treated with surgery and endovascular grafting. AA can be a cause of AD (see below).

**Aortic dissection (AD):** When aortic dissection (tearing) occurs, blood enters the linings of the aorta, tearing apart the layers of the wall, creating another pathway within which the blood runs (a false lumen). The dissection (a potentially life-threatening event) can travel along the length of the aorta, occluding blood vessels that arise from the aorta and causing damage to the organs supplied by those blood vessels. The primary tear is often more than 50% of the circumference of the aorta (Green & Kron, 2003) and is more common in the ascending aorta.

**Aortic rupture:** Dissection can result in an early or late rupture (a catastrophic event). Because the aorta is the body's main supplier of blood, rupture can cause life-threatening bleeding.

**Endoleak:** A condition in which blood leaks into a vessel that has had a stent graft inserted to correct an aortic aneurysm.

#### CARE SETTING

1. Emergency department: Screening may identify presence of aneurysm in patient being evaluated for pain. Patient risk and need for admission must be classified as high, medium, or low. These levels are determined by presence of high-risk conditions, such as pain and outcome of physical examination (White et al, 2013).
2. Acute care for emergent or elective surgical repair of aneurysm.
3. Community care for medical management of slow-growing aneurysms. Medical management includes periodic monitoring for changes in size of aneurysm and medications to reduce hypertension and lessen pulsatile load or aortic stress (White et al, 2013).
4. Note: Medical management is not addressed in this care plan.

**Note:** Focus of this care plan is postoperative care.

#### RELATED CONCERNs

- Acute coronary syndrome, page 54
- Cerebrovascular accident (CVA)/stroke, page 247
- Cardiac surgery, page 98
- Hypertension: severe, page 26
- Myocardial infarction, page 72
- Upper gastrointestinal bleeding, page 340
- Pneumothorax/hemothorax, page 169
- Psychosocial aspects of care, page 835
- Acute kidney injury (acute renal failure), page 595
- Surgical intervention, page 873

## CLIENT ASSESSMENT DATABASE (PRERUPTURE/PREOPERATIVE)

Data depend on the duration and severity of underlying problem and involvement of other body systems. Refer to specific plans of care for or relevant data and Diagnostic Studies and nursing diagnoses.

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<b>CIRCULATION</b> <ul style="list-style-type: none"><li>History of poorly controlled hypertension and current hypertension</li></ul>	<ul style="list-style-type: none"><li>Hypertension (70% of patients with AD have chronic hypertension) (White et al, 2013)</li><li>Blood pressure differential &gt;20 mm Hg between right and left arms (dissection)</li><li>Hypotension (with rupture)</li><li>Hypertension potentially followed by hypotension (with dissection)</li><li><b>Pulses:</b> Tachycardia (with rupture); bounding pulses, wide pulse pressure (dissection). Pulse deficit is not always present but occurs more commonly in type A dissections than in type B. Absence of upper extremity pulses may suggest ascending aortic aneurysm. Absent or reduced lower extremity peripheral pulses may occur if aneurysm is affecting either iliac artery.</li><li><b>Heart rate and rhythm:</b> Tachycardia and/or various dysrhythmias may occur. ECG may show ischemia or patterns of myocardial damage if coronary arteries are involved.</li><li><b>Heart sounds:</b> Abnormal sounds are not always present. Aortic insufficiency murmurs are present in about 44% of patients with type A dissections (White et al, 2013). Diastolic murmurs may be heard. Heart sounds are distant if pericardial tamponade is occurring.</li><li><b>Skin:</b> Pallor, clamminess, diaphoresis</li></ul>
<b>EGO INTEGRITY</b> <ul style="list-style-type: none"><li>Feeling anxious</li></ul>	<ul style="list-style-type: none"><li>Restlessness, self-focus, alteration in attention; decreased perceptual field</li></ul>
<b>ELIMINATION</b> <ul style="list-style-type: none"><li>May have decreased/or absent output if renal arteries are involved or hypotension/shock is present</li></ul>	<ul style="list-style-type: none"><li>May have decreased urinary output if renal arteries are involved or hypotension shock is occurring secondary to right coronary artery occlusion or cardiac tamponade due to rupture into pericardial space (Strauss &amp; Davis, 2014).</li></ul>
<b>FOOD/FLUID</b> <ul style="list-style-type: none"><li>Nausea</li></ul>	<ul style="list-style-type: none"><li>Vomiting</li><li>Diaphoresis</li></ul>
<b>NEUROSENSORY</b> <ul style="list-style-type: none"><li>Dizziness</li><li>Weakness on one side of body</li></ul>	<ul style="list-style-type: none"><li>May have syncope; loss of consciousness</li><li>May have symptoms similar to stroke if aortic arch is involved.</li></ul>
<b>PAIN/DISCOMFORT</b> <ul style="list-style-type: none"><li>Pulsating mass near navel</li><li>Pain reports:</li><li>Chest pain can mimic those of acute coronary syndromes</li><li>Pain with <b>dissection:</b></li></ul>	<ul style="list-style-type: none"><li>Mass may be palpated in abdomen (size must be about 4 cm before it can be felt) (Thompson &amp; Szalay, 2014).</li><li>Client may not experience pain (particularly in slow-developing thoracic or abdominal aneurysm).</li><li>Differential diagnosis will clarify issues, but diagnostic studies are usually necessary.</li><li>Although opiates can positively influence hemodynamics, they may not relieve patient's pain because of its severity (White et al, 2013).</li></ul>

**MAY REPORT (continued)**

- For acute type A dissections, pain is often “tearing or ripping.” Pain is at maximal intensity at onset, rather than gradual (White et al, 2013).
- For type B dissections, chest pain and back pain may be about equally reported (Strauss & Davis, 2014; White et al, 2013).
- Pain may migrate as dissection increases in size.
- Pain with rupture:**
  - Pain may occur in abdominal, lower back, flank, groin
  - Lower limb pain

**RESPIRATION**

- Shortness of breath
- Tobacco use (smoking), which is a major risk factor

**SAFETY**

- Lightheadedness; fainting
- Fever

**TEACHING/LEARNING**

- Familial and individual risk factors, including hypertension, atherosclerosis; prior aneurysms in other large blood vessels (e.g., behind knee, thoracic aorta); diseases that cause blood vessels to become inflamed

**DISCHARGE PLAN CONSIDERATIONS**

- May require assistance with ADLs, transportation, homemaking tasks, dressing(s)/supplies
- Possible placement in rehabilitation or long-term care facility

► Refer to section at end of plan for post discharge considerations.

**MAY EXHIBIT (continued)**

- Pallor, lack of pulses, cool extremity (if AAA rupture)

- Respiratory distress or use of accessory muscles
- Adventitious breath sounds, such as crackles or wheezes
- Pallor or cyanosis generally associated with advanced cardiopulmonary effects of sustained or severe hypertension

- May or may not be present

- While certain risk factors (e.g., gender, age, race) are nonmodifiable, smoking and drug use are behaviors that should be addressed in teaching.

**DIAGNOSTIC STUDIES (PREOPERATIVE)****TEST****WHY IT IS DONE****WHAT IT TELLS ME****BLOOD TESTS**

- Complete blood count (CBC):** Battery of screening tests that typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count; morphology, indices, and distribution width index; platelet count and size; and white blood cell (WBC) count and differential.
- Cardiac enzymes, including troponin I and troponin T, also possibly creatinine kinase (CK) and myoglobin:** Substances released from heart muscle when it is damaged.
- Smooth-muscle myosin heavy-chain assay:** A cytoplasmic structural protein that is a major component of the contractile apparatus in smooth muscle cells.
- Serum lipids, including total lipids, cholesterol, and triglycerides:** A group of tests that make up a lipid profile.

Presence of leukocytes in WBCs may indicate stress state. Decreased Hgb and Hct levels in the CBC may be present with leaking or rupture of dissection anywhere along the aorta.

Troponins are reliable markers for cardiac tissue damage (if coronary arteries involved). Myoglobin is not specific to cardiac muscle tissue, but if negative, it can help rule out MI. Test is performed in the first 24 hours. Increased levels in the first 24 hours are 90% sensitive and 97% specific for aortic dissection. Levels are highest in the first 3 hours (Mancini, 2016).

Presence of high cholesterol increases risk of atherosclerosis, which can cause aortic aneurysms, and increases risk of stroke when aneurysm is large or unstable.

(continues on page 114)

## DIAGNOSTIC STUDIES (PREOPERATIVE) (contd.)

### WHY IT IS DONE (continued)

- **Blood urea nitrogen (BUN) and creatinine (Cr):** These tests measure the amount of nitrogen and chemical waste product in the blood that passes through the kidneys to be filtered and eliminated in urine. When measured together (in certain ratios), information is obtained about kidney function.

### WHAT IT TELLS ME (continued)

Changes in kidney function may occur with renal artery involvement and/or with hypotension/shock state.

## DIAGNOSTIC STUDIES (IMAGING TESTS)

- Ultrasound (abdominal or thoracic) (also called sonography): Imaging method that uses high-frequency sound waves to produce images of structures within the body.
- **Computerized tomography (CT) scan with or without contrast:** Imaging method that uses x-rays to create pictures of cross sections of the body.
- **Chest x-ray:** Evaluates organs and structures within the chest.
- **Electrocardiogram (ECG):** Record of the electrical activity of the heart showing rhythm and rate, electrical conduction, signs of ischemia, and muscle damage to the heart.
- **Echocardiogram (may be transthoracic [TTE] or transesophageal [TEE]):** Noninvasive scan similar to ultrasound that shows the size and shape of the heart and how well the heart chambers and valves are working.
- **Magnetic resonance imaging (MRI):** Diagnostic technique that uses magnetic fields and radio waves to produce a detailed image of the body's soft tissue and bones.
- **Magnetic resonance angiogram (MRA):** Type of magnetic resonance imaging scan that uses a magnetic field and pulses of radio wave energy to provide pictures of blood vessels inside the body.
- **Aortogram:** X-ray test that uses dye and fluoroscopy to evaluate blood flow in an artery (such as the aorta). The procedure involves placement of a catheter in the aorta and injection of contrast material while taking x-rays of the aorta.

Test most commonly done to diagnose abdominal aortic aneurysm (AAA). May be used to monitor size and other aspects of slow-growing thoracic aneurysms to determine risk of rupture. May be used as screening tool for male 65 to 75 who has ever smoked or is at least 60 years with a close family member (e.g., father, brother) who has had an aneurysm.

Provides clear images of aorta; can detect size and shape of aneurysm. May be used to monitor slow-growth aneurysm over time.

May show widened mediastinum or aorta, and/or pulmonary congestion.

May show inferior ischemic changes, ST elevation or depression, T-wave inversions (if right coronary artery involved), low-voltage ECG and electrical alternans (signs of cardiac tamponade), and rhythm disturbances.

May be done to evaluate the function of the heart when aortic arch aneurysm is suspected or when coronary arteries are involved. May be first diagnostic scan that diagnoses a thoracic aortic aneurysm, especially in client too unstable to be transported to radiology. *Note:* TEE is as accurate as CT and MRI in terms of sensitivity and specificity, and it can be used at the bedside, which makes it ideal for hemodynamically unstable patients (Mancini, 2016).

May be used to diagnose aneurysm, its location, and size. MRI is the most sensitive method for diagnosing aortic dissection and has similar specificity to CT but is not always a desired tool (e.g., unstable client, client has certain prosthetic devices) (Mancini, 2016).

May be used if view more detailed than ultrasound is needed (e.g., aneurysm's relation to blood vessels or kidney or other organs).

Can determine presence and/or size of aneurysm, confirm dissection, blood clots, or other blood vessel involvement.

*Note:* Test is mostly being replaced by newer, less invasive imaging studies.

## NURSING PRIORITIES

1. Maintain organ functioning.
2. Monitor for/prevent complications.
3. Promote optimal wellness.

## DISCHARGE GOALS

1. Systemic complications prevented or minimized.
2. Necessary lifestyle or behavioral changes initiated.
3. Plan in place to meet needs after discharge.

These postoperative Nursing Diagnoses and Interventions are recommended in conjunction with general surgical interventions. Refer to Care Plan: Surgical Interventions.

NURSING DIAGNOSIS:	risk for ineffective Tissue Perfusion (Specify: cardiovascular, cerebral, renal, peripheral)
ACTIONS/INTERVENTIONS	RATIONALE
<b>Hemodynamic Regulation NIC</b> <i>Independent</i>	
Note presence of condition(s) (such as recent thoracic or abdominal aortic surgery, recent aortic rupture or surgical clamping, blood loss, hypovolemia, hypoxemia).	Factors that affect systemic circulation, tissue oxygenation, and organ function.
Observe for changes in level of consciousness or mentation, purposeful movement, and ability to follow commands and to move extremities appropriately	Changes in cerebral or peripheral circulation and perfusion may reflect state of impairment due to damage from aneurysm or may show postoperative changes, either improvement or impairments from surgical procedure.
Monitor vital signs, especially noting changes/trends in blood pressure, including hypertension or hypotension.	Changes in blood pressure may be subtle or sudden and may be indicative of several things (e.g., increased vascular resistance, hyper/hypovolemia, leaking of surgical anastomosis with slow bleeding, or hemorrhage), all complications that require monitoring for prevention or early intervention.
Assess heart sounds, as well as apical and peripheral pulses. Document dysrhythmias.	Changes in heart sounds and pulses may indicate inadequate oxygenation or hydration status. Dysrhythmias may be present because of ischemia or surgical changes to the aorta, coronary arteries, or valves.
Note and act upon changes and trends.	
Evaluate breathing patterns and respiratory rate outside of acceptable parameters.	These may indicate oxygen exchange problems; postoperative changes in the chest (e.g., ventilation or chest tubes); response to deficient hemoglobin or fluids; or respiratory depression associated with anesthesia/analgesia.
Note reports of difficulty breathing.	
Assess lung sounds, noting presence/absence of air movement in any area.	Client may have chest tubes in following thoracic surgery. When drainage has slowed/stopped and air is moving freely in all lung fields, the tube(s) will be removed.
Inspect skin for cyanosis, pallor, mottling, cool or clammy skin, and increased capillary refill time.	Skin can reveal the status of systemic and/or local oxygenation and perfusion.
Observe/measure all-source output, noting changes, trends, and imbalances.	Client may have preoperative and perioperative conditions associated with the aneurysm, which are affecting postoperative output (e.g., renal vascular involvement) and/or perioperative issues (e.g., hypotension/shock, bleeding, chest tubes) that affect fluid status and organ perfusion.

(continues on page 116)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Investigate reports of pain, noting if pain is a new or different pain than client reported prior to surgery.	Helps differentiate whether this pain is related to surgical procedure and/or if this pain differs from that experienced prior to surgery. Nonsurgical pain may be associated with inadequate systemic or localized tissue oxygenation/organ perfusion.
Perform Doppler assessment of extremity pulses, if needed.	In patients who have undergone aortic reconstructions, neither distal pulses nor Doppler signals may be present initially, because of vasoconstriction from hypothermia. For upper extremities, a Doppler signal is nearly always audible in the wrist in the immediate postoperative period.
Assist with and encourage early ambulation.	Enhances circulation and return of normal organ function.
<b>Collaborative</b>	
Collaborate in management of underlying conditions, such as bleeding, hypertension, hypovolemia, dysrhythmias, diabetes, COPD, etc.	To correct or manage acute or chronic conditions that would influence organ perfusion and function.
Maintain patent airway.	Facilitates air movement.
Provide supplemental oxygen by appropriate route (e.g., ventilator, mask, nasal cannula).	Oxygen may be needed to improve systemic circulation and tissue perfusion.
Administer IV fluids and blood products, as indicated.	Maintains circulating volume and supports tissue/organ perfusion.
Administer medications, as indicated.	Various drugs may be needed to support cardiac function, to promote systemic hemostasis, and/or to prevent or limit risk of perfusion complications (e.g., dysrhythmias, bleeding, thromboembolic phenomena, electrolyte imbalances).
Apply antiembolic hose or sequential compression devices, as indicated.	Prevents venous stasis and promotes circulation.

## NURSING DIAGNOSIS: risk for Bleeding

### Possibly Evidenced By

Aneurysm

Abnormal blood profile [e.g., altered clotting factors, decreased hemoglobin]

Treatment regimen [e.g., surgery, medications, administration of platelet-deficient blood products]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Bleeding Loss Severity NOC

Be free of signs of active bleeding such as hemoptysis, hematuria; or excessive blood loss [preoperative, perioperative, and/or postoperative].

Demonstrate stable vital signs, skin and mucous membranes free of pallor; usual mentation and urinary output.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bleeding Precautions NIC</b>	
<b>Independent</b>	
Note presence of condition(s) (such as recent thoracic or abdominal aortic surgery, recent aortic rupture or surgical clamping, hemorrhage/blood loss, hypovolemia, hypoxemia). Be aware of bleeding risks, both for sudden hemorrhage and for hidden internal blood loss.	Factors that affect systemic circulation, clotting factors, and tissue/organ perfusion. Both aneurysm rupture and open abdomen repair may result in significant blood loss.
Observe for frank bleeding from incisions, tubes, and body orifices. Hematest secretions and excretions as indicated.	Hemorrhage may occur because of an inability to achieve hemostasis in the setting of aortic aneurysm, surgery, or development of a coagulopathy.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess vital signs, including blood pressure, pulse, and respiration, especially when associated by impaired mental status.	Assists in determining intravascular fluid deficits. Tachycardia, tachypnea, hypotension, and any change in mental status can herald hypovolemia, impending shock.
Monitor hemodynamic measurements (e.g., central venous pressure or arterial blood pressures) where available.	Invasive monitoring lines will be in place in the critically ill patient, whose early postoperative care will be provided in intensive care units.
Monitor skin and mucous membrane color and moisture. Note increased capillary refill time and poor skin turgor (late sign).	Hypovolemia associated with bleeding may be demonstrated in pale, cool, and clammy skin with dry mucous membranes.
Observe/measure all-source output, noting changes, trends, and imbalances.	Client may have preoperative and perioperative conditions associated with the aneurysm, which are affecting postoperative output (e.g., renal vascular involvement) and/or perioperative issues (e.g., hypotension/shock, bleeding, chest tubes), which affect fluid status and organ perfusion.
Investigate reports of pain in specific areas and whether pain is increasing, diffuse, or localized.	Can help locate possible sources of bleeding, especially in setting of falling hemoglobin, and downward trend in vital signs.
Evaluate and mark boundaries of soft tissues (e.g., abdomen, flank, back) if hematomas present/spreading.	
Be prepared for emergency interventions.	This is a fragile client. Prompt interventions may be needed to prevent/manage complications and save life.
<b>Collaborative</b>	
Review laboratory data (e.g., hemoglobin, hematocrit, platelets, and coagulation profiles), as indicated.	Assists in determining intravascular fluid volume, status of blood volume, and bleeding risks.
Administer IV fluids and blood products/specific components, as indicated.	Restores and maintains circulating volume.

### NURSING DIAGNOSIS: acute Pain

#### May Be Related To

Physical injury agents (e.g., operative procedure)

#### Possibly Evidenced By

Verbal/coded report; expressive behavior (e.g., restlessness, crying)

Changes in physiological parameters (e.g., blood pressure, heart/respiratory rate; oxygen saturation)

Guarding/protective behavior; positioning to ease pain

Self-focus

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Pain Level NOC

Report pain or discomfort is relieved or controlled.

Verbalize nonpharmacological methods that provide relief.

Follow prescribed pharmacological regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<b>Independent</b>	
Determine and document presence of possible pathophysiological causes of pain (e.g., surgical incision(s), tissue trauma, comorbidities such as complication from ischemia or clotting prior to surgery).	Establishes a baseline for pain assessments.

(continues on page 118)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Evaluate pain in immediate postoperative period and regularly (e.g., hourly, per protocol).	Provides information about need for and effectiveness of interventions. Regular monitoring also permits early recognition of developing complication (such as might occur with abdominal distention associated with internal bleeding).
Consider patient's age and current situation (e.g., sedated, on ventilator, cognitively impaired), coexisting medical or psychological conditions: size and location of incisions/drains/tubes, etc.	Many factors affect pain situation and perception. This surgery is complex and often performed on emergent basis on elderly person (although it can be performed on person of any age) with very little time for preoperative preparation of postoperative expectations. Early postoperative situation is often complex and confusing, filled with medical/nursing interventions and activity.
Determine specifics of pain—location (e.g., incision, deep in abdomen), characteristics (e.g., throbbing, stabbing), and intensity (0 to 10, or similar scale).	Facilitates diagnosis of problem and initiation of appropriate interventions. Helpful in evaluating need for/effectiveness of therapy.
Evaluate vital signs on ongoing basis.	Changes in blood pressure and heart rate often accompany acute pain (especially in early postoperative period) and may occur before patient reports pain.
Assess causes of possible discomfort other than operative procedure.	Changes in vital signs can also point toward potential complication (e.g., bleeding, infection) causing or exacerbating pain.
Assist client in determining acceptable level of discomfort.	Allows for identification of other discomforts (e.g., nausea, infiltrated IV, chest tube, abdominal distention, need to urinate; anxiety/fear; disorientation), which may require intervention in order to promote overall comfort.
Collaborate with patient in pain management. Instruct in early reporting of pain and ongoing evaluation of effectiveness of current interventions.	It may not always be possible to eliminate pain; however, patient may be "comfortable" at a level 5 if pain has been a level 10 for a length of time. Or eliminating another discomfort (e.g., nausea) can promote improved analgesia effect.
Provide and promote nonpharmacological measures for pain relief (such as repositioning; rest in a quiet environment; family presence; splinting of incision during coughing; relaxation techniques, such as deep breathing; soft music/other diversion).	Promotes client's sense of control and maximizes efforts for pain control.
Document effects of pain management (nonpharmacological measures and analgesics).	Helps relieve muscle and emotional tension. Enhances sense of well-being.
<b>Collaborative</b> Administer analgesics by appropriate route (e.g., IV, patient-controlled analgesia [PCA], oral), as indicated.	Pain should be reassessed after each pain management intervention once a sufficient time has elapsed for the treatment to reach peak effect. Reassessment should include whether the patient's goal for pain relief was met (e.g., pain intensity, effect on function [physical or psychosocial], patient satisfaction with pain relief, whether side effects had occurred and were tolerable).
	Pain control is essential to quality patient care. It ensures patient comfort, promotes tissue healing and effective pulmonary toilet.

**NURSING DIAGNOSIS:** **ineffective Health Management****May Be Related To**

Complexity of therapeutic regimen  
Insufficient knowledge

**Possibly Evidenced By**

Reported difficulty with prescribed regimens  
Failure to include treatment regimen in daily living or to take action to reduce risk factors  
Ineffective choices in daily living for meeting health goal

**Desired Outcomes/Evaluation Criteria—Client Will****Knowledge: Treatment Regimen NOC**

Verbalize understanding of disease process and treatment regimen.  
List signs and symptoms that require immediate intervention.  
Identify and engage available resources.

**Self-Management: Hypertension NOC**

Maintain BP within individually acceptable parameters.

**ACTIONS/INTERVENTIONS****RATIONALE****Teaching: Disease Process NIC****Independent**

Determine client's circumstances, observing age, functional and cognitive status. Note type of aneurysm repair (e.g., open abdomen or endovascular), whether more than one chronic condition (e.g., COPD, stroke, renal impairment) is present at the same time.

These factors affect how the client/caregiver views and manages postoperative self-care. Elder patients (about 60% in one study) often present with worse comorbidities and severe complications such as myocardial infarction, pneumonia, and acute renal failure (Raval & Escandari, 2012). In another study, elder patients reported that health-related quality of life after AAA repair was significantly impaired in the early postoperative period (Pol et al, 2012).

Identify immediate care needs, complexity of care needs, care support system, and where convalescence will take place.

When being discharged from acute care, client may continue care in rehabilitation, long-term care, or home. This is dependent upon client's discharge status and presence or absence of support systems. This, in turn, determines the type and amount of teaching, support, and care coordination required. For example, client in early postoperative period may need assistance with surgical wound care, blood pressure monitoring, and medication safety. Client in later stages of recovery may need more teaching and support in areas of prevention of recurrence (e.g., remaining smoke-free, adhering to medical follow-up monitoring).

Assist client/caregiver in identifying modifiable risk factors, such as smoking, hypertension, and diet high in sodium and saturated fats.

It is appropriate to address preventable or manageable conditions that are known to contribute to cardiovascular disease.

Problem-solve with client/caregiver to identify ways in which appropriate lifestyle changes can be made to reduce modifiable risk factors.

Changing "comfortable or usual" behavior patterns can be very difficult and stressful. Support, guidance, and empathy can enhance client's success in accomplishing his or her health goals.

Discuss importance of eliminating smoking, and assist client in formulating a plan to quit smoking. Refer to smoking cessation program or healthcare provider for helpful medications.

Nicotine increases catecholamine discharge, resulting in increased heart rate, blood pressure, and vasoconstriction, interfering with optimal organ perfusion and function. Note: Several studies have demonstrated that tobacco use is associated with an increased rate of aneurysm expansion (preoperatively) and smoking cessation is likely the most important recommendation that can be made to a patient with AAA (Brady et al, 2004).

(continues on page 120)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct in and demonstrate BP self-monitoring technique. Observe client's technique in return, and ascertain that client understands blood pressure readings. Evaluate client's hearing, visual acuity, manual dexterity, and coordination.	Monitoring BP at home is reassuring to client because it provides visual feedback to determine treatment outcomes and helps promote early detection of deleterious changes. Note: Client may be on multiple medications with goal of keeping blood pressure at or below 120/80, to reduce flow force in aorta.
Help client develop a simple, convenient schedule for taking medications.	Individualizing schedule to fit client's personal habits may make it easier to get in the habit of including medications in healthcare management activities.
Explain prescribed medications along with their rationale, dosage, expected and adverse side effects, and particular traits.	Adequate information and understanding about beneficial and expected side effects can enhance client's commitment to the treatment plan.
Explain rationale for prescribed dietary regimen—such as diet low in sodium, saturated fat, and cholesterol.	Excess saturated fats, cholesterol, sodium, alcohol, and calories have been defined as nutritional risks in hypertension.
Encourage client to establish a regular exercise program, within client's capabilities and potential.	Besides helping to lower BP, aids in toning the cardiovascular system and improves general health and well-being.
Review symptoms that require the client to notify the healthcare provider, such as failure of healing in surgical wound; fever; sudden or continued increase of BP; chest (or other) unrelieved pain; shortness of breath; peripheral or abdominal swelling; and other symptoms as individually appropriate.	Early detection and reporting of potentially developing complications (early or late) allow for timely intervention. Note: One author reporting on postoperative thoracic aortic aneurysm follow-up stated that "development of another aneurysm postoperatively is not uncommon" (Tseng & Bush, 2016). Also, patients who have had endovascular aneurysm repair need lifelong radiographic monitoring of graft placement and for developing endoleaks. Note: An endoleak is a common complication of an endovascular aneurysm repair (EVAR) and is found in 30% to 40% of patients intraoperatively and in 20% to 40% during follow-up (Tinkham, 2013).
Provide information regarding community resources for both client and caregiver support. Initiate referrals, as indicated.	Community resources such as stop smoking clinics, stress management classes, home care, caregiver respite, and counseling services may be helpful in efforts to support lifestyle changes and enhance recovery efforts.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Activity Intolerance**—generalized weakness, imbalance between oxygen supply and demand
- **ineffective Health Management**—complexity of therapeutic regimen, economic difficulties, perceived seriousness
- **Self-Care Deficit [specify]**—pain/discomfort, weakness, fatigue
- **risk for Infection**—alteration in skin integrity, decrease in hemoglobin, smoking

## VENOUS THROMBOEMBOLISM (VTE) DISEASE INCLUDING DEEP VEIN THROMBOSIS (DVT) AND PULMONARY EMBOLISM (PE)

**I. Pathophysiology:** Venous thromboembolism (VTE) results from a combination of hereditary and acquired risk factors, known as thrombophilia or hypercoagulable states. Also, vessel wall damage, venous stasis, and alterations in the clotting mechanism (Virchow's triad) remain the fundamental issues in thrombosis (Ozaki & Bartholomew, 2012).

- a. Mechanical (e.g., trauma, surgery) or physiological (e.g., hypertension, phlebitis) damage to the vessel wall leads to platelet activation, with platelets adhering to one another and clumping together, forming a thrombus.
- b. The thrombus either dissolves over time or grows and becomes large enough to occlude a vessel, which causes blood flow to slow, expands the veins to accommodate the increased volume, and causes more clots to form.

- c. Proximal venous thromboembolism (VTE) extending to the popliteal, femoral, or iliofemoral vessels—more likely to break away from the vessel and cause pulmonary embolism (PE).
- d. Although most deep vein thromboses (DVTs) occur in lower extremities, a small percentage do occur in upper extremities. These are usually due to (1) effort-induced thrombosis (Paget-von Schrötter syndrome) or (2) secondary thrombosis, which is sometimes associated with the use of central venous catheters (Patel et al, 2016).
- e. Approximately 50% of clients with VTE are asymptomatic.

## II. Etiology

- a. Thromboembolism can affect superficial or deep veins, although VTE is more serious in terms of potential complications, including PE, postthrombotic syndrome (PTS), chronic venous insufficiency, and vein valve destruction.
- b. Predisposing and risk factors:
  - i. Previous episode of VTE (single most powerful risk factor for DVT) (Patel et al, 2016)
  - ii. Major surgery, especially orthopedic; trauma; prolonged immobilization for any cause; paralysis, paresis, or recent plaster immobilization of lower extremities; spinal cord injury; extended travel

- iii. Cardiovascular conditions such as valvular heart disease with dysrhythmias, myocardial infarction (MI), heart failure, and stroke
- iv. Cancer (active or ongoing treatment within last 6 months); central venous catheter use
- v. Obesity with BMI  $>30$
- vi. Age greater than 40
- vii. Pregnancy-related complications; hormone replacement therapy, oral estrogen birth control
- viii. Intravenous (IV) drug users, pills
- ix. Indwelling central venous catheters, pacemaker; or presence of inferior vena cava (IVC) filter

## III. Statistics

- a. **Morbidity:** VTE is the third most common cardiovascular illness after acute coronary syndrome and stroke. Approximately 900,000 incidents of VTE occur annually in the United States (Centers for Disease Control and Prevention [CDC], 2015).
- b. **Mortality:** It is estimated that 60,000 to 100,000 die of DVT/PE annually in the United States (10% to 30% within one month of diagnosis). Sudden death is the first symptom in about one-quarter (25%) of people who have a PE.
- c. **Costs:** Annual health plan payments for services related to VTE were an average of \$15,123 for a VTE event from 2008 to 2011 (Fernandez et al, 2015).

## G L O S S A R Y

**Coagulation:** Complex process or cascade of events involving more than 30 types of cells and substances by which blood cells clump together to form a clot via one of two pathways: extrinsic (blood is exposed to a subendothelial tissue factor) or intrinsic (triggered when the blood is exposed to a foreign substance). Disorders of coagulation can lead to an increased risk of bleeding and clotting or thrombus formation.

**Embolus:** Something that travels through the bloodstream, lodges in a blood vessel, and blocks it. Examples of emboli are a detached blood clot, a clump of bacteria, and foreign material such as air.

**Homans' sign:** Deep calf pain in affected leg upon dorsiflexion of the foot, which is present in approximately one-third of cases of DVT. Homans' sign is not specific to DVT (can occur in about 50% of persons with leg pain unrelated to DVT).

**Postthrombotic syndrome:** Occurs when blood can no longer circulate properly because venous circulation is impaired from veins and valves that have been damaged by thrombosis. It can mimic recurrent DVT.

**Pulmonary embolism (PE):** A thrombus that dislodges from a vessel wall and travels through the right side of the heart into the pulmonary artery, thereby obstructing blood flow.

**Recurrent VTE:** Occurs within a year after the initial event. Because of persistent abnormalities in affected vasculature after the initial VTE, it can be difficult to differentiate an acute event from an ipsilateral limb recurrence clinically. Diagnosis requires evidence of new clot formation.

**Thrombophlebitis:** Inflammation of a vein that occurs when a blood clot develops in the vein. *Note:* Superficial thrombophlebitis is characterized by the finding of a palpable, cordlike, tender, subcutaneous venous segment. *Note:* Forty percent of patients with superficial thrombophlebitis without coexisting varicose veins and with no other obvious etiology (e.g., intravenous catheters, intravenous drug abuse, soft tissue injury) have an associated DVT (Patel et al, 2016).

**Venous thromboembolism (VTE):** Disease that includes both deep vein thrombosis (DVT) and pulmonary embolism (PE).

## CARE SETTINGS

DVT is primarily treated at the community level, with short inpatient stay indicated in the presence of embolization. Client with sudden-onset pulmonary embolism is usually critically ill and requires initial care in critical care unit.

## RELATED CONCERNS

- Cancer, page 945
- Fractures, page 702
- Spinal cord injury, page 288
- Surgical intervention, page 873
- Respiratory failure/ventilatory assistance, page 187

**ACTIVITY/REST**

- Occupation that requires sitting or standing for long periods of time
- Prolonged immobility
- Leg pain with activity
- Fatigue, general malaise
- Weakness of affected extremity; generalized weakness

- Generalized or extremity weakness

**CIRCULATION**

- History of previous peripheral vascular disease, venous thrombosis, varicose veins
- Presence of other predisposing factors, such as pregnancy-induced hypertension, diabetes mellitus, MI or valvular heart disease, thrombotic stroke, or blood dyscrasias
- Fainting

- Tachycardia >100/min
- Accentuated second heart sound (53% with PE)
- Peripheral pulse may be diminished in the affected extremity
- Varicosities or dilated veins
- Skin color and temperature in affected extremity: variable discoloration, may be pinkish red, warm along the superficial vein (over area of thrombosis in DVT) (Patel et al, 2016)
- Pallor or cyanosis (PE)
- Differences in leg circumferences: affected leg may be larger than the unaffected leg when measured 10 cm (4 inches) below the kneecap (tibial tuberosity)
- Syncope

**EGO INTEGRITY**

- Sense of impending doom (PE)

- Apprehension

**FOOD/FLUID**

- Poor skin turgor, dry mucous membranes (dehydration predisposes to hypercoagulability)
- Obesity (predisposes to stasis and pelvic vein pressure)

**PAIN/DISCOMFORT**

- Throbbing, tenderness, aching pain aggravated by standing or movement of affected extremity (DVT)
- Severe crushing chest pain (during onset of PE)
- Pleuritic chest pain (sharp pain on inhalation or exhalation) may be present (84%)
- Pain may radiate through to back or into jaws and/or ears (PE)

- Guarding of affected extremity

**RESPIRATORY**

- Sudden-onset shortness of breath
- Cough, with or without sputum production

- Dyspnea (73% with PE)
- Tachypnea (rate over 18 breaths/min) (96%) (Ouellette et al, 2016)
- Normal lung sounds can be present (PE), although crackles (rales) are common (53%)
- Sputum may be pink tinged

**SAFETY**

- History of direct or indirect injury to extremity or vein, such as major trauma or fractures, orthopedic or pelvic surgery, surgical procedures longer than 2 hours, urologic surgery, pregnancy, prolonged labor with fetal head pressure on pelvic veins, heart failure, venous cannulation or catheterization, or IV therapy

- Fever, chills

**MAY REPORT (continued)****MAY EXHIBIT (continued)**

- Presence of malignancy, particularly neoplasms of the pancreas, lung, gastrointestinal system, prostate
- Sepsis

**TEACHING/LEARNING**

- Use of oral contraceptives and estrogens; recent anticoagulant therapy predisposes to hypercoagulability
- Use of vitamins and herbal supplements, such as vitamin B<sub>6</sub>, vitamin E, niacin, magnesium, L-carnitine, and bromelain, for heart or blood pressure health
- Recurrence and lack of resolution of previous thrombophilic episode

**DISCHARGE PLAN CONSIDERATIONS**

- Temporary assistance with shopping, transportation, and homemaker and maintenance tasks
- Properly fitted antiembolic hose

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES**

TEST WHY IT IS DONE	WHAT IT TELLS ME
<b>BLOOD TESTS</b> <ul style="list-style-type: none"> <li>• <b>Complete blood count (CBC):</b> Battery of screening tests, which typically includes hemoglobin (Hgb), hematocrit (Hct), red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; and white blood cell (WBC) count and differential.</li> <li>• <b>Coagulation profile:</b> (e.g., prothrombin time and activated partial thromboplastin time) to evaluate for a hypercoagulable state.</li> <li>• <b>D-dimer assay:</b> Measures fibrin degradation fragments generated by fibrinolysis.</li> <li>• <b>Tropionins:</b> Protein molecules that are part of cardiac and skeletal muscle.</li> </ul>	<p>Hemoconcentration (elevated Hct) potentiates risk of thrombus formation. WBC count may be normal or elevated in patients with pulmonary embolism.</p> <p>Identifies clotting problems that may increase one's risk of VTE. For example, antithrombin is useful in determining cause of hypercoagulation; inherited biochemical conditions; and deficits in certain other coagulation modulators, such as antithrombin III, protein S, or protein C, that can predispose client to thrombus formation.</p> <p>An elevated D-dimer level indicates a thrombotic process but is not specific to DVT. Combining D-dimer results with measurement of the exhaled end-tidal ratio of carbon dioxide to oxygen (etCO<sub>2</sub>/O<sub>2</sub>) can be useful for diagnosis of pulmonary embolism (Ouellette et al, 2016).</p> <p>Cardiac troponins (cTnT and cTnI) may be elevated in patients with confirmed PE. Elevated cTnTs and cTnIs also correlate with the severity of right ventricular (RV) dysfunction, most likely because of acute right ventricular myocardial stretch (Glatter, 2008; Konstantinides, 2008).</p>

(continues on page 124)

## DIAGNOSTIC STUDIES (contd.)

### WHY IT IS DONE (continued)

### WHAT IT TELLS ME (continued)

#### OTHER DIAGNOSTIC STUDIES (WILBER & SHIAN, 2012)

- **Noninvasive flow studies (Doppler ultrasound; compression ultrasonography duplex venous ultrasound):** Detect and measure blood flow.
- **Contrast venography:** A special x-ray of the veins that is performed by first injecting a radiopaque contrast into the vein in question and then taking a conventional x-ray.
- **CT scan with or without contrast:** A series of x-ray images taken from different angles using computer processing to create cross-sectional images of body.
- **Computed tomography angiography (CTA):** Uses an injection of iodine-rich contrast material and CT scanning to help diagnose and evaluate blood vessel disease or blockages.
- **Ventilation-perfusion (V/Q) scanning:** Imaging test that uses special x-ray scanners to create pictures of air and blood flow patterns in the lungs.
- **Magnetic resonance imaging (MRI):** Technique that uses the properties of magnetic fields to provide images of the body.

Ultrasound imagery can reveal a thrombus in a deep vein, especially above the knee. The Doppler ultrasound measures the blood flow velocity in veins and can detect flow abnormalities. *Note:* In most circumstances, compression ultrasonography is the test of choice for patients with suspected DVT. When a blood clot is present in a vein, it is relatively difficult to collapse, making compression ultrasound a reliable indicator of DVT, especially in veins of the groin and thigh (Fogoros, 2016; Pai & Douketis, 2016). Duplex venous ultrasonography appears to be the most accurate noninvasive method for diagnosing multiple proximal VTE in iliac, femoral, and popliteal veins but is less reliable in detecting isolated calf vein thrombi.

Used to demonstrate a vein blockage. Radiographically confirms diagnosis through changes in blood flow and size of channels. *Note:* Although considered the gold standard for diagnosing DVT, this study carries a risk of inducing VTE and therefore is reserved for the client with negative or difficult to interpret noninvasive studies.

Contrast-enhanced CT scanning is increasingly used as the initial radiologic study in the diagnosis of PE, especially in patient with abnormal chest x-ray.

Considered by the American College of Radiology to be standard of care for detection of PE.

May be used to establish PE when CT scanning not available or contraindicated.

May be done for diagnosis of both proximal and distal VTE and is believed to be superior to other diagnostic tests for detection of pelvic VTE or suspected VTE of the inferior vena cava or pelvic veins. MRI is highly sensitive for detection of central, lobar, or segmental PE.

#### NURSING PRIORITIES

1. Maintain or enhance tissue perfusion and facilitate resolution of thrombus.
2. Maintain adequate oxygenation.
3. Promote optimal comfort.
4. Prevent complications.
5. Provide information about disease process, prognosis, and treatment regimen.

#### DISCHARGE GOALS

1. Tissue perfusion improved in affected limb.
2. Pain or discomfort relieved.
3. Absence of symptoms of respiratory distress.
4. Complications prevented or resolved.
5. Disease process, prognosis, and therapeutic needs understood.
6. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS:** **ineffective peripheral tissue Perfusion****May Be Related To**

Deficient knowledge of disease process or aggravating factors (e.g., sedentary lifestyle/immobility, trauma, smoking, obesity)

**Possibly Evidenced By**

Edema, extremity pain  
Diminished pulses, capillary refill >3 seconds  
Alteration in skin characteristics (e.g., color, temperature, sensation)

**Desired Outcomes/Evaluation Criteria—Client Will****Tissue Perfusion: Peripheral NOC**

Demonstrate improved perfusion as evidenced by peripheral pulses present, equal skin color, and temperature normal and absence of edema.

Engage in behaviors or actions to enhance tissue perfusion (e.g., engage in regular exercise, cessation of smoking, disease management).

Display increasing tolerance to activity.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Embolus Care: Peripheral NIC</b>	
<b>Independent</b>	
Inspect legs from groin to foot for skin color and temperature changes as well as edema. Note symmetry of calves; measure and record calf circumference. Report proximal progression of inflammatory process and traveling pain.	Symptoms help distinguish between thrombophlebitis and VTE. Redness, heat, tenderness, and localized edema are characteristic of superficial involvement. Calf vein involvement is associated with the absence of edema; femoral vein involvement is associated with mild to moderate edema, and iliofemoral vein thrombosis is characterized by severe edema. Note: Unilateral edema is one of the most reliable physical findings in DVT.
Examine extremity for obviously prominent veins. Palpate gently for local tissue tension, stretched skin, and knots or bumps along the course of the vein.	Distention of superficial veins can occur in DVT because of backflow through communicating veins. Thrombophlebitis in superficial veins may be visible or palpable.
Evaluate client for Homans' sign (pain in the calf of the leg upon dorsiflexion of the foot with the leg extended) per protocol.	Homans' sign is easily applied at point of care and is an assessment that clinicians often perform. However, its use is considered unreliable because Homans' sign is absent in many clients with VTE and can be positive in several other conditions beside DVT. A negative Homans' sign, on the other hand, doesn't automatically exclude DVT (Patel et al, 2016).
Promote early ambulation.	Short, frequent walks are better for extremities and prevention of pulmonary complications than one long walk. If client is confined to bed, engage in range-of-motion exercises.
Elevate legs when in bed or chair, as indicated.	Reduces tissue swelling and rapidly empties superficial and tibial veins, preventing overdistention and thereby increasing venous return. Note: Some physicians believe that elevation may potentiate release of thrombus, thus increasing risk of embolization and decreasing circulation to the most distal portion of the extremity.
Initiate active or passive exercises while in bed or chair; for example, flex, extend, and rotate feet periodically. Assist with ambulation as needed as soon as client is out of bed.	These measures are designed to increase venous return from lower extremities and reduce venous stasis as well as improve general muscle tone and strength.
Caution client to avoid crossing legs or hyperflexion at knee, such as seated position with legs dangling or lying in jackknife position.	Physical restriction of circulation impairs blood flow and increases venous stasis in pelvic, popliteal, and leg vessels, thus increasing swelling and discomfort.
Instruct client to avoid rubbing or massaging the affected extremity.	This activity potentiates risk of fragmenting and dislodging thrombus, causing embolization and increasing risk of complications.

(continues on page 126)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage deep-breathing exercises.	Increases negative pressure in thorax, which assists in emptying large veins.
Increase fluid intake to at least 1500 to 2000 mL/d, within cardiac tolerance.	Dehydration increases blood viscosity and venous stasis, predisposing to thrombus formation.
<b>Collaborative</b> Administer pharmacological measures, as indicated:	Pharmacological measures involve various types of anticoagulation to reduce blood coagulability.
Heparin sodium via continuous or intermittent IV and intermittent subcutaneous (SC) injections	Heparin prevents extension of the thrombus by preventing the conversion of prothrombin to prothrombin at low doses and preventing the conversion of fibrinogen to fibrin in higher doses. It has been shown to significantly reduce (but may not eliminate) the incidence of fatal and nonfatal pulmonary embolism and recurrent thrombosis.
Low-molecular-weight heparin (LMWH) preparations, such as enoxaparin (Lovenox), dalteparin (Fragmin), tinzaparin (Innohep), and fondaparinux (Arixtra) via SC injections	The efficacy and safety of LMWH for the initial treatment of deep venous thrombosis have been well established in several trials. May be used as “bridging” drugs while client starts oral anticoagulant therapy.
Oral anticoagulants; vitamin K antagonists, e.g., warfarin (Coumadin, Jantoven)	Coumadin has a potent depressant effect on liver formation of prothrombin from vitamin K and impairs formation of factors VII, IX, and X (extrinsic pathway). Coumadin is generally used for long-term postdischarge therapy to keep international normalized ratio (INR) at 2 to 3. However, it does have a narrow therapeutic window and requires frequent monitoring. Many foods, drugs, and disease processes alter Coumadin’s effectiveness, sometimes making it difficult to regulate.
Factor Xa inhibitors, e.g., rivaroxaban (Xarelto), apixaban (Eliquis), and fondaparinux (Arixtra)	These drugs have been approved for treating DVT and PE and for prevention of recurrences. Benefits of these agents include no need for heparin bridging, and drugs can be given in fixed doses without routine coagulation monitoring. Note: Fondaparinux is administered SC, whereas other drugs listed here are given orally (“Antiarhythmic Agents,” 2017; Patel et al, 2016).
Direct thrombin inhibitors, e.g., dabigatran (Pradaxa) and bivalirudin (Angiomax)	Inhibits free and clot-bound thrombin and thrombin-induced platelet aggregation. Used in both treatment and prevention of VTE (Patel et al, 2016).
Thrombolytic agents, such as tenecteplase (TNKase), activase (Alteplase), and reteplase (Retavase)	May be used in hemodynamically unstable client with PE or massive VTE. Note: Currently accepted indications for thrombolytic therapy include hemodynamic instability (systolic BP <90 mm Hg) or a clinical risk factor assessment that suggests that hypotension is likely to develop (Ouellette et al, 2016).
Monitor laboratory studies, as indicated:	
Platelet counts (if on heparin); prothrombin time (PT), partial thromboplastin time (PTT), activated prothrombin time (aPTT), international normalized ratio (INR) (if on warfarin), hemoglobin/hematocrit (Hgb/Hct), as indicated	Monitors response to therapy, identifies presence of risk factors, such as hemoconcentration and dehydration, which potentiate clot formation. Note: Xa factor and thrombin inhibitors do not require serial monitoring because PT and aPTT are not affected.
Apply and regulate graduated compression stockings and intermittent pneumatic compression if indicated.	Sequential compression devices may be used to improve blood flow velocity and empty vessels by providing artificial muscle-pumping action.
Apply elastic support hose following acute phase. Take care to avoid tourniquet effect.	Properly fitted support hose are useful, once ambulation has begun, to minimize risk of postphlebotic syndrome. They must exert a sustained, evenly distributed pressure over entire surface of calves and thighs to reduce the caliber of superficial veins and increase blood flow to deep veins.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Prepare for and assist with procedures, such as the following: Surgical intervention, such as thrombectomy and vena cava screen, when indicated	Thrombectomy (excision of thrombus) may be done in very rare cases when condition does not respond to typical treatments or circulation is severely restricted. Multiple or recurrent thrombotic episodes unresponsive to medical treatment (or when anticoagulant therapy is contraindicated) may require insertion of a vena cava filter (Siskin & Kwan, 2015).

NURSING DIAGNOSIS:	acute Pain
<b>May Be Related To</b>	
Biological injury agent (e.g., ischemia)	
<b>Possibly Evidenced By</b>	
Reports of pain (e.g., extremity or chest); evidence of pain using standard pain behavior checklist Changes in physiological parameters (e.g., blood pressure, heart/respiratory rate, oxygen saturation) Guarding/protective behavior Expressive behaviors—restlessness, moaning	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Pain Control NOC</b>	
Report that pain or discomfort is alleviated or controlled. Verbalize methods that provide relief. Display relaxed manner; can sleep or rest and engage in desired activity.	

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b> <i>Independent</i> Assess degree and characteristics of discomfort and pain, using standardized pain checklist.	Degree of pain is directly related to extent of circulatory deficit, inflammatory process, degree of tissue ischemia, and extent of edema associated with thrombus development. Changes in characteristics of pain may indicate development of complications.
Maintain bedrest (if indicated) during acute phase.	Studies suggest that individuals with DVT or PE who are receiving appropriate anticoagulant therapy do better (both immediately and later on) with early ambulation (Pai & Douketis, 2016; Thompson & Kabrhel, 2016).
Elevate affected extremity above heart level, as indicated.	May be done to reduce symptoms such as swelling and pain.
Monitor vital signs, noting elevated temperature.	Elevations in heart rate may indicate increased discomfort or may occur in response to fever and inflammatory process. Fever can also increase client's discomfort.
Investigate reports of sudden or sharp chest pain, accompanied by dyspnea, tachycardia, and apprehension.	These signs and symptoms suggest the presence of PE as a complication of VTE.
<b>Collaborative</b> Administer medications, as indicated; for example, analgesics (opioid and nonopioid).	Relieves pain and decreases muscle tension. Note: NSAIDs should not be used when patient is on anticoagulants because of increased risk of bleeding.

## NURSING DIAGNOSIS: impaired Gas Exchange (in presence of Pulmonary Embolus)

### May Be Related To

Ventilation-perfusion imbalance [altered blood flow to portions of the lung]  
Alveolar-capillary membrane changes

### Possibly Evidenced By

Abnormal breathing pattern (e.g., rate, rhythm, depth)  
Restlessness, irritability, somnolence  
Abnormal arterial blood gases, hypoxemia, hypercapnia

### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status: Gas Exchange NOC

Demonstrate adequate ventilation and oxygenation by ABGs within client's normal range.  
Report or display resolution or absence of symptoms of respiratory distress.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Embolus Care: Pulmonary NIC</b> <i>Independent</i> Note respiratory rate and depth and work of breathing, such as use of accessory muscles or nasal flaring and pursed-lip breathing.	Tachypnea and dyspnea accompany pulmonary obstruction. Dyspnea and increased work of breathing may be first or only sign of subacute PE. Severe respiratory distress and failure accompany moderate to severe loss of functional lung units.
Auscultate lungs for areas of decreased and absent breath sounds and the presence of adventitious sounds, such as crackles or wheezing.	Nonventilated areas may be identified by the absence of breath sounds. Crackles occur in fluid-filled tissues and airways or may reflect cardiac decompensation. Wheezing can occur because of airway restriction. Note: A PE is a lung injury and results in postacute reactive airways that resemble asthma and may require long-term medications.
Observe for generalized duskeness and cyanosis in "warm tissues," such as earlobes, lips, tongue, and buccal membranes.	Indicative of systemic hypoxemia.
Monitor vital signs. Note changes in cardiac rhythm.	Tachycardia, tachypnea, and changes in BP are associated with advancing hypoxemia and acidosis. Rhythm alterations and extra heart sounds may reflect increased cardiac workload related to worsening ventilation imbalance.
Assess level of consciousness and evaluate mentation changes.	Systemic hypoxemia may be demonstrated initially by restlessness and irritability, then by progressively decreased mentation.
Assess activity tolerance, such as reports of weakness and fatigue, vital sign changes, or increased dyspnea during exertion. Encourage rest periods, and limit activities to client tolerance.	These parameters assist in determining client response to resumed activities and ability to participate in self-care.
<b>Airway Management NIC</b> Institute measures to restore or maintain patent airways, such as deep-breathing exercises, coughing, and suctioning.	Plugged or collapsed airways reduce number of functional alveoli, negatively affecting gas exchange.
Elevate head of bed as client tolerates.	Promotes maximal chest expansion, making it easier to breathe and enhancing physiological and psychological comfort.
Assist with frequent changes of position, and get client out of bed to ambulate as tolerated.	Turning and ambulation enhance aeration of different lung segments, thereby improving oxygen diffusion.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assist client to deal with fear and anxiety that may be present:	Feelings of fear and severe anxiety are associated with difficulty breathing and may cause increased oxygen consumption.
Encourage expression of feelings and inform client and SOs of normalcy of anxious feelings and sense of impending doom.	Understanding basis of feelings may help client regain some sense of control over emotions.
Provide brief explanations of what is happening and expected effects of interventions.	May allay anxiety related to unknown and help reduce fears concerning personal safety.
Monitor frequently, and arrange for someone to stay with client, as indicated.	Provides assurance that changes in condition will be noted and that assistance is readily available.
<b>Embolus Care: Pulmonary</b> <b>NIC</b>	
<i>Collaborative</i>	
Prepare for CT or VQ lung scan.	Reveals pattern of abnormal perfusion in areas of ventilation, reflecting ventilation and perfusion mismatch, confirming diagnosis of PE and degree of obstruction. Absence of both ventilation and perfusion reflects alveolar congestion or airway obstruction.
Monitor constant pulse oximetry and/or serial ABGs.	Hypoxemia may be (but is not always) present, depending on the amount of airway obstruction, usual cardiopulmonary function, and presence and degree of shock. Respiratory alkalosis and metabolic acidosis may also be present.
<b>Airway Management</b> <b>NIC</b>	
Administer supplemental oxygen by appropriate method, if indicated.	Maximizes available oxygen for gas exchange, reducing work of breathing. When pulse oximeter shows O <sub>2</sub> saturation 89% or higher, it is not likely that oxygen will help/is needed. Note: If obstruction is large or hypoxemia does not respond to supplemental oxygenation, it may be necessary to move client to critical care area for intubation and mechanical ventilation.
Administer fluids, IV or by mouth (PO), as indicated.	Increased fluids may be given to reduce hyperviscosity of blood, which can potentiate thrombus formation, or to support circulating volume and tissue perfusion.
Administer medications, as indicated, for example:	
Thrombolytic agents, such as alteplase (Activase, t-PA), reteplase (Retavase), and tenecteplase (TNKase)	Indicated in massive pulmonary obstruction when client is seriously hemodynamically threatened. Note: These clients will probably be initially cared for in, or transferred to, the critical care setting.
Morphine sulfate and antianxiety agents	May be necessary initially to control pain or anxiety and improve work of breathing, maximizing gas exchange.
Provide supplemental humidification, such as ultrasonic nebulizers.	Delivers moisture to mucous membranes and helps liquefy secretions to facilitate airway clearance.
Assist with respiratory therapy, such as incentive spirometer.	Facilitates deeper respiratory effort.
Prepare for surgical intervention, if indicated.	Vena caval ligation or insertion of an intracaval umbrella may be useful for clients who experience recurrent emboli despite adequate anticoagulation, when anticoagulation is contraindicated, or when septic emboli arising from below the renal veins do not respond to treatment. Additionally, pulmonary embolectomy may be considered in life-threatening situations.

**NURSING DIAGNOSIS:** **deficient Knowledge [Learning Need] regarding condition, treatment program, self-care, and discharge needs**

**May Be Related To**

Insufficient information or insufficient interest in learning  
Insufficient knowledge of resources

**Possibly Evidenced By**

Reports the problem  
Inaccurate follow-through of instructions  
Development or preventable complications

**Desired Outcomes/Evaluation Criteria—Client Will**

**Knowledge: Thrombus Threat Reduction NOC**

Verbalize understanding of disease process, treatment regimen, and limitations.  
Participate in learning process.  
Identify signs and symptoms requiring medical evaluation.  
Correctly perform therapeutic actions and explain reasons for actions.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Ascertain client's/SO's level of knowledge about condition and ability, readiness, or barriers to learning. Note personal factors (e.g., age, functional and developmental level) that may impact ability to understand condition and treatment regimen.	Individual may not be physically, emotionally, or mentally capable of learning early in disease process. Information may be presented in small units over time, relayed to family members, and repeated/reinforced.
Review pathophysiology of condition and signs and symptoms of possible complications, such as PE, chronic venous insufficiency, and venous stasis ulcers (postphlebotic syndrome).	Provides a knowledge base from which client can make informed choices and understand and identify healthcare needs. A significant number of clients experience a recurrence of DVT. Note: Genetic blood testing may help identify inherited thrombotic disorders. Screening tests should be done when venous thrombosis occurs in those aged 45 years or younger; when a thrombus occurs at an unusual location such as in gastrointestinal tract, brain, or arm; and when there is an immediate family history of VTE.
Explain purpose of activity restrictions (if any) and need for balance between activity and rest.	Rest reduces oxygen and nutrient needs of compromised tissues. Balancing rest with activity prevents exhaustion and further impairment of cellular perfusion.
Establish appropriate exercise and activity program.	Aids in developing collateral circulation, enhances venous return, and reduces risk of recurrence.
Problem-solve solutions to predisposing factors that may be present, such as employment that requires prolonged standing or sitting, wearing restrictive clothing, use of oral contraceptives, obesity, prolonged immobility, and dehydration.	Actively involves client in identifying and initiating lifestyle and behavior changes to promote health and prevent recurrence of condition or development of complications.
Review position recommendations, such as sitting with feet touching the floor, avoiding crossing of legs.	Prevents excess pressure on the popliteal space and enhances venous return.
Review purpose and demonstrate correct application and removal of antiembolic hose.	Understanding may enhance cooperation with prescribed therapy and prevent improper or ineffective use.
Instruct in meticulous skin care of lower extremities, such as prevent or promptly treat breaks in skin and report development of ulcers or changes in skin color.	Chronic venous congestion and postphlebotic syndrome may develop, especially in the presence of severe vascular involvement and recurrent VTE, potentiating risk of stasis ulcers.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Teaching: Prescribed Medication NIC</b> Discuss purpose and dosage of anticoagulant. Emphasize importance of taking drug as prescribed.	Promotes client safety by reducing risk of inadequate therapeutic response and deleterious side effects, such as bleeding.
Identify safety precautions, such as use of soft toothbrush, electric razor for shaving, gloves for gardening, avoiding sharp objects (including toothpicks), walking barefoot, engaging in rough sports and activities, or forceful blowing of nose.	Reduces the risk of traumatic injury, which potentiates bleeding or clot formation.
Review client's usual medications and foods (when on warfarin); emphasize need to read ingredient labels of over-the-counter (OTC) drugs and herbal supplements.	Warfarin (Coumadin) interacts with many foods, drugs, and herbs, either increasing or decreasing the anticoagulant effect. All anticoagulant medications require stopping the use of aspirin/other NSAIDs. Client needing pain management should know that even use of acetaminophen may prolong clotting times; alternate treatments may be required. Also, use of herbal products, such as ginkgo, garlic, and vitamin E, impairs clotting and should be avoided during anticoagulant therapy.
Remind client to discuss anticoagulant use with all health care providers (including dentists) before starting new medications and when changing medications.	Medications should be periodically reviewed for potential interactions, adverse effects, and side effects.
Identify untoward anticoagulant effects requiring medical attention, such as bleeding from mucous membranes (nose, gums), continued oozing from cuts and punctures, severe bruising after minimal trauma, and development of petechiae.	Early detection of deleterious effects of therapy, such as prolongation of clotting time, allows for timely intervention and may prevent serious complications.
Emphasize importance of medical follow-up and laboratory testing.	Understanding that close supervision of warfarin therapy is necessary (therapeutic dosage range is narrow and complications may prove fatal) promotes client participation.
Encourage wearing of medical ID bracelet or necklace, as indicated.	Alerts emergency healthcare providers to history of thrombotic problems or current use of or need for anticoagulants, such as prophylactic before and after any procedure or event with an increased risk of venous thromboembolism.

**POTENTIAL CONSIDERATIONS** following discharge from care setting (dependent on client's age, physical condition, and presence of complications, personal resources, and life responsibilities)

- **ineffective Health Management**—perceived seriousness/benefit
- **risk for Bleeding**—treatment regimen

# CHAPTER 3

## Respiratory

### CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) AND ASTHMA

#### I. Pathophysiology

- a. Chronic obstructive pulmonary disease (COPD): Chronic obstructive bronchitis and emphysema
  - i. Chronic airflow limitations (CAL): Caused by a mixture of small airway disease (obstructive bronchitis) and parenchymal destruction (emphysema)
  - ii. Airway inflammation: Causes structural changes, narrowing of lumina, and loss of elastic recoil in parenchyma
- b. Asthma (also called chronic reactive airway disease)
  - i. Chronic inflammatory disorder—episodic exacerbations of reversible inflammation and hyperreactivity and variable constriction of bronchial smooth muscle, hypersecretion of mucus, and edema

#### II. Spirometric Classification of Severity of COPD (airflow limitation based on postbronchodilator FEV<sub>1</sub>)—Global Initiative for Chronic Obstructive Lung Disease (GOLD), 2017 report

- a. GOLD 1 (mild COPD)—mild airflow limitation ( $FVC < 0.70$ ;  $FEV_1 \geq 80\%$  predicted)
- b. GOLD 2 (moderate COPD)—worsening airflow limitation ( $FVC < 0.70$ ;  $50\% \leq FEV_1 < 80\%$  predicted); shortness of breath on exertion, and chronic cough and sputum production may be present
- c. GOLD 3 (severe COPD)—continued worsening of airflow limitation ( $FVC < 0.70$ ;  $30\% \leq FEV_1 < 50\%$  predicted); increasing shortness of breath, reduced exercise capacity, fatigue, and repeated exacerbations
- d. GOLD 4 (very severe COPD)—severe airflow limitation ( $FVC < 0.70$ ;  $FEV_1 < 30\%$  predicted)
- e. Symptom evaluation: Although spirometry is necessary for making the diagnosis of COPD, assessment goals should focus on symptoms, risk for exacerbations, and determining effect of disease on client's overall health. Updated COPD guidelines include groups A, B, C, and D that guide therapy (Helle, 2017).

#### III. Etiology

- a. COPD
  - i. Risk factors: Smoking (primary irritant), indoor/outdoor air pollution, secondhand smoke (e.g., smoke

from cooking or heating fuels); history of childhood respiratory infections, heredity— $\alpha_1$ -antitrypsin deficiency; occupational dusts, vapors, fumes, gases, and other chemicals.

- ii. Acute exacerbations usually due to pulmonary infections.
- b. Asthma
  - i. Tends to be acute and intermittent or episodic.
  - ii. The severity is classified as (1) intermittent, (2) mild persistent, (3) moderate persistent, or (4) severe persistent. This classification is based on the impairment and risk related to disease, which is measured by (a) frequency and severity of symptoms, including nocturnal symptoms; (b) characteristics of acute episodes; (c) pulmonary function; and (d) exacerbations (Sharma & Gupta, 2016).
  - iii. Environmental and other factors (not a complete listing): Household substances (such as dust mites, pets, cockroaches, mold), pollen, foods, latex, emotional upheaval, air pollution, cold weather, exercise, chemicals, medications, and viral infections are known to contribute to development of asthma.
  - iv. Genetics: Although allergies and environmental exposure factors are known risk factors in the development of asthma, both twin and family studies point to a strong genetic component. To date, linkage studies have identified more than a dozen genomic regions linked to asthma (Barnes, 2016). According to a Centers for Disease Control and Prevention (CDC) report, if a person has a parent with asthma, he or she is three to six times more likely to develop asthma than someone who does not have a parent with asthma (Benaroch, 2016).
  - v. In most children, asthma develops before age 5 years, and in more than half, asthma develops before age 3 years. Multiple triggers or precipitants as above plus upper respiratory infections (most commonly viral), including respiratory syncytial virus (RSV) bronchitis in infancy, irritants such as tobacco smoke,

- sports and games requiring continuous activity or that are played in cold weather, and changes in atmospheric or barometric pressure (Sharma & Gupta, 2016).
- vi. The Severe Asthma Research Program of the National Heart, Lung, and Blood Institute identified five phenotypes of asthma (Moore et al., 2010):
1. Group 1 clients have early onset asthma with normal lung function treated with two or fewer controller medications and minimal healthcare utilization.
  2. Group 2 clients have early onset asthma and preserved lung function but increased medication requirements (three or more medications) and healthcare utilization.
  3. Group 3 comprises mostly older obese women with late-onset asthma, moderate reductions in pulmonary function, and frequent oral corticosteroid use to manage exacerbations.
  4. Group 4 and 5 clients have severe airflow obstruction with bronchodilator responsiveness but differ in their ability to attain normal lung function, age of asthma onset, atopic status, and use of oral corticosteroids.

## G L O S S A R Y

- Asthma:** Chronic, reversible inflammation of the airways caused by a reaction of the airways to various stimuli.
- Bronchiectasis:** Condition in which damage to the airways causes them to widen and become flabby and scarred. Bronchiectasis is usually the result of infection or other condition that injures airway walls and causes loss of ability to clear mucus.
- CAT (COPD Assessment Test) Score:** Range from 0 to 40. Represents disease impact; score less than 10 equals low impact; greater than 10 equals high impact. A change of score of two or more points is considered clinically significant.
- Chronic bronchitis:** Inflammation and scarring of the lining of the bronchi.

## CARE SETTING

Primarily community level; however, severe exacerbations may necessitate emergency or inpatient hospital stay.

## IV. Statistics

### a. COPD

- i. Morbidity: Over 9 million Americans (3.8%) reported that they had been diagnosed with COPD in that year (2015) (CDC: National Center for Health Statistics, 2017a)
- ii. Mortality: In 2014, death due to chronic lower respiratory diseases was the fifth leading cause of death (23,894) in age group 45 to 64 and the third leading cause of death (124,693) in age group 65 and older (CDC, 2015a).
- iii. Cost: In 2010, total national costs attributable to COPD and its sequelae were estimated at \$32.1 billion (Ford et al, 2015).

### b. Asthma

- i. Morbidity: In 2015, over 18 million Americans were reported to have asthma, including 6.2 million children under 18 (CDC, National Center for Health Statistics, 2017b).
- ii. Mortality: In 2015, there were 3651 deaths attributed to asthma.
- iii. Cost: Annual direct healthcare cost is approximately \$50.1 billion; indirect costs (e.g., lost productivity) are \$5.9 billion, totaling \$56.0 billion (Asthma & Allergy Foundation of America [AAFA], 2015).

**Chronic obstructive pulmonary disease (COPD):** Disease state characterized by an airflow limitation that is not fully reversible. It is usually progressive and associated with an abnormal inflammatory response to noxious particles or gases.

**Dyspnea:** Shortness of breath that may be persistent, worse with activity, and progressive over time.

**Emphysema:** Destruction of the alveoli, which leads to overdistention of the air spaces. Damage is irreversible.

**FEV<sub>1</sub>:** Forced expired volume in 1 second.

**FVC:** Forced vital capacity.

**Hypercapnia:** Condition in which there is increased level of carbon dioxide in blood. This condition is closely associated with hypoxemia (low level of oxygen), which causes breathing difficulty and breathing/respiratory failure.

## RELATED CONCERNs

Heart failure: chronic, page 38

Pediatric considerations, page 993

Pneumonia, page 147

Psychosocial aspects of care, page 835

Surgical intervention, page 873

Respiratory failure: ventilatory assistance, page 187

**ACTIVITY/REST**

- Fatigue, exhaustion, malaise
- Inability to perform basic activities of daily living (ADLs) because of breathlessness
- Inability to sleep, need to sleep sitting up
- Dyspnea at rest or in response to activity or exercise

- Fatigue
- Restlessness, insomnia
- General debilitation or loss of muscle mass

**CIRCULATION**

- Swelling of lower extremities

- Elevated blood pressure (BP)
- Elevated heart rate or severe tachycardia, dysrhythmias
- Distended neck veins, with advanced disease
- Dependent edema, which may not be related to heart disease
- Faint heart sounds due to increased anteroposterior (AP) chest diameter
- Skin color and mucous membranes may be pale or bluish and cyanotic, clubbing of nails and peripheral cyanosis, pallor (can indicate anemia)

**EGO INTEGRITY**

- Increased stress factors
- Changes in lifestyle
- Feelings of hopelessness, loss of interest in life

- Anxious, fearful, irritable behavior, emotional distress
- Apathy, change in alertness, dull affect, withdrawal

**FOOD/FLUID**

- Nausea—side effect of medication or mucus production
- Poor appetite, anorexia (emphysema)
- Altered taste due to medications
- Inability to eat because of respiratory distress
- Persistent weight loss, decreased muscle mass or subcutaneous fat (emphysema)
- Weight gain reflecting edema (bronchitis, prednisone use)

- Poor skin turgor
- Dependent edema
- Diaphoresis
- Abdominal palpation may reveal hepatomegaly

**HYGIENE**

- Decreased ability and increased need for assistance with ADLs
- Poor hygiene

**PAIN/DISCOMFORT**

- Chest tightness (asthma)

**RESPIRATION**

- Variable levels of dyspnea, with insidious and progressive onset (predominant symptom in emphysema), especially on exertion
- Seasonal or episodic occurrence of breathlessness (asthma); inability to breathe (asthma); chronic “air hunger” (COPD)
- Use of oxygen at night or continuously

- **Respirations:**
  - Usually rapid and may be shallow
  - Prolonged expiratory phase with grunting, pursed-lip breathing (emphysema)
  - Assumption of three-point (“tripod”) position for breathing—especially with acute exacerbation of chronic bronchitis
  - Use of accessory muscles for respiration, such as elevated shoulder girdle, retraction of supraclavicular fossae, flaring of nares
  - Chest may appear hyperinflated with increased AP diameter (barrel-shaped), minimal diaphragmatic movement
- **Breath sounds:**
  - May be faint with expiratory wheezes (emphysema)
  - Scattered, fine, or coarse moist crackles (bronchitis)

**MAY REPORT (continued)****• Coughing:**

- Intermittent cough episodes (note chronic cough is often first symptom of COPD)
- Paroxysms of cough (asthma)

**• Skin color****• Voice**

- History of recurrent respiratory infections (asthma) (particularly during childhood)
- Long-term exposure to indoor or outdoor air pollution or respiratory irritants (asthma)
- Occupational or environmental exposures to smoke, dust, particulates, and fumes (e.g., chemical agents, coal burning and coal dust; biomass fuels [from organic materials such as wood and sawdust, animal dung, crop residues]) (asthma)
- Smoking (cigarette, pipe, cigar, water pipe) (cigarette smoking is the most commonly occurring risk factor for COPD)
- Concomitant chronic diseases frequently include cardiovascular disease, skeletal muscle dysfunction, metabolic syndrome, osteoporosis, depression, anxiety, and lung cancer
- Familial and hereditary factors, that is, deficiency of  $\alpha_1$ -antitrypsin (emphysema)

**SAFETY**

- History of allergic reactions or sensitivity to substances or environmental factors
- Recent or recurrent infections

**SEXUALITY**

- Decreased libido

**SOCIAL INTERACTION**

- Dependent relationship(s)
- Insufficient support from or to partner or significant other (SO), lack of support systems
- Prolonged disease or disability progression

**TEACHING/LEARNING**

- Use or misuse of respiratory drugs
- Use of herbal supplements, such as astragalus, coleus, echinacea

**MAY EXHIBIT (continued)**

- Rhonchi, wheezing throughout lung fields on expiration and possibly during inspiration, progressing to diminished or absent breath sounds. Wheezing of COPD can vary from day to day or time of day. Widespread wheezing may be heard on inspiration or expiration. Laryngeal-level wheezing can be present without other abnormal breath sounds (asthma).
- **Percussion:** May reveal hyperresonance over lung fields (air-trapping with emphysema) or dullness over lung fields (consolidation, fluid, mucus)
- Cough may be productive or nonproductive.
- Persistent cough with sputum production (gray, white, or yellow), which may be copious (chronic bronchitis).
  - Sputum production may be small, large, or intermittent.
  - Large volumes of sputum can accompany underlying bronchiectasis or bacterial exacerbations.
- May be normal despite abnormal gas exchange and rapid respiratory rate (moderate emphysema, known as “pink puffers”)
- Pallor, with cyanosis of lips, nailbeds; overall duskeness; ruddy color (chronic bronchitis, sometimes called “blue bloater”)
- Difficulty speaking sentences of more than four or five words at one time, loss of voice

- Flushing, perspiration (asthma)

- Inability to converse or maintain voice because of respiratory distress
- Limited physical mobility
- Neglectful relationships with other family members
- Inability to perform or inattention to employment responsibilities, absenteeism, confirmed disability

(continues on page 136)

## CLIENT ASSESSMENT DATABASE (contd.)

### MAY REPORT (continued)

- Smoking or difficulty stopping smoking, chronic exposure to secondhand smoke, smoking substances other than tobacco
- Regular use of alcohol
- Failure to improve over long period of time

### MAY EXHIBIT (continued)

### DISCHARGE PLAN CONSIDERATIONS

- Episodic or long-term assistance with shopping, transportation, self-care needs, homemaker or home maintenance tasks
- Changes in medication and therapeutic treatments, use of supplemental oxygen, ventilator support; end-of-life issues

► Refer to section at end of plan for postdischarge considerations.

### DIAGNOSTIC STUDIES

#### TEST

#### WHY IT IS DONE

#### WHAT IT TELLS ME

##### *Pulmonary function tests (PFTs)*

- Numerous specific tests are included as part of the comprehensive PFT and fall within three categories: airway flow rates, lung volumes and capacities, and gas exchange.
- **Total lung capacity (TLC):** Maximum amount of air that lungs can hold, measured at the top of an inhalation.
- **Residual volume (RV):** Air remaining in the lungs after maximum exhalation.
- **Vital capacity (VC):** Maximum amount of air that can be exhaled during a normal or slow exhalation after fullest possible inhalation. Important measurement in assessing the client's ability to cough and protect airway.
- **Spirometry testing, including FVC and FEV<sub>1</sub>:** Measures the amount of air taken in (volume) and exhaled as a function of time (e.g., after deepest possible inhalation), which is also known as forced vital capacity (FVC).

- **Peak expiratory flow:** Measures the speed of exhaling and lung constriction.

- **Plethysmography:** Test that takes lung volume measurements (inhaling and exhaling). The test involves sitting in an airtight booth and blowing into a mouthpiece while a computer records measurements.

##### *Bronchial provocation tests*

- **Exercise challenge:** Baseline spirometry followed by exercise on a treadmill or bicycle to heart rate greater than 60% of predicted maximum, with monitoring of the ECG and oxyhemoglobin saturation.
- **Inhalation challenge test:** Measures how much and how quickly client can breathe air in and out before and after taking medicine.

Used to establish baseline lung function, evaluate dyspnea, detect pulmonary disease, and monitor effects of therapies used to treat respiratory disease. *Note:* The spirometer is also used as an exercise tool for improving lung function, for example, after surgery.

Increased in obstructive lung disease. Decreased in restrictive lung disease.

Increased in obstructive lung disease. Decreased in restrictive lung disease.

Normal or decreased in obstructive lung disease.

Decreased in restrictive lung disease.

Increased in obstructive lung disease. *Note:* Spirometry is required to make the diagnosis of COPD; presence of a postbronchodilator FEV<sub>1</sub>/FVC <0.70 confirms presence of persistent airflow limitation. *Note:* Spirometry may be done at the same time as body plethysmography using the same equipment.

People with asthma often use this test routinely to monitor their asthma control.

Helps diagnose respiratory diseases with similar symptoms, including asthma, pulmonary fibrosis, and chronic obstructive pulmonary disease (COPD).

The diagnosis of asthma can be confirmed with the exercise challenge in a patient with history of exercise-induced symptoms (e.g., cough, wheeze, chest tightness or pain) (Sharma & Gupta, 2016).

Determines whether bronchial tubes overreact to environmental factors (e.g., breathing cold air, highly humid air) or to inhaling certain substances (e.g., methacholine, histamine, or respiratory inhalers). This may support a diagnosis of asthma.

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<b>Other diagnostic studies</b>	
• <b>Chest x-ray:</b> Evaluates organs or structures within the chest.	May reveal hyperinflation of lungs with increased AP diameter, flattened diaphragm, increased retrosternal air space, decreased vascular markings/bullae (emphysema), increased bronchovascular markings (bronchitis), and normal findings during periods of remission (asthma).
• <b>Pulse oximetry:</b> Reflects oxygen saturation through measurement of the portion of light transmitted by oxygenated hemoglobin using a sensor attached to fingers/earlobes.	Noninvasive measure of arterial blood oxygen and diffusion. Abnormally low levels (<88%) indicate impaired gas exchange. ABG analysis is recommended when $\text{SaO}_2 < 80\%$ (Kee et al, 2010).
<b>BLOOD TESTS</b>	
• <b>Arterial blood gases (ABGs):</b> Measures oxygen and carbon dioxide levels to assess and monitor gas exchange.	Gas exchange abnormalities result in hypoxemia and hypercapnia. Gas transfer for oxygen and carbon dioxide worsens as disease progresses. Reduced ventilation may also be due to reduced ventilatory drive or increased dead space (Elbehairy et al, 2015). Most often $\text{PaO}_2$ is decreased and $\text{PaCO}_2$ is normal or increased in chronic bronchitis and emphysema but is often decreased in asthma; pH normal or acidotic, mild respiratory alkalosis secondary to hyperventilation (moderate emphysema or asthma) (Kee et al, 2010).
• <b>Complete blood count (CBC) and differential:</b> Provides baseline data about the hematologic system and yields information related to oxygen-carrying capacity and infection.	Findings are variable and can include increased hemoglobin (advanced emphysema) and increased eosinophils (asthma); elevated white blood cells (WBCs) in severe respiratory infection.
• <b>Alpha-1 antitrypsin (AAT):</b> A deficiency in AAT is a genetic trait considered to be a risk factor for the development of COPD. Performed when COPD develops in patients <45 years old, of Caucasian descent, with strong family history of COPD (Kee et al, 2010).	Decreased levels are seen in early onset emphysema in adults; increased levels are present in acute and chronic inflammatory disorders.
• <b>Allergy testing</b>	Can identify allergic factors that may significantly contribute to asthma.
• <b>Histologic evaluation of airways</b>	Typically reveal infiltration with inflammatory cells, narrowing of airway lumina, bronchial and bronchiolar epithelial denudation, and mucus plugs (Sharma & Gupta, 2016).

**NURSING PRIORITIES**

1. Maintain airway patency.
2. Assist with measures to facilitate gas exchange.
3. Enhance nutritional intake.
4. Prevent complications and slow progression of condition.
5. Provide information about disease process, prognosis, and treatment regimen.

**DISCHARGE GOALS**

1. Ventilation/oxygenation adequate to meet self-care needs.
2. Nutritional intake meeting caloric needs.
3. Infection treated or prevented.
4. Disease process, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS: ineffective Airway Clearance****May Be Related To**

Obstructed airway: Chronic obstructive pulmonary disease; airway spasm; excessive mucus; retained secretions, exudate in the alveoli

Physiological factors: Asthma; infection

Environmental factors: Smoking, exposure to smoke; secondhand smoke

**Possibly Evidenced By**

Dyspnea, difficulty verbalizing

Alteration in respiratory rate or pattern

(continues on page 138)

**NURSING DIAGNOSIS:** **ineffective Airway Clearance** (continued)

Diminished/adventitious breath [rales, crackles; wheezes, rhonchi]  
Ineffective cough  
Restlessness, cyanosis

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Airway Patency NOC**

Maintain patent airway with breath sounds clear or clearing.  
Demonstrate behaviors to improve airway clearance.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Airway Management NIC</b> <i>Independent</i> Auscultate breath sounds. Note adventitious breath sounds such as wheezes, crackles, or rhonchi.	Some degree of bronchospasm is present with obstructions in airway and may or may not be manifested in adventitious breath sounds, such as scattered, moist crackles (bronchitis); faint sounds, with expiratory wheezes (emphysema); or absent breath sounds (severe asthma).
Assess and monitor respiratory rate. Note inspiratory-to-expiratory ratio.	Tachypnea is usually present to some degree and may be pronounced on admission, during stress, or during concurrent acute infectious process. Respirations may be shallow and rapid, with prolonged expiration in comparison to inspiration.
Note presence and degree of dyspnea, for example, reports of “air hunger,” restlessness, anxiety, respiratory distress, and use of accessory muscles. Use a 0 to 10 scale or American Thoracic Society’s Grade of Breathlessness Scale to rate breathing difficulty. Ascertain precipitating factors when possible. Differentiate acute episode from exacerbation of chronic dyspnea.	Respiratory dysfunction is variable depending on the underlying process, for example, infection, allergic reaction, and the stage of chronicity in a client with established COPD. Note: Using a scale to rate dyspnea aids in quantifying and tracking changes in respiratory distress.
<b>P</b> Check peak expiratory flow rate (PEFR) before and after treatments using peak flow meter (PFM).	Monitors effectiveness of drug therapy; identifies need for change in regimen in children age 5 and older. Note: Although peak flow monitoring in the emergency room (ER) may prove helpful for assessment of lung function and response to treatment, it’s usually possible only if client is familiar with the technique because he or she already uses it at home (Volpe et al, 2011).
Assist client to maintain a comfortable position to facilitate breathing by elevating the head of bed, leaning on over-bed table, or sitting on edge of bed.	Elevation of the head of the bed facilitates respiratory function using gravity; however, client in severe distress will seek the position that most eases breathing. Supporting arms and legs with table, pillows, and so on helps reduce muscle fatigue and can aid chest expansion.
Encourage and assist client with COPD to practice abdominal or pursed-lip breathing exercises.	Provides client with some means to cope with and control dyspnea and reduce air-trapping.
Observe for persistent, hacking, or moist cough. Assist with measures to improve effectiveness of cough effort.	Cough can be persistent but ineffective, especially if client is elderly, acutely ill, or debilitated. Coughing is most effective in an upright or in a head-down position after chest percussion.
Increase fluid intake to 3000 mL/d within cardiac tolerance. Provide warm or tepid liquids. Recommend intake of fluids between, instead of during, meals.	Hydration helps decrease the viscosity of secretions, facilitating expectoration. Using warm liquids may decrease bronchospasm. Fluids during meals can increase gastric distention and pressure on the diaphragm.
<b>P</b> Avoid iced liquids, especially in children.	May trigger bronchospasm.
Limit exposure to environmental pollutants such as dust, smoke, and feather pillows according to individual situation.	Precipitators of allergic type of respiratory reactions that can trigger or exacerbate onset of acute episode.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>P</b> Use a spacer when administering metered-dose inhaler (MDI) and spacer with mask as indicated.	Most effective way of delivering maximum amount of medication. Mask should be used in child too young to seal lips around mouthpiece. Note: Spacer is not to be used with dry-powder inhalers.
<b>Collaborative</b> Administer medications, as indicated, for example:	The goal of <b>pharmacologic management of COPD</b> is to (1) reduce shortness of breath, (2) control coughing and wheezing, and (3) prevent exacerbations. Drug classes to accomplish this include short- and long-acting bronchodilators, corticosteroids, and phosphodiesterase-4 (PDE4) inhibitors.
Short-acting bronchodilators including short-acting beta2-agonists (in inhaled, pill, liquid, and injectable forms) such as albuterol (Proventil, Ventolin), levalbuterol (Xopenex), and metaproterenol (Alupent)	The goal of <b>pharmacologic management of asthma in teens and adults</b> is to (1) prevent long-term symptoms that interfere with daily living, (2) maintain lung function, (3) allow the person to participate in all desired activities of daily living, (4) treat asthma attacks as they occur, and (5) prevent repeated asthma attacks. Treatment choices include long-term (controller) medicines used daily for persistent asthma and quick-relief medicines used as needed to provide rapid relief of symptoms during asthma attacks. Drug classes to accomplish these goals include inhaled, oral, or injected corticosteroids; short-acting and long-acting beta2-agonists; anticholinergics; leukotriene pathway modifiers; and (less commonly) mast cell stabilizers.
Long-acting bronchodilators, including beta2-agonists (such as formoterol [Foradil] and salmeterol [Serevent]), anticholinergics (such as ipratropium [Atrovent], tiotropium [Spiriva]), or combination drugs (e.g., beta2-agonist and corticosteroid)	These agents are first-line therapies for rapid symptomatic improvement of bronchoconstriction (often called “rescue drugs”). They relax smooth muscles and reduce local congestion, reducing airway spasm, wheezing, and mucus production. Inhalation by metered-dose inhaler (MDI) with a spacer is recommended, but medications may be nebulized in the event client has severe coughing or is too dyspneic to puff effectively.
Methylxanthines, such as theophyllines (Elixophyllin/Theo-24, Uniphyll)	Long-acting bronchodilators are used to provide control—not quick relief—of asthma. They are often used in conjunction with inhaled steroids. Note: Inhaled anticholinergic agents are considered first-line drugs for clients with stable COPD because they have a longer duration of action with less toxicity potential while still providing the effective relief of the beta-agonists.
	This class of bronchodilator can be used as a long-term controller for both asthma and COPD. It decreases the lungs’ response to irritants, improves breathing by increasing the strength of the diaphragm, stimulates the breathing control centers in the brain; it must be used regularly to prevent wheezing and shortness of breath. Note: Theophylline products are used with less frequency now and are not recommended as first-line drugs in older clients with COPD because of their potentially adverse cardiovascular effects.

(continues on page 140)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Anti-inflammatory drugs: <b>oral or intravenous (IV) steroids</b> , such as prednisone (Cordrol, Deltasone, Pred-Pak, Liquid Pred), methylprednisolone (Medrol), and dexta-methasone (Decadron), and <b>inhaled steroids</b> , such as fluticasone (Flovent HFA), budesonide (Pulmicort Flexhaler), beclomethasone (Qvar), ciclesonide (Alvesco), and mometasone (Asmanex)	Corticosteroids reduce local airway inflammation and edema by inhibiting effects of histamine and other mediators. Note: Anti-inflammatory drugs (particularly inhaled steroids) are the most important treatment for most people with asthma (Sharma & Gupta, 2016). The aim of inhaled corticosteroids in COPD is to reduce exacerbation rates and slow decline in health status. Studies have shown benefits of systemic steroids in the management of COPD exacerbations, but these must be weighed against potential harmful side effects (e.g., thrush, hoarseness, and risk of pneumonia) (Yang et al, 2012).
Leukotriene antagonists, such as montelukast (Singulair), zafirlukast (Accolate), and zileuton (Zyflo)	Reduce leukotriene activity to limit inflammatory response. In mild to moderate asthma, reduces need for inhaled beta <sub>2</sub> -agonists and systemic corticosteroids. Not effective in acute exacerbations because there is no bronchodilator effect.
Phosphodiesterase type 4 enzyme inhibitors, such as roflumilast (Daliresp)	Decreases exacerbations in clients with severe COPD associated with chronic bronchitis; acts as an NSAID to decrease number of neutrophils and eosinophils in airway.
Mast cell stabilizers such as cromolyn (Intal) and nedocromil (Tilade)	These agents work to prevent allergy cells (mast cells) from breaking open and releasing chemicals that help cause inflammation. They make the airways less sensitive to many asthma triggers.
Antimicrobials	Various antimicrobials may be indicated for control of bacterial exacerbations of COPD, such as pneumonia. (Refer to CP: Pneumonia.)
Analgesics, cough suppressants, or antitussives, such as codeine and dextromethorphan products (Benylin DM, Comtrex, Novahistine)	Persistent, exhausting cough may need to be suppressed to conserve energy and permit client to rest. Note: Regular use of antitussives is not recommended for COPD clients as cough can have a significant protective effect.
Provide supplemental humidification, such as ultrasonic nebulizer and aerosol room humidifier.	Humidity helps reduce viscosity of secretions, facilitating expectoration, and may reduce or prevent formation of thick mucus plugs in bronchioles.
Assist with respiratory treatments, such as spirometry and chest physiotherapy.	Breathing exercises help enhance diffusion; aerosol or nebulizer medications can reduce bronchospasm and stimulate expectoration. Postural drainage and percussion enhance removal of excessive and sticky secretions and improve ventilation of lung segments in the setting of COPD (Leader, 2016a). Note: Chest physiotherapy may aggravate bronchospasm in asthmatics.
Monitor and graph serial ABGs, pulse oximetry, and chest x-ray.	Establishes baseline for monitoring progression or regression of disease process and complications. Note: Pulse oximetry readings detect changes in saturation as they are happening, helping to identify trends possibly before client is symptomatic. However, the accuracy of pulse oximetry may be questioned if client has severe peripheral vasoconstriction.

### NURSING DIAGNOSIS: **impaired Gas Exchange**

#### May Be Related To

Ventilation-perfusion imbalance [retained secretions, bronchospasm, air-trapping]  
Alveolar-capillary membrane changes [e.g., obstructive lung disease]

#### Possibly Evidenced By

Dyspnea  
Confusion, restlessness

**NURSING DIAGNOSIS:** **Impaired Gas Exchange** (continued)

Abnormal breathing (e.g., rate, rhythm, depth); tachycardia  
 Abnormal ABGs—hypoxia, hypercapnia  
 Nasal flaring; abnormal skin color (e.g., pale, dusky, cyanosis)  
 Reduced tolerance for activity

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Gas Exchange NOC**

Demonstrate improved ventilation and adequate oxygenation of tissues by ABGs within client's normal range and be free of symptoms of respiratory distress.  
 Participate in treatment regimen within level of ability and situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Acid-Base Management: Respiratory Acidosis NIC</b> <i>Independent</i>	
Assess respiratory rate and depth. Note use of accessory muscles, pursed-lip breathing, and inability to speak or converse.	Useful in evaluating the degree of respiratory distress and chronicity of the disease process.
Elevate head of bed and assist client to assume position to ease work of breathing. Include periods of time in prone position as tolerated. Encourage deep, slow, or pursed-lip breathing as individually needed and tolerated.	Oxygen delivery may be improved by upright position and breathing exercises to decrease airway collapse, dyspnea, and work of breathing. Note: Recent research supports use of prone position to increase PaO <sub>2</sub> .
Assess and routinely monitor skin and mucous membrane color.	Cyanosis may be peripheral (noted in nailbeds) or central (noted around lips or earlobes). Duskeness and central cyanosis indicate advanced hypoxemia.
Encourage expectoration of sputum; suction when indicated.	Thick, tenacious, copious secretions are a major source of impaired gas exchange in small airways with COPD. Deep suctioning may be required when cough is ineffective for expectoration of secretions.
Auscultate breath sounds, noting areas of decreased airflow and adventitious sounds.	Breath sounds may be faint because of decreased airflow or areas of consolidation. Presence of wheezes may indicate bronchospasm or retained secretions. Scattered, moist crackles may indicate interstitial fluid or cardiac decompensation.
Palpate chest for fremitus.	Decrease of vibratory tremors suggests fluid collection or air-trapping.
Monitor level of consciousness and mental status. Investigate changes.	Restlessness and anxiety are common manifestations of hypoxia. Worsening ABGs accompanied by confusion and somnolence are indicative of cerebral dysfunction due to hypoxemia.
Evaluate level of activity tolerance. Provide calm, quiet environment. Limit client's activity or encourage bedrest or chair rest during acute phase. Have client resume activity gradually and increase as individually tolerated.	During severe, acute, or refractory respiratory distress, client may be totally unable to perform basic self-care activities because of hypoxemia and dyspnea. Rest interspersed with care activities remains an important part of treatment regimen. An exercise program is aimed at improving aerobic capacity and functional performance, increasing endurance and strength without causing severe dyspnea (Corbridge & Nyenhuis, 2017).
Evaluate sleep patterns; note reports of difficulties and whether client feels well rested. Provide quiet environment and group care and monitoring activities to allow periods of uninterrupted sleep. Limit stimulants such as caffeine. Encourage position of comfort.	Multiple external stimuli and presence of dyspnea and hypoxemia may prevent relaxation and inhibit sleep. Sleeping difficulties due to hypoxia related to apnea and nocturnal hypopnea may require referral to sleep specialist.
Monitor vital signs and cardiac rhythm.	Tachycardia, dysrhythmias, and changes in BP can reflect effect of systemic hypoxemia on cardiac function.

(continues on page 142)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Monitor and graph serial ABGs and pulse oximetry.	$\text{PaCO}_2$ is usually elevated in bronchitis and emphysema, and $\text{PaO}_2$ is generally decreased, so that hypoxia is present in a greater or lesser degree. Note: A "normal" or increased $\text{PaCO}_2$ signals impending respiratory failure for asthmatics.
Administer supplemental oxygen judiciously via nasal cannula, mask/nonrebreathing mask, high-flow oxygen systems, or mechanical ventilator. Titrate as indicated by ABG results and client tolerance.	Used to correct and prevent worsening of hypoxemia, improve survival and quality of life. Supplemental oxygen can be provided during exacerbations only or as a long-term therapy. Note: High-flow oxygen therapy (providing flow rates of up to 60 L/min, high molecular humidity, and precise oxygen delivery) has been found to decrease the work of breathing and improve gas exchange. This can reduce the need for noninvasive ventilation and intubation in selected patient populations (Frat et al, 2015).
Administer antianxiety, sedative, or opioid agents, such as morphine, with caution.	May be used to reduce dyspnea by controlling anxiety and restlessness, which increases oxygen consumption and demand, exacerbating dyspnea. Must be monitored closely because depressive effect may lead to respiratory failure.
Assist with noninvasive (nasal or oronasal) intermittent positive-pressure ventilation (NIPPV) or intubation and institution of mechanical ventilation, as indicated; transfer to critical care unit depending on client directives.	Development of or impending respiratory failure requires prompt life-saving measures. NIPPV provides ventilatory support by means of positive pressure, typically through a nasal mask. It may be useful in the home setting as well to treat chronic respiratory failure or limit acute exacerbations in clients who can maintain spontaneous respiratory effort due to hypercapnia. NIPPV remains the standard of care for decreasing morbidity and mortality in patients hospitalized with exacerbation of COPD and acute respiratory failure (Elliot & Nava, 2012).
Prepare for additional referrals and interventions, such as to a pulmonary specialist, pulmonary rehabilitation program, or for surgical intervention, as appropriate.	May be indicated to confirm diagnosis and optimize appropriate treatment. A multidisciplinary approach including education and exercise training may be helpful in improving client function and quality of life. Screened candidates—those with severe dyspnea or end-stage emphysema with $\text{FEV}_1$ less than 35% of the predicted value despite maximal medical therapy and with the ability to complete preoperative pulmonary rehabilitation programs—may benefit from lung volume reduction surgery (LVRS). This procedure removes ineffective lung tissue, allowing for better lung expansion, enhanced blood flow to healthy tissues (correction of ventilation-perfusion mismatch), and improved respiratory muscle efficiency.

## NURSING DIAGNOSIS: imbalanced Nutrition: less than body requirements

### May Be Related To

Biological factors—dyspnea; medication side effects; anorexia, nausea or vomiting; fatigue

### Possibly Evidenced By

Body weight 20% or more under ideal weight range; poor muscle tone  
Reported altered taste sensation, aversion to eating, lack of interest in food

### Desired Outcomes/Evaluation Criteria—Client Will

#### Nutritional Status NOC

Display progressive weight gain toward goal as appropriate.  
Demonstrate behaviors and lifestyle changes to regain and maintain appropriate weight.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Therapy NIC</b>	
<b>Independent</b>	
Assess dietary habits, recent food intake. Note degree of difficulty with eating. Evaluate weight and body size or mass.	Client in acute respiratory distress is often anorectic because of dyspnea, sputum production, and medication effects. In addition, many COPD clients habitually eat poorly even though respiratory insufficiency creates a hypermetabolic state with increased caloric needs. As a result, client often is admitted with some degree of malnutrition. People who have emphysema are often thin, with wasted musculature.
Auscultate bowel sounds.	Diminished or hypoactive bowel sounds may reflect decreased gastric motility and constipation (common complication) related to limited fluid intake, poor food choices, decreased activity, and hypoxemia.
Give frequent oral care, remove expectorated secretions promptly, and provide specific container for disposal of secretions and tissues.	Noxious tastes, smells, and sights are prime deterrents to appetite and can produce nausea and vomiting with increased respiratory difficulty.
Encourage a rest period of 1 hour before and after meals. Provide frequent small feedings.	Helps reduce fatigue during mealtime and provides opportunity to increase total caloric intake.
Avoid gas-producing foods and carbonated beverages.	Can produce abdominal distention, which hampers abdominal breathing and diaphragmatic movement and can increase dyspnea.
Avoid very hot or very cold foods.	Extremes in temperature can precipitate or aggravate coughing spasms.
Weigh, as indicated.	Useful in determining caloric needs, setting weight goal, and evaluating adequacy of nutritional plan. Note: Weight loss may continue in the client with COPD, despite adequate intake, as edema is resolving.
<b>Collaborative</b>	
Consult dietitian or nutritional support team to provide easily digested, nutritionally balanced meals by mouth, supplemental or tube feedings, and parenteral nutrition. (Refer to CP: Total Nutritional Support: Parenteral/Enteral Feeding.)	Method of feeding and caloric requirements are based on individual situation and specific needs to provide maximal nutrients with minimal client effort and energy expenditure.
Review serum albumin or prealbumin, transferrin, amino acid profile, iron, nitrogen balance studies, glucose, liver function studies, and electrolyte laboratory values as ordered.	Determines deficits and monitors effectiveness of nutritional therapy.
Administer supplemental oxygen during meals, as indicated.	Decreases dyspnea and increases energy for eating, enhancing intake.

### NURSING DIAGNOSIS: **ineffective Health Management**

#### May Be Related To

Insufficient knowledge of therapeutic regimen; complexity of therapeutic regimen  
 Perceived seriousness of condition, susceptibility, benefit  
 Economically disadvantaged; excessive demands  
 Family pattern of healthcare

#### Possibly Evidenced By

Reports difficulty with prescribed regimen  
 Failure to include treatment regimen in daily living or to take action to reduce risk factors  
 Unexpected acceleration of illness symptoms

(continues on page 144)

## NURSING DIAGNOSIS: **ineffective Health Management** (continued)

### Desired Outcomes/Evaluation Criteria—Client Will

#### **Self-Management: Chronic Obstructive Pulmonary Disease/Asthma Management NOC**

Verbalize understanding of condition and disease process and treatment.

Identify relationship of current signs and symptoms to the disease process and correlate these with causative factors.

Participate in problem-solving of factors interfering with integration of therapeutic regimen.

Initiate necessary lifestyle changes and participate in treatment regimen.

### ACTIONS/INTERVENTIONS

#### **Teaching: Disease Process/Asthma Management NIC**

##### *Independent*

Explain and reinforce explanations of individual disease process, including factors that lead to exacerbation episodes.

Understanding decreases anxiety and can lead to improved participation in treatment plan.

**P** Review possible disease course as appropriate.

For children with asthma, symptoms may disappear during their teen years but may return in adulthood.

Discuss respiratory medications, side effects, drug interactions, and adverse reactions.

Frequently, these clients are on several respiratory drugs simultaneously that have similar side effects and potential drug interactions. It is important that the client/SO understand the difference between nuisance side effects (medication continued) and untoward or adverse side effects (medication possibly discontinued or dosage changed).

Demonstrate correct technique for using an MDI, such as how to hold it, pausing 2 to 5 minutes between puffs, and cleaning the inhaler.

Proper administration of drug enhances delivery and effectiveness. Note: When administering MDI, client begins inhalation and then presses canister. If MDI is used with a spacer, canister is pressed first then client takes two breaths.

Devise system for recording prescribed intermittent drug and inhaler usage.

Reduces risk of improper use or overdosage of pen (as necessary) medications, especially during acute exacerbations, when cognition may be impaired.

Discuss dietary concerns such as food allergies or intolerances in client with asthma.

Although rare, asthma can be triggered by foods. Person with both food allergies and asthma symptoms should be aware of how asthma might affect allergies and vice versa. Studies have found that the following foods and food additives can trigger an asthma attack: milk, eggs, peanuts, tree nuts, soy, wheat, fish, shellfish, and turkey (Groce, 2016).

Review eating plan and ways to manage allergic responses (e.g., keeping rescue medication for asthma close at hand, along with epinephrine to treat inadvertent allergic reactions).

Having food allergy and asthma places people at greater risk for morbidity and mortality. With heightened awareness of the relationship between these two entities, management of food allergy and asthma and recognition of food-triggered asthma exacerbations may improve treatment and prevent severe reaction. Particular attention should be given to patients with both food allergies and asthma as these patients have been found to have a higher incidence of fatal or near-fatal anaphylaxis (Bird & Burks, 2009; Wang & Liu, 2011).

Discuss use of herbals, especially when client is on multiple respiratory medications.

Many interactions can occur between herbals and medications used to treat respiratory disorders. Although most herbals do not usually have dangerous side effects, effects can become dangerous or lethal if combined with other substances or when taken in larger doses. For example, herbs, such as ephedra, should be used only in very small doses and for a short time and could be dangerous when used with rescue medications (similarity of action in some ingredients).

**ACTIONS/INTERVENTIONS** (continued)

Recommend avoidance of sedative antianxiety agents unless specifically prescribed and approved by physician treating respiratory condition.	Although client may be nervous and feel the need for sedatives, these can depress respiratory drive and protective cough mechanisms. Note: These drugs may be used prophylactically when client is unable to avoid situations known to increase stress and trigger respiratory response.
<b>P</b> Instruct asthmatic client/parent in use of peak flow meter (PMF) as appropriate.	Peak flow level can drop before client exhibits any signs and symptoms of asthma after the “first time” the client is exposed to a trigger. Regular use of the peak flow meter may reduce the severity of the attack because of earlier intervention. However, trying to learn to use the PFM during an attack may not be possible.
Encourage client to monitor own status with use of CAT (or similar numeric value grading score) to evaluate cough, mucus production, chest tightness, ability to rest, activity limitations, confidence, and energy levels) and to relay the information to healthcare providers.	This self-administered questionnaire helps the client monitor own respiratory status and changes that may be indicative of improvement or need for prompt medical evaluation.
<b>P</b> Recommend client/parent keep a daily or periodic diary of asthma symptoms as indicated.	Helpful in determining effectiveness of treatment plan and need for adjustment as child ages. Note: Symptoms at night are an indication of nocturnal asthma or poor control even if condition appears stable during the day (Sawicki & Haver, 2016).
<b>Discuss self-management plan</b>	
<b>P</b> Avoidance of triggers and ways to control these factors in and around the home and school/work setting.	Avoiding triggers (e.g., known allergens, excessively dry or cold air, wind, temperature extremes, chemical products and fumes, tobacco smoking, and secondhand smoke) is important in the self-management of asthma and in the prevention of acute exacerbations.
<b>P</b> Use of asthma symptom zones, as appropriate.	Zones may be divided into green (peak expiratory flow rate [PEFR] 80% to 100% and no breathing difficulty); yellow (PEFR 50% to 80% of baseline and some difficulty breathing, with wheezing and coughing), indicating need for a short-term change or increase in medication; and red (PEFR less than 50% baseline and does not respond to inhaled bronchodilators), which should be evaluated by care provider (Sawicki & Haver, 2016).
Review of breathing exercises, coughing effectively, and general conditioning exercises.	Pursed-lip and abdominal or diaphragmatic breathing exercises strengthen muscles of respiration, help minimize collapse of small airways, and provide the individual with means to control dyspnea. Conditioning exercises, carried out regularly and soon after taking medications, can increase activity tolerance, muscle strength, and quality of life.
Importance of regular oral care and dental hygiene.	Decreases bacterial growth in the mouth, which can lead to pulmonary infections.
Importance of avoiding people with active respiratory infections. Emphasize need for routine influenza and pneumococcal vaccinations.	Decreases exposure to and incidence of acquired acute upper respiratory infections (URIs). Note: The Global Initiative for Obstructive Lung Disease (GOLD) advises that getting vaccinated against the flu and pneumonia viruses helps reduce the risk of acute COPD exacerbation (Leader, 2016b).
<b>P</b> Discuss and encourage family to form a detailed rescue plan for an acute asthmatic episode, including how to identify signs of an acute attack, how to use and monitor effects of rescue medications, and how, when, and where to obtain emergent care.	Child (if of age to self-manage) and/or caregiver must have the knowledge and capability of helping child in emergent asthma attack, including medications to use and contact numbers to obtain rapid assistance. Relief medications include short-acting bronchodilators, systemic corticosteroids, and ipratropium (Atrovent) to bring about relaxation of bronchi (Sawicki & Haver, 2016; Sharma & Gupta, 2016).

(continues on page 146)

**ACTIONS/INTERVENTIONS** (continued)

<p>P Recommend client wear medical identification device at all times.</p>	Provides important information during emergency situations regarding client's condition, allergies, usual medications, emergency contacts, and provider information.
<p>Review the harmful effects of smoking in regard to client's particular condition. Strongly advise cessation of smoking by client and SO. Assess client's willingness and rationale for client's stated desire to quit. Assist client in devising a quit plan with information on QUITLINES, support groups, nicotine substitutes, and other resources that aid in smoking cessation.</p>	Cessation of smoking may slow or halt progression of COPD. Even when client wants to stop smoking, support groups and medical monitoring may be needed. Note: Research studies suggest that side stream or secondhand smoke can be as detrimental as actually smoking.
<p>Provide information about benefits of regular exercise while addressing individual activity limitations.</p>	
<p>P Encourage preventive therapy for strenuous play or sports.</p>	Having this knowledge can enable client and SO to make informed choices and decisions to reduce client's dyspnea, maximize functional level, perform most desired activities, and prevent complications. This may include alternating activities with rest periods to prevent fatigue, conserving energy during activities by pulling instead of pushing articles, sitting instead of standing while performing tasks, using pursed-lip breathing, side-lying position, and possible need for supplemental oxygen during sexual activity.
<p>Discuss importance of regular medical follow-up care, when to notify healthcare professional of changes in condition, and periodic spirometry testing, chest x-rays, and sputum cultures.</p>	Use of a reliever (short-acting) inhaler 10 to 15 minutes before engaging in activities and repeating medication after 2 hours of continuous exercise or conclusion of activity as well as warm-up exercises and appropriate cool-down activities can prevent asthma symptoms.
<p>Recommend obtaining vaccines as indicated (e.g., influenza, pneumonia).</p>	Can reduce serious illnesses of lower respiratory tract infections that can exacerbate COPD condition and increase risk of death (Wongsurakiat et al, 2004).
<p>Review oxygen requirements and dosage for client who is discharged on supplemental oxygen. Discuss safe use of oxygen and refer to supplier as indicated.</p>	Monitoring disease process allows for alterations in therapeutic regimen to meet changing needs and may help prevent complications. P It is recommended that children with asthma see their primary provider every 1 to 6 months, as the choice of medications varies depending on age of child (Sawicki & Haver, 2016).
<p>Instruct client and SO in use of NIPPV as appropriate. Problem-solve possible side effects, and identify adverse signs and symptoms such as increased dyspnea, fatigue, daytime drowsiness, or headaches on awakening.</p>	Reduces risk of misuse—too little or too much—and resultant complications. Promotes environmental and physical safety.
<p>Provide information and encourage participation in support groups sponsored by the American Lung Association and public health department.</p>	NIPPV may be used at night and periodically during day to decrease CO <sub>2</sub> level, improve quality of sleep, and enhance functional level during the day. Signs of increasing CO <sub>2</sub> level indicate need for more aggressive therapy.
<p>Refer for evaluation of home care if indicated. Provide a detailed plan of care and baseline physical assessment to home-care nurse as needed on discharge from acute care.</p>	These clients and their SOs may experience anxiety, depression, and other reactions as they deal with a chronic disease that has an impact on their desired lifestyle. Support groups may be desired or needed to provide assistance, emotional support, and respite care.
<p>Assist client and SO in making arrangements for access to emergency assistance, such as a buddy system for getting help quickly, special phone numbers, and "panic button."</p>	Provides for continuity of care. May help reduce frequency of hospitalization.

**ACTIONS/INTERVENTIONS** (continued)

Facilitate discussion about healthcare directives and end-of-life wishes as indicated.

Client with chronic respiratory condition should have access to prompt assistance when needed. This is both necessary and psychologically comforting for self-management. Although many clients have an interest in discussing living wills, their wishes may be unspoken. In client with severe pulmonary disease, it is helpful to discuss preferences regarding aggressive treatment, home care only, hospitalization for comfort care, and full life support. It is useful also to discuss the goals of care, such as functional independence or continuation of life support in an extended-care nursing facility.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Self-Care deficit, [specify]**—fatigue, weakness, severe anxiety
- **impaired Home Maintenance**—condition impacting ability to maintain home; insufficient support system or finances; insufficient knowledge of neighborhood resources
- **risk for Infection**—chronic illness, inadequate vaccination; inadequate primary defenses (e.g., decrease in ciliary action, smoking); increased environmental exposure to pathogens

## PNEUMONIA

### I. Pathophysiology

- a. Inflammation of the lung parenchyma associated with alveolar edema and congestion that impairs gas exchange
- b. Common pathogens
  - i. Viruses (CDC, 2016a)
    1. Common causative organisms include respiratory syncytial virus (RSV) (most common virus causing pneumonia in children); Influenza (most common virus causing pneumonia in adults) and human parainfluenza viruses (HPIVs); human metapneumovirus (HMV).
    2. Viruses account for approximately half of all cases of community-acquired pneumonia (CAP).
  - ii. Bacteria
    1. Divided into typical and atypical types.
    2. Gram-positive *Streptococcus pneumoniae*, *Haemophilus*, and *Staphylococcus* most common typical bacterial causes.
    3. Atypical bacterial causes include *Legionella*, *mycoplasma*, and *chlamydia* (National Heart, Lung, and Blood Institute [NHLB], 2016).
  - iii. Fungus
    1. Most common causes *Histoplasma capsulatum* and *Coccidioides immitis*.
    2. *Pneumocystis jirovecii* (formerly *carinii*) and cytomegalovirus (CMV) often occur in immunocompromised persons.
  - iv. Chemical: Inflammation of lung tissue is from poisons or toxins. Many substances can cause chemical pneumonia, including liquids, gases, and small particles, such as dust or fumes. Note: Aspiration pneumonia is a type of chemical pneumonia.

### II. Types (NHLB, 2016)

- i. Community-acquired pneumonia (CAP): Commonly caused by *S. pneumoniae*, *Chlamydia pneumoniae*, *Haemophilus influenzae*, RSV, and occasionally atypical pathogens.
- ii. Hospital-acquired pneumonia (HAP): Pneumonia that occurs 48 hours or more after hospital admission and that was not present at the time of admission.
- iii. Ventilator-assisted pneumonia (VAP): Often caused by *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, and both methicillin-sensitive and methicillin-resistant *S. aureus* (MRSA).
- iv. Aspiration pneumonia: Caused by inhaling food, drink, vomit, or saliva from the mouth into the lungs. Aspiration may occur when something disturbs the normal gag reflex, such as a brain injury, swallowing problem, or excessive use of alcohol or drugs.

### III. Etiology

- i. Primary pneumonia is caused by the client's inhalation or aspiration of a pathogen (microaspiration).
- ii. Secondary pneumonia ensues from lung damage caused by the spread of an infectious agent—bacterial, viral, or fungal—from another site in the body or from various chemical irritants (including gastric reflux and aspiration, smoke inhalation) or radiation therapy.
- iii. Risk factors: Comorbidities, such as heart or lung disease, compromised immune system, diabetes mellitus, liver or renal failure, malnutrition, smoking, previous antibiotic therapy, abdominal or thoracic surgical procedures, endotracheal intubation with mechanical ventilation.

(continues on page 148)

#### IV. Statistics

- a. Morbidity: Hospital discharges in the United States attributed to pneumonia in 2013 were 674,000 (CDC, 2017a). Pneumonia accounts for 13% of all infectious illnesses in infants younger than 2 years. However, deaths occur almost exclusively in children with underlying conditions, such as chronic lung disease of prematurity, congenital heart disease, and immunosuppression (Bennett & Domachowske, 2017).  
Respiratory syncytial virus (RSV) is the leading cause of acute lower respiratory infections (ALRIs) in children. Studies conducted using molecular diagnostic assays confirmed that RSV accounts for over 50% of bronchiolitis (see Glossary) in young children requiring hospitalization
- b. Mortality: In the United States, deaths attributed to pneumonia in 2014 were over 55,000 and listed as the eighth leading cause of death (Kochanek et al, 2016).

Globally, pneumonia killed more than 900,000 children younger than age 5 years in 2015 and is the leading cause of death of infectious diseases in children worldwide (World Health Organization [WHO], 2016).

#### c. Cost:

- i. A study published in 2015 with data gleaned from 2007—2011 reported that pneumonia-related medical costs in the post-Prevnar-13 period (2011) showed a 22% decrease compared with the pre-Prevnar-13 period (2007—2009), although these differences were not statistically significant (Park et al, 2015).
- ii. CAP: In the United States, annual healthcare costs associated with CAP range from \$10.6 to \$17 billion and are expected to grow as the proportion of older persons increases. Inpatient care accounts for more than 90% of pneumonia-related health expenditures (Kaysen & Viera, 2016).

#### G L O S S A R Y

**Adventitious breath sounds:** Abnormal breath sounds heard when listening to the chest. Adventitious sounds may include crackles or rales, rhonchi or wheezes, or pleural friction rubs.

**Bronchial breath sounds:** A harsh or blowing quality, made by air moving in the large bronchi and barely, if at all, modified by the intervening lung; may be heard over a consolidated lung.

**Bronchiolitis** : Involves inflammation of small airways, which is a common condition in children. Patients with bronchiolitis present with features close to pneumonia. Cough, sputum, fever, and pleuritic-type chest pain are some of the clinical features of bronchiolitis. Most of the cases have a mixture of features of pneumonia and obstructive airway disease. *Note:* It is not common for pneumonia to progress into bronchiolitis while the reverse is very common.

**Community-acquired pneumonia (CAP):** Acquired outside healthcare organizations, including hospitals, nursing homes, and other long-term care facilities; includes the first 2 days of hospitalization.

**Crackles:** An adventitious breath sound produced by air passing over airway secretions; a discontinuous sound, as opposed to a wheeze, which is continuous. Crackles are classified as “fine” or “coarse” and are also known as rales.

**Empyema:** A condition in which pus and fluid from infected tissue collect in a body cavity; most often used to refer to

collections of pus in the space around the lungs (pleural cavity).

**Fremitus:** A palpable vibration, as felt by the hand placed on the chest during coughing or speaking.

**Healthcare-associated pneumonia (HCAP) (also may be called hospital-acquired pneumonia [HAP] or nosocomial pneumonia):** Occurs 48 hours or longer after admission to a facility.

**Percussion:** An assessment method in which the surface of the body is struck with the fingertips to obtain sounds that can be heard or vibrations that can be felt. It can determine the position, size, and consistency of an internal organ. It is done over the chest to determine the presence of normal air content in the lungs.

**Pleural effusion:** Accumulation of fluid in the space between the membrane encasing the lung and lining the thoracic cavity.

**Pleural friction rub:** An abrasive sound that is synchronous with the respiratory movements, made by the rubbing together of two acutely inflamed serous surfaces, as in acute pleurisy.

**Respiratory syncytial virus (RSV):** A highly contagious virus and the leading cause of lower respiratory disease (e.g., bronchiolitis and pneumonia) in children ages 2 and under. RSV infection is primarily a disease of winter or early spring, with waves of illness sweeping through a community. There is currently no vaccine against RSV.

#### CARE SETTING

Most clients are treated as outpatients in community settings.

Persons at higher risk (such as children under 5, those older than 65, and persons with other chronic conditions such as chronic obstructive pulmonary disease [COPD], diabetes, cancer, and congestive heart failure) are treated in the hospital, as are those already hospitalized for other reasons and who have developed healthcare-acquired pneumonia.

#### RELATED CONCERNS

Acute lung injury/acute respiratory distress syndrome, page 177

Acquired immunodeficiency syndrome (AIDS), page 800  
Chronic obstructive pulmonary disease (COPD) and asthma, page 132

Pediatric considerations, page 993

Psychosocial aspects of care, page 835

Respiratory failure/ventilatory assistance, page 187

Sepsis/septic shock, page 772

**CLIENT ASSESSMENT DATABASE****DIAGNOSTIC DIVISION  
MAY REPORT****MAY EXHIBIT****ACTIVITY/REST**

- Fatigue, weakness
- Insomnia
- Prolonged immobility and bedrest

- Lethargy
- Decreased tolerance to activity

**CIRCULATION**

- History of recent or chronic heart failure (HF)

- Tachycardia
- Flushed appearance, pallor, central cyanosis

**FOOD/FLUID**

- Loss of appetite
- Nausea, vomiting
- May be receiving intestinal, gastric feedings

- Cachectic appearance (malnutrition)
- Distended abdomen
- Hyperactive bowel sounds
- Dry skin with poor turgor

**NEUROSENSORY**

- Changes in mentation, such as confusion, somnolence
- Changes in behavior, such as irritability, restlessness, lethargy

**PAIN/DISCOMFORT**

- Headache
- Substernal chest pain (influenza)
- Chest, rib and/or back pain (pleuritic) aggravated by cough

- Splinting, guarding over affected area
- Position—commonly lies on affected side to restrict movement

**RESPIRATION**

- Progressive or sudden shortness of breath

- **Respirations:** Tachypnea, shallow grunting respirations
- Use of accessory muscles, nasal flaring
- **Breath sounds** are diminished or absent over involved area
  - Bronchial breath sounds over area(s) of consolidation
  - Coarse inspiratory crackles
  - Pleural friction rub

- **Color:** Pallor or cyanosis of lips or nailbeds
- **Percussion:** Dull over consolidated areas
- **Fremitus:** Tactile and vocal, gradually increases with consolidation
- **P** Signs of respiratory distress (Bradley et al, 2011)
  - Tachypnea—respiratory rate, breaths/min
    - Age 0 to 2 months: >60
    - Age 2 to 12 months: >50
    - Age 1 to 5 years: >40
    - Age 5 years: >20
  - Dyspnea
  - Retractions (suprasternal, intercostal, or subcostal); nasal flaring
  - Grunting
  - Apnea
  - Altered mental status
  - Sputum: Scanty or copious; pink, rusty, or purulent (green, yellow, or white)

- Cough: dry and hacking (initially), progressing to productive cough
- Presence of tracheostomy, endotracheal tube; current treatment with mechanical ventilator
- History of recurrent or chronic upper respiratory infections (URIs), tuberculosis, COPD, cigarette smoking

(continues on page 150)

## CLIENT ASSESSMENT DATABASE (contd.)

### MAY REPORT (continued)

### MAY EXHIBIT (continued)

#### SAFETY

- Recurrent chills
- History of altered immune system, such as systemic lupus erythematosus (SLE), AIDS, active malignancies, neurological disease, HF, diabetes, steroid or chemotherapy use; institutionalization, general debilitation

- Diaphoresis
- Shaking
- Fever

#### TEACHING/LEARNING

- Recent surgery, chronic alcohol use or long history of alcoholism, intravenous (IV) drug therapy or abuse, chemotherapy or other immunosuppressive therapy
- Use of herbal supplements, such as garlic, ginkgo, licorice, onion, turmeric, horehound, marshmallow, mullein, wild cherry bark, astragalus, echinacea, elderberry, goldenseal, Oregon grape root

#### DISCHARGE PLAN CONSIDERATIONS

- Assistance with self-care, homemaker tasks
- Supplemental oxygen, especially if recovery is prolonged or other predisposing condition exists

► Refer to section at end of plan for postdischarge considerations.

## DIAGNOSTIC STUDIES

### TEST

### WHY IT IS DONE

### WHAT IT TELLS ME

#### DIAGNOSTIC TESTS

- **Chest x-ray:** Evaluates organs and structures within the chest. Confirms the diagnosis of pneumonia.
- **P Chest x-rays are not routinely done for children but should be obtained in child with suspected or documented hypoxemia or significant respiratory distress.**
- **Ultrasonography:** Uses ultrasonic waves to visualize internal organs for possible pathology.

Confirms diagnosis of pneumonia. Identifies structural distribution of pneumonia, such as lobar or bronchial. May show scattered or localized infiltration (bacterial) or diffuse and extensive nodular infiltrates (more often viral). In *Mycoplasma pneumoniae*, chest x-ray may be clear.

**P Recent studies have found that point-of-care ultrasound imaging can diagnose pneumonia in children and young adults with higher specificity than x-ray (Shah et al, 2013).**

#### BLOOD TESTS

- **Complete blood count (CBC):** Battery of screening tests that typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; white blood cell (WBC) count and differential. Provides baseline data about the hematologic system and yields information related to oxygen-carrying capacity and infection.
- **P Blood cultures:** Determines presence of infection.

Leukocytosis with a left shift is usually present in bacterial pneumonia, although a low WBC count may be present in viral infection, immunosuppressed conditions such as AIDS, and overwhelming bacterial pneumonia.

Identification of specific organism useful in choice of therapy for child requiring hospitalization for presumed bacterial pneumonia or in outpatient setting for children receiving antibiotic therapy who demonstrate progressive deterioration.

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<p><b>ASSOCIATED TESTS</b></p> <ul style="list-style-type: none"> <li>• <b>Sputum studies:</b> Often necessary to determine the etiology of pneumonia, type of infecting organisms, and sensitivity to antibiotics. Serial sputum studies may be necessary to determine response to treatment.</li> </ul> <p><b>P RSV washing:</b> Detects virus that is being shed in the respiratory/nasal secretions of an infected child usually between age 6 months to 2 years.</p> <ul style="list-style-type: none"> <li>• <b>Serologic studies (viral or Legionella titers, cold agglutinins):</b> Assist in differential diagnosis of specific organism.</li> <li>• <b>Arterial blood gases (ABGs):</b> Measure oxygen and carbon dioxide levels to rule out hypoxemia or hypercapnia.</li> <li>• <b>Pulse oximetry:</b> Noninvasive measure of arterial blood oxygen diffusion and saturation.</li> <li>• <b>Bronchoscopy:</b> Insertion of a flexible scope into the airways allows direct visualization of tracheobronchial tree for abnormalities and to obtain sputum for cytological examination.</li> </ul>	<p>More than one type of organism may be present. Fifty percent of pneumonia cases are believed to be caused by viruses and tend to result in less severe illness than pneumonias triggered by bacteria. Mycoplasma pneumonia is one of the most common causes of atypical pneumonia. Opportunistic pneumonias (organisms causing disease in a host whose resistance to fight infection is diminished) consist of <i>Pneumocystis carinii</i>, cytomegalovirus, and tuberculosis (TB) (Benito et al, 2012). <i>Note:</i> Sputum cultures may not identify all offending organisms. Blood cultures may show transient bacteremia.</p> <p>Rapid results help guide treatment options and possible need for further testing if results are negative in a symptomatic child.</p> <p>Provide information on the specific organism causing the pneumonia or can rule out other diseases.</p> <p>Abnormalities may be present, depending on extent of lung involvement and underlying lung disease.</p> <p>The percentage expressed is the ratio of oxygen to Hgb. Pulse oximetry less than 90% indicates hypoxia. Abnormally low levels (&lt;88%) indicate impaired gas exchange and impending respiratory failure.</p> <p>May be both diagnostic (qualitative cultures) and therapeutic (reexpansion of lung segment).</p>
<p><b>NURSING PRIORITIES</b></p> <ol style="list-style-type: none"> <li>1. Maintain or improve respiratory function.</li> <li>2. Prevent complications.</li> <li>3. Support recuperative process.</li> <li>4. Provide information about disease process, prognosis, and treatment.</li> </ol>	<p><b>DISCHARGE GOALS</b></p> <ol style="list-style-type: none"> <li>1. Ventilation and oxygenation adequate for individual needs.</li> <li>2. Complications prevented or minimized.</li> <li>3. Disease process, prognosis, and therapeutic regimen understood.</li> <li>4. Lifestyle changes identified and initiated to prevent recurrence.</li> <li>5. Plan in place to meet needs after discharge.</li> </ol>

### NURSING DIAGNOSIS: **ineffective Airway Clearance**

#### May Be Related To

Infection—[tracheal bronchial inflammation, edema formation]; underlying chronic obstructive pulmonary disease  
Exudate in alveoli

#### Possibly Evidenced By

Changes in respiratory rate  
Diminished/adventitious breath sounds  
Dyspnea, cyanosis  
Ineffective cough

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Respiratory Status: Airway Patency **NOC**

Identify and demonstrate behaviors to achieve airway clearance.  
Display patent airway with breath sounds clearing and absence of dyspnea and cyanosis.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Airway Management NIC</b>	
<b>Independent</b>	
Assess rate and depth of respirations and chest movement.	Tachypnea, shallow respirations, and asymmetric chest movement are frequently present because of discomfort of moving chest wall or fluid in lung.
Auscultate lung fields, noting areas of decreased or absent airflow and adventitious breath sounds, such as crackles and wheezes.	Decreased airflow occurs in areas consolidated with fluid. Bronchial breath sounds (normal over bronchus) can also occur in consolidated areas. Crackles, rhonchi, and wheezes are heard on inspiration and expiration in response to fluid accumulation, thick secretions, and airway spasm or obstruction.
Monitor for signs of respiratory failure, for example, cyanosis and severe tachypnea.	When pneumonia is severe, the client may require endotracheal intubation and mechanical ventilation to keep airways clear.
Elevate head of bed; change position frequently.	Keeping the head elevated lowers diaphragm, promoting chest expansion, aeration of lung segments, and mobilization of secretions to keep the airway clear.
Assist client with frequent deep-breathing exercises. Demonstrate and help client, as needed; learn to perform activity, such as splinting chest and effective coughing while in upright position.	Deep breathing facilitates maximum expansion of the lungs and smaller airways. Coughing is a natural self-cleaning mechanism, assisting the cilia to maintain patent airways. Splinting reduces chest discomfort, and an upright position favors deeper, more forceful cough effort. Note: Cough associated with pneumonias may last days, weeks, or even months.
Perform treatments between meals and limit fluids when appropriate.	Coordination of treatments, schedules, and oral intake reduces likelihood of vomiting with coughing and expectorations.
Suction, only as needed, for example, oxygen desaturation related to airway secretions.	Stimulates cough or mechanically clears airway in client who is unable to do so because of ineffective cough or decreased level of consciousness.
Force fluids to at least 2500 mL per day, unless contraindicated, as in HF. Offer warm, rather than cold, fluids.	Fluids, especially warm liquids, aid in mobilization and expectoration of secretions.
<b>Collaborative</b>	
Assist with and monitor effects of nebulizer treatments and other respiratory physiotherapy, such as incentive spirometer, intermittent positive-pressure breathing (IPPB), percussion, and postural drainage.	Facilitates liquefaction and removal of secretions. Note: Postural drainage may not be effective in interstitial pneumonias or those causing alveolar exudates or destruction.
Administer medications, as indicated, for example, expectorants, bronchodilators, and analgesics.	Aids in reduction of bronchospasm and mobilization of secretions. Analgesics are given to improve cough effort by reducing discomfort but should be used cautiously because they can decrease cough effort and depress respirations.
Provide supplemental fluids such as IV, humidified oxygen, and room humidification.	Fluids are required to replace losses, including insensible losses, and aid in mobilization of secretions. Note: Some studies indicate that room humidification has been found to provide minimal benefit and is thought to increase the risk of transmitting infection.
Monitor serial chest x-rays, ABGs, and pulse oximetry readings. (Refer to ND: Impaired Gas Exchange, following.)	Follows progress and effects of disease process and therapeutic regimen and facilitates necessary alterations in therapy.

**NURSING DIAGNOSIS:** **impaired Gas Exchange****May Be Related To**

Alveolar-capillary membrane changes [such as in acute respiratory distress]

**Possibly Evidenced By**

Abnormal breathing pattern (e.g., rate, rhythm, depth); nasal flaring  
Dyspnea, abnormal skin color (e.g., pale, dusky)  
Tachycardia; dysrhythmias  
Restlessness; confusion; irritability  
Abnormal arterial blood gases (ABGs)

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Gas Exchange NOC**

Demonstrate improved ventilation and oxygenation of tissues by ABGs within client's acceptable range and absence of symptoms of respiratory distress.

Participate in treatment regimen (e.g., breathing exercises, effective coughing, use of oxygen) within level of ability or situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b>	
<b>Independent</b>	
Assess respiratory rate, depth, and ease.	Manifestations of respiratory distress are dependent on, and indicative of, the degree of lung involvement and underlying general health status.
Observe color of skin, mucous membranes, and nailbeds, noting presence of peripheral cyanosis (nailbeds) or central cyanosis (circumoral).	Cyanosis of nailbeds may represent vasoconstriction or the body's response to fever or chills; however, cyanosis of earlobes, mucous membranes, and skin around the mouth ("warm membranes") is indicative of systemic hypoxemia.
Assess mental status.	Restlessness, irritation, confusion, and somnolence may reflect hypoxemia or decreased cerebral oxygenation.
Monitor heart rate and rhythm.	Tachycardia is usually present because of fever and dehydration but may represent a response to hypoxemia.
Monitor body temperature, as indicated. Assist with comfort measures to reduce fever and chills, such as addition or removal of bedcovers, comfortable room temperature, and tepid or cool water sponge bath.	High fever (common in bacterial pneumonia and influenza) greatly increases metabolic demands and oxygen consumption and alters cellular oxygenation.
Maintain bedrest. Encourage use of relaxation techniques and diversional activities.	Reduces exhaustion (as well as oxygen consumption and demands) to facilitate resolution of infection.
Elevate head and encourage frequent position changes, deep breathing, and effective coughing.	These measures promote maximal inspiration and enhance expectoration of secretions to improve ventilation. (Refer to ND: ineffective Airway Clearance.)
Assess level of anxiety. Encourage verbalization of concerns and feelings. Answer questions honestly. Visit frequently and arrange for significant other (SO) and visitors to stay with client as indicated.	Anxiety is a manifestation of psychological concerns and physiological responses to hypoxia. Providing reassurance and enhancing sense of security can reduce the psychological component, thereby decreasing oxygen demand and adverse physiological responses.
Observe for deterioration in condition, noting hypotension, copious amounts of pink or bloody sputum, pallor, cyanosis, change in level of consciousness, severe dyspnea, and restlessness.	Shock and pulmonary edema are the most common causes of death in pneumonia and require immediate medical intervention.
<b>Collaborative</b>	
Monitor ABGs and pulse oximetry.	Identifies problems, such as ventilatory failure; follows progress of disease process or improvement; and facilitates alterations in pulmonary therapy.

(continues on page 154)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Oxygen Therapy NIC</b> Administer oxygen therapy by appropriate means, for example, nasal prongs, mask.	The purpose of oxygen therapy is to maintain PaO <sub>2</sub> above 60 mm Hg, or greater than 90% O <sub>2</sub> saturation. Oxygen is administered by the method that provides appropriate delivery within the client's tolerance.
Prepare for and transfer to critical care unit if indicated.	Intubation and mechanical ventilation may be required in the event of severe respiratory insufficiency. (Refer to CP: Respiratory Failure/Ventilatory Assistance.)

## NURSING DIAGNOSIS: risk for Infection [spread]

### Possibly Evidenced By

Inadequate primary defenses—decreased ciliary action, stasis of body fluids [respiratory secretions]  
 Inadequate secondary defenses—[presence of existing infection], immunosuppression; chronic disease, malnutrition; inadequate vaccination  
 [Exposure to multiple healthcare workers]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Infection Severity NOC

Achieve timely resolution of current infection without complications.

#### Risk Control: Infectious Process NOC

Identify interventions to prevent and reduce risk and spread of a secondary infection.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Control NIC</b>	
<b>Independent</b>	
Monitor vital signs closely, especially during initiation of therapy.	During this period, potentially fatal complications, such as hypotension or shock, may develop.
Instruct client concerning the disposition of secretions (e.g., raising and expectorating versus swallowing) and reporting changes in color, amount, and odor of secretions.	Although client may find expectoration offensive and attempt to limit or avoid it, it is essential that sputum be disposed of in a safe manner. Changes in characteristics of sputum reflect resolution of pneumonia or development of secondary infection.
Demonstrate and encourage good hand-washing technique.	Effective means of reducing spread or acquisition of infection.
Change position frequently and provide good pulmonary toilet.	Promotes expectoration, clearing of infection.
Perform proper suctioning technique for ventilated clients as appropriate.	Secretions that accumulate below and above the endotracheal (ET) tube cuff are an ideal growth medium for pathogens. Numerous studies are currently being carried out to determine what factors influence the incidence of VAP. Results are inconclusive, but efforts are continuing to find a way to reduce infections and improve patient outcomes. This includes actions regarding suctioning (e.g., timing and type of suctioning [closed or open] and types of ET tubes). It also involves specific care interventions (e.g., raising or lowering the head of bed, subglottic suctioning, use of special mouthwashes and antibiotics) (Damas et al, 2015; Klompas, 2015).
Limit visitors as indicated.	Reduces likelihood of exposure to other infectious pathogens.
Institute isolation precautions as individually appropriate (e.g., masks and gloves, possibly gowns) during client contact.	Depending on type of infection, response to antibiotics, client's general health, and development of complications, isolation techniques may be instituted to prevent spread and protect client from other infectious processes.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage adequate rest balanced with moderate activity. Promote adequate nutritional intake.	P RSV (which is highly contagious) and certain other infective agents that cause pneumonia in children require that caregivers, family, and visitors be protected. Facilitates healing process and enhances natural resistance.
Monitor effectiveness of antimicrobial therapy.	Signs of improvement in condition should occur within 24 to 48 hours.
Investigate sudden changes or deterioration in condition, such as increasing chest pain, extra heart sounds, altered sensorium, recurring fever, and changes in sputum characteristics.	Delayed recovery or increase in severity of symptoms suggests resistance to antibiotics or secondary infection. Complications affecting any organ system include lung abscess, empyema, bacteremia, pericarditis, endocarditis, meningitis, encephalitis, and superinfections.
<b>Collaborative</b> Administer antimicrobials, as indicated, by results of sputum and blood cultures, for example, <b>macrolides</b> such as azithromycin (Zithromax), clarithromycin (Biaxin), and erythromycin (E-Mycin); <b>penicillin combinations</b> , for example, amoxicillin (Amoxil) and clavulanate (Augmentin); <b>tetracyclines</b> , for example, doxycycline (Doryx, Bio-Tab) and minocycline (Minocin); <b>cephalosporins</b> , for example, cefepime (Maxipime) and cefuroxime (Kefurox, Zinacef); <b>ketolides</b> , for example, telithromycin (KETEK); and <b>oxazolidinones</b> , for example, linezolid (Zyvox).	These drugs are used to combat most of the microbial pneumonias. Combinations of drugs can be used when the pneumonia is a result of mixed organisms.
<b>P</b> Provide influenza antiviral therapy (e.g., oseltamivir [Tamiflu]), as indicated.	Should be administered as soon as possible to child with moderate to severe CAP consistent with influenza virus infection during widespread local circulation of influenza viruses (Bradley et al, 2011).
Prepare for and assist with additional diagnostic studies, as indicated.	Fiberoptic bronchoscopy may be done for clients who do not respond in a reasonable amount of time to antimicrobial therapy to clarify diagnosis and therapeutic needs.

## NURSING DIAGNOSIS: Activity Intolerance

### May Be Related To

Imbalance between oxygen supply and demand  
General weakness

### Possibly Evidenced By

Report of weakness, fatigue, exertional dyspnea  
Tachypnea  
Abnormal heart rate response to activity

### Desired Outcomes/Evaluation Criteria—Client Will

#### Activity Tolerance NOC

Report and demonstrate a measurable increase in tolerance to activity with absence of dyspnea and excessive fatigue, with vital signs within client's acceptable range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Energy Management NIC</b> <i>Independent</i> Evaluate client's response to activity. Note reports of dyspnea, increased weakness and fatigue; changes in oxygen saturation ( $O_2$ sat, per pulse oximetry) and vital signs during and after activities.	Establishes client's capabilities and needs and facilitates choice of interventions.

(continues on page 156)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide a quiet environment and limit visitors during acute phase, as indicated. Encourage use of stress management and diversional activities as appropriate.	Reduces stress and excess stimulation, promoting rest.
Explain importance of rest in treatment plan and necessity for balancing activities with rest.	Bed and chair rest is maintained during acute phase to decrease metabolic demands, thus conserving energy for healing. Activity restrictions thereafter are determined by individual client response to activity and resolution of respiratory insufficiency.
Assist client to assume comfortable position for rest and sleep.	Client may be comfortable with head of bed elevated, sleeping in a chair, or leaning forward on over-bed table with pillow support.
Assist with self-care activities as necessary. Provide for progressive increase in activities during recovery phase. Reduce intensity level or postpone activities that cause undesired physiological changes.	Minimizes exhaustion and helps balance oxygen supply and demand.
<b>Collaborative</b>	
Provide and monitor response to supplemental oxygen, when indicated.	If oxygen saturation (per pulse oximetry) drops with client activity during acute or early recovery phase, oxygen may be needed during activities.
Refer to physical/occupational therapy, as indicated.	May be needed/desired to develop individually appropriate exercise/progressive activity plans.

### NURSING DIAGNOSIS: **acute Pain**

#### May Be Related To

Biological injury agent (e.g., infection; [inflammation of lung parenchyma, cellular reactions to circulating toxins]); [persistent coughing]

#### Possibly Evidenced By

Verbal/coded report [pleuritic chest pain, headache, muscle or joint pain]  
Guarding behavior; positioning to ease pain  
Expressive behavior—restlessness

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Pain Level NOC

Verbalize relief or control of pain.  
Demonstrate relaxed manner, resting, sleeping, and engaging in activity appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<b>Independent</b>	
Determine pain characteristics, such as sharp, constant, and stabbing. Investigate changes in character, location, and intensity of pain.	Chest pain, usually present to some degree with pneumonia, may also herald the onset of complications of pneumonia, such as pericarditis and endocarditis.
Monitor vital signs.	Changes in heart rate or blood pressure (BP) may indicate that client is experiencing pain, especially when other reasons for changes in vital signs have been ruled out.
Provide comfort measures, such as back rubs, change of position, and quiet music or conversation. Encourage use of relaxation and breathing exercises.	Nonanalgesic measures administered with a gentle touch can lessen discomfort and augment therapeutic effects of analgesics. Client involvement in pain control measures promotes independence and enhances sense of well-being.
Offer frequent oral hygiene.	Mouth breathing and oxygen therapy can irritate and dry out mucous membranes, potentiating general discomfort.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct and assist client in chest-splinting techniques during coughing episodes.	Aids in control of chest discomfort while enhancing effectiveness of cough effort.
<b>Collaborative</b> Administer analgesics and antitussives, as indicated.	These medications may be used to suppress body discomforts (e.g., headache, chest/rib pain) and paroxysmal cough, thus enhancing general comfort and rest.

**NURSING DIAGNOSIS:** **risk for deficient Fluid Volume****Possibly Evidenced By**

Excessive losses through normal routes [e.g., fever, profuse diaphoresis, mouth breathing, hyperventilation]  
Factors influencing fluid needs [e.g., hypermetabolic state]; extremes of age or weight; deviations affecting intake of fluids

**Desired Outcomes/Evaluation Criteria—Client Will****Fluid Balance NIC**

Demonstrate fluid balance evidenced by individually appropriate parameters, such as moist mucous membranes, good skin turgor, prompt capillary refill, and stable vital signs.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Management NIC</b>	
<b>Independent</b>	
Assess vital sign changes, such as increased temperature, prolonged fever, tachycardia, and orthostatic hypotension.	Elevated temperature or prolonged fever increases metabolic rate and fluid loss through evaporation. Orthostatic BP changes and increasing tachycardia may indicate systemic fluid deficit.
Assess skin turgor, moisture of mucous membranes—lips and tongue.	Indirect indicators of adequacy of fluid volume, although oral mucous membranes may be dry because of mouth breathing and supplemental oxygen.
Note reports of nausea and vomiting.	Presence of these symptoms reduces oral intake.
Monitor intake and output (I&O), noting color and character of urine. Calculate fluid balance. Be aware of insensible losses. Weigh as indicated.	Provides information about adequacy of fluid volume and replacement needs.
Force fluids to at least 3000 mL per day or as individually appropriate.	Meets basic fluid needs, reducing risk of dehydration.
<b>P</b> Ensure child is receiving daily maintenance fluids, in addition to covering fluid losses caused by current conditions (e.g., fever, inability to take oral fluids, vomiting).	Basic fluid needs are determined by child's weight—up to 10 kg: 100 mL/kg/24 hr; 10 to 20 kg: 50 mL/kg/24 hr; more than 20 kg: 20 mL/24 hr. Note that the smaller the child, the greater the percentage of weight is water.
<b>Collaborative</b>	
Administer medications, as indicated, such as antipyretics, antiemetics.	Useful in reducing fluid losses.
Provide supplemental IV fluids as necessary.	In the presence of reduced intake or excessive loss, use of parenteral route may correct or prevent deficiency.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, treatment, self-care, and discharge needs****May Be Related To**

Insufficient information; insufficient knowledge of resources  
Alteration in cognitive functioning or memory

(continues on page 158)

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, treatment, self-care, and discharge needs** (continued)

**Possibly Evidenced By**

Reports the problem  
Inaccurate follow-through of instructions  
Development of preventable complication

**Desired Outcomes/Evaluation Criteria—Client Will**

**Knowledge: Pneumonia Management NOC**

Verbalize understanding of condition, disease process, and prognosis.  
Verbalize understanding of therapeutic regimen.  
Initiate necessary lifestyle changes.  
Participate in treatment program.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Review normal lung function and pathology of condition, as appropriate. Discuss debilitating aspects of disease, length of convalescence, and recovery expectations. Identify self-care and homemaker needs and resources.	Promotes understanding of current situation and importance of cooperating with treatment regimen. Information can enhance coping and help reduce anxiety and excessive concern. Respiratory symptoms may be slow to resolve, and fatigue and weakness can persist for an extended period. These factors may be associated with depression and the need for various forms of support and assistance.
Provide information in verbal, written, and/or audiovisual forms.	Fatigue and depression can affect ability to assimilate information and follow medical regimen. Having written instructions for later referral may help client/SO in following previous verbal instructions.
Emphasize importance of continuing effective coughing and deep-breathing exercises.	Continuing respiratory exercises may be necessary for an extended period of time while chest is congested and secretions are difficult to manage.
Emphasize necessity of continuing antimicrobial therapy for prescribed length of time.	Early discontinuation of antibiotics may result in failure to completely resolve infectious process.
Review importance of cessation of smoking. Refer to smoking cessation program or physician as indicated.	Smoking destroys tracheobronchial ciliary action, irritates bronchial mucosa, and inhibits alveolar macrophages, compromising body's natural defense against infection.
Outline steps to enhance general health and well-being, such as balanced rest and activity, well-rounded diet, program of aerobic exercise or strength training (particularly elderly individuals), and avoidance of crowds during cold and flu season and of persons with upper respiratory infections.	Recent research suggests elderly people with moderate physical limitations can significantly improve immunological defenses through exercise that increases levels of salivary IgA—immunoglobulin that aids in blocking infectious agents entering through mucous membranes.
Emphasize importance of continuing medical follow-up and obtaining vaccinations and immunizations as appropriate for both children and adults.	May prevent recurrence of pneumonia and related complications. Note: In the United States, there are several vaccines that can help protect against infections caused by bacteria or viruses. These vaccines include pneumococcal, <i>Haemophilus influenzae</i> type b (Hib), pertussis (whooping cough), varicella (chickenpox), measles, and influenza (flu) vaccine (CDC, 2016a). <b>P</b> Note: RSV lower respiratory tract infection has been found to be a risk factor for asthma and wheezing later in childhood (Bass, 2017).
Identify signs and symptoms requiring notification of healthcare provider, such as increasing dyspnea, chest pain, prolonged fatigue, weight loss, fever or chills, persistence of productive cough, and changes in mentation.	Prompt evaluation and timely intervention may prevent or minimize complications.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Fatigue**—disease states, stress
- **risk for Infection**—inadequate secondary response (e.g., leukopenia, suppressed inflammatory response), chronic disease, mal-nutrition, [current use of antibiotics]
- **ineffective Health Management**—complexity of therapeutic regimen, economic difficulties, perceived seriousness and susceptibility

## LUNG CANCER: POSTOPERATIVE CARE

### I. Pathophysiology

- a. Usually develops within the wall or epithelium of the bronchial tree
  - b. Exposure to environmental and occupational carcinogens and an individual's susceptibility to these carcinogens are thought to increase the risk for developing lung cancer. Smoking continues to be the leading cause of lung cancer, accounting for 80% of cases.
- II. Classification:** Cancers of the lung are divided into two major subdivisions (American Cancer Society [ACS], 2017; Cancer Treatment Centers of America, n.d.):
- a. Small cell lung carcinomas (SCLCs) and non–small cell lung carcinomas (NSCLCs)
  - b. SCLC (also called oat cell cancer) accounts for 20% of lung cancers, while NSCLC accounts for approximately 80% of lung cancers. There are three main types of NSCLC: adenocarcinomas, squamous cell carcinomas, and large cell carcinomas.

**III. Staging:** Small cell lung cancer is staged in two ways: (1) limited (confined to one lung, including nearby lymph nodes) and (2) extensive (cancer has spread to the other lung, the pleura, or to other organs in the body).

The TNM (tumor-node-metastasis) system, developed by the American Joint Commission for Staging and End Results Reporting, is used to stage non–small cell lung cancer:

- a. T describes the size of the original tumor and extent of invasion of the cancer into the epithelium.
- b. N describes involvement of the lymph nodes.
- c. M describes the extent of metastasis (usually liver, bones, or brain).
- d. Once the T, N, and M categories have been assigned, the information is combined to assign an overall stage of 0, I, II, III, or IV. Some stages are subdivided into A and B, which have important treatment and prognosis implications (ACS, 2016).

### IV. Etiology (ACS, 2017)

- a. While tobacco smoking is believed to account for 80% of lung cancer cases, not all smokers develop lung cancer, and some patients with lung cancer have never smoked. Studies published by the U.S. Surgeon General in 2006 concluded that living with a smoker increases a nonsmoker's chances of developing lung cancer by 20% to 30% (National Center for Biotechnology Information [NCBI], Office on Smoking and Health, 2006).
- b. While genetic predisposition can be attributed to all populations, certain other factors, either in conjunction with smoking or independent of smoking, are population specific, including chronic viral exposure; exposure to arsenic, radon gas, asbestos; and other environmental carcinogens.

### V. Statistics

- a. Morbidity (ACS, 2017)
  - i. Lung cancer is the most common cause of cancer worldwide. In the United States, lung cancer is the second most common cancer in women and second only to prostate cancer in men. Lung cancer is more common in men than women, particularly in blacks and non-Hispanic whites (National Institutes of Health [NIH], National Cancer Institute, SEER, 2009–2013).
  - ii. The probability of developing lung cancer increases after age 40 in both sexes and peaks around age 70, especially in men. In 2013, 83% of those living with lung cancer were 60 years of age or older (NIH, 2013).
- b. Mortality
 

Lung cancer is the leading cause of cancer death in both men and women in the United States. It is estimated that in 2017, approximately 156,000 lung cancer deaths occurred (one in four cancer deaths) (ACS, 2017).
- c. Cost—In 2016, the NIH estimated lung cancer care cost in the United States at \$13.6 billion (NIH, 2017).

### VI. Treatment Options

- a. Depends upon staging—generally the lower the stage, the more favorable the prognosis
  - i. Surgery is primary treatment for NSCLC stage I and stage II tumors.
  - ii. Selected stage III carcinomas may be operable if the tumor is resectable.
- b. Surgical procedures for operable tumors of the lung include:
  - i. Pneumonectomy—performed for lesions originating in the mainstem bronchus or lobar bronchus
  - ii. Lobectomy—preferred for peripheral carcinoma localized in a lobe
  - iii. Wedge or segmental resection—performed for lesions that are small and well contained within one segment
  - iv. Endoscopic laser resection—may be done on peripheral tumors to reduce the necessity of cutting through ribs
  - v. Photodynamic therapy—reduces symptoms such as bleeding or may be used to treat small tumors
  - vi. Cryotherapy—instrument is used to freeze and destroy the tumor
  - vii. Electrotherapy—electrical current is used to cauterize (burn) and destroy the tumor
- c. Medical treatments may include radiation, chemotherapy, and targeted drug therapy.

\*\*\*\*\*This care plan addresses only surgical treatments.

## G L O S S A R Y

**Adenocarcinomas:** Are the most common type of NSCLC in the United States and comprise up to 40% of **lung cancer** cases. While adenocarcinomas are associated with **smoking** like other lung cancers, this type is also seen in nonsmokers—especially women—who develop **lung cancer** (Ratini, 2016).

**Cryosurgery:** Freezing of tumor in its original location (*in situ*). Sometimes used for NSCLC patients who can't tolerate surgery.

**Hemoptysis:** Expectoration of blood or of blood-stained sputum.

**Lobectomy:** Removal of one lobe.

**Pneumonectomy:** Removal of an entire lung.

**Staging:** Classification as to the extent of disease, based on pathology report from tissue obtained during bronchoscopy, needle (or other) biopsy, bloodwork, and imaging studies to rule out distant metastases.

**Video-assisted thoracoscopic surgery (VATS):** Less invasive type of surgery used when possible for treatment of early stage NSCLC.

**Wedge or segmental resection:** Removal of the tumor and a small part of the lung.

## CARE SETTING

Primary Health Care Settings—aimed at health education, prevention (Stop Smoking and Clean Air Campaigns), early diagnosis, and follow-up care

Secondary Health Care Settings—referral to specialists in pulmonology, thoracic surgery, oncology, radiology, nutrition, occupational therapy, outpatient/ambulatory surgery, hospice, and home care

Tertiary Health Care Settings—inpatient medical-surgical unit, ICU

## RELATED CONCERNS

Cancer, general considerations, page 945

Pneumothorax/hemothorax, page 169

Psychosocial aspects of care, page 835

Radical neck surgery: laryngectomy (postoperative care), see *DavisPlus*

Surgical intervention, page 873

## CLIENT ASSESSMENT DATABASE (PREOPERATIVE)

Findings depend on type, duration of cancer, and extent of metastasis.

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Fatigue, inability to maintain usual routine
- Dyspnea with activity

#### CIRCULATION

- Swelling of extremities
- Swelling in neck lymph nodes
- Fast heart rate

### MAY EXHIBIT

- Lassitude—usually in advanced stage

- Jugular vein distention (JVD), with vena caval obstruction
- Swelling of face
- Swollen lymph nodes above collarbone
- Expanded veins in arms, chest, or neck
- Tachycardia and dysrhythmias
- Pericardial rub, indicating effusion
- Clubbing of fingers

- Restlessness
- Repetitive questioning

#### EGO INTEGRITY

- Frightened feelings, fear of outcome of surgery
- Denial of severity of condition and potential for malignancy

#### ELIMINATION

- Intermittent diarrhea, due to hormonal imbalance, small cell lung cancer (SCLC)
- Increased frequency and amount of urine, due to hormonal imbalance (epidermoid tumor)

**MAY REPORT (continued)****MAY EXHIBIT (continued)****FOOD/FLUID**

- Weight loss
- Poor appetite, decreased food intake
- Difficulty swallowing (late symptom)
- Thirst, increased fluid intake

**PAIN/DISCOMFORT**

- Chest pain—not usually present in early stages and not always present in advanced stages. When present, pain may be described as dull, aching, persistent
- Shoulder or arm pain, particularly with large cell carcinoma or adenocarcinoma
- Bone and joint pain—cartilage erosion secondary to increased growth hormones (large cell carcinoma or adenocarcinoma)
- Intermittent abdominal pain

**RESPIRATION**

- History of smoking; occupational exposure to pollutants, industrial dusts, such as asbestos, iron oxides, coal dust, or to radioactive materials
- Mild cough or change in usual cough pattern, sputum production
- Shortness of breath
- Weak breathing
- Hoarseness or change in voice (late symptom)

**SAFETY**

- Thin, emaciated, or wasted appearance in late stages
- Edema of face or neck, chest, back, due to vena caval obstruction; facial or periorbital edema, due to hormonal imbalance (SCLC)
- Glucose in urine, due to hormonal imbalance (epidermoid tumor)

- Guarding and protective actions
- Distraction behaviors, such as restlessness, withdrawal

- Dyspnea, aggravated by exertion
- Increased tactile fremitus, indicating consolidation
- Dullness when chest is tapped
- Brief crackles or wheezes on inspiration or expiration
- Persistent crackles or wheezes; tracheal shift (space-occupying lesion)
- Hemoptysis

**SEXUALITY**

- Fever may be present, with large cell carcinoma or adenocarcinoma
- Bruising, discoloration of skin, due to hormonal imbalance (SCLC)

- Gynecomastia, due to neoplastic hormonal changes (large cell carcinoma)
- Amenorrhea, impotence, due to hormonal imbalance (SCLC)

**TEACHING/LEARNING**

- Familial risk factors—cancer, especially lung, tuberculosis
- Failure to improve
- Use of vitamins or herbal supplements, such as vitamins A, C, E; riboflavin; folic acid; ashwagandha; birch; yellow doc; milk thistle; turmeric; ginger; red clover; echinacea; astragalus; reishi and shiitake mushrooms; zedoary

**DISCHARGE PLAN CONSIDERATIONS**

- Assistance with transportation, medications, treatments, self-care, homemaker and maintenance tasks

► Refer to section at end of plan for postdischarge considerations.

## DIAGNOSTIC STUDIES

### TEST

Note: These tests may be done preoperatively (not necessarily a comprehensive listing)

WHY IT IS DONE	WHAT IT TELLS ME
<ul style="list-style-type: none"><li><b>Carcinoembryonic antigen (CEA, also called carcinogenic antigen):</b> A cancer-specific immune system protein that is present in many adenocarcinomas, including lung adenocarcinoma.</li><li><b>Parathyroid protein-related hormone (PTHrP):</b> Measures the release of a protein—similar to parathyroid hormone—produced by some cancers, including all lung cancers.</li></ul>	Increased preoperative levels of CEA usually suggest a poor prognosis. A CEA level greater than 50 may indicate advanced-stage lung cancer.
<ul style="list-style-type: none"><li><b>Lymphocyte count:</b> Determines number of white blood cells present.</li><li><b>Sputum cytology:</b> Examines a sample of sputum (mucus) under a microscope to determine whether abnormal cells are present.</li></ul>	Blood levels of PTHrP may help to distinguish lung cancer from cancer of the pleura or other diseases, is responsible for the clinical syndrome of hypercalcemia of malignancy, may stimulate proliferation of cancer cells, and is a factor in development of bone metastasis. Lymphocytopenia or decreased level of cells can occur with surgical procedures and is associated with shorter survival times for clients with advanced lung cancer.
<ul style="list-style-type: none"><li><b>Chest x-ray, posteroanterior (PA) and lateral:</b> Evaluates organs or structures within the chest.</li><li><b>Thoracic CT:</b> An imaging method that uses x-rays to create cross-sectional pictures of the chest and upper abdomen.</li><li><b>Positron emission tomography (PET) scan:</b> Nuclear imaging scan used to evaluate and stage lung cancer.</li></ul>	Sputum is produced in the lungs and in the airways leading to the lungs. Sputum cytology may be done when lung cancer is suspected. Lung cancer is often discovered on chest x-ray. Size and location of mass can be determined. Peripheral nodules and hilar and mediastinal changes may suggest lymphadenopathy. Pleural effusions and endobronchial obstruction may be seen. A CT scan is frequently the second step either to follow up on an abnormal chest x-ray finding or to evaluate troublesome symptoms in those with a normal chest x-ray.
<ul style="list-style-type: none"><li><b>Magnetic resonance imaging (MRI) scan:</b> Uses magnetic fields to produce two- or three-dimensional images of organs inside the body.</li><li><b>Pulmonary function studies, including total lung capacity (TLC), functional residual capacity (FRC), and residual volume (RV):</b> Provide information on the extent of the pulmonary abnormality and if there is air-trapping in the lungs.</li><li><b>Biopsy:</b> May be performed using forceps or needle, or may be via open surgical incision. Allows for direct and microscopic examination of tissue for presence of malignant cells.</li></ul>	Identifies occult metastatic disease in the mediastinum and distant sites. More sensitive and specific than CT scan and may be used in combination with, or instead of, CT to determine tumor size and location and for staging. Used to confirm abnormalities seen on chest x-ray, to detect early (<1 cm) lesions not visible on chest x-ray, and to assess spread to the mediastinum. Outlines shape, size, and location of lesion. May reveal erosion of ribs or vertebrae.
<ul style="list-style-type: none"><li><b>Bronchoscopy:</b> Procedure used to look inside the lungs' airways, or bronchi and bronchioles, by means of a thin tube inserted through the mouth or nose.</li><li><b>Thoracentesis:</b> Procedure in which a needle is used to remove excess fluid in the pleural space (space between the lungs and the chest wall).</li><li><b>Endoscopic ultrasound:</b> Minimally invasive procedure to assess gastrointestinal and lung diseases. It uses high-frequency sound waves to produce detailed images of the lining and walls of digestive tract and chest, as well as nearby organs. May be combined with fine-needle aspiration (FNA) of tissue or fluids.</li></ul>	Volumes may be increased, indicating air-trapping, especially advanced disease. If airways are blocked by tumor, an obstructive pattern of pulmonary disease may lead to changes in FRC. Needle biopsy may be performed on scalene nodes, hilar lymph nodes, or pleura to establish diagnosis. Tissue biopsy of metastatic sites is used to stage disease and determine prognosis and treatment. Samples may be taken from fluid (bronchoalveolar lavage), tissue (transbronchial biopsy), or lymph nodes (transbronchial needle aspiration) to diagnose or stage certain cancers. If fluid is present in the lining of the lung, removal of the fluid may help diagnose cancer, as well as improve breathing symptoms. May be done to stage cancer, if present, or determine if cancer has metastasized to lymph nodes or other organs. Also done to provide precise information about NSCLC, to guide treatment.
<b>TESTS THAT MAY BE DONE POSTOPERATIVELY</b>	
<ul style="list-style-type: none"><li><b>Arterial blood gases (ABGs):</b> Measures arterial oxygen (<math>\text{PaO}_2</math>), carbon dioxide tension (<math>\text{PaCO}_2</math>), and acidity (pH).</li></ul>	Done to evaluate ventilation and acid-base status to determine treatment needs and response to therapy.

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li><b>Pulse oximetry:</b> Noninvasive method of continuously measuring arterial oxyhemoglobin saturation (<math>\text{SaO}_2</math>) via sensor placed on fingertip or earlobe.</li> <li><b>Complete blood count (CBC):</b> Measures the levels of components in blood, including hemoglobin and hematocrit (Hgb/Hct), red blood cells (RBCs), white blood cells (WBCs) and their components (differential), and platelets.</li> </ul>	May be particularly useful in the care patients with advanced lung cancer, allowing for early detection of hypoxemia.
	Identifies presence of anemia (low Hgb/Hct, RBCs) and potential or presence of infection (changes in numbers of WBCs and differential). Altered platelets can cause/exacerbate bleeding and bruising.

## NURSING PRIORITIES

- Maintain or improve respiratory function.
- Control or alleviate pain.
- Support efforts to cope with diagnosis and situation.
- Provide information about disease process, prognosis, and therapeutic regimen.

## DISCHARGE GOALS

- Oxygenation and ventilation adequate to meet individual activity needs.
- Pain controlled.
- Anxiety and fear decreased to manageable level.
- Free of preventable complications.
- Disease process, prognosis, and planned therapies understood.
- Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: Impaired Gas Exchange

#### May Be Related To

Ventilation-perfusion imbalance [removal of lung tissue, hypoventilation, hypovolemia]

#### Possibly Evidenced By

Abnormal breathing pattern (e.g., rate, rhythm, depth); nasal flaring  
Dyspnea, abnormal skin color (e.g., pale, dusky)  
Restlessness; confusion; irritability  
Abnormal arterial blood gases (ABGs)

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status: Gas Exchange NOC

Demonstrate improved ventilation and oxygenation of tissues by ABGs within client's acceptable range and absence of symptoms of respiratory distress.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Respiratory Monitoring NIC

##### Independent

Note respiratory rate, depth, and ease of respirations.  
Observe for use of accessory muscles, pursed-lip breathing, or changes in skin or mucous membrane color, such as pallor and cyanosis.

Respirations may be increased because of pain or as an initial compensatory mechanism to accommodate for loss of lung tissue. However, increased work of breathing and cyanosis may indicate increasing oxygen consumption and energy expenditures or reduced respiratory reserve, for example, in an elderly client or a client with coexisting COPD.

Auscultate lungs for air movement and abnormal breath sounds.

Consolidation and lack of air movement on operative side are normal in the client who has had a pneumonectomy; however, a client who has had a lobectomy should demonstrate normal airflow in remaining lobes.

Investigate restlessness and changes in mentation and level of consciousness.

May indicate increased hypoxia or complications such as mediastinal shift in a client who has had a pneumonectomy when accompanied by tachypnea, tachycardia, and tracheal deviation.

(continues on page 164)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess client response to activity. Encourage rest periods, limiting activities to client tolerance.	Increased oxygen consumption and demand and stress of surgery may result in increased dyspnea and changes in vital signs with activity; however, early mobilization is desired to help prevent pulmonary complications and to obtain and maintain respiratory and circulatory efficiency.
Note development of fever.	Fever within the first 24 hours after surgery is frequently due to atelectasis. Temperature elevation within postoperative days 5 to 10 usually indicates an infection, such as wound or systemic.
<b>Airway Management NIC</b>	
Maintain patent airway by positioning, suctioning, and use of airway adjuncts.	Airway obstruction impedes ventilation, impairing gas exchange. (Refer to ND: ineffective Airway Clearance.)
Reposition frequently, placing client in sitting and supine to side positions.	Maximizes lung expansion and drainage of secretions.
Avoid positioning client with a pneumonectomy on the operative side; instead, favor the “good lung down” position.	Research shows that positioning clients following lung surgery with their “good lung down” maximizes oxygenation by using gravity to enhance blood flow to the healthy lung, thus creating the best possible match between ventilation and perfusion.
Encourage and assist with deep-breathing exercises and pursed-lip breathing, as appropriate.	Promotes maximal ventilation and oxygenation and reduces or prevents atelectasis.
<b>Tube Care: Chest NIC</b>	
Maintain patency of chest drainage system following lobectomy and segmental wedge resection procedures.	Drains fluid from pleural cavity to promote reexpansion of remaining lung segments.
Note changes in amount or type of chest tube drainage.	Bloody drainage should decrease in amount and change to a more serous composition as recovery progresses. A sudden increase in amount of bloody drainage or return to frank bleeding suggests thoracic bleeding or a hemothorax; sudden cessation suggests blockage of tube, requiring further evaluation and intervention.
Observe for presence of bubbling in water-seal chamber.	Air leaks appearing immediately postoperatively are not uncommon, especially following lobectomy or segmental resection; however, this should diminish as healing progresses. Prolonged or new leaks require evaluation to identify problems in client versus a problem in the drainage system. (Refer to CP: Pneumothorax/Hemothorax for more information regarding chest tubes.)
<b>Airway Management NIC</b>	
<i>Collaborative</i>	
Administer supplemental oxygen via nasal cannula, partial rebreathing mask, or high-humidity face mask, as indicated.	Maximizes available oxygen, especially while ventilation is reduced because of anesthetic, depression, or pain, and during period of compensatory physiological shift of circulation to remaining functional alveolar units.
Assist with and encourage use of incentive spirometer.	Prevents or reduces atelectasis and promotes reexpansion of small airways.
Monitor and document ABGs and pulse oximetry readings.	Decreasing PaO <sub>2</sub> or increasing PaCO <sub>2</sub> may indicate need for ventilatory support.
Note hemoglobin (Hgb) levels.	Significant blood loss results in decreased oxygen-carrying capacity, reducing PaO <sub>2</sub> .

**NURSING DIAGNOSIS:** **ineffective Airway Clearance****May Be Related To**

Excessive mucus; retained secretions  
[Restricted chest movement—pain, weakness]

**Possibly Evidenced By**

Dyspnea  
Changes in respiratory rate  
Adventitious breath sounds  
Ineffective cough

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Airway Patency NOC**

Demonstrate patent airway, with fluid secretions easily expectorated, clear breath sounds, and noiseless respirations.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Airway Management NIC</b>	
<b>Independent</b>	
Auscultate chest for character of breath sounds and presence of secretions.	Noisy respirations, rhonchi, and wheezes are indicative of retained secretions or airway obstruction.
Assist client with and provide instruction in effective deep breathing, coughing in upright position (sitting), and splinting of incision.	Upright position favors maximal lung expansion, and splinting improves force of cough effort to mobilize and remove secretions. Splinting may be done by nurse placing hands anteriorly and posteriorly over chest wall and by client, with pillows, as strength improves.
Observe amount and character of sputum and aspirated secretions. Investigate changes, as indicated.	Increased amounts of colorless (or blood-streaked) or watery secretions are normal initially and should decrease as recovery progresses. Presence of thick, tenacious, bloody, or purulent sputum suggests development of secondary problems—for example, dehydration, pulmonary edema, local hemorrhage, or infection—that require correction or treatment.
Suction if cough is weak or breath sounds not cleared by cough effort. Avoid deep endotracheal and nasotracheal suctioning in client who has had pneumonectomy, if possible.	“Routine” suctioning increases risk of hypoxemia and mucosal damage. Deep endotracheal suctioning is generally contraindicated following pneumonectomy to reduce the risk of rupture of the bronchial stump suture line. If suctioning is unavoidable, it should be done gently and only to induce effective coughing.
Encourage oral fluid intake, at least 2500 mL/d, within cardiac tolerance.	Adequate hydration aids in keeping secretions loose and enhances expectoration.
Assess for pain and discomfort and medicate on a routine basis and before breathing exercises.	Encourages client to move, cough more effectively, and breathe more deeply to prevent respiratory insufficiency.
<b>Collaborative</b>	
Provide and assist client with incentive spirometer and postural drainage and percussion, as indicated.	Improves lung expansion and ventilation and facilitates removal of secretions. Note: Postural drainage may be contraindicated in some clients and, in any event, must be performed cautiously to prevent respiratory embarrassment and incisional discomfort.
Use humidified oxygen and ultrasonic nebulizer. Provide additional fluids intravenously (IV), as indicated.	Providing maximal hydration helps loosen and liquefy secretions to promote expectoration. Impaired oral intake necessitates IV supplementation to maintain hydration.
Administer bronchodilators, expectorants, and analgesics, as indicated.	Relieves bronchospasm to improve airflow. Expectorants increase mucus production and liquefy and reduce viscosity of secretions, facilitating removal. Alleviation of chest discomfort promotes cooperation with breathing exercises and enhances effectiveness of respiratory therapies.

## NURSING DIAGNOSIS: acute Pain

### May Be Related To

Injuring agents—(biological [cancer invasion of pleura, chest wall]; physical [surgical incision, tissue trauma, presence of chest tube])

### Possibly Evidenced By

Verbal/coded report  
Guarded behavior  
Expressive behavior—restlessness  
Narrowed focus  
Changes in blood pressure (BP), heart, or respiratory rate

### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Level NOC

Report pain relieved or controlled.  
Appear relaxed and sleep or rest appropriately.  
Participate in desired as well as needed activities.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b> <i>Independent</i> Ask client about pain. Determine pain location and characteristics, for example, continuous, aching, stabbing, or burning. Have client rate intensity on a scale (e.g., numeric, faces, etc.).	Helpful in evaluating cancer-related pain symptoms, which may involve viscera, nerve, or bone tissue. Use of rating scale aids client in assessing level of pain and provides tool for evaluating effectiveness of analgesics, enhancing client control of pain.
Assess client's verbal and nonverbal pain cues.	Discrepancy between verbal and nonverbal cues may provide clues to degree of pain and need for and effectiveness of interventions.
Note possible psychological as well as pathophysiological causes of pain.	Fear, distress, anxiety, and grief over confirmed diagnosis of cancer can impair ability to cope. In addition, a postero-lateral incision is more uncomfortable for client than an anterolateral incision. The presence of chest tubes can greatly increase discomfort.
Evaluate effectiveness of pain control. Encourage sufficient medication to manage pain; change medication or time span as appropriate.	Pain perception and pain relief are subjective. If client is unable to provide input, the nurse should observe physiological and nonverbal signs of pain and administer medications on a regular basis.
Encourage verbalization of feelings about the pain.	Fears and concerns can increase muscle tension and lower threshold of pain perception. (Refer to ND: Anxiety [specify level], following.)
Provide comfort measures such as frequent changes of position, back rubs, and support with pillows. Encourage use of relaxation techniques, including visualization, guided imagery, and appropriate diversional activities.	Promotes relaxation and redirects attention. Relieves discomfort and augments therapeutic effects of analgesia.
Schedule rest periods; provide quiet environment.	Decreases fatigue and conserves energy, enhancing coping abilities.
Assist with self-care activities, breathing and arm exercises, and ambulation.	Prevents undue fatigue and incisional strain. Encouragement and physical assistance and support may be needed for some time before client is able or confident enough to perform these activities because of pain or fear of pain.
<b>Collaborative</b> Assist with patient-controlled analgesia (PCA) or analgesia through epidural catheter. Administer intermittent analgesics routinely, as indicated, especially 45 to 60 minutes before respiratory treatments and deep-breathing and coughing exercises.	Maintaining a constant drug level avoids cyclic periods of pain, aids in muscle healing, and improves respiratory function and emotional comfort and coping.

**NURSING DIAGNOSIS: Anxiety [specify level]****May Be Related To**

Major change (e.g., health status; threat to current status); situational crises  
Threat of death

**Possibly Evidenced By**

Reports apprehensive; worried, distressed  
Poor eye contact; self-focused; alteration in attention and concentration; decreased ability to learn or problem solve  
Increased pulse, respiration, blood pressure  
Insomnia

**Desired Outcomes/Evaluation Criteria—Client Will****Anxiety Level NOC**

Demonstrate appropriate range of feelings and appear relaxed and resting appropriately.

**Anxiety Self-Control NOC**

Acknowledge and discuss fears and concerns.  
Verbalize accurate knowledge of situation.  
Report beginning use of individually effective coping strategies.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction NIC</b> <i>Independent</i>	
Evaluate client and significant other (SO) level of understanding of diagnosis.	Client and SO are hearing and assimilating new information that includes changes in self-image and lifestyle. Understanding perceptions of those involved sets the tone for individualizing care and provides information necessary for choosing appropriate interventions.
Acknowledge reality of client's fears and concerns and encourage expression of feelings.	Support may enable client to begin exploring and dealing with the reality of cancer and its treatment. Client may need time to identify feelings and even more time to begin to express them.
Provide opportunity for questions and answer them honestly. Be sure that client and care providers have the same understanding of terms used.	Establishes trust and reduces misperceptions or misinterpretation of information.
Accept, but avoid reinforcing, client's denial of the situation.	When extreme denial or anxiety is interfering with progress of recovery, the issues facing client need to be explained and resolutions explored.
Note comments and behaviors indicative of beginning acceptance or use of effective strategies to deal with situation.	Fear and anxiety will diminish as client begins to accept and deal positively with reality. Indicator of client's readiness to accept responsibility for participation in recovery and to "resume life."
Involve client and SO in care planning. Provide time to prepare for events and treatments.	May help restore some feeling of control and independence to client who feels powerless in dealing with diagnosis and treatment.
Provide for client's physical comfort.	It is difficult to deal with emotional issues when experiencing extreme or persistent physical discomfort.

**NURSING DIAGNOSIS: deficient Knowledge regarding condition, treatment, prognosis, self-care, and discharge needs****May Be Related To**

Lack of exposure, unfamiliarity with resources  
Information misinterpretation  
Lack of recall

(continues on page 168)

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, treatment, prognosis, self-care, and discharge needs** (continued)**Possibly Evidenced By**

Reports the problem  
Inadequate follow-through of instruction  
Inappropriate or exaggerated behaviors—agitated, apathetic

**Desired Outcomes/Evaluation Criteria—Client Will****Knowledge: Cancer Management NOC**

Verbalize understanding of ramifications of diagnosis, prognosis, and possible complications.  
Participate in learning process.  
Verbalize understanding of therapeutic regimen.  
Correctly perform necessary procedures and explain reasons for the actions.  
Initiate necessary lifestyle changes.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Discuss diagnosis, current and planned therapies, and expected outcomes.	Provides individually specific information, creating knowledge base for subsequent learning regarding home management. Radiation and/or chemotherapy may follow surgical intervention, and information is essential to enable the client and SO to make informed decisions.
Reinforce surgeon's explanation of surgical procedure, providing diagram as appropriate. Incorporate this information into discussion about short- and long-term recovery expectations.	Length of rehabilitation and prognosis depend on type of surgical procedure, preoperative physical condition, and duration and degree of complications.
Discuss necessity of planning for follow-up care before discharge.	Follow-up assessment of respiratory status and general health is imperative to ensure optimal recovery. Also provides opportunity to readdress concerns or questions at a less stressful time.
Identify signs and symptoms requiring medical evaluations, such as changes in appearance of incision, development of respiratory difficulty, fever, increased chest pain, and changes in appearance of sputum.	Early detection and timely intervention may prevent or minimize complications.
Emphasize importance of avoiding exposure to smoke, air pollution, and contact with individuals with upper respiratory infections (URIs).	Protects lung(s) from irritation and reduces risk of infection.
Review nutritional and fluid needs. Suggest increasing protein and use of high-calorie snacks as appropriate.	Meeting cellular energy requirements and maintaining good circulating volume for tissue perfusion facilitate tissue regeneration and healing process.
Identify individually appropriate community resources, such as American Cancer Society, visiting nurse, social services, and home care.	Agencies such as these offer a broad range of services that can be tailored to provide support and meet individual needs.
<b>Prescribed Activity/Exercise NIC</b> Help client determine activity tolerance and set goals.	Weakness and fatigue should decrease as lung heals and respiratory function improves during recovery period, especially if cancer was completely removed. If cancer is advanced, it is emotionally helpful for client to be able to set realistic activity goals to achieve optimal independence.
Evaluate availability and adequacy of support system(s) and necessity for assistance in self-care and home management.	General weakness and activity limitations may reduce individual's ability to meet own needs.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage alternating rest periods with activity and light tasks with heavy tasks. Emphasize avoidance of heavy lifting and isometric or strenuous upper body exercise. Reinforce physician's time limitations about lifting.	Generalized weakness and fatigue are usual in the early recovery period but should diminish as respiratory function improves and healing progresses. Rest and sleep enhance coping abilities, reduce nervousness (common in this phase), and promote healing. Note: Strenuous use of arms can place undue stress on incision because chest muscles may be weaker than normal for 3 to 6 months following surgery.
Recommend stopping any activity that causes undue fatigue or increased shortness of breath.	Exhaustion aggravates respiratory insufficiency.
Instruct and provide rationale for arm and shoulder exercises. Have client or SO demonstrate exercises. Encourage following graded increase in number and intensity of routine repetitions.	Simple arm circles and lifting arms over the head or out to the affected side are initiated on the first or second postoperative day to restore normal range of motion (ROM) of shoulder and to prevent ankylosis of the affected shoulder.
<b>Incision Site Care NIC</b> Encourage inspection of incisions. Review expectations for healing with client.	Healing begins immediately, but complete healing takes time. As healing progresses, incision lines may appear dry with crusty scabs. Underlying tissue may look bruised and feel tense, warm, and lumpy (resolving hematoma).
Instruct client and SO to watch for and report places in incision that do not heal or reopening of healed incision, any drainage (bloody or purulent), and localized area of swelling with redness or increased pain that is hot to touch.	Signs and symptoms indicating failure to heal, development of complications requiring further medical evaluation and intervention.
Suggest wearing soft cotton shirts and loose-fitting clothing; cover portion of incision with pad, as indicated, and leave incision open to air as much as possible, unless compression garment is used.	Reduces suture line irritation and pressure from clothing. Leaving incisions open to air promotes healing process and may reduce risk of infection.
Shower in warm water, washing incision gently. Avoid tub baths until approved by physician.	Keeps incision clean and promotes circulation and healing. Note: "Climbing" out of tub requires use of arms and pectoral muscles, which can put undue stress on incision.

**POTENTIAL CONSIDERATIONS** following hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **ineffective Airway Clearance**—excessive mucus, retained secretions, [pain, fatigue]
- **acute Pain**—physical—surgical incision, tissue trauma, disruption of intercostal nerves, anxiety
- **Self-Care deficit**—fatigue, pain/discomfort, weakness

Refer to CP: Cancer-General Considerations for additional interventions.

## PNEUMOTHORAX/HEMOTHORAX

- I. **Pathophysiology** (Daley et al, 2016; Schiffman, 2016)
  - a. Partial or complete collapse of lung due to accumulation of air (pneumothorax), blood (hemothorax), or other fluid (pleural effusion) in the pleural space.
  - b. Intrathoracic pressure changes are induced by increased pleural space volumes and reduced lung capacity, causing respiratory distress and gas exchange problems. This produces tension on mediastinal structures that can impede cardiac and systemic circulation.
  - c. Complications include hypoxemia, respiratory failure, and cardiac arrest.
- II. **Classification**
  - a. Primary spontaneous pneumothorax
  - b. Secondary spontaneous pneumothorax
  - c. Iatrogenic pneumothorax
  - d. Traumatic pneumothorax

(continues on page 170)

### III. Etiology (Daley et al, 2016)

- a. Primary spontaneous: Rupture of pleural blebs typically occurs in young people without parenchymal lung disease or occurs in the absence of traumatic injury to the chest or lungs.
- b. Secondary spontaneous: Occurs in the presence of lung disease (primarily emphysema) but can also occur with tuberculosis (TB), sarcoidosis, cystic fibrosis, malignancy, and pulmonary fibrosis.
- c. Iatrogenic: Complication of medical or surgical procedures, such as therapeutic thoracentesis, tracheostomy, transthoracic needle aspiration biopsy of pulmonary nodules (most common cause), transbronchial or pleural biopsy, central venous catheter insertion (usually subclavian or internal jugular); acute respiratory distress syndrome (ARDS) and positive-pressure mechanical ventilation (tension pneumothorax); inadvertent intubation of right mainstem bronchus.
- d. Traumatic: Most common form of pneumothorax and hemothorax, caused by open or closed chest or abdominal trauma related to blunt or penetrating injuries (e.g., chest injury from car crash; gunshot or stab wounds) and high-risk occupation (e.g., diving, flying).

### IV. Indications for Thoracostomy

- a. Pneumothorax: Open or closed; simple or tension
- b. Bleeding into pleural space (hemothorax)
- c. Lymphatic fluid leaking into pleural space (chylothorax)
- d. Pus and infected tissue fluid in pleural space (empyema)

- e. Abnormal amount of fluid in pleural space resulting from either excess fluid production or decreased fluid absorption (pleural effusion): Often associated with an underlying malignancy but may result from several other conditions (e.g., TB, cirrhosis with ascites, chronic pancreatitis, nephrotic syndrome, medication-associated effusion).

### V. Patient presentation and possible treatment options (Bau-mann et al, 2001; Daley et al, 2016)

- a. Client has no symptoms and the pneumothorax finding is incidental (usually on an x-ray performed for an unrelated reason). Treatment decisions may be based on the likelihood of recurrence.
- b. Client is symptomatic but clinically stable: Treatment with small-bore catheter or chest tube placement is recommended.
- c. Client has life-threatening pneumothorax that causes hemodynamic instability. This condition is treated immediately with tube thoracostomy and treatment of underlying conditions.

### VI. Statistics (Schiffman, 2016)

- a. Morbidity: Primary spontaneous pneumothorax affects approximately 9000 persons per year in the United States and is more common in men between 20 and 40 years of age.
- b. Recurrence rate is about 40% for both primary and secondary spontaneous pneumothorax, occurring in intervals of 1.5 to 2 years.
- c. Mortality: Rate is 15% for those with secondary pneumothorax associated with underlying lung disease.

## G L O S S A R Y

**Blunt-force chest trauma:** Closed trauma to the chest may result in laceration of lung tissue or an artery by a rib, causing blood to collect in the pleural space.

**Chest tube drainage unit (CDU):** Drainage system that is connected to a chest tube to remove air and/or fluids from the chest cavity or pleural space. The device consists of a water seal and collection chambers and a suction-control chamber or a one-way mechanical valve, depending on the amount of drainage anticipated and the client's level of mobility.

**Crepitation:** A dry, crackling sound or sensation on auscultation or palpation of the skin, indicating the presence of subcutaneous emphysema, or air trapped in the tissues, associated with a pneumothorax.

**Empyema:** Pus from an infection, such as pneumonia, in the pleural space.

**Fremitus:** Vibratory sensation or tremors felt through the chest wall during coughing or speaking.

**Hamman sign:** Crunching sound heard in chest auscultation, which correlates with heartbeat, reflecting air in mediastinum.

**Hemopneumothorax:** Both air and blood in the pleural space.

**Hemothorax:** Collection of blood in the pleural space, which can exert pressure on the lung, causing it to collapse.

**Hypercapnia:** Increased level of carbon dioxide in the blood.

**Hypoxemia:** Decreased level of oxygen in the blood.

**Penetrating chest trauma:** Chest trauma in which a weapon, such as a knife, bullet, or needle, lacerates the lung.

**Pleural effusion:** Excessive fluid in the pleural space.

**Pleural space:** Area between the parietal pleura (membrane lining the chest cavity) and the visceral pleura, which surrounds the lungs. Normally, this potential space holds about 50 mL of lubricating fluid that prevents friction between the pleurae as they move during inhalation and exhalation.

**Pneumothorax:** Buildup of air in the pleural space, exerting pressure against the lung and causing it to collapse.

**Tachypnea:** Abnormally rapid respirations.

**Tension pneumothorax:** Accumulation of air into the intrapleural space that shifts the mediastinum to the unaffected side, thus impairing ventilation and compromising cardiac function and venous return.

**Thoracentesis:** Use of a needle to rapidly remove fluid from the pleural space.

**Thoracostomy:** Minimally invasive procedure in which a thin plastic tube is inserted into the pleural space—the area between the chest wall and lungs—to remove excess fluid or air (may be attached to a suction device).

**CARE SETTING**

This care plan addresses the patient who has chest tube placement and is treated in an inpatient medical or surgical unit.

**RELATED CONCERNS**

Cardiac surgery, page 98  
 Chronic obstructive pulmonary disease (COPD) and asthma, page 132  
 Psychosocial aspects of care, page 835  
 Pulmonary tuberculosis (TB), page 204  
 Respiratory failure/ventilatory assistance (mechanical), page 187

**CLIENT ASSESSMENT DATABASE**

Findings vary depending on the amount of air and/or fluid accumulation, rate of accumulation, and underlying lung function.

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<b>ACTIVITY/REST</b>	<ul style="list-style-type: none"> <li>• Shortness of breath</li> <li>• Fatigue</li> <li>• Dyspnea with activity or even at rest</li> </ul>
<b>CIRCULATION</b>	<ul style="list-style-type: none"> <li>• Tachycardia; irregular rate, dysrhythmias</li> <li>• S<sub>3</sub> or S<sub>4</sub> or gallop heart rhythm—heart failure (HF) secondary to effusion</li> <li>• Apical pulse reveals point of maximal impulse (PMI) displaced in presence of mediastinal shift with tension pneumothorax</li> <li>• Homans' sign—crunching sound correlating with heartbeat, reflecting air in mediastinum</li> <li>• <b>Blood pressure (BP):</b> Hypertension or hypotension. <i>Note:</i> Hypotension is an inconsistent finding, although is a key sign in tension pneumothorax.</li> <li>• Jugular vein distention (JVD), especially with tension pneumothorax</li> <li>• Restlessness, irritability</li> </ul>
<b>EGO INTEGRITY</b>	<ul style="list-style-type: none"> <li>• Anxiety, apprehension</li> <li>• Facial grimacing</li> <li>• Guarding affected area</li> <li>• Distraction behaviors</li> </ul>
<b>PAIN/DISCOMFORT</b>	<ul style="list-style-type: none"> <li>• Unilateral chest pain, aggravated by breathing, coughing, and movement; or</li> <li>• Sudden onset of symptoms while coughing or straining—spontaneous pneumothorax; or</li> <li>• Sharp, stabbing chest pain aggravated by deep breathing, possibly radiating to neck, shoulders, abdomen—pleural effusion</li> <li>• <b>Respirations:</b></li> <li>• Tachypnea. <i>Note:</i> In tension pneumothorax, pulse may exceed 130 bpm.</li> <li>• Labored breathing, use of accessory muscles in chest, neck; intercostal retractions; forced abdominal expiration</li> <li>• Respiratory distress/respiratory arrest</li> <li>• <b>Chest observation and auscultation:</b></li> <li>• Unequal or paradoxical chest movement (if trauma, flail), reduced thoracic excursion on affected side</li> <li>• Breath sounds distant or absent on involved side</li> <li>• Ipsilateral (same side) crackles, wheezes</li> </ul>
<b>RESPIRATION</b>	(continues on page 172)
<ul style="list-style-type: none"> <li>• Difficulty breathing, “air hunger”</li> <li>• Coughing, which may be presenting symptom</li> <li>• Use of positive-pressure mechanical ventilation or positive end-expiratory pressure (PEEP) therapy</li> <li>• History of recent chest surgery or trauma; chronic lung disease, lung inflammation, or infection (empyema or effusion); diffuse interstitial disease (sarcoidosis); malignancies (e.g., obstructive tumor)</li> <li>• Previous spontaneous pneumothorax; spontaneous rupture of emphysematous bulla, subpleural bleb in COPD</li> </ul>	

## CLIENT ASSESSMENT DATABASE (contd.)

### MAY REPORT (continued)

### MAY EXHIBIT (continued)

#### *Chest percussion:*

- Hyperresonance over air-filled area—pneumothorax; dullness over fluid-filled area—hemothorax
- Fremitus decreased on involved site
- Skin:** Pallor, cyanosis, diaphoresis, subcutaneous crepitation
- Mentation:** Anxiety, restlessness, confusion, stupor

### SAFETY

- Recent chest trauma, such as fractured ribs, penetrating wound
- Radiation and chemotherapy for malignancy
- Presence of central intravenous (IV) line

### TEACHING/LEARNING

- History of familial risk factors, such as TB, cancer
- Recent intrathoracic surgery or lung biopsy

### DISCHARGE PLAN CONSIDERATIONS

- Temporary assistance with self-care, homemaker and maintenance tasks

► Refer to section at end of plan for postdischarge considerations.

## DIAGNOSTIC STUDIES

### TEST

### WHY IT IS DONE

### WHAT IT TELLS ME

### DIAGNOSTIC STUDIES

- Chest x-ray:** Evaluates organs or structures within the chest and is the initial study of choice in blunt-force chest trauma.
- Thoracic computed tomography (CT):** Enhances anatomic views of the chest and locates abnormalities. Early CT may influence therapeutic management.
- Chest ultrasonography:** Noninvasive diagnostic exam that produces images, used to assess the organs and structures within the chest, such as the lungs, mediastinum, and pleural space.

May show injuries (e.g., to chest wall, ribs, heart, or great vessels) if due to trauma. May reveal air and fluid accumulation in the pleural space; may show shift of mediastinal structures. CT is more sensitive than x-ray in detecting thoracic injuries, lung contusion, hemothorax, and pneumothorax.

Bedside thoracic ultrasound can rapidly and accurately diagnose pneumothorax without the need for chest x-ray. This can greatly reduce the elapsed time between assessment for and treatment of pneumothorax in an emergency setting (Summers et al, 2016). Ultrasound can detect as little as 5 to 50 mL of pleural fluid and has a 100% sensitivity for effusions greater than 100 mL. May also be used to guide needle insertion for chest tube placement (Daley et al, 2016; Mechem, 2015).

## NURSING PRIORITIES

- Promote or maintain lung reexpansion for adequate oxygenation and ventilation.
- Minimize or prevent complications.
- Reduce discomfort and pain.
- Provide information about disease process, treatment regimen, and prognosis.

## DISCHARGE GOALS

- Adequate ventilation and oxygenation maintained.
- Complications prevented or resolved.
- Pain absent or controlled.
- Disease process, prognosis, and therapy needs understood.
- Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS:** **ineffective Breathing Pattern****May Be Related To**

Musculoskeletal impairment  
Pain; anxiety

**Possibly Evidenced By**

Dyspnea, tachypnea  
Alterations in depth of breathing; altered chest excursion  
Use of accessory muscles to breathe, nasal flaring  
Decreased vital capacity

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Ventilation NOC**

Establish a normal and effective respiratory pattern with ABGs within client's normal range.  
Be free of cyanosis and other signs or symptoms of hypoxia.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b>	
<i>Independent</i>	
Identify etiology or precipitating factors, such as trauma, malignancy, infection, complication of mechanical ventilation.	Understanding the cause of lung collapse is necessary for proper chest tube placement and choice of other therapeutic measures.
Evaluate respiratory function, noting rapid or shallow respirations, dyspnea, reports of "air hunger," development of cyanosis, and changes in vital signs.	Respiratory distress and changes in vital signs occur because of physiological stress and pain or may indicate development of shock due to hypoxia or hemorrhage.
Monitor for asynchronous respiratory pattern when using mechanical ventilator. Note changes in airway pressures.	Difficulty breathing with ventilator or increasing airway pressures suggests worsening of condition and development of complications, such as a tension pneumothorax.
Auscultate breath sounds.	Breath sounds may be diminished or absent in a lobe, lung segment, or entire lung field (unilateral). Atelectatic area will have no breath sounds, and partially collapsed areas have diminished sounds. Regularly scheduled evaluation also helps determine areas of good air exchange and provides a baseline to evaluate resolution of pneumothorax.
Note chest excursion and position of trachea.	Chest excursion is unequal until lung reexpands. Trachea deviates from affected side with tension pneumothorax.
Assess fremitus.	Voice and tactile fremitus (vibration) is reduced in fluid-filled or consolidated tissue.
<b>Ventilation Assistance NIC</b>	
Assist client with splinting painful area when coughing or during deep breathing.	Supporting chest and abdominal muscles makes coughing more effective and less traumatic.
Maintain position of comfort, usually with head of bed elevated. Turn to affected side. Encourage client to sit up as much as possible.	Promotes maximal inspiration; enhances lung expansion and ventilation in unaffected side.
Maintain a calm attitude, assisting client to "take control" by using slower, deeper respirations.	Assists client to deal with the physiological effects of hypoxia, which may be manifested as anxiety or fear.
<b>Tube Care: Chest NIC</b>	
Ascertain type of client's chest drainage system.	This care plan concerns the hospitalized client whose treatment plan includes use of a traditional chest drainage system. Mobile drains are indicated for those clients who are ambulatory and do not require a suction for reinflation of lungs.

(continues on page 174)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Once chest tube is inserted:	
Seal drainage tubing connection sites securely with lengthwise tape or bands and pad bands with gauze or tape according to established policy.	Prevents disconnection and air leaks at connector sites. Padding protects skin from irritation and pressure.
Anchor thoracic catheter to chest wall and provide extra length of tubing before turning or moving client.	Prevents thoracic catheter dislodgment or tubing disconnection and reduces pain and discomfort associated with pulling or jarring of tubing.
Secure drainage unit to client's bed or on stand or cart placed in low-traffic area.	Maintains upright position and reduces risk of accidental tipping and breaking of unit.
Monitor thoracic insertion site, noting condition of skin and presence and characteristics of drainage from around the catheter. Change and reapply sterile occlusive dressing as needed.	Provides for early recognition and treatment of developing skin or tissue erosion or infection.
Determine if dry-seal chest drain or water-seal system is used.	Some chest drains use a mechanical one-way valve in place of a conventional water seal. The one-way valve allows air to escape from the chest and prevents air from entering the chest. Dry suction-control systems regulate suction pressure mechanically rather than with a column of water. Some dry suction systems use a screw-type valve that varies the size of the opening to the vacuum source, thereby limiting the amount of negative pressure that can be transmitted to the chest. These valves narrow the opening of the chest drain to adjust the level of negative pressure; therefore, the total amount of air that can flow out of the chest drain is also limited. Thus, this type of dry suction-control mechanism is impractical for clients with significant pleural air leaks. Note: Dry-seal setups are also used with an automatic control valve (ACV), which provides a one-way valve seal like that achieved with the water-seal system.
If water-seal system and suction is used:	
Check suction-control chamber for correct amount of suction, as determined by water level, wall, or table regulator, at correct setting.	Maintains prescribed intrapleural negativity, which promotes optimum lung expansion and fluid drainage.
Check fluid level in water-seal chamber; maintain at prescribed level.	Water in a sealed chamber serves as a barrier that prevents atmospheric air from entering the pleural space should the suction source be disconnected and aids in evaluating whether the chest drainage system is functioning appropriately. Note: Underfilling the water-seal chamber leaves it exposed to air, putting client at risk for pneumothorax or tension pneumothorax. Overfilling, a more common mistake, prevents air from easily exiting the pleural space, thus preventing resolution of pneumothorax and possibly creating a tension pneumothorax.
Observe for bubbling in water-seal chamber.	Bubbling during expiration reflects venting of pneumothorax (desired action). Bubbling usually decreases as the lung expands or may occur only during expiration or coughing as the pleural space diminishes. Absence of bubbling may indicate complete lung reexpansion (normal) or represent complications, such as obstruction, in the tube.
Monitor water-seal chamber "tidaling." Note whether change is transient or permanent.	The water-seal chamber serves as an intrapleural manometer (gauges intrapleural pressure); therefore, fluctuation, or tidaling, reflects pressure differences between inspiration and expiration. Tidaling of 2 to 6 cm during inspiration is normal and may increase briefly during coughing episodes. Continuation of excessive tidal fluctuations may indicate existence of airway obstruction or presence of a large pneumothorax.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide safe transportation if client is sent off unit for diagnostic purposes. Before transporting, check water-seal chamber for correct fluid level; presence or absence of bubbling; and presence, degree, and timing of tidalizing. Ascertain whether chest tube can be clamped or disconnected from suction source.	Promotes continuation of optimal evacuation of fluid or air during transport. If client is draining large amounts of chest fluid or air, tube should not be clamped or suction interrupted because of risk of accumulating fluid or air, compromising respiratory status.
Monitor for abnormal or continuous water-seal chamber bubbling.	With suction applied, continuous water-seal bubbling may indicate a persistent air leak that may be from a large pneumothorax at the chest insertion site (client centered) or chest drainage unit (system centered). Note: Because the assessment of bubbling is variable and subjective, practitioners are favoring electronic drains because assessment of air leak becomes objective and consistent from clinician to clinician (Cerfolio et al, 2010).
Determine location of air leak (client or system centered) by clamping thoracic catheter just distal to exit from chest.	If bubbling stops when catheter is clamped at insertion site, leak is client centered at insertion site or within the client.
Place petrolatum gauze or other appropriate material around the insertion as indicated.	Usually corrects insertion site air leak.
Clamp tubing in stepwise fashion downward toward drainage unit if air leak continues.	Isolates location of a system-centered air leak. Note: As a rule, clamping for a suspected leak is the only time that chest tube should be clamped.
Position drainage system tubing for optimal function; for example, shorten tubing or coil extra tubing on bed, making sure tubing is not kinked or hanging below entrance to drainage container. Drain accumulated fluid as necessary.	Improper position, kinking, or accumulation of clots and fluid in the tubing changes the desired negative pressure and impedes air or fluid evacuation. Note: If a dependent loop in the drainage tube cannot be avoided, lifting and draining it every 15 minutes will maintain adequate drainage in the presence of a hemothorax.
Note character and amount of chest tube drainage, whether tube is warm and full of blood and whether bloody fluid level in water-seal bottle is rising.	Useful in evaluating resolution of pneumothorax or development of hemorrhage requiring prompt intervention. Note: Some drainage systems are equipped with an autotransfusion device, which allows for salvage of shed blood.
Follow facility protocol and/or specific physician orders regarding chest tube stripping (“milking”).	Milking the chest tube is sometimes used when it is deemed necessary to maintain free drainage in the presence of fresh bleeding, large blood clots, or purulent exudates (empyema). Concerns have been expressed over time as to the extreme negative pressure that can be exerted in the chest cavity during tube stripping. Some specialists recommend avoiding tube milking (Carroll, 2013). Note: Medical literature reveals a lack of consensus regarding benefits versus harm of this procedure, and some physicians and hospital policies support chest tube stripping (Halm, 2007; Hogg et al, 2011). However, the sixth edition of the AACN Procedure Manual for Critical Care states, “At level C evidence, that stripping and milking of closed chest drainage systems are contraindicated” (Pickett, 2011).
If thoracic catheter is disconnected or dislodged:	Pneumothorax may recur or worsen, compromising respiratory function and requiring prompt intervention to prevent fatal pulmonary and circulatory impairment.
Observe for signs of respiratory distress. If possible, reconnect thoracic catheter to tubing and suction, using clean technique. If the catheter is dislodged from the chest, cover insertion site immediately with petrolatum dressing and apply firm pressure. Notify physician at once.	(continues on page 176)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
After thoracic catheter is removed:	
Cover insertion site with sterile occlusive dressing. Observe for signs or symptoms that may indicate recurrence of pneumothorax, such as shortness of breath and reports of pain. Inspect insertion site, noting character of drainage.	Early detection of a developing complication, such as recurrence of pneumothorax or presence of infection, is essential.
<b>Collaborative:</b> Assist with lung reexpansion treatment (e.g., observation without oxygen, administering supplemental oxygen, needle aspiration, one-way valve device, thoracostomy with chest tube placement with chest tube drainage unit [CDU] and with or without suction) as indicated.	Although numerous treatment options for lung reexpansion are available (depending on the cause, location, and size of the pneumothorax), tube thoracostomy is the definitive treatment for secondary spontaneous pneumothorax and tension pneumothorax (Bascom et al, 2016). The use of water seal alone reduces duration of air leak, chest tube dwell time, and hospital stay (Deng et al, 2010; Hawley et al, 2014).
Obtain postplacement x-rays and review serial chest x-rays.	Placement of tube(s) is determined by the cause of the problem; for example, anterior chest near apex of lung or one tube at the apex and one at posterior fifth to sixth intercostal space. X-rays confirm proper placement and monitor progress of reexpansion of lung.
<b>Ventilation Assistance NIC</b> Monitor and graph serial ABGs and pulse oximetry. Review vital capacity and tidal volume measurements, where indicated.	Assesses status of gas exchange and ventilation and need for continuation or alterations in therapy.
Administer supplemental oxygen via cannula, mask, or mechanical ventilation, as indicated.	Aids in reducing work of breathing; promotes relief of respiratory distress and cyanosis associated with hypoxemia.
Administer analgesics and sedatives, as indicated.	Given to manage pleuritic pain and reduce anxiety and tachycardia associated with impaired respiratory function, especially when client is on a ventilator.

<b>NURSING DIAGNOSIS:</b>	<b>readiness for enhanced Knowledge regarding condition, treatment regimen, self-care, and discharge needs</b>
<b>Possibly Evidenced By</b>	Expresses desire to enhance knowledge
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Knowledge: Acute Illness Management NOC</b>	Verbalize understanding of cause of problem (when known). Identify signs or symptoms requiring medical follow-up.
<b>Knowledge: Treatment Regimen NOC</b>	Follow therapeutic regimen and demonstrate lifestyle changes, if necessary, to prevent recurrence.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Procedure/Treatment NIC</b> <i>Independent</i>	
Review with client purpose and function of CDU, taking note of safety features.	Information on how system works provides reassurance, reducing client anxiety.
Instruct client to refrain from lying on or pulling on tubing.	Reduces risk of obstructing drainage or inadvertently disconnecting tubing.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Identify changes and situations that should be reported to caregivers, such as change in sound of bubbling, sudden “air hunger” and chest pain, and disconnection of equipment.	Timely intervention may prevent serious complications.
<b>Teaching: Disease Process NIC</b> <i>Independent</i>	
Review pathology of individual problem.	Information reduces fear of unknown. Provides knowledge base for understanding underlying dynamics of condition and significance of therapeutic interventions.
Identify likelihood for recurrence or long-term complications.	Certain underlying lung diseases, such as severe COPD and malignancies, may increase incidence of recurrence. Note: Incidence of recurrence varies but usually strikes within the first 6 months to 3 years. Daley et al (2016) reported a 5-year recurrence rate of 28% to 32% for primary spontaneous pneumothorax (PSP) and 43% for secondary spontaneous pneumothorax (SSP).
Review signs and symptoms requiring immediate medical evaluation, for example, sudden chest pain, dyspnea, air hunger, and progressive respiratory distress.	Recurrence of pneumothorax requires medical intervention to prevent and reduce potential complications.
Review significance of good health practices, such as adequate nutrition, rest, and exercise.	Maintenance of general well-being promotes healing and may prevent or limit recurrences.
Emphasize need for smoking cessation when indicated.	Prevents respiratory complications, such as fibrotic changes in lung tissue, and may prevent recurrence of collapsed lung. Note: It is well documented that smoking can increase the risk of spontaneous pneumothorax. However, correlation percentages are unclear. One author recently reported that smoking increases the risk of a first spontaneous pneumothorax by more than 20-fold in men and by nearly 10-fold in women compared with risks in nonsmokers. Substantiating data were not available (Daley et al, 2016).

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **risk for Infection**—invasive procedure, traumatized tissue, broken skin, decreased ciliary action
- **ineffective Breathing Pattern**—pain, fatigue, musculoskeletal impairment

## ACUTE LUNG INJURY/ACUTE RESPIRATORY DISTRESS SYNDROME

Acute lung injury (ALI) is a syndrome consisting of acute hypoxic respiratory failure with bilateral pulmonary infiltrates. Acute respiratory distress syndrome (ARDS) is a subtype of ALI and is considered the most severe form of hypoxic lung injury. Some clinicians view these two entities as a continuum with the severity of hypoxemia being the deciding factor. ALI and ARDS are associated with inflammation and edema in the airways that reduce lung compliance, resulting in respiratory failure related to noncardiogenic pulmonary edema. What distinguishes ALI from ARDS is the P/F ratio (see Glossary).

**I. Pathophysiology (Pooler, 2009; Saguil & Fargo, 2012; York & Kane, 2012)**

- a. Alveolar-capillary leaking (allowing fluids, proteins, and blood cells to enter interstitial space)
  - i. Increased interstitial protein levels raises interstitial oncotic pressure and pulls fluid from vascular space, resulting in a relative hypovolemia and edema (third spacing). If fluids, proteins, and blood cells accumulate too rapidly for lymphatic system to clear, noncardiogenic pulmonary edema occurs.
  - ii. Lungs are subjected to increased hyaline membrane formation, development of fibroblasts (possibly leading to interstitial fibrosis), and inactivation of pulmonary surfactant.

(continues on page 178)

- iii. There are areas within the lungs that are collapsed or consolidated (mainly dependent lobes) and other regions that are open and ventilate in a relatively normal fashion (Chacko & Rani, 2009; Puybasset et al, 2000).
- iv. Together, these factors worsen gas exchange, decrease lung compliance, produce atelectasis, and increase work of breathing.

**II. Etiology (National Heart, Lung, and Blood Institute [NHLBI], 2012; York & Kane, 2012)**

- a. ALI/ARDS has been defined as a constellation of clinical criteria (acute onset of bilateral pulmonary infiltrates with hypoxemia without evidence of hydrostatic pulmonary edema) (Johnson & Matthay, 2010). The course of the condition can be described in three overlapping phases (Laycock & Rajah, 2010; Mackay & Al-Haddad, 2009).
  - i. The *acute* or *exudative* phase starts early and lasts up to 7 days from onset. Characterized by the development of hypoxemia, bilateral infiltrates on chest x-ray, and reduction in pulmonary compliance.
  - ii. The *subacute* or *proliferative* phase follows. Characterized by persistent hypoxemia, increased dead space, reduced lung compliance, and disruption of capillary function due to microvascular thrombus formation.
  - iii. The *chronic* or *fibrotic* phase may start as early as 14 days and lasts for many weeks. Chronicity is the result of widespread pulmonary fibrosis and loss of normal lung structure, declining lung compliance, and increased dead space.
- b. The causes of ALI/ARDS are divided into two categories: direct or indirect injuries to the lung.
  - i. **Direct injuries** include acute bacterial or viral pneumonia, upper airway obstruction, aspiration, near drowning, oxygen toxicity, mechanical ventilation, and toxic inhalation (fumes or smoke).
  - ii. **Indirect injuries** to the lung include acute pancreatitis; severe infection (sepsis and septic shock), blood transfusions, or severe bleeding from bodily injury; trauma, fractures (multiple and long bone), and fat embolism; burns; cardiopulmonary bypass; drug overdose and medication reactions; and transplantation (bone or lung).

**c. Treatments (Mackay & Al-Haddad, 2009; Powers, 2007; Saguil & Fargo, 2012; York & Kane, 2012)**

Management requires (1) maintaining airway, (2) providing adequate oxygenation, and (3) supporting hemodynamic function. Supportive therapy includes the following:

- i. **Perfusion:** Fluids are needed to replace vascular losses (associated with leaking from capillaries into alveolar spaces) but are given cautiously to avoid fluid overload. Medications include inotropics (e.g., dobutamine) to improve cardiac output and vasopressors (e.g., dopamine) to promote systemic vasoconstriction, which in turn raise blood pressure and enhance organ perfusion.
- ii. **Positioning:** Recent studies have supported the use of positioning (including prone position) to improve oxygenation by mobilizing secretions, reducing atelectasis, and improving perfusion in all aspects of the lungs. In addition, kinetic therapy reduces harmful effects of immobilization, such as skin breakdown and ventilator-associated pneumonia (VAP).
- iii. **Protective lung ventilation:** Pressure-cycled ventilation is beneficial in management of ARDS in which

there is alveolar dysfunction and vulnerability to barotrauma and volutrauma (Mutneja & Tichauer, 2016). Current guidelines include mechanical ventilation with settings that (1) provide low tidal volumes, (2) maintain higher levels of PEEP, (3) reduce FiO<sub>2</sub> as possible from 100%, and (4) limit plateau pressures (adapted from NIH, NHLBI, & ARDS, 2014).

- iv. **Protocol weaning:** Use of patient-specific weaning protocols can reduce duration of ventilated support and ICU length of stay. Weaning efforts can include (but are not limited to) spontaneous breathing trials.
- v. **Preventing complications:** The lung-injured patient is very ill and often has comorbidities (e.g., traumatic injuries, heart or chronic lung diseases, diabetes, etc.). Having ALI or ARDS adds a whole new level of complication risks (see below).

**d. Complications (Stoppler, n.d.; York & Kane, 2012)**

- i. Early complications (occurring during hospitalization) often include shock; infections (sepsis, pneumonia, VAP); pneumothorax/other ventilator-induced lung injury (VILI), lung scarring; long-term ventilation/difficulty weaning; organ dysfunction/failure (e.g., respiratory muscle disuse hypotrophy; kidney failure/multiple organ failure); fluid overload, stress ulcers; malnutrition; and immobility effects resulting in skin breakdown, blood clots (DVT and PE).
- ii. Late and ongoing health issues often include shortness of breath (After treatment, some people recover close-to-normal lung function within 6 months. For others, it may take longer. Others have breathing problems for the rest of their lives); persistent fatigue and muscle weakness; anxiety, depression, and other mood disorders; and problems with cognition, including memory, attention, and thinking clearly.

**III. Statistics**

- a. **Morbidity:** In 2016, there were about 200,000 cases of ARDS per year in the United States (American Lung Association, 2016). Survivors of ARDS have diminished functional ability and lower-than-normal quality of life 2 years after hospital discharge, related to health issues (e.g., ongoing pulmonary dysfunction, tracheostomy site complications, problems with joints, and caregiver and financial burdens) (Bakowitz, Bruns, & McCunn, 2012; Laycock & Rajah, 2010). A recent study concerning long-term effects of ARDS concluded that cognitive impairment in ARDS survivors ranges from 70% to 100% at hospital discharge and 20% at 5 years. Mood disorders, including depression and posttraumatic stress disorder (PTSD), are also sustained and prevalent (Herridge et al, 2016).
- b. **Mortality:** Between 30% and 50% of those diagnosed with ARDS die of it (American Lung Association, 2016). Since 2010, the overall mortality rates have been in-hospital (45%), 28/30 days (30%), and 60 days (32%) (Máca et al, 2016).
- c. **Costs:** No recent figures were located for direct costs of ARDS in the United States. There were recent publications from Canada, the United Kingdom, and Europe. However, a statistical brief for hospital costs in the United States in 2011 listed two of the primary diagnoses associated with ARDS: septicemia and adult respiratory failure. These costs were listed in mean costs per stay: septicemia \$18,000 (an 11.5% increase since 1997) and adult respiratory failure \$21,600 (a 6.6% increase since 1997) (Pfuntner et al, 2013).

## G L O S S A R Y

- Acute lung injury (ALI):** Condition characterized by acute severe hypoxia that is not due to left atrial hypertension. ALI is on the lower end of a continuum ending in acute respiratory distress syndrome (ARDS). ALI is defined by a  $\text{PaO}_2/\text{FiO}_2$  ratio of less than 300.
- Alveoli:** Thin walled sac at end of the airway where gas exchange takes place. In ARDS, infections, injuries, or other conditions cause fluid to build up in the alveoli.
- ARDS, or acute respiratory distress syndrome:** Rapidly progressing lung condition where low oxygen levels in the blood increase the work of breathing. “ARDS is defined by timing (within 1 week of clinical insult or onset of respiratory symptoms); radiographic changes (bilateral opacities not fully explained by effusions, consolidation, or atelectasis); origin of edema (not fully explained by cardiac failure or fluid overload); and severity based on the  $\text{PaO}_2/\text{FiO}_2$  ratio on 5 cm of continuous positive airway pressure (CPAP). The 3 categories are mild ( $\text{PaO}_2/\text{FiO}_2$  200–300), moderate ( $\text{PaO}_2/\text{FiO}_2$  100–200), and severe ( $\text{PaO}_2/\text{FiO}_2 \leq 100$ )” (Ranieri et al, 2012).
- Atelectasis:** A complete or partial collapse of a lung or lobe of a lung leading to reduced or absent gas exchange.
- Compliance:** Measurement of the relationship between changes in **lung volume** and **lung pressure**. **Lower levels of compliance** make it harder for a person to breathe normally.
- High-flow nasal oxygen therapy (HFNOT):** Provides warmed, humidified gases at flows of up to 60 L/min, with

- inspired oxygen ( $\text{FIO}_2$ ) concentrations of up to 100%, and is delivered using a blender connected to a wall outlet, a humidifier, heated tubing, and nasal cannula.
- High-flow oxygen therapy (HFOT):** Form of respiratory support (often in conjunction with compressed air and humidification) delivered at flow rates higher than that delivered traditionally in oxygen therapy.
- Inotropics:** Medications that influence the force of muscular contractions.
- Oncotic pressure:** Osmotic pressure exerted by colloids or plasma proteins (e.g., albumin) on capillary walls.
- P/F ratio:** Comparison of arterial partial pressure of oxygen ( $\text{PaO}_2$ ) with inspired fractional concentration of oxygen ( $\text{FiO}_2$ ). This ratio compares the amount of oxygen given to patient with the amount of oxygen entering the bloodstream.
- Positive end-expiratory pressure (PEEP):** A mainstay of therapy for the mechanically ventilated ARDS patient that prevents the patient from completely exhaling and recruits collapsed alveoli, thereby promoting gas exchange
- Refractory hypoxemia:** Oxygen requirements continue to increase while oxygen saturation remains low.
- Ventilation-perfusion (V/Q) mismatch:**  $\dot{V}$  (ventilation) is the air that reaches the alveoli.  $Q$  (perfusion) is the blood that reaches the alveoli via the capillaries. A mismatch is the imbalance between alveolar ventilation and pulmonary capillary blood flow as occurs in ARDS.

## CARE SETTING

Acute care facility. The patient may be hospitalized for other concerns (e.g., trauma, surgery, pneumonia) and already be on a ventilator when ALI/ARDS develops.

## RELATED CONCERNS

- Burns, page 740  
 Pneumonia, page 147  
 Pneumothorax/Hemothorax, page 169  
 Respiratory failure/ventilatory assistance, page 187  
 Psychosocial aspects of care, page 835  
 Respiratory acidosis (see *DavisPlus*)  
 Sepsis/septic shock, page 772  
 Surgical intervention, page 873  
 Total nutritional support/enteral feeding, page 525  
 Wound care: complicated or chronic, page 762

## CLIENT ASSESSMENT DATABASE

\*\*\*Data are for acute phase.

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Muscle fatigue
- General weakness

### MAY EXHIBIT

- Mental confusion
- Changes in blood pressure, heart rate/rhythm, and oxygen saturation with activity

(continues on page 180)

**CLIENT ASSESSMENT DATABASE** (contd.)**MAY REPORT** (continued)**MAY EXHIBIT** (continued)**CIRCULATION**

- Tachycardia
- Low blood pressure
- Cyanosis, mottling (despite supplemental oxygen)
- Edema (generalized)

**FOOD/FLUID**

- Loss of appetite

- Poor skin turgor, dry and flaky skin
- Muscle wasting and loss of subcutaneous fat
- Acute oliguria

**PAIN/DISCOMFORT**

- Chest pain with inspiration

- Guarding of affected area
- Distraction behaviors, restlessness

**RESPIRATION**

- Shortness of breath (worsening to severe)

- Increased respiratory rate; tachypnea; audible labored breathing
- Dry cough (first 24 to 48 hours)
- Breath sounds: Crackles
- Ventilation-perfusion mismatch
- Oxygenation problems despite delivery of higher-than-normal oxygen concentration

**Risks for direct lung injury (common triggers for ALI):**

- Pneumonia, aspiration of gastric contents; lung surgery or chest trauma with lung contusion

**Risks for direct lung injury (less common triggers for ALI):**

- Fat/amniotic fluid embolism, high altitude, near drowning, inhalation injury, reperfusion injury
- History of smoking
- History of oxygen use for a preexisting lung condition

**SAFETY****Conditions with risk for indirect injuries to lung (common triggers for ALI):**

- Sepsis; severe trauma with shock and multiple fluid transfusions

Temperature >100.9°F (38.3°C) or <96.8°F (36°C)

**Conditions with risk for indirect injuries to lung (less common triggers for ALI):**

- Burns; acute pancreatitis
- Recent high-risk surgery; cardiopulmonary bypass
- Blood transfusions
- Drug overdose (especially heroin, barbiturates)
- Disseminated intravascular coagulation (DIC)
- Chronic alcoholism; alcohol abuse

**TEACHING/LEARNING**

- Person living with sequelae of ARDS
- General debilitation and poor health status

**DISCHARGE PLAN CONSIDERATIONS**

- Assistance with or alteration in drug therapy
- Assistance in self-care and homemaker and maintenance tasks

► Refer to section at end of plan for postdischarge considerations.

DIAGNOSTIC STUDIES	
TEST	WHAT IT TELLS ME
<b>WHY IT IS DONE</b>	
	<i>Note:</i> Many different diagnostic studies may be done, depending on cause for ARDS and client condition. (Refer to individual care plans as indicated for additional diagnostic studies.)
<b>BLOOD TESTS:</b>	
• <b>Arterial blood gas (ABG):</b> Measures the arterial blood oxygen level.	ABGs may initially show respiratory alkalosis (due to tachypnea) shifting to respiratory and metabolic acidosis (due to tissue hypoxia and anaerobic metabolism).
<b>OTHER DIAGNOSTIC TESTS</b>	
• <b>Chest x-ray:</b> Evaluates organs and structures within the chest for evidence of disease.	Infiltrates are bilateral and diffuse or patchy, involving at least three quadrants, and cannot be explained as by pleural effusion, atelectasis, or nodules. <i>Note:</i> The geographic distribution of patchy “ground-glass” densities, together with areas of lobular sparing and lower-lobe consolidation, are radiologic hallmarks of ARDS (Phua et al, 2009).
• <b>Chest computed tomography (CT) scan:</b> Uses x-rays and computer to make detailed pictures of structures inside of the body.	May reveal areas of dense consolidation, air-filled bronchi (dark) being made visible by the opacification of surrounding alveoli (gray/white), patchy areas of “ground glass” opacification, and areas of relatively normal appearance.

## NURSING PRIORITIES

1. Achieve and maintain adequate ventilation and oxygenation.
2. Prevent spread of infection.
3. Provide information about disease process, prognosis, and treatment needs.

## DISCHARGE GOALS

1. Respiratory function adequate to meet individual need.
2. Complications prevented.
3. Lifestyle and behavior changes adopted to prevent spread of infection.
4. Disease process, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: impaired Gas Exchange

### May Be Related To

Alveolar-capillary membrane changes [such as in acute respiratory distress]

### Possibly Evidenced By

Abnormal breathing pattern (e.g., rate, rhythm, depth); nasal flaring  
 Dyspnea, abnormal skin color (e.g., pale, dusky)  
 Tachycardia; dysrhythmias  
 Restlessness; confusion; irritability  
 Abnormal arterial blood gases (ABGs)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status: Gas Exchange NOC

Demonstrate improved ventilation and oxygenation of tissues by ABGs within client's acceptable range and absence of symptoms of respiratory distress.  
 Participate in treatment regimen (e.g., breathing exercises, effective coughing, use of oxygen) within level of ability or situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b>	
<b>Independent</b>	
Assess respiratory rate, depth, and ease.	Manifestations of respiratory distress are dependent on, and indicative of, the degree of lung involvement and underlying general health status.
Observe color of skin, mucous membranes, and nailbeds, noting presence of peripheral cyanosis (nailbeds) or central cyanosis (circumoral).	Cyanosis of nailbeds may represent vasoconstriction or the body's response to fever or chills; however, cyanosis of earlobes, mucous membranes, and skin around the mouth ("warm membranes") is indicative of systemic hypoxemia.
Assess mental status, including awareness, thought processes, and appropriateness of responses.	Restlessness, irritation, and confusion are early signs of hypoxia. Deteriorating awareness, somnolence, and loss of consciousness are late signs of worsening hypoxemia, decreased cerebral oxygenation.
Assess anxiety, noting reports of great concern/fear and inability to breathe, and observe for increasing breathlessness, tachycardia restlessness, irritability, and confusion.	Anxiety can be a manifestation of physiological responses to hypoxia as well as psychological concerns. Refer to Care Plan: Respiratory Failure/Ventilatory Assistance, ND: Anxiety [specify level].
Monitor heart rate and rhythm.	Tachycardia is usually present because of fever and dehydration but may represent a response to hypoxemia.
Elevate head and support client in position of comfort for breathing as ventilation support measures permit. Provide frequent position changes, including prone position or place in kinetic bed, as indicated.	Patient position affects perfusion and oxygenation of lungs where patchy areas of ventilation/perfusion mismatch are occurring. These measures promote maximal inspiration, reduce atelectasis, and can enhance removal of secretions to improve ventilation and reduce lung inflammation. Prone positioning requires special beds (e.g., Stryker frame, or other prone positioner) or multiple people to perform safe repositioning.
Observe for deterioration in condition, noting hypotension (accompanied with falling oxygen saturation and pH), pallor, cyanosis, changes in level of consciousness, severe dyspnea, and restlessness.	ALI is on a continuum, with full ARDS being at the most severe end. Shock and advancing respiratory distress require immediate medical attention and additional interventions. The patient usually requires intubation and mechanical ventilation, and transfer to critical care.
<b>Collaborative</b>	
Monitor pulse oximetry continuously and ABGs as needed.	Identifies problems, such as changes in O <sub>2</sub> saturation associated with activity, or accelerating hypoxemia, respiratory acidosis, and ventilatory failure.
<b>Oxygen Therapy NIC</b>	
Administer oxygen therapy by appropriate means (e.g., nasal prongs, mask, and other noninvasive ventilation [NIV] methods).	The purpose of oxygen therapy is to maintain PaO <sub>2</sub> above 60 mm Hg, or greater than 90% O <sub>2</sub> saturation. Oxygen is administered by the method that provides appropriate delivery within the client's tolerance. Note: Early research concerning the use of NIV in patients with severe acute respiratory syndrome (SARS) reported that 70% could avoid intubation (Cheung et al, 2004).
High-flow nasal oxygen therapy (HFNOT)	HFNOT is being used in selected patients with early ARDS to postpone or potentially reduce the need for intubation and mechanical ventilation. HFNOT provides effective humidification and warming of gases, which allows more effective clearance of secretions, decreases atelectasis, and prevents airway surface dehydration. Research has shown that patients with acute hypoxic respiratory failure (as occurs in ARDS) experience improved work of breathing and comfort with HFNOT compared with traditional noninvasive ventilation methods (Ashraf-Kasan & Kumar, 2017; Roca et al, 2010).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Prepare for and transfer to critical care unit if indicated.	Intubation and mechanical ventilation are required in the event of severe respiratory insufficiency. The principle of ventilation in patients with ALI is to correct hypoxemia and maintain adequate gas exchange until the cellular damage resolves. In ARDS, mechanical ventilation is typically delivered as positive-pressure ventilation with PEEP via an endotracheal tube. Note: The National Heart, Lung, and Blood Institute's Acute Respiratory Distress Syndrome Clinical Trials Network tidal volume study (ARDSNET, 2000) showed a significant reduction in mortality by utilizing low-volume and low-peak-pressure ventilation. (Refer to CP: Respiratory Failure/Ventilatory Assistance for additional mechanical ventilation interventions.)

### NURSING DIAGNOSIS: risk for imbalanced Fluid Volume

#### Possibly Evidenced By:

Alveolar-capillary membrane changes  
Compromised regulatory mechanisms; decreased plasma proteins  
Active fluid volume loss (e.g., third spacing)  
[Hypotonic dehydration; malnutrition]  
Sepsis; trauma; treatment regimen

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Fluid Monitoring NOC

Demonstrate adequate fluid balance as evidenced by stable vital signs, palpable pulses of good quality; normal skin turgor, moist mucous membranes; individually appropriate urinary output; lack of excessive weight fluctuation (loss or gain); no edema present.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Management NIC</b>	
<b>Independent</b>	
Note the presence of overt (ALI or ARDS) condition and underlying contributing condition(s) (e.g., sepsis, burns, COPD, pneumonia, kidney failure).	Determines potential fluid fluctuations and points toward appropriate assessments and treatments.
Note current treatment modalities, including (1) major invasive procedures (e.g., surgery, intubation/mechanical ventilation); (2) use or overuse of certain medications (e.g., heparin, diuretics); and (3) multiple IV infusions and/or transfusions (may not be a complete listing).	These modalities can cause or exacerbate fluid imbalances and contribute to complications.
Be aware of client's age and functional level (e.g., frail, debilitated) and mental status (e.g., alert, somnolent).	Provides information regarding the client's risk for creating or responding to hydration issues, as well as ability to tolerate fluctuations in fluid volume.
Monitor vital signs, noting and documenting changes. Investigate possible reasons for changes.	Blood pressure, heart, and respiratory rate often increase whether either fluid excess or deficit is present.
Monitor invasive hemodynamic parameters (e.g., central venous pressure [CVP], pulmonary artery pressure [PAP], pulmonary capillary wedge pressure [PCWP]), where available.	Pressures may be high because of excessive fluid volume or low if hypovolemia or cardiovascular shock is present.
Calculate 24-hour fluid balance, noting intake more than output or vice versa.	To ensure accurate picture of fluid status and point toward appropriate interventions to achieve fluid balance.

(continues on page 184)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Measure and record intake: Include all sources (e.g., oral, IV solutions; antibiotic/other additive IVs; enteral/parenteral feedings).	
Measure and record output: Include all sources (e.g., tubes, drainage devices [urinary, gastric, wound, chest tubes], bleeding from any source; measured stools, or weighed diapers/continence pads, etc.).	
Measure/document urine output hourly or as needed. Report urine output <30 mL/hr or output <400 mL/24 hours.	Detecting trends in weight fluctuations in a timely manner allows for prompt interventions, when needed.
Weigh daily or as needed and evaluate changes as they relate to fluid status.	
Assess for dry skin and mucous membranes; delayed capillary refill (especially when accompanied by low blood pressure and elevated heart rate).	Signs of dehydration indicating fluid deficit.
Assess for and monitor edema (generalized, peripheral, dependent; eyelids); note distended neck veins; adventitious breath sounds (especially when accompanied by elevated blood pressure, heart and respiratory rate).	Signs of fluid excess.
Monitor skin and pressure points continuously. (Refer to ND: risk for Disuse Syndrome, following.)	Edematous tissues and patient's malnourished and debilitated status increase risk for skin/tissue breakdown.
Review nutritional issues (e.g., intake of sodium, potassium, protein).	Imbalances in these factors are associated with fluid imbalances. Note: A malnourished patient (common in ARDS) can experience significant fluid shifts and electrolyte changes after nutritional support is initiated.
<b>Collaborative</b>  Administer IV fluids as indicated, using pumps to deliver fluids accurately, and at desired rates to prevent either underinfusion or overinfusion.	Distinguishing between <b>initial fluid resuscitation</b> and <b>ongoing fluid therapy</b> is important. In the early phase of ARDS, an associated septic state is usually responsible for hypovolemia. On the other hand, ARDS is characterized by pulmonary edema (caused by an increase in pulmonary capillary permeability) (Mackay & Al-Haddad, 2009; Roch et al, 2011). Patients with hemodynamic failure (shock) must receive early fluid resuscitation, while pulmonary (and generalized) edema may require fluid restriction (and use of diuretics or dialysis). Thus, liberal and conservative fluid strategies are complementary and should follow each other in time in the same patient (Mikkelsen et al, 2012). Note: Studies have reported that conservative fluid management (with the goal to obtain zero fluid balance) significantly increases the number of days without mechanical ventilation (Weidemann et al, 2006).
Review laboratory data and chest x-ray (ongoing).	To determine changes associated with both fluid and electrolyte status.

### NURSING DIAGNOSIS: **risk for Disuse Syndrome**

#### Possibly Evidenced by:

Alteration in level of consciousness  
Immobility [unavoidable musculoskeletal inactivity; mechanical ventilation; critically ill condition/shock state; hypoxemia; debilitation; malnutrition]

**NURSING DIAGNOSIS:** **risk for Disuse Syndrome** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Risk Control NOC**

Maintain or regain optimal level of cognitive, neurosensory, and musculoskeletal functioning.  
 Demonstrate adequate peripheral perfusion with skin warm and dry; palpable peripheral pulses.  
 Display intact tissues or achieve timely wound healing.  
 Maintain or reestablish effective elimination patterns.  
 Express sense of control over present situation and potential outcome.  
 Be free of preventable complications.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bed Rest Care NIC</b>	
<b>Independent</b>	
Identify underlying conditions/pathology in addition to ALI (e.g., trauma, critical illness; chronic disease conditions, neurological conditions, malnutrition).	These conditions cause or exacerbate problems associated with inactivity and immobility such as reduced strength and endurance; impaired sitting, standing, walking; pressure ulcers; impaired urinary and bowel function; blood clots; and impairments in mental and emotional functioning (interventions and rationale in this ND adapted from Doenges, Moorhouse, & Murr, 2016).
Note specific and potential concerns relating to client's age and preexisting cognitive, mobility, and functional status.	Age-related physiological changes (along with limitation imposed by current illness) predispose older adults to deconditioning and functional decline.
Determine if current condition is likely to involve a long-term illness/recovery time, and evaluate client's risk for complications.	The patient with ALI/ARDS may be in intensive care and hospitalized for a long time, resulting in a higher risk of physical and psychological complications. The patient's coping abilities and willingness to participate in activities can be affected by whether limitations imposed by current condition are likely to be short-term or long-term.
Assess and document (ongoing) patient's functional status, including cognition, vision and hearing, social support; psychological well-being; abilities in performance of activities of daily living.	Provides a comparative baseline that is helpful in evaluating status of condition/underlying disease process, response to treatment, as well as in identifying preventative interventions or necessary services.
Monitor patient's responses to current illness, noting presence of anxiety, depression, withdrawal, problems with thinking and attention.	Studies suggest these patients are at high risk for significant long-term, brain-related morbidity manifested by neurocognitive and neuropsychological impairments, decline in neuromuscular and functional abilities, and diminished quality of life (Biehl et al, 2015; Hopkins et al, 2005).
Provide individually appropriate preventive or corrective interventions:	
<b>Musculoskeletal</b>	
Implement safety precautions in care environment (e.g., bed in lowest possible position, use of bedrails and mobility aids, adequate personnel and equipment for turning/sitting/standing/transfers; family or care provider presence with client).	Patient is at high risk due to (1) prolonged bed rest/immobility, (2) activity intolerance associated with hypoxia, (3) neurosensory and cognitive impairments, (4) use of multiple medications, (5) generalized weakness (debilitation) associated with nutrition status and disease process, and (6) reduced balance, muscle strength, and endurance.

(continues on page 186)

**ACTIONS/INTERVENTIONS (continued)**

Initiate and maximize mobility at earliest opportunity (e.g., advancing from passive to active ROM, turning and sitting in bed, and performing personal grooming skills to standing and walking with assistance and equipment).

**Sensory/perception**

Orient patient as needed to situation, time, place, and person. Provide cues for orientation (e.g., clock, calendar, verbal reminders, chats about current events, family presence).

Provide uninterrupted sleep and rest periods, as well as appropriate level of environmental stimulation (e.g., music, TV/radio, personal possessions, day/night lighting, visitors).

Avoid use of restraints if possible. Use the least restrictive type of restraint when applied, and monitor restrained client closely.

**Skin**

Inspect skin and bony prominences at admission and frequently, documenting changes.

Provide skin care routinely in addition to perineal care prn, washing with mild cleanser and drying well. Apply lotion to dry skin or protectant ointment to perineal area.

Reposition frequently, including weight shifts when in seated position.

Review nutritional status, noting dietary components (e.g., protein, calories, fats, vitamins, minerals, electrolytes).

**Elimination**

Observe elimination patterns (bowel and bladder), noting changes and potential problems.

Implement bowel management program, as indicated.

**Vascular (tissue perfusion)**

Assess cognition and mental status (ongoing).

Check for calf tenderness, redness, and/or swelling. Document and report these signs, when present.

**Powerlessness**

Evaluate for presence of (or potential for) factors with negative impact on recovery of physical, emotional, and behavioral health.

**RATIONALE (continued)**

Improves perfusion to all organs and systems; may prevent loss of or help maintain muscle strength and tone. Care providers may be reluctant to mobilize patient for fear that he or she will “go downhill” while up, experience falls or other injury, or disconnect lines, airways, and other life-support equipment. However, recent and ongoing research suggests that patients who are mobilized earlier come off ventilators sooner, leave ICU and the hospital earlier, and may have fewer short-term (at 12 months) complications (Denehy, Lanphere, & Needham, 2017; Patel et al, 2014; Sharma & Bendas, 2016).

Disturbances in sensory stimulation/interpretation and thought processes are associated with immobility, current disease process, treatments, and medication effects. Sensory stimulation helps in recovery of orientation and other cognitive processes.

Promotes improvement of both physiological and psychological effects associated with serious illness and treatment environment.

Use of restraints can exacerbate patient’s disorientation and confusion and are used only as a last resort when the risk of injury to the patient or others is high (Springer, 2015).

Provides baseline for ongoing assessments and response to interventions.

Clean, moisturized skin is less prone to break down. Prompt peri care minimizes contact with skin irritants (urine, stool, excessive moisture), reducing risk of skin breakdown and pressure ulcer formation in coccyx area.

Enhances circulation to compromised tissues, reducing risk of breakdown/pressure injury.

Improved nutrition aids the body in healing and promotes healthier skin and tissues. Note: Client may receive enteral or parenteral feedings during critical phase. (Refer to Care Plan: Total Nutritional Support for further assessments and interventions.)

Provides baseline for ongoing assessments and response to interventions.

The critically ill patient receiving multiple treatments and medications that impact bowel function may require specific medications/enema, etc.

Changes may be associated with underlying disease process (e.g., sepsis, trauma, shock state), mental or emotional state, and status of cerebral oxygenation.

Indicators of deep vein thrombosis, requiring prompt intervention to resolve clotting problem and prevent lung complications (pulmonary embolus).

The current situation and treatment environment can cause feelings of powerlessness. In addition, patient’s premorbid state, age, relationship status, and lack of support system/resources can further exacerbate these feelings, resulting in withdrawal or depression.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Involve patient in care decisions, as possible.	Enhances sense of control and promotes independence.
Promote interactions and normalization of activities (to extent possible within treatment environment) with family/SO, friends, and peers.	Stimulates the body to produce chemical substances that increase feelings of well-being, alertness, and normalcy in social interactions.
<b>Collaborative</b>	
Provide lateral tilting bed or pressure-reducing surfaces (e.g., air/water mattress bed, gel-filled cushions, foam padding).	Reduces static pressure on fragile tissues.
Institute peripheral vascular support measures (e.g., sequential compression devices [SCDs], elastic hose).	Enhances venous return circulation and leg edema, reduces risk of deep vein thrombosis.
Administer medications as indicated, e.g., lorazepam (Ativan); enoxaparin (Lovenox); heparin	May be required for prevention or treatment of various complications, including agitation, DVT.
Collaborate with other health team members in providing rehabilitative therapies, nutritional support, wound care, and mental health counseling as appropriate.	To achieve maximal gains in physical functioning and psychosocial well-being.
Refer for support and resources, as indicated.	ALI/ARDS survivors deal with long-term neurocognitive, emotional, social, and financial effects of critical illness. Client/SO/caregiver may need or desire counseling, support/resources, special equipment, and medications postdischarge.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Self-Care deficit, [specify]**—fatigue, weakness, neuromuscular or musculoskeletal impairment; impaired mobility; anxiety
- **risk for caregiver Role Strain**—illness severity of care receiver; care receiver discharged home with significant needs; caregiver health impairment; extended duration of caregiving required; caregiving task complexity; excessive caregiving activities; insufficient caregiver respite
- **ineffective Health Management**—complexity of healthcare system or therapeutic regimen; decisional or family conflict; insufficient social support; economically disadvantaged
- **risk for Frail Elderly Syndrome**—chronic illness; prolonged hospitalization; activity intolerance, decreased energy; alteration in cognitive functioning; malnutrition; anxiety, depression; sensory deficit; impaired balance or mobility; insufficient social support; social vulnerability (e.g., disempowerment, decreased life control)

## RESPIRATORY FAILURE/VENTILATORY ASSISTANCE

- I. **Pathophysiology**—impairment of respiratory function affecting O<sub>2</sub> uptake and CO<sub>2</sub> elimination, requiring mechanical assist to support or replace spontaneous breathing. Respiratory failure may be acute or chronic and is associated with:
  - a. Inability to maintain adequate oxygenation (hypoxemia)
  - b. Inability to maintain adequate ventilation due to apnea or alveolar hypoventilation, causing a rise in PaCO<sub>2</sub> and a fall in serum pH (respiratory acidosis)
  - c. Inability to continue the work of breathing (respiratory muscle weakness or failure)
- II. **Types (Kaymar & Sharma, 2016; Melanson, 2017)**
  - a. Type 1. Hypoxemia (PO<sub>2</sub><50 mm Hg on room air). These disorders interfere with the lung's ability to oxygenate blood as it flows through the pulmonary vasculature, such as might occur with disconnection with oxygen source, hypoventilation, high-altitude sickness, V/Q mismatch, or shunting.
  - b. Type 2 (hypercapnic/ventilatory). Acute respiratory acidosis such as might occur with acute exacerbation of chronic emphysema or asthma; increased CO<sub>2</sub> production as might occur with sepsis, fever, burns.
  - c. Type 3 (perioperative). Subset of type 1 but is a common phenomenon. Related causes include atelectasis associated with supine position, airway secretions, upper abdominal incision.
  - d. Type 4 (shock) associated with hypoperfusion. Shock may be hypovolemic, cardiogenic, or septic.
- III. **Etiologies (Kaymar & Sharma, 2016; Melanson, 2017)**
  - a. Central nervous system (CNS) impairment (e.g., drug effects or overdose; cervical spinal cord injury; brain injury with increased ICP, stroke; central alveolar hypoventilation)

(continues on page 188)

- b. Neuromuscular conditions affecting respiratory muscle function (e.g., polio, botulism, tetanus, multiple sclerosis [MS], myasthenia gravis [MG], Guillain-Barre syndrome [GBS])
- c. Chest wall trauma or deformities (e.g., thoracic/lung trauma, pneumothorax, kyphoscoliosis, obesity-hypoventilation syndrome)
- d. Lung injury (e.g., pulmonary endothelial and epithelial damage and subsequent increased permeability, such as occurs with acute respiratory distress syndrome [ARDS])
- e. Upper airway conditions (e.g., obstruction [foreign object, tumor/mass], bronchospasm, infections)
- f. Lower airway conditions (e.g., pneumonia/other lung infections, congestive heart failure)
- g. Lung parenchyma (e.g., infections, interstitial lung disease [autoimmune or rheumatologic diseases; occupational and organic exposures, radiation; pulmonary fibrosis])
- h. Cardiovascular system (e.g., pulmonary edema, cardiopulmonary shock/arrest)

#### **IV. Treatment of Respiratory Failure**

The goal in management of respiratory failure is to reverse hypoxia. Noninvasive ventilation may be considered in patients with mild to moderate acute respiratory failure. Ventilatory support via a nasal or full-face mask is increasingly being used for patients with chronic respiratory failure (see Glossary below for NIV).

However, in patients with severe hypoxemia, intubation and mechanical ventilation are usually required to increase PaO<sub>2</sub> and to lower PaCO<sub>2</sub> and to rest the respiratory muscles. Endotracheal intubation provides the link between the patient and the ventilator. The mode of ventilation and ventilator settings is determined by the patient's lung mechanics, underlying disease process, gas exchange, and response to mechanical ventilation.

#### **V. Mechanical Ventilators**

- a. While ventilator modes have classically been divided into pressure or volume controlled, a more modern approach describes ventilatory modes based on three characteristics: the **trigger** (flow versus pressure), the **limit** (what determines the size of the breath), and the **cycle** (what ends the breath). For example, in both volume-controlled ventilation (VCV) and pressure-controlled ventilation (PCV), time is the cycle, with the difference being in how the time to the end of expiration is determined.
- b. Common modes of ventilation (Parker, 2012; Miller, 2013; Open Anesthesia, 2017)
  - i. Assist control (AC): Provides a breath with either a preset volume for ventilator-initiated breaths or peak pressure every time client takes a breath. One of the most common modes, AC is used for patients who require the most support from the ventilator.
  - ii. Synchronized intermittent mandatory ventilation (SIMV): The ventilator synchronizes machine breath delivery with the patient's spontaneous breath efforts. This mode is a combination of set mandatory machine breaths synchronized with the patient's own spontaneous breaths. The rationale behind using SIMV instead of AC is to help work the patient's respiratory muscles by providing periods of reduced support.
  - iii. Pressure-controlled ventilation (PCV): Type of mandatory breathing that can be used in either AC or SIMV modes and targets a specific pressure during

inspiration. In this mode, the clinician sets a specific time for inspiration.

- iv. Pressure-supported ventilation (PSV or PS): This type of spontaneous breathing support can be used in either CPAP or SIMV modes and targets a set inspiratory pressure. Inspiration ends as the lung gets full and the delivered flow decreases to a specific value set by the clinician. The patient controls the respiratory rate and inspiratory time, as well as the flow rate and tidal volume.
- v. Positive end-expiratory pressure (PEEP): An adjunct to mechanical ventilation that uses elevated pressure during the expiratory phase to increase functional residual capacity lung surface area available for gas exchange. This helps prevent small airway collapse.
- vi. Airway pressure release ventilation (APRV): A variation of CPAP that releases pressure temporarily on exhalation. APRV uses an inverse I:E ratio (i.e., the expiratory [E] phase is longer than the inspiratory [I] phase) to sustain higher airway pressures. Patient can spontaneously ventilate at both low and high pressures, although typically more ventilation occurs at high pressure. This mode has been shown to improve oxygenation in patients who are otherwise difficult to oxygenate.
- vii. Continuous positive airway pressure (CPAP): This mode allows the patient to breathe at a continuous, elevated airway pressure that can improve oxygenation (PEEP/CPAP) and reduce the patient's work of breathing.

#### **c. Ventilator Settings**

- i. FiO<sub>2</sub>: Measure of oxygen delivered during inspiration.
- ii. Rate: Number of breaths delivered by ventilator per minute.
- iii. Tidal volume: Volume of gas delivered with each breath.
- iv. Sensitivity: Alerts ventilator when to recognize the start of spontaneous breathing effort.
- v. Peak flow: The flow rate used to deliver each breath.
- vi. Inspiratory and expiratory times: Time to deliver one complete respiratory cycle. Typically, expiratory time is three times longer than inspiratory time.
- vii. Cycling: Way the ventilator ends the inspiratory phase and allows the patient to exhale. Cycling may be volume cycled, pressure cycled, or flow cycled.
- viii. Limit: Restricts the volume, pressure, or time that gas is delivered during inspiratory phase.

#### **d. Complications**

- i. Associated with endotracheal (ET) tube: Tissue damage to lips, tongue, throat; mucous plugs impairing ventilation and obstruction caused by client biting tube; auto PEEP; sinusitis or otitis; cuff herniation (rare).
- ii. Associated with the ventilator: Infection, hemodynamic instability from positive-pressure ventilation, barotraumas, gastrointestinal (GI) bleeding due to stress ulcer.

#### **V. Statistics**

- a. Morbidity: Acute respiratory failure requiring mechanical ventilation accounts for approximately 30% of admissions to intensive care units (ICUs) (Esteban et al, 2002).
- b. Mortality: The mortality associated with respiratory failure varies according to the etiology. Younger patients

(<60 years) have better survival rates than older patients. For ARDS, mortality is approximately 40% to 45%; this figure has not changed significantly over the years (Phua et al, 2009). Significant mortality also occurs in patients with hypercapnic respiratory failure because they have a chronic respiratory disorder and other comorbidities (such as cardiopulmonary, renal, hepatic, or neurologic disease) (Kaymar & Sharma, 2016). A meta-analysis of 39 studies of patients on prolonged mechanical ventilation reported a

1-year mortality of approximately 60% (Demuth et al, 2015).

- c. Cost: A large-scale study (of 905,035 patients) who required mechanical ventilation between 2008 and 2011 (but did not have ventilator-associated pneumonia) reported that the average per person cost of hospitalization was \$44,888. Patients who developed VAP had a significantly higher cost of hospitalization (\$98,386 vs. \$44,098,  $P <.001$ ) (Soni et al, 2014).

## G L O S S A R Y

**Acute respiratory failure:** A short-term condition, occurring suddenly, and treated as a medical emergency.

**Barotrauma:** Injury to the lungs, airways, or chest wall due to local overinflation caused by high distending pressure in the intrapulmonary airways.

**Capnography:** Measures the concentration or **partial pressure of carbon dioxide** ( $\text{CO}_2$ ) in respiratory gases and the adequacy of patient ventilation. Capnographs typically provide a numerical value for end-tidal  $\text{CO}_2$  (ET $\text{CO}_2$ ) and a graphic representation of exhaled  $\text{CO}_2$  in respiratory gases over time.

**Chronic respiratory failure:** Develops over time and requires long-term treatment.

**Endotracheal (ET) tube:** Tube inserted through the mouth into the trachea to facilitate passage of air into and out of the lungs.

**$\text{FiO}_2$  (fraction of inspired oxygen):** Fraction or percentage of oxygen in the space being measured.

**Hypercapnic respiratory failure:** Characterized by  $\text{PaCO}_2$  higher than 50 mm Hg.

**Hyperventilation:** Fast rate of respiration, which results in loss of carbon dioxide from the blood.

**Hypoventilation:** High partial pressure of alveolar  $\text{CO}_2$  ( $\text{PaCO}_2$ ).

**Hypoxemia:** Low oxygen levels in the blood, common in patients with hypercapnic respiratory failure breathing room air.

**Hypoxic respiratory failure:** Characterized by a  $\text{PaO}_2$  lower than 60 mm Hg with a normal  $\text{PaCO}_2$  and is the most common form of respiratory failure.

**Noninvasive ventilation (NIV):** Administration of ventilatory support without using an endotracheal or tracheostomy tube. Use of NIV has significantly increased over the past two decades and is now an essential tool in management of both acute and chronic respiratory failure. NIV modes include positive- or negative-pressure ventilation and high-flow nasal oxygenation (Soo Hoo, 2016).

**$\text{PaCO}_2$ :** Arterial carbon dioxide tension.

**$\text{PaO}_2$ :** Arterial oxygen tension.

**Positive-pressure ventilation:** Increases pressure in airway, thus forcing air into lungs.

**Pressure-cycled ventilator:** Gas pressure limit is predetermined.

**Respiratory failure:** Syndrome in which the respiratory system fails in one or both of its gas exchange functions: oxygenation and carbon dioxide elimination. Respiratory failure can be classified as hypoxic (low blood oxygen levels) or hypercapnic (high carbon dioxide levels). Respiratory failure may result from either a reduction in ventilatory capacity or an increase in ventilatory demand (or both) (see below).

**Ventilation:** Ability to remove  $\text{CO}_2$  through the lungs.

**Ventilatory capacity:** Maximal spontaneous ventilation that can be maintained without development of respiratory muscle fatigue.

**Ventilatory demand:** Spontaneous minute ventilation that results in a stable  $\text{PaCO}_2$ .

**Volume cycle ventilator:** Volume of gas (tidal volume) is predetermined and delivered.

## CARE SETTING

The focus of this plan of care is the client with invasive mechanical ventilation who remains on a ventilator, whether in an acute or postacute care setting. The expectation is that most clients will be weaned before discharge. However, some clients are either unsuccessful at weaning or are not candidates for weaning. For these clients, portions of this plan of care would need to be modified for the discharge care setting, whether it be an extended-care facility or home.

## RELATED CONCERNS

Acute lung injury/acute respiratory distress syndrome, page 177

Cardiac surgery, page 98

Chronic obstructive pulmonary disease (COPD) and asthma, page 132

Craniocerebral trauma (acute rehabilitative phase), page 226

Pneumothorax/hemothorax, page 169

Psychosocial aspects of care, page 835

Spinal cord injury, page 288

Total nutritional support, page 525

## CLIENT ASSESSMENT DATABASE: RESPIRATORY FAILURE

Gathered data depend on the underlying pathophysiology and reason for ventilatory support.

\*\*\*Refer to the appropriate plan of care.

DIAGNOSTIC DIVISION MAY REPORT	MAY OBSERVE
<b>ACTIVITY/REST</b> <ul style="list-style-type: none"><li>• Generalized weakness and fatigue</li><li>• Shortness of breath at rest or with exertion</li></ul>	<ul style="list-style-type: none"><li>• Tachycardia, hypertension, and diaphoresis (stress response)</li><li>• Peripheral or central cyanosis</li></ul>
<b>NEUROSENSORY</b> <ul style="list-style-type: none"><li>• Dizziness</li></ul>	<ul style="list-style-type: none"><li>• Altered level of consciousness (e.g., drowsy, lethargic, somnolent, comatose)</li><li>• Altered cognitive status (e.g., confused, agitated)</li></ul>
<b>RESPIRATION</b> <ul style="list-style-type: none"><li>• Shortness of breath, inability to breathe</li></ul> <p>History of chronic lung conditions (e.g., COPD, recurrent pneumonia, cystic fibrosis, chest injury, stroke, muscular dystrophy)</p>	<ul style="list-style-type: none"><li>• Increased work breathing, including tachypnea, use of accessory muscles, nasal flaring; intercostal indrawing, suprasternal or supraclavicular retractions</li><li>• Abnormal arterial blood gas results or decreased oxygen saturation</li><li>• Coughing up mucus, wheezing (with chronic respiratory failure)</li></ul>
<b>DISCHARGE PLAN CONSIDERATIONS</b> <p>(If client is ventilator dependent) may require changes in physical layout of home; acquisition of equipment and supplies; provision of a backup power source; instruction of significant other (SO) and caregivers; provision for continuation of plan of care; assistance with transportation; coordination of resources and support systems</p>	<p>► Refer to section at end of plan for postdischarge considerations.</p>

DIAGNOSTIC STUDIES	
TEST	WHAT IT TELLS ME
<b>WHY IT IS DONE</b> <ul style="list-style-type: none"><li>• <b>Chest x-ray:</b> Procedure used to evaluate organs and structures within the chest.</li></ul>	<p>Chest x-ray results vary depending on type of respiratory failure (acute or chronic), for example:</p> <p>May be clear and associated with hypoxemia and normocapnia such as might occur with pulmonary embolus, shock</p> <p>May be diffusely white (opacified) with hypoxemia and normocapnia such as might occur with ARDS, noncardiogenic PE, CHF, pulmonary fibrosis</p> <p>May show localized infiltrates as might occur with pneumonia, atelectasis</p> <p>May be clear with hypercapnia such as might occur with COPD, asthma; overdoses; neuromuscular weakness respiratory conditions (Melanson, 2017)</p>

**WHY IT IS DONE** (continued)**WHAT IT TELLS ME** (continued)**PULMONARY FUNCTION STUDIES**

Determine the ability of the lungs to exchange oxygen and carbon dioxide and include, but are not limited to, the following:

- **Vital capacity (VC):** The total amount of air that can be exhaled after a maximum inspiration; the sum of the inspiratory reserve volume, the tidal volume, and the expiratory reserve volume.
- **Forced vital capacity (FVC):** Total amount of air that can forcibly be blown out after full inspiration.
- **Tidal volume ( $V_T$ ):** Specific volume of air that is drawn into and then expired out of the lungs.
- **Minute ventilation ( $V_E$ ):** Measures volume of air inhaled and exhaled in 1 minute of normal breathing.
- **Peak inspiratory pressure (PIP):** Measures respiratory muscle strength pressure needed to provide each breath.
- **Forced expiratory volume (FEV<sub>1</sub>):** Measures amount of air in liters that a person can forcibly blow out in 1 second. Along with FVC, it is considered one of the primary indicators of lung function.

**STUDIES THAT MONITOR STATUS AND DETERMINE READINESS FOR WEANING**

- **Arterial blood gases (ABGs):** Assesses status of oxygenation, ventilation, and acid-base balance via arterial blood.
- **Chest x-ray:** Procedure used to evaluate organs and structures within the chest.
- **Nutritional assessment:** Assesses albumin, prealbumin, serum transferrin, complete blood count (CBC), electrolytes, lipid profile, iron tests, blood urea nitrogen (BUN)/creatinine (Cr), glucose, and so on.

**NURSING PRIORITIES**

1. Promote adequate ventilation and oxygenation.
2. Prevent complications.
3. Provide emotional support for client and SO.
4. Provide information about disease process, prognosis, and treatment needs.

Reduced in restrictive chest or lung conditions

Normal or increased in COPD

Normal to decreased in neuromuscular diseases, such as Guillain-Barré syndrome

Decreased in conditions limiting thoracic movement, such as kyphoscoliosis. *Note:* Negative inspiratory force (NIF) can be substituted for VC to determine whether client can initiate a breath.

Reduced in restrictive conditions and in asthma and is normal to reduced in COPD.

May be decreased in both restrictive and obstructive processes.

This reflects muscle endurance and is a major determinant of work of breathing.

Normal values should roughly equal the residual volume. Target PIP is below 30 cm H<sub>2</sub>O. *Note:* High PIP may indicate a kinked tube, a need for suctioning, bronchospasm, or a lung problem, such as pulmonary edema or pneumothorax (Parker, 2012).

Usually decreased in obstructive and restrictive lung disorders.

ABG results help determine settings for the ventilator, such as partial pressure of arterial oxygen (PaO<sub>2</sub>), arterial saturation (SaO<sub>2</sub>), and partial pressure of arterial carbon dioxide (PaCO<sub>2</sub>). Monitors resolution and progression of underlying condition, such as ARDS, atelectasis, and pneumonia.

Done to identify nutritional imbalances that might prolong time on ventilator or interfere with successful weaning.

**DISCHARGE GOALS**

1. Respiratory function maximized and adequate to meet individual needs.
2. Complications prevented or minimized.
3. Effective means of communication established.
4. Disease process, prognosis, and therapeutic regimen understood, including home ventilatory support if indicated.
5. Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: Ineffective Breathing Pattern/Impaired Spontaneous Ventilation

### May Be Related To

Neuromuscular or neurological impairment  
Respiratory muscle fatigue; musculoskeletal impairment  
Hyperventilation/hyperbreath syndrome [alteration of client's normal O<sub>2</sub>:CO<sub>2</sub> ratio]

### Possibly Evidenced By

Decreased minute volume, vital capacity, tidal volume  
Dyspnea; increased use of accessory muscles  
Tachypnea or bradypnea or cessation of respirations when off the ventilator  
Decreased PO<sub>2</sub> and SaO<sub>2</sub>, increased PCO<sub>2</sub>  
Increased restlessness, apprehension, metabolic rate

### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status: Ventilation NOC

Reestablish and maintain effective respiratory pattern via ventilator with absence of retractions and use of accessory muscles, cyanosis, or other signs of hypoxia; ABGs and oxygen saturation within acceptable range.  
Participate in efforts to wean (as appropriate) within individual ability.

#### Caregiver Will

Demonstrate behaviors necessary to maintain client's respiratory function.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Mechanical Ventilation Management: Invasive NIC</b> <i>Independent</i> Investigate etiology of respiratory failure.	Understanding the underlying cause of client's particular ventilatory problem is essential to the care of client, for example, decisions about future capabilities and ventilation needs and most appropriate type of ventilatory support.
Observe overall breathing pattern. Note respiratory rate, distinguishing between spontaneous respirations and ventilator breaths.	Client on a ventilator can experience hyperventilation, hypoventilation, or dyspnea and "air hunger" and attempt to correct deficiency by overbreathing.
Auscultate chest periodically, noting presence or absence and equality of breath sounds, adventitious breath sounds, and symmetry of chest movement.	Provides information regarding airflow through the tracheobronchial tree and the presence or absence of fluid, mucous obstruction. Note: Frequent crackles or rhonchi that do not clear with coughing or suctioning may indicate developing complications, such as atelectasis, pneumonia, acute bronchospasm, and pulmonary edema. Changes in chest symmetry may indicate improper placement of the ET tube or development of barotrauma.
Count client's respirations for 1 full minute and compare with desired respirations and ventilator set rate.	Respirations vary depending on problem requiring ventilatory assistance; for example, client may be totally ventilator dependent or be able to take breath(s) on own between ventilator-delivered breaths. Rapid client respirations can produce respiratory alkalosis and prevent desired volume from being delivered by ventilator. Slow client respirations and hypoventilation increase PaCO <sub>2</sub> levels and may cause acidosis.
Verify that client's respirations are in phase with the ventilator.	Adjustments may be required in flow, tidal volume, respiratory rate, and dead space of the ventilator, or client may need sedation to synchronize respirations and reduce work of breathing and energy expenditure.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Position client by elevating head of bed or chair if possible; place in prone position, as indicated.	Elevating the client's head and helping client get out of bed while still on the ventilator is both physically—helps decrease risk of aspiration—and psychologically beneficial. Note: Large randomized trials and recent meta-analyses show that prone position, when performed early and in sufficient duration, may improve survival in patients with severe ARDS and in patients with restrictive lung conditions ventilated with small tidal volumes. Prone positioning seems to act beneficially, improving hemodynamics, gas exchange, and respiratory mechanics. There are contraindications (e.g., unstable vertebral fractures, difficult airway management, recent thoracic surgery) and care difficulties (e.g., patient's size and number of lines, lack of sufficient personnel to perform care interventions, or safe and rapid repositioning when needed) (Koulouras et al, 2016.)
Inflate tracheal or ET tube cuff properly, using minimal leak and occlusive technique. Check cuff inflation every 4 to 8 hours and whenever cuff is deflated and reinflated.	The cuff must be properly inflated to ensure adequate ventilation and delivery of desired tidal volume and to decrease risk of aspiration. Note: In long-term clients, the cuff may be deflated most of the time or a noncuffed tracheostomy tube used if the client's airway is protected.
Check tubing for obstruction, such as kinking or accumulation of water. Drain tubing as indicated, avoiding draining toward client or back into the reservoir.	Kinks in tubing prevent adequate volume delivery and increase airway pressure. Condensation in tubing prevents proper gas distribution and predisposes to bacterial growth.
Check ventilator alarms for proper functioning. Do not turn off alarms, even for suctioning. Remove from ventilator and ventilate manually if source of ventilator alarm cannot be quickly identified and rectified. Ascertain that alarms can be heard in the nurses' station.	Ventilators have a series of visual and audible alarms, such as oxygen, low volume or apnea, high pressure, and inspiratory/expiratory (I:E) ratio. Turning off or failure to reset alarms places client at risk for unobserved ventilator failure or respiratory distress or arrest.
Keep resuscitation bag at bedside and ventilate manually whenever indicated.	Provides or restores adequate ventilation when client or equipment problems require client to be temporarily removed from the ventilator.
Assist client in "taking control" of breathing if weaning is attempted or ventilatory support is interrupted during procedure or activity.	Coaching client to take slower, deeper breaths; practice abdominal or pursed-lip breathing; assume position of comfort; and use relaxation techniques can be helpful in maximizing respiratory function.
<b>Collaborative</b>	
Assess ventilator settings routinely and readjust, as indicated:	Controls or settings are adjusted according to client's primary disease and results of diagnostic testing to maintain parameters within appropriate limits.
Note operating mode of ventilation (e.g., AC, pressure support [PS]).	Client's respiratory requirements, presence or absence of an underlying disease process, and the extent to which client can participate in ventilatory effort determine parameters of each setting. PS has advantages for client on long-term ventilation because it allows client to strengthen pulmonary musculature without compromising oxygenation and ventilation during the weaning process.
Observe oxygen concentration percentage ( $\text{FiO}_2$ ), verify that oxygen line is in proper outlet or tank, and monitor in-line oxygen analyzer or perform periodic oxygen analysis.	$\text{FiO}_2$ is adjusted (21% to 100%) to maintain an acceptable oxygen percentage and saturation (e.g., 90%) for client's condition.
Observe end-tidal $\text{CO}_2$ ( $\text{ETCO}_2$ ) values.	Measures the amount of exhaled $\text{CO}_2$ with each breath and is displayed graphically to spot $\text{CO}_2$ exchange problems early before they show up on ABGs. In some cases, a slightly higher level of $\text{CO}_2$ can be beneficial, such as for the client with long-standing emphysema. In this instance, elevated $\text{PCO}_2$ is accepted without correction, leading to the term "permissive hypercapnia" (Byrd & Roy, 2017).

(continues on page 194)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess set respiratory frequency (f).	Respiratory rate of 10 to 15 per minute may be appropriate except for client with COPD and CO <sub>2</sub> retention. In these individuals, rate and volume should be adjusted to achieve personal baseline PaCO <sub>2</sub> , not necessarily a "normal" PaCO <sub>2</sub> .
Assess V <sub>T</sub> . Verify proper function of spirometer, bellows, or computer readout of delivered volume; note alterations from desired volume delivery.	Monitors amount of air inspired and expired. Changes may indicate alteration in lung compliance or leakage through machine or around tube cuff. Note: For the client without preexisting lung disease, the V <sub>T</sub> and rate are traditionally selected by using V <sub>T</sub> of 8 to 10 mL/kg delivered 12 times per minute in the AC mode. For clients with COPD, the V <sub>T</sub> and rate are slightly reduced to 10 mL/kg at 10 breaths per minute to prevent overinflation and hyperventilation. Many clinicians now use a smaller V <sub>T</sub> (6 to 8 mL/kg), especially in clients with ARDS and sometimes in obstructive and restrictive lung disease, to reduce air-trapping and mechanical stress on the lung.
Flow rate	Speed with which the V <sub>T</sub> is delivered is usually about 50 L/min but is variable in order to maintain I:E ratio appropriate for specific situation.
Pressure limit	Regulates the amount of pressure the volume-cycled ventilator can generate to deliver the preset V <sub>T</sub> with usual setting at 10 to 20 cm H <sub>2</sub> O above the client's peak inspiratory pressure. Airway pressure should remain relatively constant. Increased pressure alarm reading reflects (1) increased airway resistance as may occur with bronchospasm, (2) retained secretions, and (3) decreased lung compliance as may occur with obstruction of the ET tube, development of atelectasis, ARDS, pulmonary edema, worsening COPD, or pneumothorax. Low airway pressure alarms may be triggered by pathophysiological conditions causing hypoventilation, such as disconnection from ventilator, low ET cuff pressure, ET tube displaced above the vocal cords, and client "overbreathing" or out of phase with the ventilator.
Monitor I:E ratio.	Expiratory phase is usually twice the length of the inspiratory rate but may be longer to compensate for air-trapping to improve gas exchange in the client with COPD.
Set sigh rate, when used.	Clinicians once recommended that periodic machine breaths that were 1.5 to 2 times the preset V <sub>T</sub> be given six to eight times per hour. At present, accounting for sighs is not recommended if the client is receiving V <sub>T</sub> of 8 to 10 mL/kg or if PEEP is required. When a low V <sub>T</sub> is used, sighs are preset at 1.5 to 2 times the V <sub>T</sub> and delivered six to eight times per hour if the peak and plateau pressures are within acceptable limits (Byrd & Roy, 2017).
Note inspired humidity and temperature; use heat moisture exchanger (HME), as indicated.	Usual warming and humidifying function of nasopharynx is bypassed with intubation. Dehydration can dry up normal pulmonary fluids, cause secretions to thicken, and increase risk of infection. Temperature should be maintained at about body temperature to reduce risk of damage to cilia and hyperthermia reactions. The introduction of a heated wire circuit to the traditional system significantly reduces the problem of "rainout" or condensation in the tubing.
Monitor serial ABGs and pulse oximetry.	Adjustments to ventilator settings may be required, depending on client's response and trends in gas exchange parameters.

**NURSING DIAGNOSIS:** **ineffective Airway Clearance****May Be Related To**

Presence of artificial airway  
Neuromuscular dysfunction

**Possibly Evidenced By**

Changes in respiratory rate  
Ineffective/absent cough  
Adventitious breath sounds  
Restlessness  
Cyanosis

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Airway Patency NOC**

Maintain patent airway with breath sounds clear.  
Be free of aspiration.

**Caregiver Will**

Identify potential complications and initiate appropriate actions.

**ACTIONS/INTERVENTIONS****RATIONALE****Artificial Airway Management NIC***Independent*

Assess airway patency.

Obstruction may be caused by accumulation of secretions, mucous plugs, hemorrhage, bronchospasm, and problems with the position of tracheostomy or ET tube.

Evaluate chest movement and auscultate for bilateral breath sounds.

Symmetrical chest movement with breath sounds throughout lung fields indicates proper tube placement and unobstructed airflow. Lower airway obstruction, such as pneumonia or atelectasis, produces changes in breath sounds, such as rhonchi and wheezing.

Monitor ET tube placement. Note lip line marking and compare with desired placement. Secure tube carefully with tape or tube holder. Obtain assistance when retaping or repositioning tube.

The ET tube may slip into the right main-stem bronchus, thereby obstructing airflow to the left lung and putting client at risk for a tension pneumothorax.

Note excessive coughing, increased dyspnea (using a 0 to 10 [or similar] scale), high-pressure alarm sounding on ventilator, visible secretions in endotracheal or tracheostomy tube, and increased rhonchi.

The intubated client often has an ineffective cough reflex, or client may have neuromuscular or neurosensory impairment, altering ability to cough. Client is usually dependent on suctioning to remove secretions. Note: Research supports use of a dyspnea rating scale (like those used to measure pain) to more accurately quantify and measure changes in dyspnea as experienced by client.

Suction as needed when client is coughing or experiencing respiratory distress, limiting duration of suction to no more than 15 seconds. Choose appropriate suction catheter. Hyperventilate before and after each catheter pass, using 100% oxygen if appropriate, using vent rather than Ambu bag, which has an increased risk of barotrauma. Suction continuously during withdrawal.

Suctioning should not be routine, and duration should be limited to reduce hazard of hypoxia. Suction catheter diameter should be less than 50% of the internal diameter of the ET or tracheostomy tube for prevention of hypoxia. Hyperoxygenation with ventilator sigh on 100% oxygen may be desired to reduce atelectasis and to reduce accidental hypoxia. Note: Instilling normal saline (NS) is no longer recommended, although it persists in practice. Reasons to abstain from NS use vary but include complications such as infection and harmful hemodynamic changes (Caporros & Forbes, 2014).

Use inline catheter suction when available.

Helps maintain oxygen saturation and PEEP when used.

Reposition or turn periodically.

Promotes drainage of secretions and ventilation to all lung segments, reducing risk of atelectasis.

(continues on page 196)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage the client to drink fluids (if swallowing is possible) and provide fluids within individual capability.	Helps liquefy secretions, enhancing expectoration.
<b>Collaborative</b>	
Provide chest physiotherapy as indicated, such as postural drainage and percussion.	Promotes ventilation of all lung segments and aids drainage of secretions.
Administer intravenous (IV) and aerosol bronchodilators as indicated.	Promotes ventilation and removal of secretions.
Assist with fiber-optic bronchoscopy, if indicated.	May be performed to remove secretions and mucous plugs.

## NURSING DIAGNOSIS: impaired verbal Communication

### May Be Related To

Physical barrier (e.g., tracheostomy intubation)

### Possibly Evidenced By

Inability to speak

### Desired Outcomes/Evaluation Criteria—Client Will

#### Communication: Expressive NOC

Establish method of communication in which needs can be understood.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Communication Enhancement: Speech Deficit NIC</b>	
<b>Independent</b>	
Assess client's ability to communicate by alternative means.	Reasons for long-term ventilatory support are various; client may be alert and be adept at writing (such as chronic COPD with inability to be weaned) or may be lethargic, comatose, or paralyzed. Method of communicating with client is therefore highly individualized. Note: The inability to talk while intubated is a primary cause of feelings of fear.
Establish means of communication, for example, maintain eye contact; ask yes/no questions; provide magic slate, paper and pencil, computer, cell phone (if client can text); picture or alphabet board; use sign language as appropriate; and validate meaning of attempted communications.	Eye contact assures client of interest in communicating; if client can move head, blink eyes, or is comfortable with simple gestures, a great deal can be done with yes/no questions. Texting, word-processing, writing, or pointing to letter boards is often tiring to client, who can then become frustrated with the process. Use of picture boards that express a concept (e.g., "need pain shot") or routine needs (e.g., "need bedpan") may simplify communication. Family members and other caregivers may be able to assist and interpret needs.
Consider form of communication when placing IV.	IV positioned in hand or wrist may limit ability to write or sign.
Place call light or bell within reach, making certain client is alert and physically capable of using it. Answer call light or bell immediately. Anticipate needs. Tell client that nurse is immediately available should assistance be required.	Ventilator-dependent client may be better able to relax, feel safe (not abandoned), and breathe with the ventilator knowing that nurse is vigilant and needs will be met.
Place note at central call station informing staff that client is unable to speak.	Alerts all staff members to respond to client at the bedside instead of over the intercom.
Encourage family and SO to talk with client, providing information about family and daily happenings.	SO may feel self-conscious in one-sided conversation, but knowledge that he or she is assisting client to regain or maintain contact with reality and enabling client to feel part of family unit can reduce feelings of awkwardness.
<b>Collaborative</b>	
Evaluate need for or appropriateness of talking tracheostomy tube.	Client with adequate cognitive and muscular skills may have the ability to manipulate talking tracheostomy tube.

**NURSING DIAGNOSIS: Anxiety [specify level]****May Be Related To**

Situational crises; threat to self-concept  
Threat of death  
Change in health, economic status, or role functioning

**Possibly Evidenced By**

Increased muscle/facial tension  
Insomnia, restlessness  
Hypervigilance  
Alteration in attention, concentration; confusion  
Fear, awareness of physiological symptoms

**Desired Outcomes/Evaluation Criteria—Client Will****Anxiety Self-Control NOC**

Communicate awareness of feelings and healthy ways to deal with them.  
Demonstrate problem-solving skills or behaviors to cope with current situation.

**Anxiety Level NOC**

Report that anxiety is reduced to manageable level.  
Appear relaxed and sleeping or resting appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction NIC</b>	
<i>Independent</i>	
Identify client's perception of threat represented by situation. Determine current respiratory status and adequacy of ventilation.	Defines scope of individual problem separate from physiological causes and influences choice of interventions.
Observe and monitor physical responses, such as restlessness, changes in vital signs, and repetitive movements. Note congruity of verbal/nonverbal communication.	Useful in evaluating extent or degree of concerns, especially when compared with "verbal" comments.
Encourage client and SO to acknowledge and express fears.	Provides opportunity for dealing with concerns, clarifies reality of fears, and reduces anxiety to a more manageable level.
Acknowledge the anxiety and fear of the situation. Avoid meaningless reassurance that everything will be all right.	Validates the reality of the situation without minimizing the emotional impact. Provides opportunity for client and SO to accept and begin to deal with what has happened, reducing anxiety.
Identify and review with client and SO the safety precautions being taken, such as backup power and oxygen supplies and emergency equipment at hand for suctioning. Discuss or review the meanings of alarm system.	Provides reassurance to help allay unnecessary anxiety, reduce concerns of the unknown, and preplan for response in emergency situation.
Note reactions of SO. Provide opportunity for discussion of personal feelings, concerns, and future expectations.	Family members have individual responses to what is happening, and their anxiety may be communicated to client, intensifying these emotions.
Identify previous coping strengths of client and SO and current areas of control and ability.	Focuses attention on own capabilities, increasing sense of control.
Demonstrate and encourage use of relaxation techniques, such as guided imagery and progressive relaxation. Provide music therapy and biofeedback as appropriate.	Provides active management of situation to reduce feelings of helplessness.
Provide and encourage sedentary diversional activities within individual capabilities, such as handicrafts, writing, and television.	Although handicapped by dependence on ventilator, activities that are normal or desired by the individual should be encouraged to enhance quality of life.
<i>Collaborative</i>	
Refer to support individuals, groups, and therapy, as needed.	May be necessary to provide additional assistance if client and SO are not managing anxiety or when client is "identified with the machine."

## NURSING DIAGNOSIS: risk for impaired Oral Mucous Membrane

### Possibly Evidenced By

Mechanical factors—tubes [ET, NG]  
Decreased salivation  
Ineffective oral hygiene

### Desired Outcomes/Evaluation Criteria—Client Will

#### Tissue Integrity: Skin and Mucous Membrane NOC

Report or demonstrate a decrease in symptoms.

### Caregiver Will

Identify specific interventions to promote healthy oral mucosa as appropriate.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Oral Health Maintenance NIC

##### Independent

Suction mouth prior to oral care, as well as prn per nursing assessment and facility protocol.

Oral care stimulates saliva production, thereby increasing the amount of secretions present in the mouth and back of throat. Suctioning the mouth before and after oral care reduces the accumulation of excess secretions above the cuff of the endotracheal tube, where aspiration often occurs (a risk factor for ventilator-associated pneumonia [VAP]) (Sole et al, 2011). (Refer to CP: Pneumonia, ND: risk for Infection [spread] for additional information.)

Routinely inspect oral cavity, teeth, gums for sores, lesions, and bleeding.

Early identification of problems provides opportunity for appropriate intervention and preventive measures.

Administer mouth care routinely per protocol and as needed, especially in client with an oral intubation tube; for example, cleanse mouth with water, saline, or preferred alcohol-free mouthwash.

Prevents drying and ulceration of mucous membrane and reduces medium for bacterial growth. Promotes comfort.

Brush teeth with suction toothbrush, pediatric soft toothbrush, or WaterPik™. Use swab instead of toothbrush on edentulous patient.

Brushing helps remove plaque and debris. Use of a power suction toothbrush helps in accessing hard-to-reach areas while reducing secretion accumulation and minimizing mucosal irritation (Booker et al, 2013).

Apply water-based lip balm and oral lubricant solution.

Maintains moisture and prevents drying of mucosal surfaces. Note: Dry, cracked mucosa causes discomfort and provides a portal of entry for bacteria.

Change position of ET tube and airway on a regular and prn (as necessary) schedule as appropriate.

Reduces risk of lip and oral mucous membrane ulceration.

## NURSING DIAGNOSIS: imbalanced Nutrition: less than body requirements

### May Be Related To

Inability to ingest/digest food  
[Increased metabolic demands]

### Possibly Evidenced By

Weight loss; poor muscle tone; [decreased subcutaneous fat or muscle mass]  
[Hypo-] or hyperactive bowel sounds

### Desired Outcomes/Evaluation Criteria—Client Will

#### Nutritional Status NOC

Demonstrate progressive weight gain toward goal with normalization of laboratory values.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Therapy</b> <b>NIC</b>	
<b>Independent</b>	
Evaluate ability to eat.	Client with a tracheostomy tube may be able to eat, but client with ET tube must have enteral or parenteral nutrition.
Observe and monitor for generalized muscle wasting and loss of subcutaneous fat.	These symptoms are indicative of depletion of muscle energy and can reduce respiratory muscle function.
Weigh, as indicated.	Significant and recent weight loss (7% to 10% of body weight) and poor nutritional intake provide clues regarding catabolism, muscle glycogen stores, and ventilatory drive sensitivity.
Administer fluid intake of at least 2500 mL/d within cardiac tolerance.	Prevents dehydration that can be exacerbated by increased insensible losses (ventilator or diaphoresis, hypermetabolic state) and reduces risk of constipation.
Assess GI function: presence and quality of bowel sounds and changes in abdominal girth, nausea, and vomiting. Observe and document changes in bowel movements, such as diarrhea and constipation. Test all stools for occult blood.	A functioning GI system is essential for the proper utilization of enteral feedings. Note: Mechanically ventilated clients are at risk of developing abdominal distention (trapped air or ileus) and gastric bleeding (stress ulcers).
<b>Collaborative</b>	
Refer to dietitian to adjust nutrients to meet respiratory needs, as indicated.	High intake of carbohydrates, protein, and calories may be desired or needed during ventilation to improve respiratory muscle function. Carbohydrates may be reduced and fat somewhat increased just before weaning attempts to prevent excessive CO <sub>2</sub> production and reduced respiratory drive.
Administer tube feeding or hyperalimentation, as needed. (Refer to CP: Total Nutritional Support: Parenteral/Enteral Feeding.)	Provides adequate nutrients to meet individual needs when oral intake is insufficient or not appropriate.
Monitor laboratory studies as indicated, such as prealbumin, serum transferrin, BUN/Cr, and glucose.	Provides information about adequacy of nutritional support or need for change.

### NURSING DIAGNOSIS: **risk for Infection**

#### Possibly Evidenced By

- [Inadequate primary defenses]—traumatized lung tissue, decrease in ciliary action, stasis of body fluids
- [Inadequate secondary defenses]—immunosuppression
- Chronic illness, malnutrition
- [Increased exposure to pathogens:] Invasive procedure—intubation; exposure to multiple healthcare workers

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Risk Control: Infectious Process **NIC**

Be free of signs/symptoms of infection.

##### Client/Caregiver Will

Identify individual risk factors.

Demonstrate interventions to promote safe environment.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pneumonia Prevention NIC</b> <i>Independent</i> Note risk factors for occurrence of infection.	Intubation interferes with the normal defense mechanisms that keep microorganisms out of the lungs. ET tubes, especially cuffed ones, interfere with the mucociliary transport system that helps clear airway secretions. Secretions that accumulate below and above the ET tube cuff are an ideal growth medium for pathogens. The ET tube also prevents normal closure of the epiglottis, resulting in an incomplete seal of the laryngeal structures that normally protect the lungs. This can contribute to aspiration, which often leads to ventilator-associated pneumonia (VAP) (Damas et al, 2015). The reported incidence of VAP varies according to different studies but is reportedly occurring in 10% to 28% of individuals receiving mechanical ventilation (Amanullah & Posner, 2015). Other factors include prolonged mechanical ventilation, trauma, general debilitation, malnutrition, age, and invasive procedures. Awareness of individual risk factors provides opportunity to limit effects and helps prevent VAP.
Observe color, odor, and characteristics of sputum. Note drainage around tracheostomy tube.	Yellow or green, purulent odorous sputum or drainage is indicative of infection; thick, tenacious sputum suggests dehydration.
Engage in proper hand washing or alcohol-based hand rubs, wear gloves when handling respiratory secretions and equipment contaminated with respiratory secretions; maintain sterile techniques when performing arterial punctures (for ABGs) and when suctioning using open system; use closed-system ET tube whenever possible, to allow for continuous removal of secretions.	These factors may be the simplest but are the most important keys to prevention of hospital-acquired infection.
Restrict the number of times the ventilator tubes are open, and provide clean nebulizer and tubing changes per protocol.	Research indicates that frequent changes of ventilator tubings have not been shown to reduce the risk of VAP and are currently not recommended. Current recommendations are to change tubings when soiled or when causing the ventilator to malfunction (Amanullah & Posner, 2015).
Auscultate breath sounds.	Presence of rhonchi and wheezes suggests retained secretions requiring expectoration or suctioning.
Monitor for elevation of temperature.	Fever may signal onset of infection, although if client is immunosuppressed, fever may not present.
Keep head of bed elevated (if not prohibited by medical conditions such as spinal cord injury) to >30 degrees.	Positioning of the intubated patient is believed to be relevant in the development of VAP. The 45-degree semi-recumbent position is widely recommended, but recent data suggest that the lateral position may be superior to prevent VAP (Coppadoro, Bittner, & Berra, 2012; Niel-Weise et al, 2011).
Provide or instruct client and SO in proper oral care and secretion disposal, such as disposing of tissues and soiled tracheostomy dressings.	Reduces risk of pneumonia associated with aspiration of oral bacteria, as well as transmission of fluid-borne organisms.
Monitor and screen visitors. Avoid contact with persons with respiratory infections.	Individual is already compromised and is at increased risk with exposure to infections.
Provide respiratory isolation when indicated.	Depending on specific diagnosis, client may require protection from others or must prevent transmission of infection, for example, influenza or tuberculosis (TB) to others.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Maintain adequate hydration and nutrition. Encourage fluids to 2500 mL/d within cardiac tolerance.	Helps improve general resistance to disease and reduces risk of infection from static secretions.
Avoid gastric distention. Check pH of secretions, if indicated. Avoid antacids, as well.	Helps identify presence of gastric secretions in respiratory tract and permits early intervention for VAP associated with gastric reflux and aspiration.
Encourage self-care and activities to limit of tolerance. Assist with graded exercise program.	Improves general well-being and muscle strength and may stimulate immune system recovery. Note: Many studies are being conducted addressing benefits and adverse effects of early mobility for the patient on a ventilator. In addition to no severe negative effects, many benefits have been correlated with early mobility. Studies have demonstrated that intensive care unit (ICU) patients who participate in early rehabilitation have (1) improved muscle strength, (2) a significant reduction in the duration of mechanical ventilation, and (3) demonstrable decrease in patients' ICU and hospital lengths of stay (Agency for Healthcare Research and Quality [AHRQ], 2017).
<b>Collaborative</b>	
Monitor laboratory tests (e.g., WBCs with differential).	Leukocytosis may indicate presence and severity of infection.
Evaluate period chest x-rays.	Infiltrates may signal presence of pneumonia.
Obtain sputum cultures as indicated.	May be needed to identify pathogens and appropriate antimicrobials. Note: Microorganisms implicated in VAP that occurs in the first 48 hours after intubation are those of the upper airway ( <i>Haemophilus influenzae</i> and <i>Streptococcus pneumoniae</i> ). After this early period, gram-negative bacilli (e.g., <i>Pseudomonas aeruginosa</i> , <i>Escherichia coli</i> , and <i>Acinetobacter</i> , <i>Proteus</i> , and <i>Klebsiella</i> ) are more predominant. <i>Staphylococcus aureus</i> , especially methicillin-resistant <i>S. aureus</i> (MRSA), typically becomes a major agent after 7 days of mechanical ventilation (Byrd & Roy, 2017).
Administer broad-spectrum antimicrobials, as indicated.	If infection does occur, one or more agents may be used, depending on identified pathogen(s).

### NURSING DIAGNOSIS: risk for dysfunctional Ventilatory Weaning Response

#### Possibly Evidenced By

Physiological factors: Inadequate nutrition; pain, [muscle weakness or fatigue], alteration in sleep pattern

Psychological factors: Uncertainty about ability to wean; anxiety, fear; [unprepared for weaning attempt]

Situational factors: Environmental barrier (e.g., distractions, low nurse to patient ratio, unfamiliar healthcare staff); history of ventilator dependence >4 days; history of multiple unsuccessful weaning attempts

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Mechanical Ventilation Weaning Response: Adult NOC

Actively participate in the weaning process.

Reestablish independent respiration with ABGs within acceptable range and free of signs of respiratory failure.

##### Activity Tolerance NOC

Demonstrate increased tolerance for activity and participate in self-care within level of ability.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Mechanical Ventilatory Weaning NIC</b>	
<b>Independent</b>	
Assess physical factors involved in weaning as follows:	
Stable heart rate/rhythm, blood pressure (BP), and clear breath sounds	The heart must work harder to meet increased energy needs associated with weaning. Weaning may be deferred if tachycardia, pulmonary crackles, or hypertension are present.
Fever	Increase of 1°F (0.6°C) in body temperature raises metabolic rate and oxygen demands by 7%.
Nutritional status and muscle strength	Weaning is hard work. Client not only must be able to withstand the stress of weaning but also must have the stamina to breathe spontaneously for extended periods.
Determine psychological readiness.	Weaning provokes anxiety for client regarding concerns about ability to breathe on own and long-term need of ventilator.
Explain weaning techniques, for example, spontaneous breathing trial (SBT), T-piece, pressure support ventilation (PSV), and spontaneous intermittent maximal ventilation (SIMV). Discuss individual plan and expectations.	Assists client to prepare for weaning process, helps limit fear of unknown, promotes cooperation, and enhances likelihood of a successful outcome. Note: Current guidelines recommend SBT as the preferred method of weaning as it withdraws ventilatory support while oxygenation is continued. The simplest form of SBT is the T-piece trial. In PSV weaning, all breaths are spontaneous and combined with enough pressure support to ensure that each breath is a reasonable tidal volume. Findings from randomized trials suggest that SIMV weaning delays extubation compared with PSV and SBT and that it should not be the primary mode of weaning in most clients (Byrd & Roy, 2017).
Provide undisturbed rest and sleep periods. Avoid stressful procedures or situations and nonessential activities.	Maximizes energy for weaning process; limits fatigue and oxygen consumption. Note: It takes approximately 12 to 14 hours of respiratory rest to rejuvenate tired respiratory muscles. For clients on AC, raising the rate to 20 breaths per minute can also provide respiratory rest.
Evaluate and document client's progress. Note restlessness; changes in BP, heart rate, and respiratory rate; use of accessory muscles; disordinated breathing with ventilator; increased concentration on breathing (mild dysfunction); client's concerns about possible machine malfunction; inability to cooperate or respond to coaching; and color changes.	Indicators that client may require slower weaning and an opportunity to stabilize or may need to stop or revise program.
Recognize and provide encouragement for client's efforts.	Positive feedback provides reassurance and support for continuation of weaning process.
Monitor cardiopulmonary response to activity.	Excessive oxygen consumption and demand increase the possibility of failure.
<b>Collaborative</b>	
Consult with dietitian and nutritional support team for adjustments in composition of diet.	Reduction of carbohydrates and fats may be required to prevent excessive production of CO <sub>2</sub> , which could alter respiratory drive.
Monitor CBC, serum albumin and prealbumin, transferrin, total iron-binding capacity, and electrolytes, especially potassium, calcium, and phosphorus.	Verifies that nutrition is adequate to meet energy requirements for weaning.
Review chest x-ray and ABGs.	Chest x-rays should show clear lungs or marked improvement in pulmonary congestion or infiltrates. ABGs should document satisfactory oxygenation on an FiO <sub>2</sub> of 40% or less.

**NURSING DIAGNOSIS:** **deficient Knowledge (Specify)****May Be Related To**

Alteration in cognitive functioning or memory  
Insufficient information; insufficient knowledge of resources

**Possibly Evidenced By**

Reports the problem  
Inaccurate follow-through of instruction or performance of a procedure  
Inappropriate behaviors—agitated, apathetic  
Development of preventable complications

**Desired Outcomes/Evaluation Criteria—Client/SO/Caregiver Will****Health-Seeking Behavior NOC**

Participate in learning process.  
Exhibit increased interest, shown by verbal or nonverbal cues.  
Assume responsibility for own learning and begin to look for information and to ask questions.

**Knowledge: Treatment Regimen NOC**

Indicate understanding of mechanical ventilation therapy.  
Demonstrate behaviors or new skills to meet individual needs and prevent complications.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Learning Facilitation NIC</b> <i>Independent</i> Determine ability and willingness to learn.	Physical condition may preclude client involvement in care before and after discharge. SO/caregiver may feel inadequate, afraid of machinery, and have reservations about ability to learn or deal with overall situation.
Schedule teaching sessions for quiet, nonstressful times when all participants are well rested.	Enhances learners' ability to focus on and absorb content provided.
Arrange information in logical sequence, progressing from simple to more complex material at learners' pace.	Allows learners to build on information learned in previous sessions; is less threatening and overwhelming.
<b>Knowledge: Disease Process</b> Provide material in multiple formats, such as books and pamphlets, audiovisuals, hands-on demonstrations, and take-home instruction sheets, as appropriate.	Uses multiple senses to stimulate learning and retention of information. Provides resources for review following discharge.
Discuss specific condition requiring ventilatory support, what measures are being tried for weaning, and short- and long-term goals of treatment.	Provides knowledge base to aid client and SO in making informed decisions. Weaning efforts may continue for several weeks (extended period of time). Dependence is evidenced by repeatedly increased $\text{PCO}_2$ and decline in $\text{PaO}_2$ during weaning attempts, presence of dyspnea, anxiety, tachycardia, perspiration, and cyanosis.
Encourage client and SO to evaluate impact of ventilatory dependence on their lifestyle and what changes they are willing or unwilling to make. Problem-solve solutions to issues raised.	Quality of life must be resolved by the ventilator-dependent client and caregivers who need to understand that home ventilatory support is a 24-hour job that affects everyone.
Promote participation in self-care and diversional activities and socialization, as appropriate.	Refocuses attention toward more normal life activities, increases endurance, and helps prevent depersonalization.
Review issues of general well-being: role of nutrition, assistance with feeding and meal preparation, graded exercise and specific restrictions, and rest periods alternated with activity.	Enhances recuperation and ensures that individual needs will be met.
Recommend that SO and caregivers learn cardiopulmonary resuscitation (CPR).	Provides sense of security about ability to handle emergency situations that might arise until help can be obtained.
Schedule team conference. Establish in-hospital training for caregivers if client is to be discharged home on ventilator.	Team approach is needed to coordinate client's care and teaching program to meet individual needs.

(continues on page 204)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct caregiver and client in hand-washing techniques, use of sterile technique for suctioning, tracheostomy or stoma care, and chest physiotherapy.	Reduces risk of infection and promotes optimal respiratory function.
Provide demonstration and “hands-on” sessions, as well as written material, about specific type of ventilator to be used, including function and care of equipment.	Enhances familiarity, reducing anxiety and promoting confidence in implementation of new tasks and skills.
Discuss what and when to report to the healthcare provider, for example, signs of respiratory distress and infection.	Helps reduce general anxiety while promoting timely and appropriate evaluation and intervention to prevent complications.
Ascertain that all needed equipment is in place and that safety concerns have been addressed, such as alternative power source (generator, batteries), backup equipment, and client call and alarm system.	Predischarge preparations can ease the transfer process. Planning for potential problems increases sense of security for client and SO.
Contact community or hospital-based services.	Suppliers of home equipment, physical therapy, care providers, emergency power provider, and social services, such as financial assistance, aid in procuring equipment and personnel and facilitate transition to home.
Refer to vocational or occupational therapist.	Some ventilator-dependent clients are able to resume vocations either while on the ventilator or during the day (while ventilator dependent at night).

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

If client is discharged on ventilator, the client's needs and concerns remain the same as noted in this plan of care, in addition to the following:

- **Self-Care deficit**—musculoskeletal/neuromuscular impairment, weakness, fatigue, pain, environmental barriers
- **interrupted Family Processes**—situational crisis, shift in family roles, shift in health status of a family member
- **risk for Relocation Stress Syndrome**—reports powerlessness, decreased health status, lack of predeparture counseling, moderate to high degree of environmental change
- **risk for caregiver Role Strain**—discharge of family member with significant home-care needs, presence of situational stressors that normally affect families (economic vulnerability, changes in roles and responsibilities), duration of caregiving required, inexperience with caregiving

## PULMONARY TUBERCULOSIS (TB)

### I. Pathophysiology

- a. Bacterial infection by *Mycobacterium tuberculosis* (Mtb) bacilli
  - i. Primarily affects the lungs (85%; Herchline & Amorosa, 2016), although it can invade other body systems.
  - ii. Airborne droplets are inhaled, with the droplet nuclei deposited within the alveoli of the lung.
- b. Primary infection is followed by a latent or dormant phase or by active disease in some individuals.
- c. When the immune system weakens, dormant TB organisms can reactivate and multiply (reactivation TB).

### II. Classifications

- a. Latent: Body's immune system has encapsulated the bacteria into tiny capsules called tubercles, infection not transmissible to others.
- b. Active: Infection is spreading in the body and can be transmitted to others.

### III. Etiology

- a. Following exposure, the bacilli may (1) be killed by the immune system, (2) multiply and cause primary TB, (3) become dormant and remain asymptomatic, or (4) proliferate after a latency period (reactivation disease) (Herchline & Amorosa, 2016).
- b. Multidrug-resistant tuberculosis (MDR-TB)
  - i. Primary: Caused by person-to-person transmission of a drug-resistant organism
  - ii. Secondary: Usually the result of nonadherence to therapy or inappropriate treatment
  - iii. On the rise especially in large cities, in those previously treated with antitubercular drugs, or in those who failed to follow or complete a drug regimen
  - iv. Can progress from diagnosis to death in as little as 4 to 6 weeks
- c. Risk factors: Individuals with weakened immune systems (higher among persons with HIV infection); chronic

conditions such as diabetes, kidney disease, some forms of cancer, IV drug use; advanced age, malnutrition; impoverished populations, homelessness, shelter dwelling, incarceration; as well as among people who have traveled or lived in countries in which TB is endemic (e.g., Africa, eastern Europe, Asia, Russia, Latin America, Caribbean Islands).

#### IV. Statistics

- a. Morbidity: In 2015, in the United States, 9557 TB cases were reported to CDC, representing a 1.6% increase from 2014. In 2015, a total of 66.4% of reported TB cases in the United States occurred among foreign-born persons (CDC, 2015b). In 2014, an estimated 1.2 million (12%) of the 9.6 million people who developed TB worldwide were HIV positive (World Health Organization [WHO], 2015).

- b. Mortality: There were 493 deaths in the United States from TB in 2014, the most recent year for which these data are available (CDC, 2015b and 2016b). Although the global TB death rate dropped 47% between 1990 and 2014, there were still 1.8 million TB-related deaths worldwide in 2015 (WHO, 2015). TB is a leading killer of HIV-positive people: in 2015, 35% of HIV deaths were due to TB (WHO, 2017).
- c. Costs: The average direct per person cost of treating multidrug-resistant TB (MDR-TB) is \$134,000 (rising to \$430,000 for extensively drug-resistant TB [XDR-TB]) compared with \$17,000 for drug-susceptible TB. Outpatient medications accounted for about 40% of costs, averaging \$53,300 for MDR-TB and \$164,000 for XDR-TB (Kelly, 2014).

#### G L O S S A R Y

**Acid-fast bacilli (AFB):** Rod-shaped bacteria that can be seen and counted under the microscope on a specially stained sputum sample on a glass slide, called an AFB smear. The most common AFB are members of the genus *Mycobacterium*.

**BCG (Bacille Calmette-Guerin):** Vaccine for TB used in many countries with a high prevalence of TB, to prevent childhood tuberculous meningitis and miliary (skin rash) disease. BCG is not generally used in adults in the United States because of the variable effectiveness of the vaccine against adult pulmonary TB and the vaccine's potential interference with tuberculin skin test reactivity. However, the client should be asked whether he or she has been vaccinated upon admission to care (worked with clients with active disease; may have lived in, traveled to, or immigrated from countries with high incidence of TB) (CDC, 2016c).

**Cavitation:** The formation of cavities in a body tissue or an organ, especially those formed in the lung, because of TB. In cavitary disease, breath sounds are high-pitched and hollow (like blowing over the end of an empty bottle).

**Directly observed treatment (DOT):** Healthcare worker observes client taking antitubercular medications. DOT provides a mechanism for early detection of adverse medication reactions or nonadherence with medication regimen in high-risk clients or environments, such as jails, homeless shelters, and crowded worksites, among others.

**Extensively drug-resistant TB (XDR-TB):** A rare type of MDR-TB that is resistant to isoniazid and rifampin, plus any fluoroquinolone and at least one of three injectable second-line drugs (i.e., amikacin, kanamycin, or capreomycin). XDR-TB needs up to 2 years of extensive treatment and is the most challenging to treat (CDC, 2016b).

**Fremitus:** Sensation felt by a hand placed on the chest that vibrates during speech.

**Latent TB:** Persons with latent TB are infected with *M. tuberculosis* but do not have TB disease. The only sign of TB infection is a positive reaction to the tuberculin skin test or TB blood test. Persons with latent TB infection are not infectious and cannot spread TB infection to others. Without treatment, about 5% to 10% of infected persons will develop TB disease at some time in their lives (CDC, 2014).

**Multidrug-resistant tuberculosis (MDR-TB):** A form of TB caused by bacteria that do not respond to, at least, isoniazid and rifampicin, the two most powerful, first-line (or standard) anti-TB drugs.

**Tubular breath sounds:** Low-pitched and sticky and occur over areas of consolidation.

**Whispered pectoriloquies:** Transmission of the voice sound through the pulmonary structures so that it is unusually audible on auscultation of the chest, indicating either consolidation of the lung parenchyma or the presence of a large cavity.

#### CARE SETTING

Most clients are treated in community clinics but may be hospitalized for diagnostic evaluation or initiation of therapy, adverse drug reactions, or severe illness or debilitation.

\*\*\*\*This plan of care is intended to reflect care of the **hospitalized** person or long-term care resident with active (rather than latent) TB.

#### RELATED CONCERNS

Pneumonia, page 147

Psychosocial aspects of care, page 835

## CLIENT ASSESSMENT DATABASE

Data depend on stage of disease and degree of involvement.

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- Generalized weakness and fatigue
- Shortness of breath with exertion
- Difficulty sleeping, with evening or night fever, chills
- Soaking night sweats
- Nightmares

- Tachycardia, tachypnea/dyspnea on exertion
- Muscle wasting, pain, and stiffness (advanced stages)

#### EGO INTEGRITY

- Recent or long-standing stress factors
- Financial concerns, poverty
- Feelings of helplessness and hopelessness

- Denial (especially during early stages)
- Anxiety, apprehension, irritability
- Inattention, marked irritability, change in mentation (advanced stages)

#### FOOD/FLUID

- Loss of appetite
- Nausea, vomiting
- Weight loss

- Muscle wasting and loss of subcutaneous fat
- Poor skin turgor, dry and flaky skin

#### PAIN/DISCOMFORT

- Chest pain aggravated by recurrent cough
- Discomfort when coughing or breathing

- Guarding of affected area
- Distraction behaviors, restlessness

#### RESPIRATION

- Shortness of breath
- History of TB or exposure to infected individual
- Persistent cough, productive or nonproductive

- **Respirations:** Increased respiratory rate (associated with fever, extensive disease, or fibrosis of the lung parenchyma and pleura)
- **Breath sounds:** Diminished bilaterally or unilaterally (pleural effusion or pneumothorax); tubular breath sounds and/or whispered pectoriloquies over large lesions; crackles may be noted over apex of lungs during quick inspiration after a short cough (posttussive crackles)
- **Sputum characteristics:** May be green, or purulent, mucoid, or blood-tinged
- Asymmetry in respiratory excursion (pleural effusion)
- Dullness to percussion and decreased fremitus (pleural fluid or pleural thickening)

#### SAFETY

- Presence of immunosuppressed conditions, such as AIDS, cancer
- Positive HIV test; HIV infection
- Visit to, immigration from, or close contact with persons in areas with high prevalence of TB, such as Southeast Asia, sub-Saharan Africa, and the countries of the former Soviet Union

- Low-grade fever or acute febrile illness
- Enlarged lymph nodes in neck

#### SOCIAL INTERACTION

- Feelings of isolation and rejection because of communicable disease
- Change in usual patterns of responsibility or change in physical capacity to resume role

**MAY REPORT (continued)****MAY EXHIBIT (continued)****TEACHING/LEARNING**

- Familial history of TB
- Person living with HIV
- General debilitation and poor health status
- Use or abuse of substances such as intravenous (IV) drugs, cocaine, and crack
- Failure to improve or reactivation of TB
- Nonparticipation in therapy

**DISCHARGE PLAN CONSIDERATIONS**

- Assistance with or alteration in drug therapy
- Temporary assistance in self-care and homemaker and maintenance tasks

♦ Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****TEST  
WHY IT IS DONE****WHAT IT TELLS ME****DIAGNOSTIC TESTS**

- **Acid-fast bacilli (AFB) sputum smear:** Rapid screening test to detect mycobacteria.
- **Sputum TB culture:** Acid-fast bacilli (AFB) are rod-shaped bacteria identified through sputum culture and smear. *M. tuberculosis* is the most prevalent species of mycobacteria and the most infectious.
- **Molecular diagnostic tools for TB (e.g., restriction fragment length polymorphism, real-time PCR, DNA sequencing, and DNA strip assays):** Sputum sample assay that can rapidly detect TB and simultaneously detect drug resistance.
- **TB screening skin tests (TST), such as purified protein derivative (PPD) administered by single-needle intradermal injection (Mantoux test):** Determine past or present exposure to TB and whether the client (immigrant, traveler) has received BCG vaccine (common in countries where TB is prevalent).

This is a relatively quick way to determine if an infection may be due to one of the mycobacteria (such as tuberculosis). AFB smears can provide presumptive results within a few hours and are valuable in helping to make decisions about treatment while culture results are pending (Lab Tests Online, 2014).

Culture for AFB is the most specific test for TB and allows direct identification and determination of susceptibility of the causative organism. Though this test is more sensitive than an AFB smear, *Mycobacteria* grow more slowly than other types of bacteria, so positive identification may take days to several weeks. Negative results (no mycobacterial growth) can take up to 6 to 8 weeks to confirm. Note: Positive cultures should be followed by drug susceptibility testing (Herchline & Amorosa, 2016; Lab Tests Online, 2014).

Innovations in TB testing in recent years provide for rapid, sensitive, and specific diagnosis of *M. tuberculosis* in clinical specimens, as well as the status of its drug sensitivity. These tests have improved diagnostic accuracy, shortened time to diagnosis and treatment, and reduced unnecessary treatment (Herchline & Amorosa, 2016; Sharma et al, 2013).

A positive reaction—area of induration 10 mm or greater, occurring 48 to 72 hours after intradermal injection of the antigen—indicates past infection and the presence of antibodies but is not necessarily indicative of active disease. Positive results develop 2 to 10 weeks after exposure. A significant reaction in a client who is clinically ill means that active TB is a possibility. A significant reaction in healthy persons usually signifies dormant TB or an infection caused by a different mycobacterium. Note: BCG vaccination may cause a false-positive reaction to the TST, which may complicate decisions about prescribing treatment. Blood tests to detect TB infection, unlike the TST, are not affected by prior BCG vaccination and are less likely to give a false-positive result (see Glossary) (CDC, 2016c).

(continues on page 208)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li><b>TB screening blood tests: Interferon-gamma release assays (IGRAs), e.g., QuantiFERON®-TB Gold In-Tube test (QFT-GIT) and T-SPOT® TB test (T-Spot)</b></li></ul>	An IGRA may be used in place of (but not in addition to) a TST in all situations in which the CDC recommends tuberculin skin testing as an aid in diagnosing <i>M. tuberculosis</i> infection. Blood testing requires only one visit to the lab, is typically more accurate than a skin test, and results are available within 24 hours.
<ul style="list-style-type: none"><li><b>Human immunodeficiency virus (HIV) serology</b> (e.g., combination HIV antibody and HIV antigen test): Screening test for HIV, available only as a blood test.</li></ul>	The CDC recommends that HIV serology testing be done in all patients diagnosed with TB whose HIV status is unknown. <i>Note:</i> Among 8366 persons with TB disease who had a documented HIV test result in 2015, 6% were coinfected with HIV (CDC, 2017b).
<ul style="list-style-type: none"><li><b>Blood cultures:</b> A test designed to detect if microorganisms (such as bacteria and fungi) are present in blood. A blood culture is done when a person has symptoms of a blood infection (bacteremia).</li></ul>	Help to establish the diagnosis of active TB. However, mycobacterial bacteremia is detectable using blood cultures only if specialized systems (with mycobacteria-specific, radioisotope tagging) are used; these bacilli have specific nutrient growth requirements not met by routine culture systems (Herchline & Amorosa, 2016).
<ul style="list-style-type: none"><li><b>Rapid drug susceptibility testing:</b> Recommended at the time of TB diagnosis to quickly detect if infected patient is resistant to one or more antitubercular drugs.</li></ul>	Timely diagnosis of drug resistance can ensure that infected patient is not placed on ineffective drug therapies and can minimize risks of spreading infection to others (York & Kane, 2013).
<ul style="list-style-type: none"><li><b>Chest x-ray:</b> Evaluates organs and structures within the chest for evidence of disease.</li></ul>	May show small, patchy infiltrations of early lesions in the upper-lung field, calcium deposits of healed primary lesions, or fluid of an effusion. Changes indicating more advanced TB may include cavitation, scar tissue, and fibrotic areas. <i>Note:</i> Chest radiographic findings may be normal in as many as 15% of patients with primary pulmonary tuberculosis (Catanzano, 2016).
<ul style="list-style-type: none"><li><b>Computed tomography (CT) scan:</b> Uses computer-processed combinations of many x-ray images taken from different angles to produce cross-sectional images of the body.</li></ul>	CT is the examination of choice for evaluating the tracheobronchial tree and may be helpful in evaluating parenchymal involvement and bronchogenic spread of infection. Concerning characterization of the infection as active or not, CT is more sensitive than chest x-ray (Catanzano, 2016).

### NURSING PRIORITIES

1. Achieve and maintain adequate ventilation and oxygenation.
2. Prevent spread of infection.
3. Support behaviors and tasks to maintain health.
4. Provide information about disease process, prognosis, and treatment needs.

### DISCHARGE GOALS

1. Respiratory function adequate to meet individual need.
2. Complications prevented.
3. Lifestyle and behavior changes adopted to prevent spread of infection.
4. Disease process, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: risk for Infection [spread]

#### Possibly Evidenced By

Inadequate primary defenses—decreased ciliary action, stasis of body fluids  
[Tissue destruction; extension of infection]  
Inadequate secondary defenses—suppressed inflammatory response  
Malnutrition  
Increased environmental exposure to pathogens  
[Deficient knowledge to avoid exposure to pathogens]

**NURSING DIAGNOSIS:** **risk for Infection [spread]** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Risk Control: Infectious Process NOC**

Identify interventions to prevent or reduce risk of spread of infection.

Demonstrate techniques and initiate lifestyle changes to promote safe environment.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Control NIC</b>	
<i>Independent</i>	
For hospitalized client/resident suspected of or diagnosed with active TB:	This list does not encompass all isolation precautions that might be implemented but is intended as a basic guide for nursing care in the hospital setting (adapted from Knechel, 2009; Siegel et al, 2007; York & Kane, 2013):
Implement/maintain patient and healthcare personnel isolation precautions:	Most hospitalized patients are in a compromised immune state and at higher risk of exposure to infectious diseases than when in the community. This factor necessitates isolation of the patient (with suspected or known active TB disease) from other patients. In addition, the patient with latent TB (immunocompromised due to other factors, e.g., uncontrolled diabetes, sepsis, chemotherapy, ventilator-associated pneumonia [VAP], malnutrition) is at high risk of activation or reactivation of TB.
Meticulous handwashing by all persons before and after examining and providing hands-on care to patient and when handling respiratory secretions.	
Healthcare personnel use high-level particulate respirator mask when in patient room.	
Patient wears surgical mask when visitors present or if leaving room.	
Instruct and remind patient to cough, sneeze, and expectorate into tissue and to refrain from spitting.	
Review proper disposal of tissue and provide disposal container.	
Use closed system suctioning if patient on mechanical ventilation.	
<i>Implement environmental isolation procedures:</i>	
Single-patient room	
Negative pressure relative to surrounding area with 6 to 12 air exchanges per hour if available	
Air exhausted to outdoors or recirculated through air purifier system	
Door closed at all times	
Signage on door; visitor screening and limitation, per facility protocol	
Cleaning and disinfection of patient-care areas for frequently touched surfaces (e.g., bedrails, bedside tables, commodes, doorknobs, sinks, surfaces, and equipment in close proximity to the patient)	
Identify others at risk, such as household members, close associates, and friends.	Those exposed may require a course of drug therapy to prevent development of infection.
Instruct client to cough, sneeze, and expectorate into tissue and to refrain from spitting. Review proper disposal of tissue and good hand washing techniques. Request return demonstration.	Behaviors necessary to prevent spread of droplet/airborne infection.

(continues on page 210)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review necessity of infection control measures, such as temporary respiratory isolation.	May help client understand need for protecting others while acknowledging client's sense of isolation and social stigma associated with communicable diseases.
Monitor temperature, as indicated.	Febrile reactions are indicators of continuing presence of infection.
<b>Collaborative</b> Administer anti-infective agents, as indicated, for example:	The goals for treatment of TB are to cure the individual and to minimize transmission to other persons. It is essential that treatment be tailored and supervision be based on each client's clinical and social circumstances. Directly observed treatment (DOT) may be the most effective way to maximize the completion of therapy in certain situations/selected populations.
Primary drugs: isoniazid (INH, Liniazid), rifampin (RIF, Rifadin, Rimactane), pyrazinamide (PZA, Tebrazid), and ethambutol (Etbi, Myambutol)	There are 10 drugs currently approved by the U.S. Food and Drug Administration (FDA) for treating TB. Of the approved drugs, these first-line medications are highly effective for susceptible TB (CDC, 2016d). In active TB, these four drugs will be given together for the initial phase (first 2 months) of therapy, followed by a choice of options (usually two drugs based on drug sensitivity testing for the continuation phase [usually 4 to 7 months]). Extended therapy for up to 24 months is indicated for reactivation cases, extrapulmonary reactivated TB, or in the presence of other medical problems, such as diabetes mellitus or silicosis.
Other FDA-approved agents include cycloserine (Seromycin), ethionamide (Trecator), para-aminosalicylic acid (PAS), amikacin (Amikan)/kanamycin (Kantrex), streptomycin (Streptomycin), levofloxacin (Levoquin)/moxifloxacin (Aveflox), and capreomycin (Capastat).	These second-line drugs are used in combination with other antitubercular agents, often when client is unable to tolerate typical TB drugs or when client has drug-resistant TB.
Rifabutin (Mucobutin)	Therapeutic agent for atypical mycobacterium typically used in client with advanced HIV disease with TB.
Bedaquiline (Sirturo)	Approved specifically for treatment of multidrug-resistant (MDR)-TB as part of combination therapy (Walker, 2016).
Monitor laboratory studies, such as the following: Sputum smear results	Client who has three consecutive negative sputum smears over a 3- to 5-month period, is adhering to drug regimen, and is asymptomatic will be classified as a nontransmitter.
Liver function studies, such as aspartate aminotransferase (AST), alanine aminotransferase (ALT)	The most common serious adverse effect of drug therapy—particularly RIF, but possibly others as well—is drug-induced hepatitis.
Notify local health department.	Required by law and should be reported within 1 week of diagnosis. Helpful in identifying contacts to reduce spread of infection. Treatment course is long and usually handled in the community, with public health nurse monitoring.

### NURSING DIAGNOSIS: **ineffective Airway Clearance**

#### May Be Related To

Physiological: Infection  
Excessive mucus; exudates in the alveoli; retained secretions

#### Possibly Evidenced By

Change in respiratory rate, rhythm  
Ineffective cough

**NURSING DIAGNOSIS:** **ineffective Airway Clearance** (continued)

Diminished/adventitious breath sounds—[rhonchi, wheezes, stridor]  
Dyspnea

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Airway Patency NOC**

Maintain patent airway.  
Expectorate secretions without assistance.  
Demonstrate behaviors to improve or maintain airway clearance.  
Participate in treatment regimen, within the level of ability and situation.  
Identify potential complications and initiate appropriate actions.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Airway Management NIC</b>	
<i>Independent</i>	
Assess respiratory function, such as breath sounds, rate, rhythm, and depth, and use of accessory muscles.	Diminished breath sounds may reflect atelectasis. Rhonchi and wheezes indicate accumulation of secretions and inability to clear airways, which may lead to use of accessory muscles and increased work of breathing.
Note ability to expectorate mucus and cough effectively; document character and amount of sputum and presence of hemoptysis.	Expectoration may be difficult when secretions are thick, cloudy, and sometimes bloody because of infection or inadequate hydration. Blood-tinged or frankly bloody sputum results from tissue breakdown in the lungs and may require further evaluation and intervention.
Place client in semi- or high-Fowler's position. Assist client with coughing and deep-breathing exercises.	Positioning helps maximize lung expansion and decreases respiratory effort. Maximal ventilation may open atelectatic areas and promote movement of secretions into larger airways for expectoration.
Clear secretions from mouth and trachea; suction as necessary.	Prevents obstruction and aspiration. Suctioning may be necessary if client is unable to expectorate secretions.
Maintain fluid intake of at least 2500 mL/d unless contraindicated.	High fluid intake helps thin secretions, making them easier to expectorate.
<i>Collaborative</i>	
Humidify inspired oxygen.	Prevents drying of mucous membranes and helps thin secretions.
Administer medications, as indicated, for example:	
Bronchodilators, such as oxtriphylline (Choledyl) and theophylline (Theo-Dur)	Increases lumen size of the tracheobronchial tree, thus decreasing resistance to airflow and improving oxygen delivery.
Corticosteroids (prednisone)	May be useful in the presence of extensive involvement with profound hypoxemia and when inflammatory response is life-threatening.
Be prepared for and assist with emergency intubation.	Intubation may be necessary in rare cases of bronchogenic TB accompanied by laryngeal edema or acute pulmonary bleeding.

**NURSING DIAGNOSIS:** **risk for impaired Gas Exchange****Possibly Evidenced By**

Ventilation-perfusion imbalance  
Alveolar-capillary membrane changes

(continues on page 212)

## NURSING DIAGNOSIS: risk for impaired Gas Exchange (continued)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status: Gas Exchange NOC

Report absence of or decreased dyspnea.

Demonstrate improved ventilation and adequate oxygenation of tissues by ABGs within acceptable ranges and absence of symptoms of respiratory distress.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Respiratory Monitoring NIC

##### Independent

Assess for dyspnea (using 0 to 10 [or similar] scale), tachypnea, abnormal breath sounds, increased respiratory effort, limited chest wall expansion, and fatigue.

Evaluate change in level of mentation.

Note cyanosis or change in skin color, including mucous membranes and nailbeds.

Demonstrate and encourage pursed-lip breathing during exhalation, especially for clients with fibrosis or parenchymal destruction.

Promote bedrest, or limit activity and assist with self-care activities as necessary.

##### Collaborative

Monitor serial ABGs and pulse oximetry.

Provide supplemental oxygen as appropriate.

Pulmonary TB can cause a wide range of effects in the lungs, ranging from a small patch of bronchopneumonia to diffuse intense inflammation, caseous necrosis, pleural effusion, and extensive fibrosis.

Accumulation of secretions and airway compromise can impair oxygenation of vital organs and tissues, often reflected in change in mental status.

Respiratory effects can range from mild dyspnea to profound respiratory distress. Note: Using a scale to evaluate dyspnea helps clarify degree of difficulty and changes in condition.

Creates resistance against outflowing air to prevent collapse of the airways, thereby helping to distribute air throughout the lungs and relieve or reduce shortness of breath.

Reducing oxygen consumption and demand during periods of respiratory compromise may reduce severity of symptoms.

Decreased oxygen content ( $\text{PaO}_2$ ) and saturation or increased  $\text{PaCO}_2$  indicates need for change in therapeutic regimen.

Aids in correcting the hypoxemia that may occur secondary to decreased ventilation and diminished alveolar lung surface.

## NURSING DIAGNOSIS: imbalanced Nutrition: less than body requirements

### May Be Related To

[Fatigue]

Biological factors—frequent cough and sputum production; dyspnea; [nausea]

Inability to ingest or digest food; inability to absorb nutrients

Economically disadvantaged

### Possibly Evidenced By

Body weight 20% or more below ideal weight range; [decreased subcutaneous fat or muscle mass]; insufficient muscle tone

Reported lack of interest in food, altered taste sensation

### Desired Outcomes/Evaluation Criteria—Client Will

#### Nutritional Status NOC

Demonstrate progressive weight gain toward goal with normalization of laboratory values and be free of signs of malnutrition.

Initiate behaviors or lifestyle changes to regain and to maintain appropriate weight.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Management NIC</b>	
<b>Independent</b>	
Identify client at risk for malnutrition and issues that may affect client's dietary plan whether in community or acute care setting.	Many factors are in play when considering malnutrition in persons with TB. Risk factors may include (1) poverty (e.g., lack of health insurance, low quality of health services, lack of resources for food purchase or preparation, homelessness), (2) client's age and chronic illness status (institutional living/incarceration), (3) geographical inaccessibility (e.g., limited access to supermarkets; lack of transportation) or psychological inaccessibility (e.g., client suffering with stigma of disease), and (4) certain cultural aspects, including language and conceptions about nutrition (e.g., personal food preferences, price, convenience, cooking skills) and the health-disease process.
Document client's nutritional status on admission, noting skin turgor, current weight and degree of weight loss, integrity of oral mucosa, ability to swallow, presence of bowel tones, and history of nausea, vomiting, or diarrhea.	Useful in defining extent of issues affecting nutritional intake and suggesting appropriate choice of interventions.
Determine client's ability and willingness to address nutritional issues. Ascertain client's usual dietary pattern and likes and dislikes.	Helps to identify specific needs or strengths. Consideration of individual preferences may improve dietary intake.
Monitor intake and output (I&O) and weight periodically.	Useful in measuring effectiveness of nutritional and fluid support.
Investigate anorexia, nausea, and vomiting. Note possible correlation to medications. Monitor frequency, volume, and consistency of stools.	Affects dietary choices and can identify areas for problem-solving to enhance intake of nutrients.
Encourage and provide for frequent rest periods.	Helps conserve energy, especially when metabolic requirements are increased by fever.
Provide oral care before and after respiratory treatments.	Reduces bad taste left from sputum or medications used for respiratory treatments that can stimulate the vomiting center.
Encourage small, frequent meals or snacks with foods high in protein and carbohydrates.	Maximizes nutrient intake without undue energy expenditure from eating large meals.
Encourage SO to bring foods from home and to share meals with client unless not feasible or contraindicated.	Creates a more normal social environment during mealtime and helps meet personal and cultural preferences.
<b>Collaborative</b>	
Refer to dietitian/nutritionist for adjustments in dietary composition.	Can aid in planning a diet with nutrients adequate to meet client's metabolic requirements, dietary preferences, and financial resources.
Consult with respiratory therapy to schedule treatments 1 to 2 hours before or after meals.	May help reduce the incidence of nausea and vomiting associated with medications or the effects of respiratory treatments on a full stomach.
Monitor laboratory studies, such as blood urea nitrogen (BUN), serum protein, and prealbumin and albumin.	Low values reflect malnutrition and indicate need for change in therapeutic regimen.
Administer antipyretics, as appropriate.	Fever increases metabolic needs and therefore calorie consumption.
Administer antiemetics (e.g., odansetron [Zofran]; promethazine [Phenergan]), as appropriate.	Treating nausea associated with many antitubercular drugs may help client with food aversion/intolerance, thereby improving nutritional status.

## NURSING DIAGNOSIS: risk for ineffective Health Management

### Possibly Evidenced By:

Complexity of therapeutic regimen or healthcare system  
Insufficient knowledge of therapeutic regimen; decisional conflicts  
Economically disadvantaged; insufficient social support; family pattern of healthcare  
Perceived seriousness of condition, susceptibility, benefit, or barrier

### Desired Outcomes/Evaluation Criteria—Client Will

#### Self-Management: Chronic Disease NOC

Verbalize acceptance of need and desire to change actions to achieve agreed-upon health goals.  
Initiate behaviors or lifestyle changes to improve general well-being and reduce risk of reactivation or transmission of TB.  
Identify symptoms requiring evaluation and intervention.  
Describe a plan for receiving adequate follow-up care.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Learning Facilitation NIC</b> <i>Independent</i> Assess client's ability and willingness to learn (noting level of fear, concern, fatigue, participation level), best environment in which client can learn, how much content the client can learn, best media and language to teach the client, and determine who should be included.	Learning depends on emotional and physical readiness and is achieved at an individual pace.
Provide instruction and specific written or audio/visual information for client to refer to (such as schedule for medications and follow-up sputum testing for documenting response to therapy).	Take-home information relieves client of the burden of having to remember large amounts of information. Repetition strengthens learning.
Encourage client and SO to verbalize fears and concerns. Answer questions factually. Note prolonged use of denial.	Provides opportunity to correct misconceptions that may alleviate anxiety. Prolonged denial may affect coping with and managing the tasks necessary to regain health.
<b>Teaching: Disease Process NIC</b> Review pathology of disease—active or inactive phases, dissemination of infection through bronchi to adjacent tissues or via bloodstream and lymphatic system to other organs—and potential spread of infection to others via airborne droplets during coughing, sneezing, spitting, talking, laughing, and singing.	Knowledge may reduce risk of transmission or reactivation. Understanding of how the disease is passed and awareness of transmission possibilities help client and significant other (SO) take steps to prevent infection of others.
Identify individual risk factors for reactivation of tuberculosis, such as lowered resistance associated with alcoholism, malnutrition, intestinal bypass surgery, use of immunosuppressant drugs, presence of diabetes mellitus or cancer, or postpartum.	Knowledge about these factors helps client alter lifestyle and avoid or reduce incidence of disease reactivation.
Identify symptoms that should be reported to healthcare provider, such as hemoptysis, chest pain, fever, difficulty breathing.	Complications associated with active pulmonary tuberculosis (and possibly reactivation TB) include (and are not limited to) drug-resistant TB, cavitation, abscess formation, destructive emphysema, spontaneous pneumothorax, pleurisy, and extrapulmonary TB affecting many other organ systems.
Review necessity of follow-up and periodic retesting of sputum for the duration of therapy.	Aids in monitoring the effects of medications and client's response to therapy.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Explain medication dosage, frequency of administration, expected action, and the reason for long treatment period. Review potential interactions with other drugs and substances. Emphasize reportable side effects (e.g., hearing loss, vertigo).	Enhances cooperation with therapeutic regimen and may prevent client from discontinuing medication before cure is truly effected. DOT is the treatment of choice when client is unable or unwilling to take medications as prescribed. Note: Clients with HIV infection and TB are particularly susceptible to drug interactions because they are typically taking numerous antiretroviral medications, some of which react with antituberculosis medications.
Discuss potential side effects of treatment, such as dry mouth, gastrointestinal (GI) upset, constipation, visual disturbances, headache, and orthostatic hypertension, and problem-solve solutions.	It is important that antituberculosis drugs not be discontinued because of “nuisance” side effects. Problem-solving, such as taking medication with food and changing the hour of dosing, may reduce discomfort associated with therapy and enhance cooperation with regimen. Severe reactions must be reported to physician.
Emphasize importance of uninterrupted drug therapy. Evaluate client’s potential for cooperation.	Contagious period may last only 2 to 3 days after initiation of drug regimen, but in the presence of cavitation or moderately advanced disease, risk of spread of infection may continue up to 3 months. Compliance with multidrug regimens for prolonged periods is difficult; therefore, DOT should be considered.
Emphasize need to abstain from alcohol while on drugs such as INH or cycloserine (may not be complete listing). Discuss safe alcohol intake with physician and client.	When some antitubercular drugs and alcohol are combined, there can be adverse side effects and drug interactions.
Encourage abstaining from smoking.	Although smoking does not stimulate recurrence of TB, it does increase the likelihood of respiratory dysfunction.
Discuss importance of maintaining high-protein and carbohydrate diet and adequate fluid intake. (Refer to ND: imbalanced Nutrition: less than body requirements.)	Meeting the body’s metabolic and fluid requirements helps minimize fatigue and promotes recovery.
Identify and reinforce concerns, such as treatment failure, drug-resistant TB, and relapse.	Treatment failure most often occurs because client is not adhering to treatment regimen but can also be due to drug resistance, malabsorption of drugs, laboratory error, and extreme biological variation in response. Most relapses or recurrence of positive cultures or radiographic deterioration occur 6 to 12 months after completion of therapy. Continuous monitoring by healthcare providers can identify these concerns early and alter the plan accordingly.
Refer to public health agency as appropriate.	DOT by community nurses is often the most effective way to ensure client adherence to therapy. Monitoring may include pill counts and urine dipstick testing for presence of antitubercular drug. Clients with MDR-TB may be monitored with monthly sputum specimens for AFB smear and culture. Note: In some states, there are legal means for involuntary confinement for care if efforts to ensure client adherence are ineffective.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client’s age, physical condition and presence of complications, personal resources, and life responsibilities)

- **ineffective Health Management**—complexity of therapeutic regimen, economic difficulties, family patterns of healthcare, perceived seriousness and benefits
- **risk for Infection (secondary)**—decrease in ciliary action, stasis of body fluids (secretions), suppressed inflammatory response, tissue destruction, chronic disease, malnutrition, increased environmental exposure
- **Fatigue**—disease states, malnutrition, discomfort
- **ineffective family Therapeutic Regimen Management**—complexity of therapeutic regimen, decisional conflicts, economic difficulties, family conflict

# Neurological/Sensory Disorders

## SEIZURE DISORDERS

### I. Pathophysiology

- a. Seizures occur because of an abnormal, excessive, disorderly discharge from neuron groups in the central nervous system (CNS) resulting in a brief disruption of brain electrical function.
- b. Clinical manifestations depend on (1) site of focus in the brain, (2) degree of irritability of the surrounding areas of the brain, and (3) intensity of the electrical impulse.
- c. During a seizure, the brain uses more energy than it can manufacture, and thus prolonged seizures can result in cell ischemia.
- d. Acute symptomatic seizures are events, occurring in close temporal relationship with an acute CNS insult, which may be metabolic, toxic, structural, infectious, or due to inflammation.
- e. An **epileptic seizure** is a transient occurrence of signs and symptoms due to abnormal excessive or synchronous neuronal activity in the brain. “Translation: a seizure is an event, and epilepsy is the disease involving recurrent unprovoked seizures” (Fisher, 2014).

### II. Classification (Fisher et al, 2014; Hasty, 2017; Kiriakopoulos & Shafer, 2017; Mayo Clinic Staff, 2015)

- a. Since 2014, the terms to describe and classify seizures have been changing. Descriptors fall into three categories:
  - i. The onset (where in the brain the seizure originates)
  - ii. Person’s level of awareness during a seizure
  - iii. Whether movements occur during a seizure
- b. The International League Against Epilepsy (ILAE). Fisher et al (2017) uses the following classification terminology:
  - i. Seizures are placed into two major groups: **generalized** seizures and **focal** seizures. The difference lies in how and where they begin.
    - 1. **Generalized-onset seizures:** (the term is already in use and still includes types such as tonic-clonic, atonic absent). These seizures emerge from both hemispheres of the brain and account for about 40% of seizures and result in loss of awareness or consciousness.
      - a. Motor symptoms: may include sustained rhythmical jerking movements (**clonic**), weak or limp muscles (**tonic**), tense or rigid muscles

(**tonic**), brief muscle twitching (**myoclonus**), or epileptic spasms (**body repeatedly flexes and extends**).

- b. Nonmotor symptoms: may be called **absence seizures**. These can be typical or atypical. Symptoms may include staring and brief twitches. There is no aura or postictal phase.
- 2. **Focal onset seizures** (replaces the term **partial**): These seizures start in one area or group of cells on one side of the brain. Focal seizures account for about 60% of seizures, are usually due to a lesion (e.g., head trauma, tumor, stroke, hypoxia at birth, metabolic disorder, infection, malformations), and frequently advance to generalized seizures.
  - a. Motor symptoms: may include sustained rhythmical jerking movements (**clonic**), weak or limp muscles (**tonic**), tense or rigid muscles (**tonic**), brief muscle twitching (**myoclonus**), or epileptic spasms (**body repeatedly flexes and extends**). There may also be automatisms (see Glossary).
  - b. Nonmotor symptoms: may include changes in sensation, emotions, thinking or cognition, autonomic functions (such as waves of heat or cold, goosebumps, heart racing, etc.), or lack of movement (behavior arrest).
  - c. Are further classified regarding awareness:
    - i. **Focal onset aware seizures (formerly called simple partial seizure):** Person is awake and aware during seizures. These seizures may be associated with limited convulsions (e.g., jerking of a single limb) and limited sensory disturbances; may be preceded or accompanied by an aura (e.g., unpleasant smell, sense of fear).
    - ii. **Focal onset impaired awareness seizures (formerly called complex partial seizure):** Awareness is affected in some manner. These seizures may be associated with staring, repetitive motor; auras are common; seizure is followed by confusion, fatigue, and throbbing headache.

### III. Etiology

- a. Major causes of seizures in adults include conditions that alter how the brain works or that affect the brain's blood supply:
  - i. Cerebral pathology: traumatic head injury, stroke, infections, hypoxia, expanding brain lesions, and increased intracranial pressure
  - ii. Toxic agents: poisons, alcohol, overdoses of prescription or nonprescription drugs, and drug abuse (with drugs being the leading toxic agent)
  - iii. Chemical imbalances: hypoglycemia, hypokalemia, hyponatremia, hypomagnesemia, and acidosis
  - iv. Fever: acute infections; heatstroke
  - v. Eclampsia: prenatal hypertension and toxemia of pregnancy

### IV. Risk factors for epilepsy by age group

Age does affect the incidence rate of epilepsy, as follows:

- a. **Age younger than 16 years:**  The risk in this age group is almost double the risk in adolescents and adults. In children, febrile seizures are the most common type of seizures and are usually outgrown by the age of 6 (Tejani, 2016). Other common causes in children: infections (e.g., meningitis), brain injury, congenital conditions (e.g., Down syndrome), and genetic factors (familial tendencies, primary seizure disorders). Prenatal factors and birth delivery problems are associated with increased risk in infants and toddlers (Simon & Zieve, 2011).
- b. **Ages 20 to 60:** In young adults, the commonly associated conditions include trauma, alcohol/other drug withdrawal, illicit drug use, brain injury or tumor, cardiovascular disease, and pregnancy. In middle-aged adults, common causes include brain tumor, cerebrovascular disease,

electrolyte and metabolic disorders, and alcohol withdrawal.

- c. **Age greater than 65:** These persons are more likely to have seizures associated with stroke, brain tumor, and Alzheimer-type dementia.

### V. Statistics

- a. Morbidity: Epilepsy is the fourth most common neurological problem (after migraine, stroke, and Alzheimer disease) (Shafer & Sirven, 2013). The average incidence new cases/year in the United States in 2013 was estimated at 150,000, while the number of people (adults and children) with active epilepsy, using prevalence numbers, was thought to be about 2.9 million people.

 About 400,000 children in the United States are living with epilepsy; most will outgrow the condition. Between 70% and 80% of children are well controlled with medication (Lava, 2016).

- b. Mortality: Seizures can result in untimely death, due to loss of awareness during high-risk activities (swimming, driving), seizure-related injury, status epilepticus, or sudden unexplained death in epilepsy (SUDEP). If seizures are uncontrolled (refractory), the risk of SUDEP increases to more than 1 out of 150 (Wright et al, 2015).

- c. Cost: The high prevalence, high morbidity, and low mortality of this disease combine to create a disproportionately high cost of illness compared with other diseases (possibly the result of higher comorbidities). Recent U.S. studies (based on 2013 dollars) reported estimates of average annual direct costs for the general epilepsy population (comprising all clinically defined subgroups): **Total direct healthcare costs per person** ranged from \$10,192 to \$47,862, and **epilepsy-specific costs** ranged from \$1022 to \$19,749 (Begley & Durgin, 2015).

### G L O S S A R Y

**Atonic movement:** Brief loss of postural tone, often resulting in falls and injury.

**Aura:** A widely variable perceptual disturbance experienced by some people prior to a seizure such as feeling of déjà vu or fear; visual or olfactory phenomena (e.g., a strange light or an unpleasant smell). The time span between the appearance of the aura and the onset of a seizure can be a few seconds up to an hour.

**Automatisms:** Repeated automatic movements, like clapping or rubbing of hands, lip-smacking, or chewing.

**Clonic movement:** Sustained rhythmic, jerky motor movements.

**Consciousness/Awareness:** Elements of consciousness include (1) awareness of ongoing activities, (2) memory for time during the event, (3) responsiveness to verbal or nonverbal stimuli, and (4) sense of self. Impairment of awareness is now part of a seizure classification.

**Convulsion:** Specific type of seizure where the attack is manifested by involuntary muscle contractions.

**Cryptogenic seizure:** A seizure of unknown etiology, not associated with a previous CNS insult known to increase the risk of developing epilepsy.

**Epilepsy:** Neurological disorder marked by sudden recurrent episodes of sensory disturbance, loss of consciousness,

and/or convulsions, associated with abnormal electrical activity in the brain.

**Genetic generalized epilepsies (formerly juvenile myoclonic epilepsy):** Belongs to the family of generalized epilepsies, formally called “idiopathic” or “primary,” but now referred to as “genetic generalized epilepsies” because of the strong evidence of genetic etiology.

**Ictal phase:** Considered to be the seizure itself.

**Idiopathic epilepsy:** Describes epileptic syndrome with specific age-related onset, specific clinical and electrographic characteristics, and a presumed genetic component.

**Myoclonic movement:** Regular unsustained (brief), jerky motor movements.

**Postictal phase:** The altered state of consciousness characterized by drowsiness, confusion, nausea, hypertension, headache, and other disorienting symptoms that occur following a seizure, usually lasting between 5 and 30 minutes but sometimes longer in the case of larger or more severe seizures.

**Prodromal phase:** An early symptom indicating the onset of an attack or a disease. Vague changes in emotional reactivity or affective response sometimes preceding aura and lasting minutes to hours, with symptoms such as diminished field of vision, disorientation, aphasia, or photosensitivity.

(continues on page 218)

## G L O S S A R Y (continued)

**Seizure:** Sudden discharge of electrical activity in the brain.

**Status epilepticus (SE):** State of continuous seizure activity lasting more than 5 minutes or frequent recurrent seizures without regaining full consciousness in between them. People with status epilepticus have an increased risk of permanent brain damage and death.

**SUDEP (sudden unexplained death in epilepsy):** The cause is unknown, but some research shows it may occur due to heart or respiratory conditions.

**Symptomatic seizure:** Event caused by a previously known or suspected disorder of the CNS and known to increase the risk of developing epilepsy.

**Tonic movement:** Sudden tonic extension or flexion of the head, trunk, and extremities lasting several seconds.

**Tonic-clonic movement (convulsion):** All areas of the brain cortex are involved, with generalized extension of extremities for several seconds, followed by rhythmic clonic movements and a prolonged postictal phase.

## CARE SETTING

Seizure disorders are treated in a community setting; however, a client with convulsive seizures may require brief in-patient care in a medical or subacute unit for stabilization or for the treatment of status epilepticus (a life-threatening emergency).

## RELATED CONCERNS

Brain infections: meningitis and encephalitis, page 267  
Cerebrovascular accident (CVA)/stroke, page 247  
Craniocerebral trauma (acute and rehabilitative phases), page 226  
Pediatric considerations, page 993  
Psychosocial aspects of care, page 835  
Substance use disorders (SUDs), page 929

## CLIENT ASSESSMENT DATABASE

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- Fatigue
- General weakness
- Limitation of activities, occupation imposed by self, significant other (SO), healthcare provider, or others

- Altered muscle tone, strength
- Involuntary movement or contractions of muscles or muscle groups—generalized tonic-clonic seizures

#### CIRCULATION

- **Ictal:** Hypertension, increased pulse, cyanosis
- **Postictal:** Vital signs normal or depressed with decreased pulse and respiration

#### EGO INTEGRITY

- Internal or external stressors related to condition or treatment
- Irritability
- Fear of death or injury
- Sense of helplessness, hopelessness
- Social embarrassment and isolation
- Changes in relationships

- Wide range of emotional responses, especially when temporal lobe is involved

#### ELIMINATION

- Episodic incontinence

- **Postictal:** Muscles relaxed, resulting in urinary or fecal incontinence

#### FOOD/FLUID

- Food sensitivity
- Nausea and vomiting correlating with seizure activity

- Teeth, or soft tissue damage—injury during seizure

#### NEUROSENSORY

- History of headaches, recurring seizure activity, fainting, dizziness
- History of head trauma, stroke, cerebral infections

**MAY REPORT (continued)**

- **Prodromal phase:** Vague changes in emotional reactivity or affective response sometimes preceding aura and lasting minutes to hours
- Presence of aura

- **Postictal:** Weakness, muscle pain, areas of paresthesias or paralysis

- **Postictal:** Absence of memory for these events, mild to moderate confusion

**PAIN/DISCOMFORT**

- Headache
- **Ictal:** Paroxysmal abdominal pain may be reported during some partial or focal seizures (occurring without loss of awareness)
- **Postictal:** Muscle, back soreness

**MAY EXHIBIT (continued)**

Seizure characteristics are as follows:

- **Convulsive generalized seizures:**

- **Tonic-clonic:** Rigidity and jerking, posturing, vocalization, loss of consciousness, dilated pupils, labored breathing, excessive salivation (froth), biting of the tongue; fecal and urinary incontinence. Usually lasts from 2 to 5 minutes.
- **Tonic phase:** Abrupt increase in muscle tone of torso and face, flexion of arms, extension of legs; usually lasts 10 to 20 seconds
- **Clonic phase:** Muscle contraction with relaxation occurring between tonic muscle contractions. The client lies still with flaccid muscles, may have stridorous breathing and excessive salivation. This phase lengthens (usually up to 2 minutes) as tonic muscle activity subsides.

- **Partial seizures:**

- **Complex—ictal:** Consciousness or awareness impaired, with reactions such as dream state, staring, wandering, irritability, hallucinations, hostility, or fear. May display involuntary motor symptoms (lip smacking) and behaviors that appear purposeful but are inappropriate (automatism) and include impaired judgment and, on occasion, antisocial acts; lasts 1 to 3 minutes.
- **Simple (focal-motor and Jacksonian):** Often preceded by aura—may report déjà vu or fearful feeling
- **Ictal:** May or may not experience loss of consciousness, convulsive movements. Behaviors are dependent on brain region involved—frontal lobe (motor dysfunction), parietal (numbness, tingling), occipital (bright, flashing lights), posterotemporal (difficulty speaking). Convulsions may march along limb or side of the body in an orderly progression. If restrained during seizure, the client may exhibit combative and uncooperative behavior; lasts seconds to minutes.

- **Status epilepticus (SE)—ictal:** Type I complex partial status epilepticus refers to **recurrent**, recognizable complex partial seizures without recovery between seizures. Type II represents **continuous, ongoing** complex partial seizure activity. Movements are typical rhythmic tonic-clonic activity with impaired consciousness; rarely may present as a persistent tonic seizure (Roth & Bloom, 2016). During absence seizures, SE may go undetected for a period of time because client does not lose consciousness.

- Guarding behavior

- Alteration in muscle tone

- Distraction behavior, restlessness

(continues on page 220)

**CLIENT ASSESSMENT DATABASE** (contd.)**MAY REPORT** (continued)**MAY EXHIBIT** (continued)**RESPIRATION****SAFETY**

- History of accidental falls, injuries, fractures

- **Ictal:** Clenched teeth, cyanosis, decreased or rapid respirations; increased mucous secretions
- **Postictal:** May have brief apnea, with spontaneous recovery of normal breathing over a short period

- Decreased general strength and muscle tone
- Soft tissue injury, ecchymosis

**SOCIAL INTERACTION**

- Problems with interpersonal relationships within family or socially
- Limitation or avoidance of social contacts

**TEACHING/LEARNING**

- Familial history of epilepsy
- Drug use or misuse, including alcohol and illicit drugs
- Use of herbal supplements, such as aloe, betony, blue cohosh, kava
- Increased frequency of seizure episodes
- Failure to improve

**DISCHARGE PLAN CONSIDERATIONS**

- May require changes in medications, assistance with some homemaker or maintenance tasks about issues of safety, and transportation

**NURSING DIAGNOSIS:** risk for Injury**Possibly Evidenced By**

Alteration in cognitive or psychomotor functioning; alteration in affective orientation

**Desired Outcomes/Evaluation Criteria—Client Will****Seizure Self-Control NOC**

Be free of injury.

Verbalize understanding of factors that contribute to possibility of injury.

Demonstrate behaviors and lifestyle changes to reduce risk factors and protect self from future seizure events and injury.

Modify environment as indicated to enhance safety.

Maintain treatment regimen to control or eliminate seizure activity.

**Significant Other [SO]/Caregiver Will****Knowledge: Personal Safety NOC**

Identify actions or measures to take when seizure activity occurs.

**ACTIONS/INTERVENTIONS****RATIONALE****Seizure Precautions NIC****Independent**

Maintain safe environment if client is experiencing prodromal signs or aura. Remove sharp objects or steer client clear of dangerous situations if client tries to walk around. Explain necessity for actions.

Client may feel restless and confused, want to walk around or wander during aural phase, thereby inadvertently removing self from safe environment and easy observation. Understanding importance of providing for own safety needs may enhance client cooperation.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Reorient client following seizure activity.	Client may be confused, disoriented, and possibly amnestic after the seizure and need help to regain control and alleviate anxiety.
Observe for status epilepticus (SE).	This is a life-threatening emergency that, if left untreated, could cause metabolic acidosis, hyperthermia, hypoglycemia, arrhythmias, hypoxia, increased intracranial pressure, airway obstruction, and respiratory arrest. Immediate intervention is required to control seizure activity and prevent permanent injury or death.
Explore with client the various stimuli that may precipitate seizure activity.	Alcohol, various drugs, and other stimuli, such as loss of sleep, flashing lights, and prolonged television viewing, may increase the potential for seizure activity. Client may or may not have control over many precipitating factors but may benefit from becoming aware of risks.
Discuss seizure warning signs, if appropriate, and usual seizure pattern. Teach SO to recognize warning signs and how to care for client during and after seizure.	Can enable client or SO to protect the individual from injury and to recognize changes that require notification of physician and further intervention. Knowing what to do when a seizure occurs can prevent injury or complications and decreases SO's feelings of helplessness.
<b>In hospitalized client:</b>	
Keep padded side rails up with bed in lowest position, or place bed up against the wall, and add floor pad if rails are not available or appropriate.	Minimizes injury should frequent or generalized seizures occur while client is in bed.
Document preseizure activity, presence of aura or unusual behavior, type of seizure activity, such as location and duration of motor activity, loss of consciousness, incontinence, eye activity, respiratory impairment, and cyanosis, and frequency or recurrence. Note whether client fell, expressed vocalizations, drooled, or had automatisms, such as lip smacking, chewing, and picking at clothes.	Helps localize the cerebral area of involvement and may be useful in chronic conditions in helping client and so prepare for or manage seizure activity.
<b>Seizure Management NIC</b>	
Stay with client during and after seizure.	Promotes client safety and reduces sense of isolation during event.
Assist client to the floor or other safe, flat area; support head to prevent it from hitting the floor. Do not attempt to hold the person down, stop movements, or restrain.	Gentle guiding reduces risk of physical injury when client lacks voluntary muscle control. Note: If an attempt is made to restrain client during a seizure, erratic movements may increase, and client may injure self or others.
Avoid putting anything in client's mouth.	Jaw and face muscles may tighten, causing the person to bite down. If this occurs when something is in the mouth, the person may break and swallow the object or break his or her teeth. Note: A person cannot swallow the tongue during a seizure.
Allow postictal "automatic" behavior without interfering while providing environmental protection.	May display confusion, or behavior of motor or psychic origin that seems inappropriate or irrelevant for time and place. Attempts to control or prevent activity may result in client becoming aggressive or combative.
Call for help as needed.	Emergent assistance is required (911) if a seizure lasts 5 minutes or longer; person cannot clear airway, breathing becomes difficult or stops.
<b>In hospitalized client:</b>	
Position head and neck to keep airway open. Turn head to side facilitates secretion drainage. Suction airway if necessary. Insert soft bite block per facility protocol, only if jaw relaxed.	Helps maintain airway. Note: Current thought is mixed regarding the use of airways during seizure activity. (Refer to ND: risk for ineffective Airway Clearance, following.)

(continues on page 222)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Perform neurological and vital sign checks after seizure: level of consciousness, orientation, ability to comply with simple commands, the ability to speak, memory of the incident, weakness or motor deficits, blood pressure (BP), pulse, and respiratory rate.	Documents postictal state and time and completeness of recovery to a normal state. May identify additional safety concerns to be addressed.
Investigate reports of pain.	May be the result of repetitive muscle contractions or symptom of injury incurred, requiring further evaluation and intervention.
<b>Collaborative</b> Administer antiepileptic drugs (AEDs), as indicated, for example:	AED therapy is generally reserved for patients diagnosed with recurrent, unprovoked seizures or epilepsy and is typically not indicated in patients who have experienced an isolated seizure or seizures secondary to a reversible cause (e.g., drug overdose) (AlEissa & Benbadis, 2016). Therapy is based on type of seizure, age, gender, comorbidities, adverse effect potential, drug interactions, and cost.
Newer AED drugs include eslicarbazepine acetate (Aptiom), lamotrigine (Lamictal), oxcarbazepine (Trileptol), topiramate (Topamax), gabapentin (Neurontin), levetiracetam (Keppra), and pregabalin (Lyrica). Older, classic medications include phenytoin (Dilantin), carbamazepine (Tegretol), valproic divalproex (Depakote), diazepam (Valium), and similar tranquilizers such as clonazepam (Klonopin).	The drug of choice depends on an accurate diagnosis, as response to specific anticonvulsants varies (reflects the different pathophysiological mechanisms in the various types of seizures). It is desirable to begin treatment with a single drug (monotherapy) in both adults and children. Each drug is effective for certain types of seizures and can be classified as <b>broad spectrum</b> (effective for many different types of seizures) and <b>narrow spectrum</b> (effective for only specific types of seizures) (Ha & Bellanger, 2013). <b>P</b> Monotherapy is especially desirable in children because it improves adherence to drug regimen, decreases the likelihood of adverse effects, and avoids drug interactions (Ko, 2016).
Monitor AED drug levels and document corresponding side effects and frequency of seizure activity.	Blood levels of the various AEDs should be evaluated on a regular basis. Blood levels should also be done when breakthrough seizures occur or any change occurs in the client's status. The standard therapeutic level may not be optimal for the individual client if untoward side effects develop or seizures are not controlled.
Prepare for/assist with more intensive interventions as indicated.	Vagal nerve stimulation, magnetic beam therapy, electrode implantation, or other surgical interventions, such as temporal lobectomy, may be done for intractable seizures or well-localized epileptogenic lesions when client is disabled and at high risk for serious injury. Success has been reported with gamma ray radiosurgery for the treatment of multiple seizure activity that has otherwise been difficult to control.

### NURSING DIAGNOSIS: risk for ineffective Airway Clearance

#### Possibly Evidenced By

Neuromuscular impairment  
Retained secretions  
Airway spasm; foreign body in airway

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Respiratory Status: Airway Patency NOC

Maintain effective respiratory pattern with airway patent.  
Be free of signs of aspiration.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Airway Management NIC</b>	
<b>Independent</b>	
Encourage client to remove dentures or other objects from mouth if aura occurs and to avoid chewing gum or sucking lozenges if seizures can occur without warning.	Reduces risk of aspiration or foreign bodies lodging in pharynx.
Place in lying position on a flat surface; turn head to side during seizure activity.	Promotes drainage of secretions; prevents tongue from obstructing the airway.
Loosen clothing from the neck, chest, and abdominal areas.	Facilitates chest expansion, enhancing breathing.
Insert soft airway as indicated per facility protocol and only if jaw is relaxed.	If inserted before jaw is tightened, these devices may prevent biting of tongue and facilitate respiratory support if required. Airway adjunct may be indicated after cessation of seizure activity if client is unconscious and unable to maintain own airway. Note: Current opinion is mixed regarding the use of airways during seizure activity.
Suction as needed.	Reduces risk of aspiration or asphyxiation. Note: Risk of aspiration is low unless the individual has eaten within the last 40 minutes.
<b>Collaborative</b>	
Administer supplemental oxygen or bag ventilation, as needed postictally.	May reduce cerebral hypoxia resulting from decreased circulation and oxygenation secondary to vascular spasm during prolonged or recurrent seizures. Note: Artificial ventilation during general seizure activity is of limited or no benefit because it is not possible to move air in and out of lungs during sustained contraction of respiratory musculature. As seizure abates, respiratory function will return unless a secondary problem exists, such as foreign body or aspiration.
Prepare for and assist with intubation, if indicated.	The presence of prolonged apnea postictally may require ventilatory support.

### NURSING DIAGNOSIS: risk for situational or chronic low Self-Esteem

#### Possibly Evidenced By

Functional impairment; exposure to traumatic situation [seizure or ongoing epilepsy]; unrealistic self-expectations  
Alteration in body image; alteration in social role  
Inadequate belonging, respect from others

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Self-Esteem NOC

Identify feelings and methods for coping with negative perception of self.  
Verbalize increased sense of self-esteem about diagnosis.  
Verbalize realistic perception and acceptance of self in changed role or lifestyle.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Esteem Enhancement NIC</b>	
<b>Independent</b>	
Discuss feelings about diagnosis and perception of threat to self.	Reactions vary among individuals, and previous knowledge or experience with this condition affects acceptance of therapeutic regimen. One study indicated that, to patients, the phenomenon of epilepsy is, above all, of a psychosocial nature and, in that dimension, is closely related to negative emotions, such as shame, fear, and sorrow.

(continues on page 224)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage expression of feelings.	Verbalization of fears, anger, and concerns about future implications can help client begin to accept and deal with situation.
Identify possible or anticipated public reaction to condition. Encourage client to refrain from concealing condition.	Provides opportunity to problem-solve response, and provides a measure of control over situation. Concealment is destructive to self-esteem (potentiates denial), blocking progress in dealing with problem, and may increase the risk of injury or negative responses when a seizure does occur.
Explore with client current and past successes and strengths.	Focusing on positive aspects can help alleviate feelings of guilt or self-consciousness and help client begin to accept manageability of condition.
Avoid overprotecting client; encourage participation in activities, providing supervision or monitoring when indicated.	Participation in all possible experiences can diminish worry and depression about limitations. While potential injury is a concern, so too is the need to participate in life activities. Observation or supervision (buddy system) should be provided for such activities as contact sports, cycling, gymnastics, climbing, swimming, and other water sports. Use of protective gear is essential if the client is engaging in contact sports or activities that commonly result in falls. Note: People with uncontrolled seizures should avoid dangerous activities like scuba diving, rock climbing, skydiving, hang gliding, and mountain climbing.
Determine attitudes and capabilities of SO. Help individual realize that client's feelings are normal; however, guilt and blame are not helpful.	Negative expectations from SO may affect client's sense of competency and self-esteem and interfere with support received from SO, limiting the potential for optimal management and personal growth.
Emphasize the importance of staff and SO remaining calm during seizure activity.	Anxiety of caregivers is contagious and can be conveyed to the client, increasing or multiplying individual's negative perceptions of situation and self.
Refer client/SO to support groups, such as the Epilepsy Foundation (national and local chapters), National Association of Epilepsy Centers, American Epilepsy Society, Citizens United for Research in Epilepsy (CURE), and Delta Society's National Service Dog Center.	Provides opportunity to gain information, support, and ideas for dealing with problems from others who share similar experiences. Note: "Seizure dogs" may be trained to bark or otherwise alert parent/caregiver when client is seizing. Other dogs (seizure response dog) may help prevent injury by breaking client's fall and staying with client during a seizure, and a few may be able to warn of a seizure in advance (seizure-predicting dogs), allowing individual to initiate safety measures (Epilepsy Foundation, n.d.). Service animals can also increase independence and personal sense of control.
Discuss long-term effects as indicated and possible referral for psychotherapy with client/SO.	Seizures can have a profound effect on personal self-esteem, and client/SO may feel guilt over perceived limitations and public stigma. Counseling can help overcome feelings of inferiority and self-consciousness.

**P** Emotional and behavioral problems can occur in some children, especially when seizures are not well controlled.

## NURSING DIAGNOSIS: readiness for enhanced Health Management

### Possibly Evidenced By

Expresses desire to enhance management of condition, risk factors, prescribed regimen

**NURSING DIAGNOSIS:** **readiness for enhanced Health Management** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Self-Management: Chronic Disease NOC**

Verbalize understanding of disorder and various stimuli that may increase or potentiate seizure activity.  
Adhere to prescribed drug regimen.  
Initiate necessary lifestyle and behavior changes as indicated.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i>	
Review pathology and prognosis of condition and lifelong need for treatments as indicated.	Provides an opportunity to clarify and dispel misconceptions and present condition as something that is manageable. <b>P</b> However, for individuals with long-standing seizure disorder (particularly children), the impact of seizures on memory and learning varies widely and depends on many factors. In general, the earlier a child develops seizures and the more extensive the area of the brain affected, the poorer the outcome. Children with seizures that are not well controlled are at higher risk for intellectual decline, and learning and language problems can occur (Mass General Staff, n.d.).
Discuss client's particular triggers if known.	The most frequent triggers include missing AED doses, taking other drugs that interfere with seizure medications, heavy alcohol use, cocaine or other drug use. <b>P</b> Also, flashing lights, hyperventilation, loud noises, video games, TV viewing, and lack of sleep (particularly in a teenager) may be problematic.
Review possible effects of female hormonal changes.	Alterations in hormonal levels that occur during menstruation and pregnancy may increase risk of seizure breakthrough.
Discuss significance of maintaining good general health, such as adequate nutrition; rest; moderate exercise; and avoidance of exhaustion, alcohol, caffeine, and stimulant drugs.	Regularity and moderation in activities may aid in reducing and controlling precipitating factors, enhancing sense of general well-being, and strengthening coping ability and self-esteem. Note: Too little sleep or too much alcohol can precipitate seizure activity in some people.
Review importance of good oral hygiene and regular dental care.	Reduces risk of oral infections and gingival hyperplasia.
Encourage client who smokes to refrain from smoking except while supervised.	Client is at risk for burn injuries if cigarette is dropped during seizure.
Evaluate need for and provide protective headgear.	Use of helmet may provide added protection for individuals who suffer recurrent and severe seizures.
Identify necessity and promote acceptance of actual limitations; discuss safety measures regarding driving, using mechanical equipment, climbing ladders, swimming, and hobbies.	Reduces risk of injury to self or others, especially if seizures occur without warning.
<b>P</b> Recommend parent/caregiver observe child during play and stay with child in an unsafe environment (e.g., if falls are a risk during seizure activity or child is bathing or swimming).	<b>P</b> Enhances safety, reducing the risk of injury/drowning.
Encourage client to wear identification tag or bracelet stating the presence of a seizure disorder.	Expedites treatment and diagnosis in emergency situations.
Emphasize need for routine follow-up care and laboratory testing as indicated; for example, CBC should be monitored biannually and in presence of a sore throat or fever and signs of other infection.	Therapeutic needs may change and serious drug side effects such as agranulocytosis or toxicity may develop.

(continues on page 226)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss local laws or restrictions about persons with epilepsy or seizure disorder. Encourage awareness but not necessarily acceptance of these policies.	Although legal and civil rights of persons with epilepsy have improved, restrictions exist in some states pertaining to such things as obtaining a driver's license, workers' compensation, and required reporting to state agencies.
<b>Teaching: Prescribed Medication <small>NIC</small></b> Review medication regimen, the necessity of taking drugs as ordered, and not discontinuing therapy without physician supervision. Include directions for missed dose.	Lack of cooperation with medication regimen is a leading cause of seizure breakthrough. Client needs to know risks of SE resulting from the abrupt withdrawal of anticonvulsants. Depending on the drug dose and frequency, client may be instructed to take missed dose if remembered within a predetermined time frame. <b>P Note:</b> Monotherapy with AED such as Depakote may be preferred for children, as compliance with regimen is enhanced when only taking one pill a day (Lava, 2015).
Recommend taking drugs with meals if appropriate.	May reduce the incidence of gastric irritation, nausea, and vomiting.
Discuss nuisance and adverse side effects of individual drugs (e.g., drowsiness, fatigue, lethargy, hyperactivity, sleep disturbances, gingival hypertrophy, visual disturbances, nausea, or vomiting). Emphasize that some side effects can be very serious (e.g., rashes, syncope, and ataxia, congenital disabilities, aplastic anemia).	Promotes involvement and participation in the decision-making process and awareness of potentially serious and long-term effects of drug therapy, and provides an opportunity to minimize or prevent complications.
Provide information about potential drug interactions and necessity of notifying other healthcare providers of drug regimen.	Knowledge of anticonvulsant use reduces risk of prescribing drugs that may interact, thus altering seizure threshold or therapeutic effect.
Discuss the use of over-the-counter (OTC) medications and supplements and herbals.	Anticonvulsant drugs can interact with many other medications and substances. Some medications can decrease the effectiveness of anticonvulsant drugs, or the client may choose a folk remedy or herbal supplement without being aware of potential for harmful effects.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition, and presence of complications, personal resources, and life responsibilities)

- **ineffective Health Management**—complexity of therapeutic regimen, insufficient social support, perceived benefit (versus side effects of medication), perceived susceptibility (possible long periods of remission)
- **risk for Injury**—physical (altered consciousness, loss of large or small muscle coordination)
- **chronic low Self-Esteem (specify)**—traumatic situation, disturbed body image, physical illness; ineffective adaptation to loss

## CRANIOCEREBRAL TRAUMA—ACUTE CARE AND REHABILITATION

- I. **Pathophysiology**
  - a. Craniocerebral trauma (also called traumatic brain injury [TBI], acquired brain injury, and head injury)—physical injury to the cranium and intracranial structures with varied outcomes, ranging from no apparent (or temporary) neurological disturbance to permanent impairment of brain function, including persistent vegetative state depending on the extent of the damage
  - b. TBI may be open or closed and can include brain concussion, contusion, laceration, hemorrhage, or skull fractures.
  - c. TBIs are classified as mild, moderate, or severe.
    - i. Concussion: most common form of mild head injury
    - ii. Intracranial hemorrhage: defined by the region of the brain (intracerebral) or surrounding structures affected, such as subdural, epidural, subarachnoid, brainstem

1. Intracerebral hemorrhage: may occur along with other brain injuries (particularly contusions), with signs and symptoms dependent on the size and location. Hemorrhage may be apparent immediately or develop slowly.
2. Acute subdural hematoma: caused by venous bleeding when bridging veins are torn, is said to occur in 5% to 25% of all severe head injuries involving a contusion or laceration, and often accompanies intracerebral bleeding (Meagher & Young, 2016); signs and symptoms present almost immediately and increase rapidly.
3. Epidural hematoma: arterial bleeding usually from the middle meningeal artery in the temporal region. Typically manifested by a brief loss of consciousness at the time of trauma, then a lucid interval that may last for several hours, followed by deterioration in level of consciousness. Epidural hematoma complicates approximately 2% of cases of head trauma annually (Liebeskind, 2016).

**II. Etiology**—(causes of traumatic brain injury and types of neurologic damage)

- a. Leading causes for TBI in the United States in 2013  
(Note: Sources vary in exact numbers) (Centers for Disease Control and Prevention [CDC], 2017b):
  - i. Falls: 47%, and are highest for children aged 0 to 4 and those aged 65 or older
  - ii. Struck by or against an object: 15%, which includes assaults, pedestrian/vehicle crashes, and sports-related injuries
  - iii. Motor vehicle/traffic crashes: 14%
  - iv. Penetrating head injuries (e.g., gunshot wounds, stab wounds, shrapnel, and motor vehicle or occupational accidents). Gunshot wounds: 35% of all TBIs resulting in death are attributed to firearms (Vinas, 2015).
  - v. Blasts: leading cause of TBI for active-duty military personnel in contemporary war zones (Eskridge et al, 2013). In addition, severe head trauma has been identified as a common cause of death in terrorist bombings and has been found to be a major cause of critical injury (Burgess et al, 2010).
  - vi. Shaken Baby Syndrome (SBS), a form of abusive head trauma (AHT) and inflicted traumatic brain injury (ITBI), is a leading cause of child maltreatment deaths and irreversible brain damage in the United States (Parks et al, 2012).
- b. Primary damage (Lump, 2014; Northwestern University, 2010): occurs at the time of injury (open or closed injury) and, if sufficiently severe, may result in death or severe disability. There are many mechanisms of injury that may occur, including:
  - i. Coup-contrecoup injury: This occurs when the force of the initial blow is great enough to cause brain damage at the site of initial impact between the skull and brain

(coup) and is also great enough to cause the brain to move in the opposite direction and hit the opposite side of the skull (contrecoup), causing damage at that site.

- ii. Contact phenomena injury: Object strikes the head, resulting in concussion, cerebral contusion, skull fracture, or intracranial hemorrhage.
- iii. Acceleration-deceleration injury: Brain rapidly accelerates and decelerates within the skull, causing the brain to strike the skull, usually in the front and the back of the skull, causing tearing of neuronal tissue and cerebral blood vessels.
- iv. Rotational acceleration-deceleration injury: Forces cause the brain to twist within the skull, resulting in torsion and shearing of nerve tissue and blood vessels.

- c. Secondary damage (Granacher, 2003; Northwestern University, 2010; Rangel-Castilla et al, 2016): Damage that begins immediately following the primary insult of the brain and continues for hours or days. Major contributors of early secondary injury are hypoxia and hypoperfusion of the brain (Brenner et al, 2012). *Note:* Many traumatic brain injuries result in multiple types of primary and secondary damage.

- i. Diffuse axonal injury: shearing injury of large nerve fibers (axons covered with myelin) in many areas of the brain, or stretching or shearing of blood vessels from the same forces, producing hemorrhage.
- ii. Systemic or neurological complications can also cause or exacerbate secondary brain injury—hypotension, hypoxia, hypercapnia, intracranial hypertension, acid-base imbalance, cerebral vaso-spasm, electrolyte abnormalities, hyperthermia, infection, cerebral ischemia, seizures, and hypoglycemia or hyperglycemia.

**III. Statistics**

- a. Morbidity: Traumatic brain injury (TBI) is a leading cause of injury, death, and disability in the United States. In 2013, about 2.5 million TBI-related emergency department visits were reported in the United States, and 282,000 TBI-related hospitalizations occurred (Taylor et al, 2017). Each year, close to 20,000 persons in the United States are involved in gunshot wounds to the head (Bizhan et al, 2015). The U.S. Department of Veterans Affairs (VA) estimates that 22% of all combat casualties from Iraq and Afghanistan are brain injuries (VA, n.d.).
- b. Mortality: There are approximately 56,000 TBI-related deaths annually (data from 2013) (Taylor et al, 2017). Traumatic injuries remain the leading cause of death in children and in adults aged 45 years or younger (Rangel-Castilla et al, 2016).
- c. Cost: The cost of TBI in 2010 (including direct and indirect medical costs) was estimated to be approximately \$76.5 billion. Additionally, the cost of fatal TBIs and TBIs requiring hospitalization accounts for approximately 90% of total TBI medical costs (CDC, 2017b).

## G L O S S A R Y

**Amnesia:** Loss of memory about recent event or a particular period of time, such as events surrounding injury.

**Anomia:** Inability to remember names of objects; individual may speak fluently but must use other words to describe familiar objects.

**Aphasia:** Loss of ability to communicate or express oneself and to understand language due to brain dysfunction.

**Apraxia:** Inability to perform complex or skilled movement or use objects properly in the absence of sensory or motor impairments.

**Ataxia:** Loss of muscle control or coordination, especially with voluntary movement, interfering with an individual's ability to walk, talk, and perform activities of daily living (ADLs).

**Closed head injury:** Blunt trauma to the brain or brain structures by a direct blow or rapid deceleration, such as striking the windshield of a car, without penetration of the skull.

**Cognition:** The process of knowing, including awareness of thoughts or perceptions, ability to process information, reasoning, and judgment.

**Coma:** A state of unconsciousness from which the individual cannot be aroused even with stimulation; completely unresponsive to environment.

**Concussion:** Injury to brain resulting from impact with an object, such as blow to the head or sudden deceleration, causing temporary loss of normal brain function with or without loss of consciousness.

**Concussion grading scale:** Three grades are widely used to categorize the severity of concussion (also known as mild TBI). Grade 1: No loss of consciousness; transient confusion (less than 20 minutes), and complete recovery within 20 minutes. Grade 2: No loss of consciousness; confusion (lasting longer than 20 minutes) posttraumatic amnesia. Grade 3: Loss of consciousness (may be brief), loss of memory for events immediately preceding and after the injury (Rangel-Castilla 2016; Swierzezski, 2015).

**Contusion/Bruise:** Discoloration and/or swelling at the location of actual impact, or at the point or points where the force of the blow has driven the brain against the skull's bony ridges.

**Deceleration:** Rapid decrease in velocity causing injury when a moving body part hits a stationary object, such as the brain hitting the inside of the skull.

**Decerebrate posture:** Rigid extension of the arms and legs, pronation of forearms, downward pointing of toes, and backward arching of head in response to noxious stimuli when cerebral control of spinal reflexes is lost, as with severe injury at the level of the brainstem.

**Decorticate posture:** Muscle rigidity with arms flexed toward chest, fists clenched, and legs extended in response to noxious stimuli and associated with brain injury at or above the upper brainstem.

**Diabetes insipidus (DI):** Defined as the passage of large volumes ( $>3$  L/24 hr) of dilute urine ( $<300$  mOsm/kg); occurs in several forms. In TBI, the most common form of DI is *central* (neurogenic, pituitary, or neurohypophyseal) characterized by decreased secretion of antidiuretic

hormone (ADH). DI is relatively rare and is not related to diabetes mellitus. Risk factors for acute DI include penetrating trauma and severe head trauma and can be an acute or chronic complication of head injury (Khadori et al, 2017).

**Diffuse brain damage:** Occurs over a widespread area and is commonly associated with acceleration/deceleration injuries, in which the head does not necessarily contact anything, but brain tissue is damaged and diffuse axonal injury occurs. This often occurs in a closed TBI. *Note:* Many traumatic brain injuries cause both localized and diffuse damage.

**Dystonia:** Involuntary prolonged muscle contractions causing twisting of the body, repetitive movements, and abnormal postures.

**Focal brain injury:** Bruising of brain tissue and damage to blood vessels due to a blow or rapid deceleration. Includes contusions and hematomas (Lump, 2014).

**Glasgow Coma Scale (GCS):** Standardized rating scale used to determine an individual's level of consciousness (LOC) and degree of brain impairment by measuring eye opening and verbal and motor response to stimuli. Scores range from a low of 3 to a high of 15. A score of 12 to 15 suggests mild brain injury; 9 to 11, moderate injury; and 8 or lower, severe brain injury.

**Hematoma, intracranial:** Collection of blood within the skull caused by ruptured blood vessels, which may be localized in one area of the brain (intracerebral), located above the dura mater (epidural), beneath the dura (subdural), or between the arachnoid membrane and the pia mater (subarachnoid).

**Hemiparesis:** Weakness or partial paralysis of one side of the body.

**Intracranial pressure (ICP):** The pressure exerted by cerebrospinal fluid (CSF) within the cranium is normally 8 to 18 mm Hg in a supine adult at rest. Increased ICP may be due to an increase in CSF or pressure from a lesion or swelling of the brain itself.

**Localized brain damage:** Occurs in a specific location and is commonly associated with an injury in which the head strikes or is struck by an object. This usually occurs following an open/penetrating traumatic brain injury. *Note:* Many traumatic brain injuries cause both localized and diffuse damage.

**Mild brain injury (MBI):** Accounts for 75% of all diagnosed head injuries (CDC, 2014). MBI can be treated in emergency department (ED) settings, yet it is estimated that about 25% of those with MBI fail to seek medical attention. The CDC refers to MBI as a "silent epidemic" because the problems experienced by patients with MBI (e.g., dizziness, headache, and memory disturbances) are not visible but may result in functional losses difficult to detect. Long-term physical, mental, social, or occupational consequences often result.

**Open head injury:** Open fracture of the skull as may occur with high-impact crashes, severe assaults with an object, or gunshot or blast injury to the head.

**Postconcussion syndrome (PCS):** Within days to weeks of a mild TBI (with or without loss of consciousness),

**G L O S S A R Y** (continued)

<p>approximately 40% of patients develop PCS. Symptoms include headache, dizziness, vertigo, memory problems, trouble concentrating, sleeping problems, restlessness, irritability, apathy, depression, and anxiety.</p> <p><b>Posttraumatic amnesia (PTA):</b> A state of agitation, confusion, and memory loss following a TBI, which can last days to months. PTA is marked by impaired ability to process information accurately and inability to form new memories.</p> <p><b>Posturing:</b> Awkward or unnatural postures (decorticate or decerebrate) associated with severe brain injury and that suggests a poor prognosis.</p>	<p><b>Proprioception:</b> Awareness of posture, movement, equilibrium, and relationship of self and limbs to environment.</p> <p><b>Quadriplegia:</b> Muscle weakness or lack of control of all four extremities—also called tetraparesis.</p> <p><b>Sympathetic storming (also called storming):</b> Exaggerated stress response in individuals with severe TBI (GCS score 3 to 8). Storming response is due to increased circulating corticoids and catecholamines, which results in agitation, extreme posturing, hypertension, tachycardia, tachypnea, diaphoresis, and hyperthermia. Episodes may occur within first 24 hours of injury or in the weeks following injury (Lemke, 2007).</p>
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**CARE SETTING**

This plan of care focuses on acute care and acute inpatient rehabilitation. Brain injury care for those experiencing moderate to severe trauma progresses along a continuum of care, beginning with acute hospital care and inpatient rehabilitation to subacute and outpatient rehabilitation, as well as home- and community-based services.

**RELATED CONCERNs**

- Brain infections: meningitis and encephalitis, page 267
- Cerebrovascular accident (CVA)/stroke, page 247
- Psychosocial aspects of care, page 835
- Seizure disorders, page 216
- Surgical intervention, page 873
- Venous thromboembolism (VTE) disease: Deep vein thrombosis (DVT) and pulmonary embolism (PE), page 120
- Total nutritional support: parenteral/enteral feeding, page 525
- Upper gastrointestinal bleeding, page 340

**CLIENT ASSESSMENT DATABASE**

Data depend on type, location, and severity of injury and may be complicated by additional injury to other vital organs.

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<p><b>ACTIVITY/REST</b></p> <ul style="list-style-type: none"> <li>Weakness, fatigue</li> <li>Sleep problems, insomnia</li> <li>Clumsiness, loss of balance</li> </ul>	<ul style="list-style-type: none"> <li>Altered consciousness, lethargy</li> <li>Hemiparesis, quadripareisis</li> <li>Unsteady gait (ataxia); balance problems</li> <li>Orthopedic injuries (trauma)</li> <li>Loss of muscle tone, muscle spasticity</li> </ul>
<p><b>CIRCULATION</b></p>	<ul style="list-style-type: none"> <li>Normal or altered blood pressure (BP) (hypotension or hypertension); prolonged hypertension and arrhythmias can occur because of sympathetic storming.</li> <li>Changes in heart rate, including bradycardia, tachycardia alternating with bradycardia, other dysrhythmias (not usually associated with hemodynamic instability)</li> <li>Diaphoresis can be severe with storming (Lemke, 2007).</li> </ul> <p style="text-align: right;"><i>(continues on page 230)</i></p>

## CLIENT ASSESSMENT DATABASE (contd.)

### MAY REPORT (continued)

### MAY EXHIBIT (continued)

#### EGO INTEGRITY

- Significant other (SO) may report that client's personality changes and behavioral problems are the most difficult disabilities to handle.
- Problems coping
- Difficulty making decisions

#### ELIMINATION

- Behavior or personality changes (subtle to dramatic) may include depression, apathy, anxiety, irritability, impulsivity, anger, paranoia, confusion, frustration, agitation, and mood swings.

- Bowel, bladder incontinence or dysfunction

#### FOOD/FLUID

- Nausea
- Changes in appetite

- Vomiting, which may be projectile
- Swallowing problems—coughing, drooling, dysphagia
- Altered bowel sounds
- Inability to eat because of altered awareness or consciousness, or other traumatic injuries
- Weight loss due to increased metabolic rate

#### HYGIENE

- Problems with bathing, dressing, grooming, feeding, toileting

#### NEUROSENSORY

- Variable levels of awareness at time of impact, such as feeling dazed, confused, "seeing stars"
- Amnesia surrounding trauma events
- Visual changes, such as double vision, movement of print or stationary objects such as walls and floor; eye strain and visual fatigue
- Vertigo, problems with balance
- Ringing in ears, hearing loss
- Tingling, numbness in extremities
- Loss of or changes in sense of taste or smell
- Changes in thinking ability

- LOC ranging from lethargy to coma
- Mental status changes, including altered orientation, alertness or responsiveness, attention, concentration, problem-solving, emotional affect or behavior, and memory. *Note:* The most common impairment among severely head-injured clients is memory loss, characterized by some loss of specific memories and the partial inability to form or store new ones (Masters, 2014).
- Pupillary changes—response to light and symmetry; deviation of eyes, inability to follow
- Facial asymmetry
- Unequal, weak handgrip
- Absent or weak deep tendon reflexes
- Apraxia, hemiparesis, quadriplegia
- Posturing—decorticate, decerebrate
- Seizure activity
- Heightened sensitivity to touch and movement—can be painful and/or initiate storming
- Proprioception
- Difficulty with hand-eye coordination
- **Vision:** Client may not be able to register what he or she is seeing or may be slow to recognize objects and have difficulty with tracking and hand-eye coordination
- **Language and communication:** Difficulty with understanding and producing spoken and written language, and with the subtler aspects of communication, such as body language and emotional, nonverbal signals

#### PAIN/DISCOMFORT

- Headache of variable intensity and location, usually persistent and long-lasting
- Body pain, especially when brain injury is a component of multiple trauma

- Facial grimacing
- Withdrawal response to painful stimulus
- Restlessness, moaning

**MAY REPORT (continued)****MAY EXHIBIT (continued)****RESPIRATION****SAFETY**

- History of recent trauma, such as fall, motor vehicle crash, bullet or blast injuries

**SOCIAL INTERACTION**

- Inability to cope
- Relationship problems and role changes
- Caregiver/SO has difficulty dealing with caregiver burdens and role

**TEACHING/LEARNING**

- Use of alcohol, other drugs
- Failure to attend to safety issues

**DISCHARGE PLAN CONSIDERATIONS**

- May require assistance with self-care, ambulation, transportation, food preparation, shopping, treatments, medications, homemaker and maintenance tasks, change in physical layout of home or placement in living facility other than home

► Refer to section at end of plan for postdischarge considerations.

- Changes in breathing patterns, such as periods of apnea alternating with hyperventilation
- Sustained hyperventilation, which may accompany storming
- Noisy respirations, stridor, choking
- Rhonchi, wheezes (possible aspiration)

- Fractures, dislocations
- Head or facial lacerations, abrasions, discoloration (raccoon eyes), Battle's sign around ears (trauma signs)
- Impaired vision, visual field disturbances, abnormal eye movements
- Drainage from ears or nose—CSF
- Impaired cognition
- Range of motion (ROM) impairment, altered muscle tone, general weakness, incomplete paralysis
- Fever (commonly occurs in patient with head injury) may be associated with infection or related to hypermetabolic rate, storming, and instability in internal regulation of body temperature.
- Behavioral changes indicative of violence to self or others

- Expressive or receptive aphasia, unintelligible speech, repetitive speech, dysarthria, anomia
- Difficulty dealing with environment, interacting with more than one or two individuals at a time

**DIAGNOSTIC STUDIES****TEST****WHY IT IS DONE****WHAT IT TELLS ME****PRIMARY DIAGNOSTIC STUDIES**

- ***Computed tomography (CT) scan (with/without contrast):*** Uses low-radiation x-rays to create a computer-generated, three-dimensional image of the brain tissues at successive layers.

Screening image of choice in acute brain injury. Useful in the differential diagnosis of cerebral infarction, ventricular displacement or enlargement, aneurysms, hemorrhage, hematoma, contusions, and skull fractures. Also identifies brain tissue swelling and shift.

(continues on page 232)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li>• <b>Xenon-enhanced CT scan:</b> Method of scanning used for neuroimaging in which the person inhales xenon gas while CT images are made.</li><li>• <b>Magnetic resonance imaging (MRI):</b> Uses magnetic fields and computer technology to generate images of the internal anatomy of the brain.</li></ul>	<p>Used to assess changes in cerebral blood flow (CBF) in the period shortly after a TBI. <i>Note:</i> The lowest CBF values occur within the first 6 to 12 hours after injury (Rangel-Castilla et al, 2016).</p> <p>More sensitive than CT for detecting cerebral trauma, determining neurological deficits not explained by CT, evaluating prolonged interval of disturbed consciousness, and defining evidence of previous trauma superimposed on acute trauma.</p> <p><i>Note:</i> MRI has limited role in evaluation of acute head injury because of longer procedure time and difficulty obtaining MRI in an acutely injured person.</p>
<b>ANCILLARY TESTS</b>	
<ul style="list-style-type: none"><li>• <b>Electroencephalogram (EEG):</b> Procedure that uses electrodes on the scalp to record electrical activity of the brain.</li></ul>	<p>May reveal presence or development of pathological waves. EEG is not generally indicated in the immediate period of emergency response, evaluation, and treatment of TBI. If the client fails to improve, EEG may help in diagnostic evaluation for seizures, focal or diffuse encephalopathy, or brain death.</p> <p><i>Note:</i> Continuous EEG monitoring can help clinicians evaluate the effectiveness of high-dose barbiturates in achieving suppression of neuronal activity.</p>
<ul style="list-style-type: none"><li>• <b>Arterial blood gases (ABGs):</b> Measures oxygen and carbon dioxide levels and pH.</li><li>• <b>Serum chemistry/electrolytes:</b> Substances that, in solution, conduct an electric current and are decomposed by their passage. Sodium, potassium, calcium, and magnesium are common electrolytes.</li><li>• <b>Serum sodium and osmolality, urine-specific gravity, and osmolality:</b> Concentration of the particles that are dissolved in a fluid.</li></ul>	<p>Determines presence of ventilation or oxygenation problems that may exacerbate and increase ICP.</p> <p>May reveal numerous imbalances that contribute to increased ICP and changes in mentation. Increased metabolic rate and diaphoresis can result in elevated sodium (hypernatremia).</p>
<ul style="list-style-type: none"><li>• <b>Blood glucose:</b> Monitors for fluctuations in serum glucose levels.</li></ul>	<p>May be indicated in TBI to assess for diabetes insipidus (DI) if patient is excreting urine output of 250 mL/hr (or more) for at least 3 consecutive hours. DI is the production of abnormally large volumes of dilute urine (polyuria) due to body's inability to concentrate urine. <i>Note:</i> Large doses of mannitol (used to reduce intracranial pressure and which produces a high urine output) can mask DI.</p> <p>Sympathetic storming can result in elevated glucose (hyperglycemia), although hypoglycemia can also occur due to inadequate nutrition.</p>

## NURSING PRIORITIES

1. Maximize cerebral perfusion and function.
2. Prevent or minimize complications.
3. Promote optimal functioning/return to preinjury level.
4. Support coping process and family recovery.
5. Provide information about condition, prognosis, potential complications, treatment plan, and resources.

## DISCHARGE GOALS

1. Cerebral function improved; neurological deficits resolving or stabilized.
2. Complications prevented or minimized.
3. Activities of daily living (ADLs) met by self or with assistance of other(s).
4. Family acknowledges reality of situation and involved in recovery program.
5. Condition, prognosis, complications, and treatment regimen understood and available resources identified.
6. Plan in place to meet needs after discharge.

## I. ACUTE CARE PHASE

<b>NURSING DIAGNOSIS:</b> risk for decreased intracranial Adaptive Capacity	
<b>Possibly Evidenced By</b> Brain injury (e.g., cerebrovascular impairment, trauma)	
ACTIONS/INTERVENTIONS	RATIONALE
<b>Neurologic Monitoring</b> NIC <i>Independent</i> Determine factors related to individual situation, cause for coma or decreased cerebral perfusion, and potential for increased intracranial pressure (ICP).	Influences choice of interventions. Deterioration in neurological signs and symptoms (or failure to improve after initial insult) may reflect reduced intracranial adaptive capacity, requiring the client to be in critical care for monitoring of ICP or surgical intervention.
Monitor and document neurological status frequently and compare with baseline (e.g., GCS [and other scales] as indicated that measure levels of awareness, cognition, behavior, and interaction with the environment):	GCS assesses trends and potential for increased ICP and is useful in determining location, extent, and progression or resolution of CNS damage. Note: The Rancho Los Amigos Scale (or Rancho Levels) may also be used. These levels do not require cooperation from the client and are based on client's response to environmental stimuli and a range of behavioral responses, including "no response, confused-agitated, purposeful-appropriate."
Evaluate eye opening—spontaneous (awake), opens only to painful stimuli, keeps eyes closed (coma).	Determines arousability and level of consciousness (LOC).
Assess verbal response; note whether client is alert, oriented to person, place, time, and situation or is confused, uses inappropriate words and phrases that make little sense.	Measures appropriateness of speech and content of consciousness. If minimal damage has occurred in the cerebral cortex, client may be aroused by verbal stimuli but may appear drowsy or uncooperative. More extensive damage to the cerebral cortex may be displayed by slow response to commands, lapsing into sleep when not stimulated, disorientation, and stupor. Damage to midbrain, pons, and medulla is manifested by lack of appropriate responses to stimuli.
Assess motor response to simple commands, noting purposeful (obeys command, attempts to push stimulus away) and nonpurposeful (posturing) movement. Note limb movement and document right and left sides separately.	Measures overall awareness and ability to respond to external stimuli. Best indicator of state of consciousness in a client whose eyes are closed because of trauma or who is aphasic. Consciousness and involuntary movement are integrated if client can both grasp and release the tester's hand or hold up two fingers on command. Purposeful movement can include grimacing or withdrawing from painful stimuli or accomplishing movements that the client desires, such as sitting up. Other movements (posturing and abnormal flexion of extremities) usually indicate diffuse cortical damage. Absence of spontaneous movement on one side of the body indicates damage to the motor tracts in the opposite cerebral hemisphere.

(continues on page 234)

**ACTIONS/INTERVENTIONS (continued)****RATIONALE (continued)**

Monitor vital signs:

BP, noting onset of and continuing systolic hypertension and widening pulse pressure; observe for hypotension in multiple-trauma client.

Normally, autoregulation maintains constant cerebral blood flow despite fluctuations in systemic BP. Loss of autoregulation may follow local or diffuse cerebrovascular damage. Rising systolic BP accompanied by falling diastolic BP (widening pulse pressure) is an ominous sign of increased ICP. Hypovolemia or hypotension associated with multiple trauma may also result in cerebral ischemia and damage.

Heart rate and rhythm, noting bradycardia, alternating bradycardia and tachycardia, and other dysrhythmias.

Changes in rate (most often bradycardia) and dysrhythmias may develop without impacting hemodynamic stability. However, dysrhythmias can reflect brainstem pressure or injury in the absence of underlying cardiac disease. Tachycardia can reflect hydration status, fever or hypermetabolic state, and sympathetic storming.

Respirations, noting patterns and rhythm, including periods of apnea after hyperventilation and Cheyne-Stokes respiration.

Irregularities can suggest location of cerebral insult, increasing ICP, and need for further intervention, including possible respiratory support. (Refer to ND: risk for ineffective Breathing Pattern, following.)

Evaluate pupils, noting size, shape, equality, light reactivity, and accommodation.

Pupil reactions are regulated by the oculomotor (III) cranial nerve and are useful in determining whether the brainstem is intact. Pupil size and equality are determined by balance between parasympathetic and sympathetic innervation. Response to light reflects combined function of optic (II) and oculomotor (III) cranial nerves.

Assess position and movement of eyes, noting whether in midposition, deviated to side, or downward. Note loss of doll's eyes or oculocephalic reflex.

Position and movement of eyes help localize area of brain involvement. An early sign of increased ICP is impaired abduction of eyes, indicating pressure or injury to the fifth cranial nerve. Loss of doll's eyes indicates deterioration in brainstem function and poor prognosis.

Note presence or absence of reflexes—blink, cough, gag, and Babinski.

Altered reflexes reflect injury at level of midbrain or brainstem and have direct implications for client safety. Loss of blink reflex suggests damage to the pons and medulla. Absence of cough and gag reflexes reflects damage to the medulla. Presence of Babinski reflex indicates injury along pyramidal pathways in the brain.

**Cerebral Perfusion Promotion NIC**

Monitor temperature and regulate environmental temperature, as indicated. Limit use of blankets; administer tepid sponge bath in presence of fever. Wrap extremities in blankets when hypothermia blanket is used.

Fever may reflect damage to the hypothalamus. Increased metabolic needs and oxygen consumption occur (especially with fever and shivering), which can further increase ICP.

Monitor intake and output (I&O). Weigh, as indicated. Note skin turgor and status of mucous membranes.

Useful indicators of total body water, which is an integral factor in systemic tissue perfusion. Cerebral trauma and ischemia can result in decreased secretion of antidiuretic hormone and diabetes insipidus (DI) (see Glossary).

Maintain head and neck in midline or neutral position. Support with small towel rolls and pillows. Avoid placing head on large pillows. Periodically check position and fit of cervical collar or tracheostomy ties when used.

Turning head to one side compresses the jugular vein and inhibits cerebral venous drainage, thereby increasing ICP. Tight-fitting collar or tracheostomy ties can also impede jugular drainage.

Provide rest periods between care activities and limit duration of procedures.

Continual activity can increase ICP and contribute to storming by producing a cumulative stimulant effect.

Reduce extraneous stimuli and provide comfort measures, such as back massage, quiet environment, soft voice, and gentle touch.

Provides calming effect, reduces adverse physiological response, and promotes rest to maintain or lower ICP.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Help client avoid or limit coughing, vomiting, and straining at stool or bearing down, when possible. Reposition client slowly; prevent client from bending knees and pushing heels against mattress to move up in bed.	These activities increase intrathoracic and intra-abdominal pressures, which can increase ICP.
Avoid or limit use of restraints.	Mechanical restraints may enhance fight response, increasing ICP. Note: Cautious use may be a last resort to prevent injury to client when other measures, including medications, are ineffective.
Limit number and duration of suctioning passes in client on ventilator, for example, two passes less than 10 seconds each. Hyperventilate prior to suctioning as indicated per facility policy.	Prevents hypoxia and associated vasoconstriction that can impair cerebral perfusion. Note: Although most of the research articles show an increased ICP above 20 mm Hg when using open-system suctioning (as opposed to closed-system suctioning), it is still not clear which technique is best for maintaining cerebral perfusion pressure (CPP) (Galbiati & Paola, 2015).
Encourage SO to talk to comatose patient.	Familiar voices of family and SO appear to have a relaxing effect on many comatose clients, which can reduce ICP.
Investigate increasing restlessness, moaning, and guarding behaviors.	These nonverbal cues may indicate increasing ICP or reflect presence of pain when client is unable to verbalize complaints. Unrelieved pain can, in turn, aggravate or potentiate increased ICP.
Palpate for bladder distention; maintain patency of urinary drainage if used. Monitor for constipation.	Urinary retention can trigger autonomic responses, raising blood pressure and potentiating elevation of ICP.
Observe for seizure activity and protect client from injury.	Seizures can occur because of cerebral irritation, hypoxia, or increased ICP; additionally, seizures can further elevate ICP, compounding cerebral damage.
Assess for nuchal rigidity, twitching, increased restlessness, irritability, and onset of seizure activity.	Indicative of meningeal irritation, which may occur because of interruption of dura or development of infection during acute or recovery period of brain injury. (Refer to Care Plan, Brain Infections: Meningitis, Encephalitis, if indicated.)
<b>Collaborative</b>	
Elevate head of bed to 30 degrees, as tolerated or indicated. Avoid hip flexion greater than 90 degrees.	Elevating the head of the patient to 30 degrees is perhaps the least invasive method of lowering ICP (Rangel-Castilla et al, 2016). Note: Presence of hypotension can compromise cerebral perfusion pressure, negating beneficial effect of elevating head of bed.
Administer isotonic intravenous (IV) fluids, such as 0.9% sodium chloride, with control device.	Fluids should not be routinely restricted but should be administered to maintain normal intravascular volume, which decreases risk of cerebral edema and elevated ICP.
Administer supplemental oxygen via appropriate route, such as mechanical ventilator or mask, to maintain appropriate O <sub>2</sub> saturation, as indicated.	Reduces hypoxemia, which is known to increase cerebral vasodilation and blood volume, elevating ICP.
Monitor pulse oximetry continually and ABGs as needed.	Determines respiratory sufficiency and indicates therapy needs.
Administer medications, as indicated, for example:  Diuretics, such as mannitol (Osmotrol) and furosemide (Lasix)	Diuretics may be used in acute phase to draw water from brain cells into the intravascular space, reducing cerebral edema and ICP. Note: Loop diuretics such as Lasix also reduce production of CSF, which can contribute to increased ICP when cerebral edema impairs CSF circulation. Mannitol usually lowers ICP within a few minutes of IV administration. Individuals being treated with mannitol must receive adequate fluid resuscitation to prevent hypovolemia and hypotension.

(continues on page 236)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Barbiturates, such as pentobarbital	Barbiturates are the most common class of drugs used to produce deep sedation in the early phase of TBI treatment. The purpose of the therapy is to protect neurons by decreasing the cerebral metabolic rate, altering vascular tone, and inhibiting some of the biochemical intracellular events known to cause secondary brain injury. Because this therapy causes respiratory depression, it should only be used while client is on a ventilator. Note: Use of sedatives and opioids for cerebral protection can suppress signs and symptoms of sympathetic storming. The onset of storming episodes frequently coincides with being weaned off these CNS depressant medications. Oral or enteric medications may then be initiated to reduce the adverse effects of sympathetic storming (Lemke, 2007).
Steroids, such as dexamethasone (Decadron) and methylprednisolone (Medrol)	May be effective for treating vasogenic edema—decreasing inflammation, reducing tissue edema. Note: Use and efficacy of steroids continue to be debated in this condition.
Anticonvulsants, such as phenytoin (Dilantin), levetiracetam (Keppra), carbamazepine (Tegretol), lamotrigine (Lamictal), and gabapentin (Neurontin)	Dilantin is the drug of choice for treatment and prevention of seizure activity in immediate posttraumatic period to reduce risk of secondary injury from associated increased ICP. Prophylactic anticonvulsive therapy (using other antiepileptic drugs [AEDs]) may be continued for an indeterminate period of time (Rangel-Costilla et al, 2016).
Analgesics and sedatives, such as lorazepam (Ativan), benzodiazepines, and propofol (Diprivan)	May be indicated to relieve pain and agitation and their negative effects on ICP. Client on ventilator will be sedated and possibly require deep sedation.
Antipyretics, such as acetaminophen (Tylenol)	Reduces or controls fever and its deleterious effect on cerebral metabolism and oxygen needs and insensible fluid losses.
Provide hypothermia therapy as indicated.	May be used to reduce effects of hypermetabolic state and risk of cerebral edema. Note: Hypothermia is well known for its ability to reduce intracranial pressure. However, research confirms that hypothermia therapy bears some risk in the patient with TBI, including coagulopathy and immunosuppression (Brain Trauma Foundation et al, 2007).
Prepare for surgical intervention, such as decompression craniotomy, or insertion of ventricular drain or ICP pressure monitor, if indicated, and transfer to higher level of care.	Client may require decompressive craniotomy to remove a section of the skull and incise the dura so that the brain can expand, thus relieving pressure. Craniotomy may also be performed to remove bone fragments, elevate depressed fractures, evacuate hematoma, control hemorrhage, and debride necrotic tissue. Monitoring of ICP requires intensive care and complex therapies. One way to monitor ICP is via a catheter in one of the brain's lateral ventricles. This device can also be used to drain CSF from the brain, reducing intracranial volume and thus decreasing ICP. Note: Intracranial pressure monitoring devices are usually placed in conjunction with cranial surgery procedures but may be placed in any client with a GCS score less than 9 and an abnormal CT scan (Chin & Toshkezi, 2016).

**NURSING DIAGNOSIS:** risk for ineffective Breathing Pattern**Possibly Evidenced By**

Neurological impairment (e.g., head trauma)

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Ventilation NOC**

Establish or maintain a normal, effective respiratory pattern, absence of cyanosis, with ABGs or pulse oximetry within client's acceptable range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b>	
<i>Independent</i>	
Monitor rate, rhythm, and depth of respiration. Note breathing irregularities, for example, apneustic, ataxic, or cluster breathing.	Changes may indicate onset of pulmonary complications, common following brain injury, or indicate location and extent of brain involvement. Slow respiration and periods of apnea (apneustic, ataxic, or cluster breathing patterns) are signs of brainstem injury and warn of impending respiratory arrest.
Note competence of gag and swallow reflexes and client's ability to protect own airway. Insert airway adjunct as indicated.	Ability to mobilize or clear secretions is important to airway maintenance. Loss of swallow or cough reflex may indicate need for artificial airway or intubation. Thickening of pulmonary secretions may occur due to diaphoresis, dehydration, or renal insufficiency. Note: Soft nasopharyngeal airways may be preferred to prevent stimulation of the gag reflex caused by hard oropharyngeal airway, which can lead to excessive coughing and increased ICP.
Elevate head of bed as permitted and position on sides, as indicated.	Facilitates lung expansion and ventilation, and reduces risk of airway obstruction by tongue.
Encourage deep breathing if client is conscious.	Prevents or reduces atelectasis.
Suction with extreme caution, no longer than 10 to 15 seconds. Note character, color, and odor of secretions.	Suctioning is usually required if client is comatose and on a ventilator or is immobile and unable to clear own airway.
Auscultate breath sounds, noting areas of hypoventilation and presence of adventitious sounds—crackles, rhonchi, and wheezes.	Identifies pulmonary problems such as atelectasis, congestion, and airway obstruction, which may jeopardize cerebral oxygenation or indicate onset of pulmonary infection, a common complication of head injury.
Monitor use of respiratory depressant drugs, such as sedatives.	Can increase respiratory embarrassment and complications.
<b>Collaborative</b>	
Monitor pulse oximetry and serial ABGs as indicated.	Determines respiratory sufficiency, acid-base balance, and therapy needs.
Review chest x-rays.	Reveals ventilatory state and signs of developing complications such as atelectasis and pneumonia.
Administer supplemental oxygen by appropriate route.	Maximizes arterial oxygenation and aids in prevention of cerebral hypoxia. If respiratory center is depressed, mechanical ventilation may be required.
Assist with chest physiotherapy when indicated.	Although contraindicated in client with acutely elevated ICP, these measures are often necessary in acute rehabilitation phase to mobilize and clear lung fields and reduce atelectasis or pulmonary complications.

## NURSING DIAGNOSIS: risk for acute Confusion

### Possibly Evidenced By

Alteration in cognitive functioning or level of consciousness

### Desired Outcomes/Evaluation Criteria—Client Will

#### Cognition NOC

Maintain or regain usual mentation and reality orientation.

#### Distorted Thought Self-Control NOC

Recognize changes in thinking and behavior.

Participate in therapeutic regimen and cognitive retraining.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Cognitive Stimulation NIC

##### Independent

Evaluate and continually monitor changes in orientation, ability to speak, mood and affect, sensorium, and thought processes.

Upper cerebral functions are often the first to be affected by altered circulation and oxygenation. Damage may occur at time of initial injury or develop later because of secondary injury. Motor, perceptual, cognitive, and personality changes may develop and persist, with gradual normalization of responses, or changes may remain permanently to some degree.

Confer with SO to compare past behaviors and preinjury personality with current responses.

Recovery from head injury often includes a prolonged phase of agitation, angry responses, and disordered thought sequences. It is helpful to know about client's past behaviors to determine if current behaviors can be attributed solely to the brain injury. Note: SOs often have difficulty accepting and dealing with client's aberrant behavior and may require assistance in coping with situation.

Review oxygenation status, vital signs, medications, fluid and electrolytes, and nutritional status continually.

These factors are likely to be out of balance in the critically ill TBI patient, negatively impacting orientation and cognitive functioning.

Reorient client to person, place, time, staff, and necessary activities, as needed. Provide reality concisely and briefly, avoid challenging illogical thinking. Maintain eye contact.

Structured reality orientation can reduce defensive reactions. The client may be disoriented or be totally unaware of injury (amnesia) and therefore can deny reality of injury. These interventions can reduce confusion and the anxiety and fear associated with the unknown.

Monitor sleep and rest patterns. Provide periods of uninterrupted sleep and rest.

Sleep deprivation and interrupted rest are likely to exacerbate confusion.

Maintain consistency in staff assigned to client to the extent possible.

Provides client with feelings of stability, familiarity, and control of situation.

Provide client/SO information about injury process in relationship to symptoms. Explain procedures and reinforce explanations given by others.

Loss of internal structure (changes in memory, reasoning, and ability to conceptualize) affects processing and retention of information and thus can compound confusion and disorientation.

Listen with regard to client's verbalizations despite speech pattern or content.

Conveys interest and worth to individual, enhancing self-esteem and encouraging continued efforts.

Encourage SO to provide current news and family happenings.

Promotes maintenance of contact with usual events, enhancing reality orientation and normalization of thinking.

##### Collaborative

Collaborate in treatment of underlying condition along with other healthcare team members (e.g., physician specialists, respiratory therapy; physical/occupational therapy, nutritionists), as needed.

Treatment of TBI is typically complex and requires multiple modalities and clinicians over an extended period of time. Alterations may be needed in medications, respiratory support, fluids, electrolytes, oxygenation, and nutrition.

## 2. ACUTE AND REHABILITATION PHASE

<b>NURSING DIAGNOSIS:</b> [disturbed Sensory Perception (specify)]		
<b>May Be Related To</b>	[Altered sensory reception, integration—neurological trauma or deficit] [Insufficient or excessive environmental stimuli] [Psychological stress]	
<b>Possibly Evidenced By</b>	[Disorientation; change in usual response to stimuli] [Sensory distortions] [Impaired communication] [Poor concentration] [Change in behavior pattern]	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>		
<b>Cognition NOC</b>	Regain or maintain usual LOC and perceptual functioning.	
<b>Knowledge: Stroke [Brain Injury] Management NOC</b>	Acknowledge changes in ability and presence of residual involvement. Demonstrate behaviors and lifestyle changes to compensate for, or overcome, deficit.	
ACTIONS/INTERVENTIONS		
RATIONALE		
<b>Reality Orientation NIC</b> <i>Independent</i>	Assess sensory awareness, including response to touch, hot/cold, dull/sharp, and awareness of motion and location of body parts. Note problems with vision and other senses.	Information is essential to client safety. All sensory systems may be affected by TBI, loss of or difference in sensations, as well as in the ability to perceive and respond appropriately to stimuli.
Observe behavioral responses—hostility, crying, inappropriate affect, agitation, and hallucinations.	Individual responses may be variable, but commonalities (e.g., emotional lability, increased irritability or frustration, apathy, and impulsiveness) exist during recovery from brain injury. Documentation of behavior provides information needed for development of structured rehabilitation.	
Document specific changes in abilities, such as focusing and tracking with both eyes, following simple verbal instructions, answering “yes” or “no” to questions, and feeding self with dominant hand.	Helps localize areas of cerebral dysfunction and identifies signs of progress toward improved neurological function.	
Ascertain and validate client’s perceptions and provide feedback. Reorient client frequently to environment, staff, and procedures, especially if vision is impaired.	Assists client to differentiate reality in the presence of altered perceptions. Cognitive dysfunction and visual deficits potentiate disorientation and anxiety.	
Provide meaningful stimulation: verbal (talk to client), olfactory (e.g., oil of clove, coffee), tactile (touch, hand holding), and auditory (music, television, radio, visitors). Avoid physical or emotional isolation.	Carefully selected sensory input may be useful for coma stimulation, as well as for documenting progress during cognitive retraining.	
Provide structured therapies, activities, and environment. Provide written schedule for client/family to refer to on a regular basis.	Promotes consistency and reassurance, reducing anxiety associated with the unknown. Promotes sense of control and cognitive retraining.	
Use day/night lighting.	Provides for normal sense of passage of time and sleep-wake pattern.	
Allow adequate time for communication and performance of activities.	Reduces frustration associated with altered abilities and delayed response pattern.	

(continues on page 240)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide for client's safety (e.g., assistance with ambulation and protection from falling or from hot or sharp objects). Document perceptual deficit and compensatory activities on chart and at bedside.	Impaired judgment and motor and sensory deficits increase risk of client injury.
Identify alternative ways of dealing with perceptual deficits, such as arrange bed, personal articles, and food to take advantage of functional vision; describe where affected body parts are located.	Enables client to progress toward independence, enhancing sense of control, while compensating for neurological deficits.
<b>Collaborative</b> Refer to physical, occupational, speech, and cognitive therapists.	Interdisciplinary approach can create an integrated treatment plan based on the individual's unique combination of abilities and disabilities with focus on evaluation and functional improvement in physical, cognitive, and perceptual skills.

## NURSING DIAGNOSIS: risk for Infection

### Possibly Evidenced By

Alteration in skin integrity, invasive procedures, CSF leak  
Decrease in ciliary action; stasis of body fluids  
Suppressed inflammatory response—steroid use

### Desired Outcomes/Evaluation Criteria—Client Will

#### Infection Severity NOC

Maintain normothermia, free of signs of infection.  
Achieve timely wound healing when present.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<b>Independent</b>	
Provide meticulous clean, or aseptic care; maintain good hand-washing techniques.	First-line defense against nosocomial infections.
Observe areas of impaired skin integrity (wounds, suture lines, invasive line insertion sites), noting presence of inflammation and drainage characteristics (when present).	Early identification of developing infection permits prompt intervention and prevention of further complications.
Monitor temperature routinely. Note presence of chills, diaphoresis, and changes in mentation.	May indicate developing infection such as pneumonia or sepsis, requiring further evaluation and intervention.
Encourage deep breathing and aggressive pulmonary toilet. Observe sputum characteristics.	Enhances mobilization and clearing of pulmonary secretions to reduce risk of pneumonia and atelectasis. Note: Postural drainage should be used with caution if risk of increased ICP exists.
Provide perineal care. Maintain integrity of closed urinary drainage system if used. Encourage adequate fluid intake.	Reduces potential for bacterial growth and ascending infection.
Observe color and clarity of urine. Note presence of foul odor.	Indicators of developing urinary tract infection (UTI) requiring prompt intervention.
Screen and restrict access of visitors or caregivers with upper respiratory infections (URIs).	Reduces risk to "compromised host."
<b>Collaborative</b> Obtain specimens, as indicated.	Culture with sensitivities may be done to verify presence of infection and identify causative organism and appropriate treatment choices.

**NURSING DIAGNOSIS:** risk for imbalanced Nutrition: less than body requirements**Possibly Evidenced By**

Inability to ingest nutrients  
Biological factors—hypermetabolic state

**Desired Outcomes/Evaluation Criteria—Client Will****Nutritional Status NOC**

Demonstrate maintenance of desired weight or progressive weight gain toward goal.  
Experience no signs of malnutrition, with laboratory values within normal range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Therapy NIC</b>	
<b>Independent</b>	
Assess ability to chew, swallow, cough, and handle secretions.	These factors determine choice of feeding options because client must be protected from aspiration.
Auscultate bowel sounds, noting decreased or absent or hyperactive sounds.	Gastrointestinal (GI) functioning is usually preserved in brain-injured clients, so bowel sounds help in determining response to feeding or development of complications, such as ileus.
Weigh, as indicated.	Evaluates effectiveness or need for changes in nutritional therapy.
Provide for feeding safety, such as elevating head of bed while eating or during tube feeding.	Reduces risk of regurgitation and aspiration.
Divide feedings into small amounts and give frequently.	Enhances digestion and client's tolerance of nutrients and can improve client cooperation in eating.
Promote pleasant, relaxing environment, including socialization during meals. Encourage SO to bring in food that client enjoys.	Although the recovering client may require assistance with feeding and use of assistive devices, mealtime socialization with SO or friends can improve intake and normalize the life function of eating.
Check stools, gastric aspirant, and vomitus for blood.	Acute or subacute bleeding may occur (Cushing's ulcer), requiring intervention and alternative method of providing nutrition.
<b>Collaborative</b>	
Consult with dietitian or nutritional support team.	Helps determine the client's requirements for energy and to provide needed nutrients. Careful monitoring of nutrition indicators, such as weight and blood tests, is necessary to prevent problems associated with malnutrition—muscle wasting, pressure sores and decubitus ulcers, renal failure, atelectasis, and pneumonia.
Monitor laboratory studies, for example, prealbumin or albumin, transferrin, amino acid profile, iron, blood urea nitrogen (BUN), nitrogen balance studies, glucose, aspartate aminotransferase (AST) and alanine aminotransferase (ALT), and electrolytes.	Identifies nutritional deficiencies, organ function, and response to nutritional therapy.
Administer feedings by appropriate means—IV, enteral tube feeding, or oral feedings with soft foods and thick liquids. (Refer to CP: Total Nutritional Support: Parenteral/Enteral Feeding.)	Choice of route depends on client needs and capabilities. Tube feedings (nasogastric, jejunostomy) may be required initially, or parenteral route may be indicated in the presence of gastric or intestinal pathology. If client can swallow, soft foods or semiliquid foods may be more easily managed without aspiration.
Involve speech, occupational, and physical therapists when mechanical problem exists, such as impaired swallow reflexes, wired jaws, contractures of hands, and paralysis.	Individual strategies and devices may be needed to improve ability to eat.

## NURSING DIAGNOSIS: impaired physical Mobility

### May Be Related To

Alteration in cognitive functioning  
Decrease in muscle strength or control  
Sensoriperceptual impairment

### Possibly Evidenced By

Slowed/uncoordinated movements  
Limited ROM; postural instability; gait changes

### Desired Outcomes/Evaluation Criteria—Client Will

#### Immobility Consequences: Physiological NOC

Maintain or increase strength and function of affected or compensatory body part(s).  
Regain or maintain optimal position of function, as evidenced by absence of contractures and footdrop.

#### Mobility NOC

Demonstrate techniques or behaviors that enable resumption of activities.  
Maintain skin integrity and bladder and bowel function.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Exercise Therapy: Muscle Control NIC</b> <i>Independent</i> Review functional ability and reasons for impairment.	Identifies probable functional impairments and influences choice of interventions.
Assess degree of immobility, using a scale to rate dependence (0 to 4).	The client may be completely independent (0), may require minimal assistance or equipment (1), moderate assistance or supervision and teaching (2), extensive assistance or equipment and devices (3), or be completely dependent on caregivers (4). Persons in all categories are at risk for injury, but those in categories 2 to 4 are at greatest risk.
Provide or assist with ROM exercises.	Helps in maintaining movement and functional alignment of joints and extremities.
Instruct and assist client with exercise program and use of mobility aids. Increase activity and participation in self-care as tolerated.	Lengthy convalescence often follows brain injury, and physical reconditioning is an essential part of the program.
<b>Bed Rest Care NIC</b> Position client to avoid skin and tissue pressure damage. Turn at regular intervals, and make small position changes between turns.	Regular turning more normally distributes body weight and promotes circulation to all areas. If paralysis or limited cognition is present, client should be repositioned frequently.
Provide meticulous skin care, massaging gently with emollients. Remove wet linen and clothing, and keep bedding free of wrinkles.	Promotes circulation and skin elasticity and reduces risk of skin excoriation.
Maintain functional body alignment—hips, feet, and hands. Monitor for proper placement of devices and signs of pressure from devices.	Use of high-top tennis shoes, “space boots,” and T-bar sheepskin devices can help prevent footdrop. Hand splints are designed to prevent hand deformities and promote optimal function. Use of pillows, bedrolls, and sandbags can help prevent abnormal hip rotation.
Support head and trunk, arms and shoulders, and feet and legs when client is in wheelchair or recliner. Pad chair seat with foam or water-filled cushion, and assist client to shift weight at frequent intervals.	Maintains comfortable, safe, and functional posture and prevents or reduces risk of skin breakdown.
Provide eye care with artificial tears and eye patches, as indicated.	Protects delicate eye tissues from drying. Client may require patches during sleep to protect eyes from trauma if unable to keep eyes closed.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor urinary output. Note color and odor of urine. Assist with bladder retraining when appropriate.	Indwelling catheter used during the acute phase of injury may be needed for an extended period of time before bladder retraining is possible. Once the catheter is removed, several methods of continence control may be tried (such as intermittent catheterization for residual and complete emptying, external catheter, planned intervals on commode, and incontinence pads).
Provide fluids within individual tolerance (i.e., regarding neurological and cardiac concerns), as indicated.	Once past the acute phase of head injury (and if client has no other contraindicating factors), forcing fluids reduces the risk of urinary tract infections, as well as bladder or kidney stone formation. Good hydration provides other positive effects as well (e.g., normal stool consistency and optimal skin turgor).
Monitor bowel elimination and provide for or assist with a regular bowel routine. Check for impacted stool; use digital stimulation, as indicated. Sit client upright on commode or stool at regular intervals. Add fiber, bulk, and fruit juice to diet, as appropriate.	A regular bowel routine requires simple but diligent measures to prevent complications. Stimulation of the internal rectal sphincter stimulates the bowel to empty automatically if stool is soft enough to do so. Upright position aids evacuation.
Inspect for localized tenderness, redness, skin warmth, muscle tension, or ropy veins in calves of legs. Observe for sudden dyspnea, tachypnea, fever, respiratory distress, and chest pain.	Client is at risk for development of deep vein thrombosis (DVT) and pulmonary embolus (PE), requiring prompt medical evaluation and intervention to prevent serious complications.
<b>Collaborative</b>	
Provide flotation mattress and kinetic therapy, as appropriate.	Equalizes tissue pressure, enhances circulation, and helps reduce venous stasis to decrease risk of tissue injury.
Apply and monitor use of sequential compression devices (SCDs) to legs.	SCDs may be used to reduce risk of DVT associated with bedrest and limited mobility.
<b>Exercise Therapy: Muscle Control NIC</b>	
Refer to physical and occupational therapists, as indicated.	Useful in determining individual needs, therapeutic activities, and assistive devices.

### NURSING DIAGNOSIS: risk for physical Trauma

#### Possibly Evidenced By

Alteration in cognitive functioning

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Physical Injury Severity NOC

Be free of injury.

##### Client/Caregiver Will

##### Risk Control NOC

Recognize signs of impending crisis/loss of control.  
Engage in appropriate risk control strategies.

### ACTIONS/INTERVENTIONS

#### Behavior Management NIC

##### Independent

Reduce provocative stimuli, negative criticism, arguments, and confrontations.

Instruct in relaxation techniques. Provide diversional activities.

### RATIONALE

Reduces risk of triggering fight-or-flight response. Aggression, anger, and self-control are common problems in brain-injured clients, who may become violent or physically or verbally abusive.

Can help refocus attention and reduce anxiety to manageable levels.

(continues on page 244)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Maintain realistic expectations of client's ability to control own behavior, comprehend, and remember information.	It is important to maintain an expectation of the ability to improve and progress to a higher level of functioning, maintain hope, and promote continued work of rehabilitation.
Implement measures to control emotional outbursts or aggressive behavior if needed—speak in a calm voice, provide distraction, tell client to “stop,” or remove client from the situation, as appropriate.	Client may need help or external control to protect self or others from harm until internal control is regained.
<b>Environmental Management: Safety</b> <b>NIC</b> Provide for client's safety, such as padded side rails or bed enclosed with safety netting; someone present with client during times of agitation, etc.	Agitation, confusion, and impaired judgment increase risk of client injury. Note: Anxiety can lead to loss of control and escalate to panic. Support may provide calming effect, reducing anxiety and risk of injury.
Use restraints for brief periods of time and only as prescribed.	Restraints (physical holding, mechanical, and pharmacological) should be used judiciously and only to intervene in escalating violent, irrational behavior.
<b>Collaborative</b> Refer for neuropsychological evaluation as indicated.	Useful for determining therapeutic interventions for cognitive and neurobehavioral disturbances.

## NURSING DIAGNOSIS: interrupted Family Processes

### May Be Related To

Situational crisis

Shift in health status of a family member; shift in family roles

### Possibly Evidenced By

Alteration in participation in problem-solving, change in participation for decision making  
[Expressed confusion about what to do, difficulty responding to change]

### Desired Outcomes/Evaluation Criteria—Family/Client Will

#### Family Coping NOC

Begin to express feelings freely and appropriately.

Identify internal and external resources to deal with the situation.

Direct energies in a purposeful manner to plan for resolution of crisis.

Encourage and allow injured member to progress toward independence.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Family Integrity Promotion</b> <b>NIC</b> <i>Independent</i>	
Note components of family unit, availability, and involvement of support systems.	Defines family resources and identifies areas of need.
Encourage expression of concerns about seriousness of condition, possibility of death, or incapacitation.	Verbalization of fears gets concerns out in the open and can decrease anxiety and enhance coping with reality.
Listen for expressions of helplessness and hopelessness.	Joy of survival of victim is often quickly replaced by grief and anger at “loss” of the preinjury person and the necessity of dealing with new person that family does not know and may not even like. Prolongation of these feelings may result in depression.
Encourage expression and acknowledgment of feelings. Do not deny or reassure client/SO that everything will be all right.	Because it is not possible to predict the outcome, it is more helpful to assist the person to deal with feelings about what is happening instead of giving false reassurance.
Support family grieving for “loss” of member. Acknowledge normality of wide range of feelings and ongoing nature of process.	Although grief may never be fully reconciled and family may vacillate among various stages, understanding that this is typical may help members accept and cope with the situation.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Emphasize importance of continuous open dialogue between family members.	Provides opportunity to get feelings out in the open. Recognition and awareness promotes resolution of guilt and anger.
Help family recognize needs of all members.	Attention may be so focused on injured member that other members feel isolated or abandoned, which can compromise family growth and unity.
<b>Family Mobilization NIC</b>	
Evaluate and discuss family goals and expectations.	Family may believe that if client is going to live, rehabilitation will bring about a cure. Despite accurate information, expectations may be unrealistic. Also, client's early recovery may be rapid, then plateau, resulting in disappointment and frustration.
Reinforce previous explanations about extent of injury, treatment plan, and prognosis. Provide accurate information at current level of understanding and ability to accept.	Client and SO are unable to absorb or recall all information, and blocking can occur because of emotional trauma. As time goes by, reinforcement of information can help reduce misconceptions, fear about the unknown, and future expectations.
Identify individual roles and anticipated and perceived changes.	Responsibilities and roles may have to be partially or completely assumed by others, which can further complicate family coping.
Assess energy direction, whether efforts at problem-solving are purposeful or scattered.	May need assistance to focus energies in an effective way to enhance coping.
Identify and encourage use of previously successful coping behaviors.	Focuses on strengths and reaffirms individual's ability to deal with current crisis.
Demonstrate and encourage use of stress management skills—relaxation techniques, breathing exercises, visualization, and music.	Helps redirect attention toward revitalizing self to enhance coping ability.
<b>Collaborative</b>	
Include family in rehabilitation team meetings, care planning, and placement decisions.	Facilitates communication, enables family to be an integral part of the rehabilitation, and provides sense of control.
Identify community resources, such as visiting nurse, homemaker service, daycare program, respite facility, and legal and financial counselors.	Provides assistance with problems that may arise because of altered role function. Also, as family structure changes over time and client's needs increase with age, additional resources and support are often required.
Refer to family therapy and support groups.	Cognitive and personality changes are usually very difficult for family to deal with. Decreased impulse control, emotional lability, and inappropriate sexual or aggressive and violent behavior can disrupt family functioning and integrity. Trained therapists and peer role models may assist family to deal with feelings and reality of situation and provide support for decisions that are made.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, potential complications, treatment, self-care, and discharge needs**

**May Be Related To**

Lack of exposure, unfamiliarity with information resources  
Lack of recall, alteration in cognitive functioning

**Possibly Evidenced By**

Insufficient knowledge  
Inaccurate follow-through of instructions  
Development of preventable complications

(continues on page 246)

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, potential complications, treatment, self-care, and discharge needs** (continued)

**Desired Outcomes/Evaluation Criteria—Client/SO Will**

**Knowledge: Chronic Disease Management NOC**

Participate in learning process.

Verbalize understanding of condition, prognosis, and potential complications.

Verbalize understanding of therapeutic regimen and rationale for actions.

Initiate necessary lifestyle changes and involvement in rehabilitation program.

Correctly perform necessary procedures.

**ACTIONS/INTERVENTIONS**

**RATIONALE**

**Teaching: Disease Process NIC**

*Independent*

Evaluate capabilities and readiness to learn for both client and SO.

Permits presentation of material based on individual needs.  
Note: Client may not be emotionally or cognitively capable of assimilating information.

Review information regarding injury process and aftereffects.

Aids in establishing realistic expectations and promotes understanding of current situation and needs.

Inform client and SO that intellectual function, behavior, and emotional functioning may gradually improve but that some effects may persist for months or even be permanent.

Most brain-injured clients have persistent problems with concentration, memory, and problem-solving. If brain injury was moderate to severe, residual effects may remain.

Review and reinforce current therapeutic regimen. Identify ways of continuing program after discharge.

Recommended activities, limitations, medications, and therapy needs have been established based on a coordinated interdisciplinary approach. Follow-through is essential to progression of recovery and prevention of complications.

Discuss plans for meeting self-care needs.

Varying levels of assistance may be required, based on individual situation.

Provide written instructions and schedules for activity, medication, and important facts.

Provides visual reinforcement and reference source after discharge.

Encourage socialization within individual limitations.

Reinforcement of positive behaviors, such as appropriate interaction with others, may be helpful in relearning internal structure.

Identify signs and symptoms of individual risks, such as delayed CSF leak, posttraumatic seizures, headache, and chronic pain.

Recognizing developing problems provides opportunity for prompt evaluation and intervention to prevent serious complications.

Assess client's attention span and distractibility. Note level of anxiety.

Attention span and ability to attend or concentrate may be severely shortened, which both causes and potentiates anxiety, affecting thought processes.

Discuss with client/SO development of symptoms, such as reexperiencing traumatic event (flashbacks, intrusive thoughts, repetitive dreams or nightmares); psychic or emotional numbness; and changes in lifestyle, including adoption of self-destructive behaviors.

May indicate occurrence or exacerbation of posttrauma response, which can occur months to years after injury, requiring further evaluation and supportive interventions.

*Collaborative*

Identify community resources, including head injury support groups/Brain Injury Association, social services, rehabilitation facilities, outpatient programs, home-care or visiting nurse, and counseling or therapy, as needed.

Assistance with physical care, home management, adjustment to lifestyle changes, and emotional and financial concerns may be helpful in supporting and sustaining recovery. Note: Studies suggest an increased risk of developing Alzheimer's disease and possible acceleration of the aging process in brain injury survivors. Families will require continued support to meet these challenges.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Coordinate/encourage participation in cognitive retraining or rehabilitation program, as indicated.	Assists client with learning methods to compensate for disruption of cognitive skills. Addresses problems in concentration, memory, judgment, sequencing, and problem-solving. Note: New developments in technology and computer software allow for the creation of interactive sensorimotor virtual reality environments. This provides an opportunity for safe interaction between client and naturalistic environments for practicing or establishing effective behavioral responses.
Review necessity of recurrent neurological evaluations.	Client's/SO's anxiety may be reduced if they understand that frequent assessments are done to prevent or limit complications and that they do not necessarily reflect seriousness of client's condition.
Refer for, and reinforce importance of, follow-up care by rehabilitation team.	With diligent work (often for several years with these providers), the client may eventually overcome residual neurological deficits and be able to resume desired and productive lifestyle.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **impaired Memory**—neurological disturbances, anemia, hypoxia
- **ineffective Health Maintenance**—perceptual or cognitive impairment, deficient communication skills, inability to make appropriate judgments, insufficient resources
- **impaired Home Maintenance**—injury/impaired functioning, insufficient finances, unfamiliarity with neighborhood resources, inadequate support systems
- **acute/chronic Pain**—physical (tissue injury and neuronal damage), psychological (stress and anxiety); chronic physical disability
- **chronic Confusion**—head injury

## CEREBROVASCULAR ACCIDENT (CVA)/STROKE

**I. Pathophysiology**—Cerebrovascular accident (CVA, “stroke” or “brain attack”) is injury or death to parts of the brain caused by an interruption in the blood supply to that area causing disability, such as paralysis or speech impairment.

**II. Types**

- a. Ischemic stroke: Impaired cerebral circulation caused by a partial or complete occlusion of a blood vessel with transient or permanent effects
  - i. Accounts for 87% of all strokes (American Heart Association/American Stroke Association [AHA/ASA], 2017), with carotid stenosis as the leading cause
  - ii. Subdivided based on the underlying cause
    - 1. Large-vessel thrombotic and embolic strokes
    - 2. Small-vessel thrombotic stroke
    - 3. Cardioembolic stroke
    - 4. Other
  - iii. Ischemia may be transient and resolve within 24 hours, be reversible with resolution of symptoms over a period of 1 week (reversible ischemic neurological deficit [RIND]), or progress to cerebral infarction with variable effects and degrees of recovery.
- b. Hemorrhagic stroke: Result of bleeding directly into the brain

i. In addition to the area of the brain injured by the hemorrhage itself, the surrounding brain can be damaged by pressure from the mass of the hematoma. A general increase in intracranial pressure (ICP) may occur.

- ii. Accounts for approximately 15% of cerebrovascular accidents but about 40% of all stroke deaths (National Stroke Association [NSA], 2017).
- iii. Seizures are more common in hemorrhagic stroke than in ischemic stroke (either at stroke onset or within 24 hours (Liebeskind, 2017)).

**III. Etiology**

- a. Ischemic stroke
  - i. Large-vessel thrombotic and embolic strokes result from hypoperfusion, hypertension, and emboli traveling from large arteries to distal branches.
  - ii. Small-vessel thrombotic stroke typically stems from plaque, diabetes mellitus, or hypertension.
  - iii. Cardioembolic stroke results from atrial fibrillation, valve disease, or ventricular thrombi.
  - iv. Other types of ischemic stroke are caused by hyperglycemia and hyperinsulinemia, arterial dissection, arteritis, and drug abuse.

(continues on page 248)

- b. Hemorrhagic stroke
  - i. Caused by hemorrhage—subarachnoid or intracerebral—from such conditions as a ruptured aneurysm, arteriovenous malformation (AVM), trauma, infections, tumors, blood-clotting deficiencies, thrombolytic therapy, or hemorrhagic transformation of an ischemic infarct.
  - ii. Major risk factor: hypertension (60%; Liebeskind, 2017).
  - iii. Intracerebral hemorrhage incidence rates are higher in Mexican Americans, Latin Americans, blacks, Native Americans, Japanese, and Chinese people than in whites (Roger et al, 2012).

#### IV. Statistics

- a. Morbidity: According to a National Health Institutes Survey 2014 (CDC, 2014), the prevalence of stroke in

the United States was estimated at 2.5 million males and 2.4 million females, and there are currently over 6 million stroke survivors in the United States (National Stroke Association, 2017). Thus, stroke is a leading cause of serious long-term disability (Mozaffarian et al, 2015).

- b. Mortality: In 2014, stroke ranked fifth as the overall cause of death in the United States and fourth as the cause of death for those aged 65 years or older (Kochanek et al, 2016). Patients with oral anticoagulation-associated intracerebral hemorrhage have higher mortality rates and poorer functional outcomes (Liebeskind, 2017).
- c. Cost: Currently, CVD (including stroke) is the costliest disease in our nation, with a price tag of \$555 billion in 2016. Direct medical costs are expected to triple over the next 20 years (AHA/ASA, 2017).

## G L O S S A R Y

**Agnosia:** Impairment of the ability to recognize or comprehend the meaning of various sensory stimuli.

**Aphasia:** Impairment caused by stroke, degenerative diseases, or head injury that damages that part of the brain where language area is located. The disability can include comprehension, reading, writing, expression, and speaking. A person suffering from aphasia might be able to speak, read, or write but be unable to comprehend the words.

**Apraxia:** Disorder of voluntary movement consisting of impairment of the performance of skilled or purposeful movements despite physical ability and willingness to move.

**Atrial fibrillation:** Most common form of irregular heartbeat and a risk factor for embolic ischemic stroke. The condition can cause a pooling of blood in the heart, which can make it easier for clots to form.

**Cardiovascular disease (CVD):** Collective term for diseases of the heart and blood vessels, such as **coronary heart disease**, heart failure, **cardiomyopathy**, congenital heart disease, **peripheral vascular disease**, and **stroke**.

**Carotid stenosis:** Buildup of hardened plaque on the carotid artery wall. This is the leading cause of ischemic stroke.

**Cerebral edema:** Swelling of the brain.

**Contralateral:** Refers to the other side. Stroke affecting the right side of the brain may cause paralysis, affecting the left arm and leg.

**Dysarthria:** Speech impairment resulting from damage to central or peripheral nervous system, which causes muscle weakness or loss of muscle control, resulting in poor articulation of the lips, tongue, and palate. Dysarthria is characterized by distorted or slurred speech; however, comprehension may still be present.

**Dysphagia:** Difficulty in swallowing.

**Embolic stroke:** Occurs when a clot is carried into cerebral circulation and causes a localized cerebral infarct.

**EMBOLUS:** Blood clot that forms in one area of the body and moves to another.

**Functional Independence Measure (FIM™) instrument:**

Widely used rehabilitation instrument that measures both motor and cognitive disablement. The FIM instrument comprises 18 items, each of which is assessed on a seven-point scale, where the higher the score for an item, the more independently the patient can perform the tasks assessed by that item.

**Hemiplegia:** One-sided paralysis.

**Ipsilateral:** Refers to the same side. A stroke on the right side of the brain causes some symptoms on the right side of the body, as opposed to contralateral (the other side).

**Thrombosis:** Obstruction of a blood vessel by a clot formed at the site of obstruction.

**Thrombotic stroke:** Type of ischemic stroke usually seen in the aging population. It is due to atherosclerosis (plaque buildup), eventually narrowing the lumen of the artery. The symptoms are much more gradual and less dramatic than other strokes due to the slow, ongoing process that produces it. The stroke is “completed” when the condition stabilizes.

**Transient ischemic attack (TIA):** Temporary lack of adequate blood and oxygen to the brain that causes stroke warning signs but no permanent damage. Generally, lasts about 1 minute but can last up to 5 minutes.

**Unilateral neglect (also called hemispatial neglect, hemineglect, spatial neglect, neglect syndrome):** A neurological condition in which, after damage to one hemisphere of the brain, a deficit in attention to the opposite side of space is observed. Note: More common in CVA after right brain injury.

**CARE SETTING**

Although the client may initially be cared for in the intensive care unit (ICU) for severe or evolving deficits, this plan of care focuses on the step-down medical unit and subacute and rehabilitation units to the community level.

**RELATED CONCERNS**

Hypertension: severe, page 26  
 Craniocerebral trauma: acute care and rehabilitation, page 226  
 Psychosocial aspects of care, page 835  
 Seizure disorders, page 216  
 Total nutritional support: parenteral/enteral feeding, page 525

**CLIENT ASSESSMENT DATABASE**

Collected data are determined by location, severity, and duration of pathology.

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<b>ACTIVITY/REST</b>	<ul style="list-style-type: none"> <li>• Difficulty with activity due to weakness, loss of sensation, or paralysis (hemiplegia)</li> <li>• Tires easily</li> <li>• Difficulty resting, pain, or muscle twitching</li> </ul>
<b>CIRCULATORY</b>	<ul style="list-style-type: none"> <li>• Altered level of consciousness (LOC)</li> <li>• Altered muscle tone—flaccid or spastic; generalized weakness</li> <li>• One-sided paralysis</li> </ul>
<b>EGO INTEGRITY</b>	<ul style="list-style-type: none"> <li>• Arterial hypertension, which is common unless CVA is due to embolism or vascular malformation</li> <li>• Severe hypertension (systolic BP greater than 220 mm Hg) is a common finding in hemorrhagic stroke</li> <li>• Bruit in carotid, femoral, iliac arteries or abdominal aorta may or may not be present.</li> <li>• Pulse rate may vary due to various factors, such as preexisting heart conditions, medications, the effect of stroke on vasomotor center.</li> <li>• Dysrhythmias, electrocardiographic (ECG) changes</li> </ul>
<b>ELIMINATION</b>	<ul style="list-style-type: none"> <li>• Emotional lability</li> <li>• Exaggerated or inappropriate responses to anger, sadness, happiness</li> <li>• Difficulty expressing self</li> </ul>
<b>FOOD/FLUID</b>	<ul style="list-style-type: none"> <li>• Change in voiding patterns—incontinence, anuria</li> <li>• Distended abdomen</li> <li>• Distended bladder</li> <li>• May have absent or diminished bowel sounds if neurogenic paralytic ileus present</li> </ul>
	<ul style="list-style-type: none"> <li>• Obesity (risk factor)</li> <li>• Chewing and swallowing problems</li> </ul>

(continues on page 250)

**CLIENT ASSESSMENT DATABASE (contd.)****MAY REPORT (continued)****MAY EXHIBIT (continued)****NEUROSENSORY**

- Dizziness or syncope before stroke or transient during TIA
- Severe headache can accompany intracerebral or subarachnoid hemorrhage
- Tingling, numbness, and weakness commonly reported during TIAs, found in varying degrees in other types of stroke; involved side seems “dead”
- Visual deficits—blurred vision, partial loss of vision (monocular blindness), double vision (diplopia), or other disturbances in visual fields
- Sensory loss on contralateral side in extremities and sometimes in ipsilateral side of face
- Disturbance in senses of taste, smell

**PAIN/DISCOMFORT**

- Headache of varying intensity
- Sudden-onset severe headache (with subarachnoid hemorrhage)

- Mental status/LOC: Coma usually presents in the initial stages of hemorrhagic disturbances; consciousness is usually preserved when the etiology is thrombotic in nature.
- Altered cognitive function—memory, problem-solving, sequencing
- Altered behavior—lethargy, apathy, combativeness
- Speech: Aphasia: May be expressive (difficulty producing speech), receptive (difficulty comprehending speech), or global (combination of the two)
- Agnosia
- Altered body image awareness, neglect or denial of contralateral side of body (unilateral neglect); disturbances in perception
- Apraxia
- Vertigo or ataxia (loss of muscle control and balance)
- Seizures—common in hemorrhagic stroke
- Extremities: Weakness or paresis (partial paralysis) may affect a single extremity, one-half of the body, or all four extremities.
- Pupil size and reaction: May be unequal; dilated and fixed pupil on the ipsilateral side may be present with hemorrhage or herniation.
- Facial drooping, paralysis or paresis (ipsilateral)

- Guarding, distraction behaviors
- Restlessness
- Muscle or facial tension; nuchal rigidity (common in hemorrhagic stroke)

**RESPIRATION**

- Smoking (risk factor)

- Inability to cough, or protect airway
- Labored and irregular respirations
- Noisy respirations, rhonchi (aspiration of secretions)

**SAFETY**

- Impaired judgment, little concern for safety, impatience, lack of insight (right CVA)
- Problems with vision
- Changes in perception of body spatial orientation (typically, but not always, right CVA); neglect of one side
- Difficulty seeing objects on left side (right CVA)
- Being unaware of affected side
- Inability to recognize familiar objects, colors, words, faces
- Diminished response to heat and cold, altered body temperature regulation
- Swallowing difficulty, inability to meet own nutritional needs

**SOCIAL INTERACTION**

- Speech problems
- Inability to communicate
- Inappropriate behavior

**TEACHING/LEARNING**

- Family history of hypertension, stroke, diabetes

**MAY REPORT (continued)**

- Higher risk for intracerebral hemorrhage in Mexican Americans, Latin Americans, blacks, Native Americans, Japanese, and Chinese people than in whites (Roger et al, 2012)
- Use of oral contraceptives
- Smoking, alcohol abuse, obesity

**MAY EXHIBIT (continued)****DISCHARGE PLAN CONSIDERATIONS**

- Medication regimen and therapeutic treatments
- Assistance with transportation, shopping, food preparation, self-care, and homemaker or maintenance tasks
- Changes in physical layout of home
- Transition placement before return to home setting

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES**

TEST WHY IT IS DONE	WHAT IT TELLS ME
<ul style="list-style-type: none"> <li>• <b>Computed tomography (CT) scan with or without enhancement:</b> Demonstrates structural abnormalities and presence of edema, hematoma, ischemia, and infarction.</li> </ul>	Noncontrast CT scanning is the most commonly used form of neuroimaging in the emergent evaluation of patients with apparent acute stroke. Ischemic infarction may not be evident for 8 to 12 hours after the event. Hemorrhagic events are evident immediately; therefore, emergency CT scan is done before administration of thrombolytics. Patients experiencing a TIA will have a normal CT scan.
<ul style="list-style-type: none"> <li>• <b>Magnetic resonance imaging (MRI):</b> Demonstrates structural abnormalities and presence of edema, hematoma, ischemia, and infarction.</li> </ul>	Evaluates the lesion's location and size. May show evidence of stroke within minutes of occurrence and is especially beneficial for assessing smaller strokes deep within the brain.
<ul style="list-style-type: none"> <li>• <b>Positron emission tomography (PET) scan:</b> Provides data on cerebral metabolism and cerebral blood flow changes.</li> </ul>	Abnormal in ischemic event.
<ul style="list-style-type: none"> <li>• <b>Cerebral angiography (conventional) or digital subtraction angiography (DSA):</b> Invasive procedure that uses fluoroscopy and opaque dye to help identify abnormalities of the blood vessels within the brain.</li> </ul>	Helps determine specific cause of strokes, such as hemorrhage or obstructed artery, and pinpoints site of occlusion or rupture. Both procedures, while invasive, can be used for diagnostic as well as interventional purposes (Neuroradiology Learning Module, 2016).
<ul style="list-style-type: none"> <li>• <b>Transcranial Doppler ultrasonography:</b> Evaluates the velocity of blood flow through major intracranial vessels.</li> </ul>	Useful for evaluating more proximal (central internal) vascular anatomy of the brain (e.g., middle cerebral artery [MCA], intracranial carotid artery) to identify diminished blood flow. <i>Note:</i> The MCA is the artery most often occluded in stroke (Internet Stroke Center, Neurology Image Library, n.d.).
<ul style="list-style-type: none"> <li>• <b>Stroke scale:</b> A standardized instrument used to detect/diagnose acute strokes (there are numerous scales). Some scales (e.g., Cincinnati or Los Angeles) are used prehospital as a quick screening tool. In the early acute care phase, clinicians may use the Glasgow Coma Scale (GCS) or the Intracerebral Hemorrhage Scale. Others, such as the NIH Stroke Scale, are lengthy and are measured repeatedly over time, using a numeric scale to document trends (National Institutes of Health [NIH], 2003).</li> </ul>	Stroke scales are useful as aids to improve diagnostic accuracy, help determine the appropriateness of specific treatments (e.g., use of tPA), monitor a patient's neurologic deficits over time and through the continuum of care, and predict outcomes. Not only are different types of scales needed for these different purposes, but no single scale is suitable for capturing all of the effects of stroke. For example, if a patient has one of three abnormal findings on the Cincinnati Stroke Scale, there is a 72% probability of an ischemic stroke. If all three findings are present, the probability of an acute stroke is more than 85%. For the NIH scale, the higher the score, the more severe the stroke symptoms.

(continues on page 252)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li><b>Blood studies, for example:</b></li><li><b>Complete blood count (CBC):</b> The determination of the quantity of each type of blood cell in a given sample, including red blood cell (RBC) indices and count, white blood cell (WBC) count, hematocrit (Hct), hemoglobin (Hgb), platelets, and differential white blood cell count.</li></ul>	Various blood tests may be done in assessing a cause for stroke. CBC may reveal a contributing condition (e.g., thrombocytosis, leukemia; anemia) or issues that may affect reperfusion strategies (thrombocytopenia).
<ul style="list-style-type: none"><li><b>Chemistry (or metabolic) panel:</b> Provides information about the functioning of kidneys and other organs. Includes sodium, potassium, glucose, and blood urea nitrogen (BUN)/creatinine (Cr).</li><li><b>Coagulation studies:</b> Measures blood's ability to clot and the amount of time it takes to do so. Tests may include bleeding time, platelet count, prothrombin time (PT), and other factors.</li><li><b>Cardiac biomarkers:</b> Measures enzymes, proteins, and hormones that are associated with heart function.</li><li><b>Toxicology screens:</b> Determine the type and approximate amount of legal and illegal <b>drugs</b> a person has taken.</li></ul>	<p>May reveal a stroke mimic (e.g., hypoglycemia, hyponatremia) or provide evidence of concurrent illness (e.g., diabetes).</p> <p>May reveal a contributing coagulopathy for the stroke and are useful when fibrinolytics are to be used.</p> <p>Cardiac biomarkers are important because of the association of cerebral vascular disease and coronary artery disease.</p> <p>May be useful in ruling out intoxication in a patient with symptoms/behavior that mimic stroke or to identify sympathomimetic (e.g., cocaine) use, which may be the cause of ischemic or hemorrhagic stroke (Jauch, Stettler, &amp; Al-Kasab, 2016).</p>

### NURSING PRIORITIES

- Promote adequate cerebral perfusion and oxygenation.
- Prevent or minimize complications and permanent disabilities.
- Assist client to gain independence in activities of daily living (ADLs).
- Support coping process and integration of changes into self-concept.
- Provide information about disease process, prognosis, and treatment and rehabilitation needs.

### DISCHARGE GOALS

- Cerebral function improved and neurological deficits resolving or stabilized.
- Complications prevented or minimized.
- ADL needs met by self or with assistance of other(s).
- Coping with situation in positive manner and planning for the future.
- Disease process, prognosis, and therapeutic regimen understood.
- Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: **Ineffective cerebral Tissue Perfusion**

#### May Be Related To

Brain injury (e.g., [bleeding], embolism; cerebrovascular impairment, neurological illness)  
Hypertension; hypercholesterolemia; coagulopathy

#### Possibly Evidenced By

[Altered LOC; memory loss; sensory, language, intellectual, or emotional deficits]  
[Changes in motor or sensory responses]

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Tissue Perfusion: Cerebral NOC

Maintain usual or improved LOC, cognition, and motor and sensory function.  
Demonstrate stable vital signs and absence of signs of increased ICP.  
Display no further deterioration or recurrence of deficits.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Cerebral Perfusion Promotion</b> NIC	
<i>Independent</i>	
Determine factors related to individual situation, cause for coma, and potential for increased intracranial pressure (ICP).	Influences choice of interventions. For example, treatment of a patient with acute hemorrhagic stroke depends on the cause and severity of bleeding. Basic life support, as well as control of bleeding, seizures, blood pressure (BP), and intracranial pressure, is critical. Deterioration in neurological signs and symptoms or failure to improve after initial insult may reflect decreased intracranial adaptive capacity, which requires that client be admitted to critical care area for monitoring of ICP and for specific therapies geared to maintaining ICP within a specified range. If the stroke is evolving, the client can deteriorate quickly and require repeated assessment and progressive treatment. If the stroke is “completed,” the neurological deficit is nonprogressive, and treatment is geared toward rehabilitation and preventing recurrence.
Monitor and document neurological status frequently and compare with baseline.	Assesses trends in level of consciousness (LOC) and the potential for increased ICP and is useful in determining location, extent of central nervous system (CNS damage). May also reveal transient ischemic attack (TIA), which may resolve with no further symptoms, or may precede a thrombotic stroke.
Monitor vital signs noting:	
Hypertension or hypotension; compare blood pressure (BP) readings in both arms.	Fluctuations in pressure may occur because of cerebral pressure or injury in the vasomotor area of the brain. Hypertension may have been a precipitating factor in the stroke, and hypotension may follow stroke because of circulatory collapse.
Heart rate and rhythm; auscultate for murmurs.	Changes in rate, especially bradycardia, can occur because of the brain damage. Dysrhythmias and murmurs may reflect cardiac disease, which may have precipitated CVA, for example, stroke after MI or from valve dysfunction.
Respirations, noting patterns and rhythm—periods of apnea after hyperventilation, Cheyne-Stokes respiration.	Irregularities can suggest the location of cerebral insult or increased ICP and need for further intervention, including possible respiratory support. (Refer to CP: Craniocerebral Trauma—Acute Care and Rehabilitation, ND: risk for ineffective Breathing Pattern.)
Evaluate pupils, noting size, shape, equality, and light reactivity.	Pupil reactions are regulated by the oculomotor (III) cranial nerve and are useful in determining whether the brain-stem is intact. Pupil size and equality are determined by the balance between parasympathetic and sympathetic innervation. Response to light reflects the combined function of the optic (II) and oculomotor (III) cranial nerves.
Document changes in vision, such as reports of blurred vision and alterations in visual field or depth perception.	Specific visual alterations reflect the area of brain involved, indicate safety concerns, and influence choice of interventions.
Assess higher functions, including speech, if client is alert. (Refer to ND: impaired verbal [and/or written] Communication.)	Changes in cognition and speech content are an indicator of location and degree of cerebral involvement and may indicate increased ICP.
Assess for nuchal rigidity, twitching, increased restlessness, irritability, and onset of seizure activity.	Indicative of meningeal irritation, especially in hemorrhagic disorders. Seizures may reflect increased ICP or reflect location and severity of cerebral injury, requiring further evaluation and intervention.
Position with the head of bed elevated to 30 degrees, and maintain head in neutral position.	Reduces arterial pressure by promoting venous drainage and may improve cerebral circulation and perfusion.

(continues on page 254)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Maintain bedrest, provide quiet environment, and restrict visitors or activities, as indicated. Provide rest periods between care activities, limiting duration of procedures.	Continual stimulation can increase ICP. Absolute rest and quiet may be needed to prevent recurrence of bleeding in the case of hemorrhagic stroke.
Prevent straining at stool or holding breath.	Valsalva's maneuver increases ICP and potentiates risk of bleeding.
<b>Collaborative</b>	
Administer supplemental oxygen, as indicated.	Reduces hypoxemia.
Administer medications, as indicated, for example:	Treatments (including medications) depend on the cause of the stroke (i.e., ischemic or hemorrhagic) and management of associated symptoms and underlying conditions.
Intravenous thrombolytics, such as tissue plasminogen activator (tPA), alteplase (Activase), and recombinant prourokinase (Prourokinase)	Rapid administration of intravenous recombinant tissue-type plasminogen activator (r-tPA) to appropriate patients remains the mainstay of early treatment of acute ischemic stroke. Timely restoration of blood flow in ischemic stroke patients is effective in reducing long-term morbidity. For patients who meet national and international eligibility guidelines, intravenous r-tPA improves functional outcomes at 3 to 6 months when given within 4.5 hours of ischemic stroke onset and should be administered, even if endovascular treatments are being considered (Jauch et al, 2013; Powers et al, 2015). Note: These agents are contraindicated in several instances (e.g., intracranial hemorrhage as diagnosed by CT scan, recent intracranial surgery, serious head trauma, and uncontrolled hypertension).
Anticoagulants, such as warfarin sodium (Coumadin); low-molecular-weight heparin, for example, enoxaparin (Lovenox) and dalteparin (Fragmin); and direct thrombin inhibitors, such as argatroban (Argatroban), bivalirudin (Angiomax), and dabigatran (Pradaxa)	May be used to improve cerebral blood flow and prevent further clotting in ischemic stroke (such as when embolus arises from atrial fibrillation or there is a large cerebral sinus thrombus). Note: Anticoagulant therapy carries with it the risk of causing intracranial hemorrhage.
Antiplatelet agents, such as aspirin (ASA), aspirin with extended-release dipyridamole (Aggrenox), ticlopidine (Ticlid), and clopidogrel (Plavix)	Antiplatelet agents may be used following an ischemic stroke or TIA or to prevent stroke associated with cardiac events or blood dyscrasias such as sickle cell anemia.
Hemostatic therapy (e.g., vitamin K, fresh-frozen plasma, platelets, prothrombin complex concentrate)	These agents may be needed for treatment of anticoagulation-associated intracranial hemorrhage or in clotting abnormalities and blood-component deficiencies in hemorrhagic stroke (Liebeskind, 2017).
Antihypertensives, such as beta blockers (e.g., labetalol [Trandate], esmolol [Breivloc]) and angiotensin-converting enzyme inhibitors (ACEIs) (e.g., enalapril [Vasotec]); angiotensin receptor blockers (ARBs) (e.g., losartan [Cozaar], valsartan [Diovan]); calcium channel blockers (e.g., nicardipine [Cardene]); osmotic diuretics (e.g., mannitol [Osmitrol]); and vasodilators (e.g., hydralazine (Apresoline))	Transient hypertension often occurs during acute stroke and may resolve without therapeutic intervention. However, many types of antihypertensives may be used for severe or refractory hypertension. Note: Preexisting or chronic hypertension requires cautious treatment because aggressive management increases the risk of extension of tissue damage during an evolving stroke.
Anticonvulsants: e.g., lorazepam (Ativan), diazepam (Valium), phenytoin (Dilantin), and phenobarbital	May be used in acute hemorrhagic stroke to control seizure activity and recurrence and for sedative action. Note: Early seizure activity occurs in 4% to 28% of clients with intracerebral hemorrhage and may be of the nonconvulsive kind (Liebeskind, 2017).
Prepare for surgery, as appropriate—carotid endarterectomy, microvascular bypass, clot evacuation, endovascular treatment of an aneurysm or cerebral angioplasty.	May be necessary to resolve the current situation, to reduce neurological symptoms or risk of recurrent stroke.

**NURSING DIAGNOSIS: impaired physical Mobility****May Be Related To**

Alteration in cognitive functioning  
Sensory perceptual, neuromuscular impairment  
Decrease in muscle control or strength  
Decrease in endurance

**Possibly Evidenced By**

Uncoordinated movement, decrease in range of motion (ROM)  
Postural instability, alteration in gait; difficulty turning  
Decrease in fine or gross motor skills

**Desired Outcomes/Evaluation Criteria—Client Will****Immobility Consequences: Physiological NOC**

Maintain or increase strength and function of affected or compensatory body part.  
Maintain optimal position of function as evidenced by the absence of contractures and foot drop.  
Demonstrate techniques and behaviors that enable resumption of activities.  
Maintain skin integrity.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Positioning NIC</b>	
<i>Independent</i>	
Assess functional ability and extent of impairment initially and on a regular basis. Classify according to a 0 to 4 scale (0 = full self-care to 4 = is dependent and does not participate).	Identifies strengths and deficiencies and may provide information regarding recovery. Assists in choice of interventions because different techniques are used for flaccid and spastic types of paralysis.
Change positions at least every 2 hours (e.g., supine, side lying) and possibly more often if placed on affected side.	Reduces risk of tissue ischemia and injury because of pressure. Additionally, the presence of atherosclerotic vascular disease (a contributing factor in stroke) can cause or exacerbate poor circulation and reduced sensation. This increases the risk of skin breakdown and pressure injury.
Position in prone position periodically as condition permits.	Helps maintain functional hip extension; however, may increase anxiety, especially about ability to breathe.
Maintain extremities in functional positions; use footboard during the period of flaccid paralysis.	Prevents contractures and foot drop and may facilitate walking when (or if) function returns.
Maintain neutral position of the head.	Flaccid paralysis may interfere with patient's ability to support the head, whereas spastic paralysis may lead to deviation of the head to one side.
Evaluate the use of, and need for, positional aids and splints during spastic paralysis:	Flexion contractures occur because flexor muscles are stronger than extensors.
Use arm sling when client is in an upright position, as indicated.	During flaccid paralysis, use of sling may reduce the risk of shoulder subluxation and shoulder-hand syndrome.
Place pillow under axilla to abduct arm.	Prevents adduction of shoulder and flexion of elbow.
Elevate arm and hand.	Promotes venous return and helps prevent edema formation.
Place hard hand-rolls in the palm with fingers and thumb opposed.	Hard cones decrease the stimulation of finger flexion, maintaining finger and thumb in a functional position.
Place knee and hip in extended position.	Maintains functional position.
Maintain leg in a neutral position with a trochanter roll.	Prevents external hip rotation.
Discontinue use of footboard, when appropriate.	Continued use after the change from flaccid to spastic paralysis can cause excessive pressure on the ball of the foot, enhance spasticity, and increase plantar flexion.
Observe affected side for color, edema, or other signs of compromised circulation.	Edematous tissue is more easily traumatized and heals more slowly.

(continues on page 256)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<p>Inspect skin regularly, particularly over bony prominences. Keep skin clean and dry and provide padding such as sheepskin, foam, as necessary.</p>	<p>Pressure points over bony prominences are most at risk for decreased perfusion and ischemia. Cleanliness and padding help prevent skin breakdown and pressure injury development.</p>
<p><b>Exercise Therapy: Muscle Control NIC</b> Begin active or passive ROM to all extremities (including splinted) on admission. Encourage exercises, such as quadriceps or gluteal exercise, squeezing rubber ball, and extension of fingers and legs and feet.</p>	<p>Minimizes muscle atrophy, promotes circulation, and helps prevent contractures. Reduces risk of hypercalciuria and osteoporosis if the underlying problem is hemorrhage. Note: Excessive and imprudent stimulation can predispose to recurrence of bleeding.</p>
<p>Assist client to develop upright sitting balance (such as raise head of bed a bit higher every day for several days (e.g., from 45 to 60 degrees); assist to sit on edge of bed, having client use the strong arm to support body weight and strong leg to move affected leg; increase sitting time daily; assist with standing balance (e.g., place flat walking shoes on client's feet; support client's lower back with hands while positioning own knees outside client's knees to pivot from bed to chair).</p>	<p>Aids in retraining neuronal pathways, enhancing proprioception and motor response.</p>
<p>Get client up in chair and advance activity as soon as vital signs and cognitive status are stable.</p>	<p>Helps stabilize BP, restoring vasoconstrictor tone, and promotes maintenance of extremities in a functional position and emptying of bladder and kidneys, reducing the risk of urinary stones and infections from stasis. Note: The American Stroke Association (ASA) recommends that mobilization begins as soon as the client's condition is judged to be "stable." While early mobilization is being adopted in many neuro units, the evidence for its effectiveness is limited. Studies are being conducted to define the term "stable" and to evaluate the potential for adverse neurological effects of very early mobilization in the stroke patient (Bernhardt et al, 2015).</p>
<p>Pad chair seat with foam, gel, or water-filled cushion, and assist client to shift weight at frequent intervals.</p>	<p>Reduces pressure on the coccyx and prevents skin breakdown.</p>
<p>Set goals with client/significant other (SO) for increasing participation in activities, exercise, and position changes.</p>	<p>Promotes a sense of expectation of progress and improvement and provides some sense of control and independence.</p>
<p>Encourage client to assist with movement and exercises using unaffected extremity to support and move weaker side.</p>	<p>May respond as if affected side is no longer part of the body and need encouragement and active training to "reincorporate" it as a part of own body. (Refer to ND: Unilateral Neglect.)</p>
<p><b>Positioning NIC Collaborative</b> Provide egg-crate mattress, water bed, flotation device, or specialized bed (e.g., kinetic), as indicated.</p>	<p>Promotes even weight distribution, decreasing pressure on bony points and helping to prevent skin breakdown and pressure ulcer formation. Specialized beds help with positioning, enhance circulation, and reduce venous stasis to decrease risk of tissue injury and complications such as orthostatic pneumonia.</p>
<p><b>Exercise Therapy: Muscle Control NIC</b> Consult with physical therapist regarding passive, active, resistive exercises and client mobilization.</p>	<p>An individualized program can be developed to meet particular needs and deal with deficits in balance, coordination, and strength.</p>
<p>Administer muscle relaxants and antispasmodics as indicated, such as baclofen (Lioresal) and dantrolene (Dantrium).</p>	<p>May be required to relieve spasticity in affected extremities.</p>

**NURSING DIAGNOSIS: impaired verbal [and/or written] Communication****May Be Related To**

Physiological condition (e.g., decreased circulation to brain, weakened musculoskeletal system), central nervous system impairment  
Alteration in perception

**Possibly Evidenced By**

Does not speak, inability to speak; difficulty speaking/verbalizing  
Difficulty forming words or sentences; difficulty expressing thoughts verbally—aphasia, dysarthria  
Inability/difficulty in use of facial expressions; difficulty in selective attending; partial visual deficit  
Difficulty comprehending or maintaining communication [oral or written]

**Desired Outcomes/Evaluation Criteria—Client Will****Communication NOC**

Indicate understanding of the communication problems.  
Establish method of communication in which needs can be expressed.  
Use resources appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Communication Enhancement: Speech Deficit NIC</b>	
<i>Independent</i>	
Assess type and degree of dysfunction, such as receptive aphasia—client does not seem to understand words, or expressive aphasia—client has trouble speaking or making self-understood.	Helps determine area and degree of brain involvement and difficulty client has with any or all steps of the communication process. Client may have trouble understanding spoken words (damage to Wernicke's speech area), speaking words correctly (damage to Broca's speech areas), or may experience damage to both areas.
Differentiate aphasia from dysarthria.	Choice of interventions depends on type of impairment. Aphasia is a defect in using and interpreting symbols of language and may involve sensory and motor components, such as the inability to comprehend written or spoken words or to write, make signs, and speak. A dysarthric person can understand, read, and write language but has difficulty forming or pronouncing words because of weakness and paralysis of oral musculature, resulting in slurred or softly spoken speech.
Listen for errors in conversation and provide feedback.	Client may lose ability to monitor verbal output and be unaware that communication is not sensible. Feedback helps client realize why caregivers are not understanding or responding appropriately and provide opportunity to clarify content and meaning.
Ask client to follow simple commands, such as “Shut your eyes,” “Point to the door”; repeat simple words or sentences.	Tests for receptive aphasia.
Point to objects and ask client to name them.	Tests for expressive aphasia—client may recognize item but not be able to name it.
Have client produce simple sounds, such as “sh,” “cat.”	Identifies dysarthria because motor components of speech (tongue, lip movement, breath control) can affect articulation and may or may not be accompanied by expressive aphasia.
Ask client to write name and a short sentence. If unable to write, have client read a short sentence.	Tests for writing disability (agraphia) and deficits in reading comprehension (alexia), which are also part of receptive and expressive aphasia.

(continues on page 258)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Post notice at nurses' station and client's room about speech impairment. Provide special call bell if necessary.	Allays anxiety related to inability to communicate and fear that needs will not be met promptly. Call bell that is activated by minimal pressure is useful when the client is unable to use regular call system.
Provide alternative methods of communication, such as writing or felt board and pictures. Provide visual clues—gestures, pictures—"needs" list, and demonstration.	Provides for communication of needs or desires based on the individual situation or underlying deficit.
Anticipate and provide for client's needs.	Helpful in decreasing frustration when dependent on others and unable to communicate desires.
Talk directly to client, speaking slowly and distinctly. Use yes/no questions to start, progressing in complexity as client responds.	Reduces confusion and anxiety at having to process and respond to a large amount of information at one time. As retraining progresses, advancing complexity of communication stimulates memory and further enhances word and idea association.
Speak with normal volume and avoid talking too fast. Give client ample time to respond. Talk without pressing for a response.	Client is not necessarily hearing impaired and raising voice may irritate or anger client. Forcing responses can result in frustration and may cause client to resort to "automatic" speech, such as garbled speech and obscenities.
Encourage SO and visitors to persist in efforts to communicate with the client, such as reading mail and discussing family happenings even if client is unable to respond appropriately.	It is important for family members to continue talking to client to reduce client's isolation, promote the establishment of effective communication, and maintain a sense of connectedness with family.
Discuss familiar topics—job, family, hobbies, and current events.	Promotes meaningful conversation and provides an opportunity to practice skills.
Respect client's preinjury capabilities; avoid speaking down to client or making patronizing remarks.	Enables client to feel esteemed because intellectual abilities often remain intact.

**Collaborative**

Consult with or refer to speech therapist.

Assesses individual verbal capabilities and sensory, motor, and cognitive functioning to identify deficits and therapy needs.

### NURSING DIAGNOSIS: [disturbed Sensory Perception (specify)]

#### May Be Related To

- [Altered sensory reception, integration—neurological trauma or deficit]
- [Insufficient or excessive environmental stimuli]
- [Psychological stress]

#### Possibly Evidenced By

- [Disorientation; change in usual response to stimuli]
- [Sensory distortions]
- [Impaired communication]
- [Poor concentration]
- [Change in behavior pattern]

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Cognition NOC

Regain or maintain usual LOC and perceptual functioning.

##### Knowledge: Stroke Management NOC

Acknowledge changes in ability and presence of residual involvement.

Demonstrate behaviors and lifestyle changes to compensate for, or overcome, the deficit.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Environmental Management NIC</b>	
<b>Independent</b>	
Review pathology of individual condition.	Awareness of type and area of involvement aids in assessing for and anticipating specific deficits and planning care.
Observe behavioral responses such as hostility, crying, inappropriate affect, agitation, and hallucination by using Los Ranchos (or similar) stroke scale, as appropriate. Eliminate extraneous noise and stimuli as necessary.	Individual responses are variable, but commonalities, such as emotional lability, lowered frustration threshold, apathy, and impulsiveness, may complicate care. Use of a stroke scale helps in documenting progress during initial weeks following the insult.
Speak in calm, quiet voice, using short sentences. Maintain eye contact.	Reduces anxiety and exaggerated emotional responses and confusion associated with sensory overload.
Ascertain and validate client's perceptions. Reorient client frequently to environment, staff, and procedures.	Client may have limited attention span or problems with comprehension. These measures can help client attend to communication.
Evaluate for visual deficits. Note loss of visual field, changes in depth perception (horizontal or vertical planes), and the presence of diplopia.	Assists client to identify inconsistencies in reception and integration of stimuli and may reduce perceptual distortion of reality.
Approach client from visually intact side.	The presence of visual disorders can negatively affect client's ability to perceive the environment and relearn motor skills and increases risk of accident and injury.
Leave a light on; position objects to take advantage of intact visual fields. Patch affected eye or encourage the wearing of prism glasses if indicated.	Provides for recognition of the presence of persons or objects; may help with depth perception problems and prevents the client from being startled. Patching may decrease the sensory confusion of double vision, and prism glasses may enhance vision across midline, decreasing neglect of affected side. (Refer to ND: Unilateral Neglect.)
<b>Peripheral Sensation Management NIC</b>	
Assess sensory awareness, such as differentiation of hot and cold, dull or sharp, the position of body parts, and muscle and joint sense.	Diminished sensory awareness and impairment of kinesthetic sense negatively affect balance and positioning (proprioception) and appropriateness of movement, which interferes with ambulation, increasing the risk of trauma.
Stimulate sense of touch—give client objects to touch and grasp. Have client practice touching walls or other boundaries.	Aids in retraining sensory pathways to integrate reception and interpretation of stimuli. Helps client orient self spatially and strengthens use of affected side.
Protect from temperature extremes; assess the environment for hazards. Recommend testing warm water with unaffected hand.	Promotes client safety, reducing risk of injury.
Note inattention to body parts and segments of the environment and lack of recognition of familiar objects or persons.	Presence of agnosia (loss of comprehension of auditory, visual, or other sensations, although sensory sphere is intact) may result in an inability to recognize environmental cues and considerable self-care deficits.

### NURSING DIAGNOSIS: Self-Care deficit (specify)

#### May Be Related To

Alteration in cognitive functioning, perceptual impairment  
Inability to perceive body part or special relationship  
Neuromuscular impairment, weakness, impaired mobility or transfer ability  
Pain, discomfort

#### Possibly Evidenced By

Impaired ability to perform necessary steps of ADL(s)

(continues on page 260)

**NURSING DIAGNOSIS:** **Self-Care deficit (specify)** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Self-Care: Status NOC**

Demonstrate techniques and lifestyle changes to meet self-care needs.

Perform self-care activities within the level of own ability.

Identify personal and community resources that can provide assistance as needed.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Care Assistance NIC</b>	
<b>Independent</b>	
Assess abilities and level of deficit (0 to 4 scale) for performing ADLs.	Aids in anticipating and planning for meeting individual needs.
Avoid doing things for client that client can do for self, providing assistance as necessary.	These clients may become fearful and dependent, and although assistance is helpful in preventing frustration, it is important for client to do as much as possible for self to maintain self-esteem and promote recovery.
Be aware of impulsive behavior or actions suggestive of impaired judgment.	May indicate the need for additional interventions and supervision to promote client safety.
Maintain a supportive, firm attitude. Allow client sufficient time to accomplish tasks.	Clients need empathy and to know caregivers will be consistent with their assistance.
Provide positive feedback for efforts and accomplishments.	Enhances sense of self-worth, promotes independence, and encourages client to continue endeavors.
Create plan for visual deficits that are present, such as the following: Place food and utensils on the tray related to client's unaffected side.	Client will be able to see to eat the food.
Situate the bed so that client's unaffected side is facing the room with the affected side to the wall.	Will be able to see when getting in or out of bed and observe anyone who comes into the room.
Position furniture against the wall, out of travel path.	Provides for safety when client can move around the room, reducing the risk of tripping and falling over furniture.
Provide self-help devices, such as button or zipper hook, knife-fork combinations, long-handled brushes, extensions for picking things up from the floor, toilet riser, leg bag for a catheter, and shower chair. Assist and encourage good grooming and makeup habits.	Enables client to manage for self, enhancing independence and self-esteem; reduces reliance on others for meeting own needs; and enables client to be more socially active.
Encourage SO to allow client to do as much as possible for self.	Reestablishes sense of independence and fosters self-worth and enhances rehabilitation process. Note: This may be very difficult and frustrating for the SO/caregiver, depending on degree of disability and time required for client to complete the activity.
Assess client's ability to communicate the need to void and ability to use urinal or commode/bedpan. Take client to the bathroom at frequent and scheduled intervals for voiding if appropriate.	Client may have a neurogenic bladder, be inattentive, or be unable to communicate needs in the acute recovery phase but usually can regain independent control of this function as recovery progresses.
Determine previous bowel habits and routines, and reestablish normal regimen. Increase bulk in the diet. Encourage fluid intake and increased activity.	Assists in development of retraining program (independence) and aids in preventing constipation and impaction (long-term effects).
<b>Collaborative</b>	
Refer for/use measurement scale (e.g., Functional Independence Measure [FIM] score; National Institutes of Health Stroke Scale [NIHSS]), if appropriate (Granger, 2015; Hamilton et al, 1987).	Aids in developing a plan of care, influences the choice of interventions, and discharge planning.
Consult with rehabilitation team, such as physical or occupational therapist.	Aids in developing a comprehensive therapy program and identifying special equipment needs that can increase client's participation in self-care.

## NURSING DIAGNOSIS: **ineffective Coping**

### May Be Related To

Situational crises, insufficient sense of control, uncertainty  
Inadequate confidence in ability to deal with situation  
Ineffective tension release strategies  
Inadequate resources

### Possibly Evidenced By

Inability to deal with situation; ask for help; [frustration]  
Alteration in concentration; inability to attend to, or organize information; inadequate problem-solving  
Inability to meet basic needs or role expectations  
Change in communication pattern

### Desired Outcomes/Evaluation Criteria—Client Will

#### Coping NOC

Verbalize acceptance of self in situation.  
Talk or communicate with SO about situation and changes that have occurred.  
Verbalize awareness of own coping abilities.  
Meet psychological needs as evidenced by appropriate expression of feelings, identification of options, and use of resources.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Coping Enhancement NIC</b>	
<i>Independent</i>	
Note current sensorimotor functional status, and evaluate how it is affecting individual's coping ability. Assess ability to understand events and provide a realistic appraisal of the situation.	Aids in developing plan of care and influences choice of interventions, as well as discharge expectations.
Assess level of anxiety on an ongoing basis.	Anxiety affects coping ability and can interfere with client's attempts to deal with current situation.
Be aware of client's speech impairments (if any). Encourage communication with staff/SO using currently established methods of expression. Devote time to listening and interacting.	If stroke has impacted speech, the client may be unable to adequately express himself or herself, adding to coping difficulties. Patience, attention, and time from care providers can help the client to express emotions and feel more in control. (Refer to ND: impaired verbal [and written] Communication for related interventions.)
Treat client with respect. Converse at client's level, providing meaningful conversation while performing care. Allow client to react in his or her own way without judgment.	To enhance client's sense of self-worth and feeling of belonging.
Active-listen and identify client's perceptions of what is happening, meaning of the loss, or change that has happened.	Some clients accept and manage altered function effectively with little adjustment, whereas others have considerable difficulty recognizing and adjusting to deficits. In order to provide meaningful support and appropriate problem-solving, healthcare providers need to understand the meaning of the stroke and limitations to the client.
Encourage client to express feelings, including fears, hostility or anger, denial, depression, and sense of disconnectedness.	Demonstrates acceptance (and normalcy) of these emotions and assists client in recognizing and beginning to deal with feelings.
Note whether client refers to affected side as "it" or denies affected side and says it is "dead."	Suggests rejection of body part or negative feelings about body image and abilities, indicating the need for intervention and emotional support.
Acknowledge statement of feelings about betrayal by the body; remain matter-of-fact about reality that client can still use unaffected side and learn to control affected side. Use words such as "weak," "affected," and "right-left" that incorporate that side as part of the whole body.	Helps client see that the nurse accepts both sides as part of the whole individual. Allows client to feel hopeful and begin to accept the current situation.

(continues on page 262)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Identify previous methods of dealing with life problems. Determine presence and quality of support systems.	Provides an opportunity to use previously effective behaviors, build on past successes, and mobilize resources.
Assist client in the use of diversion, recreation, and relaxation techniques.	Participation in pleasant activities can reduce anxiety and boredom, enhancing positive coping skills.
Emphasize and provide positive I-messages for small gains either in recovery of function or independence.	Consolidates gains, helps reduce feelings of anger and helplessness, and conveys a sense of progress.
Support behaviors (such as increased interest) and participation in rehabilitation activities.	Suggests possible adaptation to changes and understanding about own role in future lifestyle.
Monitor for increased difficulty concentrating, statements of inability to cope, lethargy, and withdrawal.	May indicate the onset of depression (a common aftereffect of stroke), which may require further evaluation and intervention.
Determine potential impact of outside stressors, including family, work, social, and future nursing and healthcare needs.	Helps identify specific needs, provides an opportunity to offer information and support and begin problem-solving. Consideration of social factors, in addition to functional status, is important in determining appropriate discharge destination.
<b>Collaborative</b> Refer for psychological evaluation, support, and counseling, if indicated.	May facilitate adaptation to role changes that are necessary for a sense of feeling and being a productive person. Note: Depression is common in stroke survivors and may be a direct result of the brain damage or an emotional reaction to sudden-onset disability.

## NURSING DIAGNOSIS: risk for impaired Swallowing

### Possibly Evidenced By

Neuromuscular impairment—decreased or absent gag reflex, decreased strength or excursion of muscles involved in mastication, facial paralysis  
Brain injury; perceptual impairment  
Coughing, choking, gagging before swallow

### Desired Outcomes/Evaluation Criteria—Client Will

#### Swallowing Status NOC

Demonstrate feeding methods appropriate to individual situation, with aspiration prevented.  
Maintain desired body weight.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Swallowing Therapy NIC</b> <i>Independent</i> Review individual pathology and ability to swallow, noting the extent of paralysis, clarity of speech, facial and tongue involvement, ability to protect airway, and episodes of coughing or choking; the presence of adventitious breath sounds and amount and character of oral secretions. Weigh periodically, as indicated.	Nutritional interventions, including choice of feeding route, are determined by these factors.
Have suction equipment available at bedside/in the dining area, especially during early feeding efforts.	Timely intervention may prevent or limit effects of aspiration.
Promote effective swallowing using methods such as the following: Schedule activities and medications to provide a minimum of 30 minutes of rest before eating.	Promotes optimal muscle function and helps to limit fatigue.
Provide a pleasant environment free of distractions, such as TV.	Promotes relaxation and allows client to focus on task of eating and swallowing.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assist client with head control or support, and position based on specific dysfunction.	Counteracts hyperextension, aiding in prevention of aspiration and enhancing the ability to swallow. Optimal positioning can facilitate intake and reduce risk of aspiration—head back for decreased posterior propulsion of tongue, head turned to the weak side for unilateral pharyngeal paralysis.
Place client in upright position during and after feeding, as appropriate.	Uses gravity to facilitate swallowing and reduces risk of aspiration.
Provide oral care based on individual need before meal.	Client with dry mouth may require a moisturizing agent (e.g., artificial saliva or alcohol-free mouthwash) before and after eating; clients with excess saliva can benefit from the use of a drying agent, such as lemon or glycerin swabs, before a meal and a moisturizing agent afterward.
Season food with herbs, spices, and lemon juice according to client's preference, within dietary restrictions.	Increases salivation, improving bolus formation and swallowing effort.
Serve foods at customary temperature and water always chilled.	Lukewarm temperatures are less likely to stimulate salivation; therefore, foods and fluids should be served either cold or warm, as appropriate. Note: Water is the most difficult to swallow.
Stimulate lips to close or manually open mouth by light pressure on lips or under chin, if needed.	Aids in sensory retraining and promotes muscular control.
Place food of appropriate consistency in unaffected side of mouth.	Provides sensory stimulation (including taste), which may increase salivation and trigger swallowing efforts, enhancing intake. Food consistency is determined by the individual deficit. For example, client with decreased range of tongue motion may require thickened liquids initially, progressing to thin liquids, whereas a client with delayed pharyngeal swallow will handle thickened liquids and thicker foods better. Note: Most milk products, peanut butter, syrup, and bananas are avoided because they produce mucus and are sticky.
Touch parts of the cheek with a tongue blade or apply ice to the weak tongue.	Can improve tongue movement and control necessary for swallowing and inhibits tongue protrusion.
Feed slowly, allowing 30 to 45 minutes for meals.	Feeling rushed can increase stress and level of frustration, may increase risk of aspiration, and may result in client's terminating meal early.
Offer solid foods and liquids at different times.	Prevents client from swallowing food before it is thoroughly chewed. In general, liquids should be offered only after the client has finished eating solids.
Limit or avoid use of drinking straw for liquids.	Although straw use could strengthen facial and swallowing muscles, the risk of aspiration may be increased if client lacks tight lip closure or if liquid is deposited too far back in the mouth.
Encourage SO to bring favorite foods.	Provides familiar tastes and preferences. Stimulates feeding efforts and may enhance swallowing and intake.
Maintain upright position for 45 to 60 minutes after eating.	Helps client manage oral secretions and reduces risk of regurgitation.
Maintain an accurate record of food and fluid intake; record calorie counts if indicated.	If swallowing efforts are not sufficient to meet fluid and nutrition needs, alternative methods of feeding must be pursued.
Encourage participation in exercise or activity program.	May increase release of endorphins in the brain, promoting a sense of general well-being and increasing appetite.

(continues on page 264)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Review results of radiographic swallow studies.	Aids in determining phase of swallowing difficulties—oral preparatory, oral, pharyngeal, or esophageal phase.
Administer intravenous (IV) fluids, parenteral nutrition, or tube feedings as appropriate.	May be necessary for fluid replacement and nutrition if client is unable to take anything orally.
Coordinate multidisciplinary approach to develop a treatment plan that meets individual needs.	The inclusion of dietitian and speech and occupational therapists can increase the effectiveness of long-term plan and significantly reduce the risk of silent aspiration.

## NURSING DIAGNOSIS: **Unilateral Neglect**

### May Be Related To

Brain injury: cerebrovascular impairment [left hemiplegia from CVA of right hemisphere]

### Possibly Evidenced By

Failure to move eyes, head, limbs, or trunk in the neglected hemisphere; failure to notice people approaching from neglected side; disturbance of sound lateralization  
 Unaware of positioning of neglected limb  
 Alteration in safety behavior on neglected side  
 Failure to eat food from portion of plate on neglected side; failure to dress or groom neglected side

### Desired Outcomes/Evaluation Criteria—Client Will

#### Helpfulness of Affected Side **NOC**

Acknowledge presence of impairment.  
 Incorporate affected body part(s) into self.

#### Client/Caregiver Will

#### Adaptation to Physical Disability **NOC**

Identify adaptive or protective measures for individual situation.  
 Demonstrate behaviors, lifestyle changes necessary to promote physical safety.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Unilateral Neglect Management <b>NIC</b></b>	
<b>Independent</b>	
Reinforce to client the reality of the dysfunction and need to compensate, avoiding participation in client's use of denial.	Enhances dealing with reality of the situation, thus avoiding scenarios (denial) that can limit progress and attainment of goals.
Instruct client and SO/caregiver in treatment strategies focused on training attention on the neglected side:	Promotes involvement of all individuals in addressing the problem, which may enhance recovery.
Approach client from affected side. Place your hand on client's chin and gently turn head toward you, far enough to make eye contact (if client has difficulty turning head in your direction). Take client's hand and move it toward the object on neglected side while saying what he is going to see (e.g., "let's get your fork").	Enhances client's awareness and promotes interaction and use of neglected side. Therapists have reported that an interesting phenomenon occurs "when you take someone's hand—their head automatically turns in that direction, and their eyes follow. By first telling them 'let's get your fork' and then taking their hand in yours to 'search' for the fork, you have now combined the sense of hearing with the sense of touch. The improvement in awareness can be dramatic, and many stroke survivors begin to try to move and 'use' the hand as you guide it" (Davis, 2016).
Place items (e.g., phone, TV remote control, drink container) on the neglected side. Place nurse call light on unaffected side.	Trains client to look and reach for objects on neglected side. Note: Call light should be placed on client's strong side for safe and rapid access.
Encourage client to turn head and eyes to "scan" the environment.	Helps client compensate for visual field loss, increasing awareness of environment.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss affected side while touching, manipulating, and stroking affected side; provide items of varied size, weight, and texture for client to hold.	Focuses client's attention, and limb activation treatment provides tactile stimuli to promote use of affected limb in neglected hemisphere.
Have client look at and handle affected side, bring across midline during care activities.	Encourages client to accept affected limb or side as part of self even though it does not feel like it belongs.
Assist client to position affected extremity carefully and to routinely visualize placement or use a mirror to adjust placement.	Promotes safety awareness, reducing risk of injury.
Instruct SO/caregiver to monitor alignment of limbs and to inspect skin regularly.	Decreased sensation and positional awareness may result in pressure injuries.
Provide safe environment, discuss ongoing safety concerns, and assist in developing plan to correct risk factors.	Client may continue to have some ongoing degree of functional impairment, including difficulty with navigating in familiar environments (Barrett & John, 2014).
Reinforce continuation of prescribed rehabilitation activities and neuropsychological therapies, as indicated.	Maximizes recovery and enhances independence. Note: Research indicates that most clients with neglect show early recovery, particularly within the first month, and marked improvement within 3 months (Barrett & John, 2014).

NURSING DIAGNOSIS:	<b>deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs</b>
<b>May Be Related To</b>	
Alteration in cognitive functioning	
Insufficient information or interest in learning; insufficient knowledge of resources	
<b>Possibly Evidenced By</b>	
Insufficient knowledge	
Inaccurate follow-through of instructions	
Development of preventable complications	
<b>Desired Outcomes/Evaluation Criteria—Client/SO Will</b>	
<b>Knowledge: Stroke Management NOC</b>	
Participate in learning process.	
Verbalize understanding of condition, prognosis, and potential complications.	
Verbalize understanding of therapeutic regimen and rationale for actions.	
Initiate necessary lifestyle changes and participate in treatment regimen.	

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b>	
<b>Independent</b>	
Evaluate type and degree of sensory-perceptual involvement.	Deficits affect the choice of teaching methods and content and complexity of instruction.
Include SO and family in discussions and teaching.	These individuals will be providing support and care and have a great impact on client's quality of life.
Discuss specific pathology and individual potentials.	Aids in establishing realistic expectations and promotes understanding of current situation and needs.
Identify signs and symptoms requiring further follow-up, such as changes or decline in visual, motor, or sensory functions; alteration in mentation or behavioral responses; and severe headache.	Prompt evaluation and intervention reduce risk of complications and further loss of function.
Review current restrictions or limitations and discuss planned or potential resumption of activities, including sexual relations.	Promotes understanding, provides hope for future, and creates an expectation of resumption of more "normal" life.

(continues on page 266)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review and reinforce current therapeutic regimen, including use of medications to control hypertension, hypercholesterolemia, and diabetes, as indicated, and use of aspirin or similar-acting drugs, such as ticlopidine (Ticlid) and warfarin sodium (Coumadin). Identify ways of continuing program after discharge.	Recommended activities, limitations, and medication and therapy needs are established by a coordinated interdisciplinary approach. Follow-through is essential to the progression of recovery and prevention of complications. Note: Long-term anticoagulation may be beneficial for clients prone to clot formation; however, these drugs are contraindicated for CVA resulting from hemorrhage.
Provide written instructions and schedules for activity, medication, and important facts.	Provides visual reinforcement and reference source after discharge.
Encourage client to refer to lists, written communications or notes, and memory book.	Provides aids to support memory and promotes improvement in cognitive skills.
Discuss plans for meeting self-care needs.	Varying levels of assistance may be required and need to be planned for based on the individual situation.
Refer to discharge planner or home-care supervisor and visiting nurse.	Home environment may require evaluation and modifications to meet individual needs.
Suggest client reduce or limit environmental stimuli, especially during cognitive retraining or tasks that require attention and concentration.	Multiple or concomitant stimuli may aggravate confusion and impair mental abilities.
Recommend client seek assistance in problem-solving process and validate decisions as indicated.	Some clients, especially those with right CVA, may display impaired judgment and impulsive behavior, compromising ability to make sound decisions.
Identify individual risk factors—hypertension, cardiac dysrhythmias, obesity, smoking, heavy alcohol use, atherosclerosis, poor control of diabetes, and use of oral contraceptives—and discuss necessary lifestyle changes.	Promotes general well-being and may reduce the risk of recurrence. Note: Obesity in women has been found to have a high correlation with ischemic stroke.
Review importance of a balanced diet rich in foods that client can swallow easily. Discuss the role of vitamins and other supplements.	Improves general health and well-being and provides energy for life activities.
<b>Collaborative</b>	
Identify community resources, such as National Stroke Association, American Heart Association's Stroke Connection, stroke support clubs, senior services, meal prep/delivery (e.g., Meals on Wheels, Menu-Direct), adult day program or respite care, and visiting nurse.	Enhances coping abilities and promotes home management and adjustment to impairments for both stroke survivors and caregivers.
Refer to and reinforce the importance of follow-up care by rehabilitation teams, such as physical, occupational, speech, and vocational therapists.	Diligent work may eventually overcome or minimize residual deficits.

POTENTIAL CONSIDERATIONS following acute hospitalization (dependent on client's age, physical condition, and presence of complications, personal resources, and life responsibilities)

- **risk for Injury**—physical (general weakness, altered mobility, visual deficits)
- **imbalanced Nutrition: less than body requirements**—inability to prepare or ingest food; lack of food
- **Self-Care deficit**—weakness; perceptual or cognitive impairment; impaired mobility status; pain/discomfort
- **impaired Home Maintenance**—impaired functioning; inadequate support systems; insufficient finances; unfamiliarity with neighborhood resources
- **situational low Self-Esteem**—functional impairment
- **risk for caregiver Role Strain**—illness severity of/cognitive problems in care receiver; discharge of family member with significant home-care needs; duration of caregiving required; complexity or amount of caregiving tasks, caregiver isolation

## BRAIN INFECTIONS: MENINGITIS AND ENCEPHALITIS

Meningitis is an inflammation of the linings of the brain and spinal cord. Encephalitis is an inflammation of the brain. The presence or absence of normal brain function is the important distinguishing feature between meningitis (normal) and encephalitis (abnormal). However, the distinction between the two entities is frequently blurred since some people may have clinical features of both. The client is usually diagnosed as having meningitis or encephalitis based upon which features predominate in the illness, although *meningoencephalitis* is also a common term that recognizes the overlap (Gluckman, 2016).

### I. Pathophysiology (Balentine, 2016; Gluckman, 2016; Howes & Lazoff, 2016; Kacprowicz, 2015)

#### a. Meningitis (indicated by “m” in tables in this section)

- i. The brain is normally protected from bloodstream infections by the blood-brain barrier. However, once bacteria or other organisms get into the brain, they are somewhat isolated from the immune system. Replicating bacteria, toxins, and exudates can rapidly spread through the cerebral spinal fluid (CSF), damaging systems such as cranial nerves or obliterating CSF pathways, resulting in cerebral edema and increased intracranial pressure.
- ii. The syndrome is most often acute but may become chronic. Acute bacterial meningitis is a medical emergency, and delays in instituting effective antimicrobial therapy result in increased morbidity and mortality.
- iii. Risk factors include (1) age: can occur at any age but is more common under 5 years and over 60 years; (2) certain disorders (e.g., diabetes, renal or adrenal insufficiency, sickle cell disease, bacterial endocarditis); (3) weakened immune system or immunosuppression (increases risk of opportunistic infections and acute bacterial meningitis); (4) crowded living spaces (e.g., college dormitories, military barracks) increase risk for person-to-person contagion; (5) brain defects such as might occur with trauma or surgery; (6) travel to areas known for meningococcal disease (e.g., sub-Saharan Africa); and (7) history of/current injected drug use.

#### b. Encephalitis (indicated by “e” in tables in this section)

- i. There are two types of encephalitis—primary and secondary forms. Primary encephalitis is directly due to a new viral infection. Secondary encephalitis, or postinfective encephalitis, arises as a consequence of an ongoing viral infection or from an immunization procedure that utilizes a virus. The latter uses a virus that has been altered to be incapable of causing harm. However, in rare cases, the vaccine itself becomes harmful.
- ii. Encephalitis is classified as either viral or bacterial, with viral being the more common.
- iii. Encephalitis can be life-threatening and create lifelong neurological problems, such as learning disabilities, seizures, and memory or motor deficits.
- iv. West Nile encephalitis (WNE) is also a common form and poses the greatest risk to older adults and those with compromised immune systems.
- v. Other, rarer types of encephalitis include equine, La Crosse, and St. Louis encephalitis.

### II. Etiology (Balentine, 2016; Gluckman, 2016; Howes & Lazoff, 2016; Kacprowicz, 2015)

#### a. Meningitis

- i. Most causative agents are bacterial or viral and usually affect the meninges in the frontal portion of the brain. Less common causative agents (e.g., fungus or tubercular) may be concentrated at the base of the brain.
- ii. Common bacteria associated with acute meningitis include *Neisseria meningitidis*, spread through the exchange of respiratory and throat secretions; *Pneumococcus* and *Haemophilus influenzae* (*H. influenzae*), possibly arising from sinus or ear infections or CSF leak following head trauma. *Streptococcus* (*S. pneumoniae*) is the most common bacterial cause and may arise from infections such as pneumonia or endocarditis or can be associated with many high-risk conditions such as hyposplenism, multiple myeloma, or chronic liver disease.
- iii. **P** *Escherichia coli* (*E. coli*) is the most common agent in neonates, and *H. influenzae* primarily affects infants younger than 2 years of age.
- iv. Less common causative agents include parasites (e.g., *Acanthamoeba* species) and fungi (e.g., *Cryptococcus neoformans*, *Candida*).
- v. In persons with HIV, meningitis is multifactorial and includes several etiologic agents (e.g., cryptococcal, tubercular, syphilitic). Note: Around 15% of encephalitis cases occur in the HIV-infected population (Nordqvist, 2016).
- vi. Most viral meningitis in America, especially in summer months, is caused by enteroviruses. Other viral causes of meningitis include mumps, Epstein-Barr (EBV) cytomegalovirus (CMV), herpes simplex, varicella-zoster, measles, and influenza.

#### b. Encephalitis

- i. In the United States, most encephalitis is caused by (1) enteroviruses (e.g., *herpes simplex 1* and *2*; *coxsackievirus*, *echovirus*, and *poliovirus*) and (2) arboviruses (from tick or mosquito bites) and Lyme disease.
- ii. Encephalitis due to *herpes simplex type 1* virus is most prevalent in people under 20 years of age and older than 40. The disease is contagious and is spread most often by inhalation of water droplets. **P** Encephalitis due to *herpes simplex type 2* is typically spread through sexual contact or, less commonly, a newborn can contract the virus from infected mother during birth.
- iii. In the United States, the four types of mosquito-borne viral encephalitis are equine (western and eastern), La Crosse, St. Louis, and West Nile.
- iv. Other, less common viruses include measles (rubeola), mumps, varicella, and German measles (rubella). These causes are now rare because of the availability of vaccinations for these diseases (Mayo Clinic Staff, 2014).
- v. In the United States and Canada, Powassan encephalitis is transmitted to humans by ticks, which have previously acquired the virus from infected deer.

(continues on page 268)

### III. Statistics

#### a. Morbidity

- i. The overall incidence of acute bacterial meningitis has declined in the United States partially because of widespread use of the *Haemophilus influenzae type b* (*Hib*) vaccine, which has nearly eliminated this pathogen as a cause of meningitis in developed countries (Hasbun, 2017).
- ii. Even with effective antimicrobial therapy, significant neurologic complications have been reported to occur in as many as 30% of survivors of bacterial meningitis (Hasbun, 2017).
- iii. A total of 2038 cases of West Nile virus disease were reported to the CDC in 2016. Of these, 1140 (56%) were classified as neuroinvasive disease (such as meningitis or encephalitis) (CDC, 2017a).

iv. Approximately 40% of survivors of herpes simplex encephalitis (HSE) have minor-to-major learning disabilities, memory impairment, neuropsychiatric abnormalities, epilepsy, fine motor control deficits, and dysarthria (Howes & Lazoff, 2016).

#### b. Mortality

- i. Among bacterial meningitis pathogens, *S. pneumoniae* causes the highest mortality (20%–30% in adults, 10% in children)  Mortality for viral meningitis (without encephalitis) is less than 1% (Hasbun, 2017).
- ii. Mortality for bacterial meningitis is highest in the first year of life, decreases in midlife, and increases again in old age (Hasbun, 2017).
- iii. Untreated herpes simplex encephalitis (HSE) has a mortality of 50% to 75%, while the mortality in treated HSE averages 20% (Howes & Lazoff, 2016).

c. Cost: No current cost statistics are located.

### G L O S S A R Y

**Arbovirus:** Any of a large group of viruses that develop in arthropods (chiefly mosquitoes and ticks) and can be transmitted to humans.

**Arthropod:** A disease caused by one of a phylum of organisms characterized by exoskeletons and segmented bodies.

**Encephalitis:** Inflammation of the brain, which may be caused by a bacterium, a virus, or an allergic reaction.

**Lumbar puncture (LP):** A procedure in which cerebrospinal fluid (CSF) is removed from the spinal canal for diagnostic testing or treatment.

**Meninges:** The three membranes that cover the brain and spinal cord.

**Meningitis:** Inflammation of the meninges, which can be caused by infection by bacteria or viruses, cancer (metastasis to the meninges), inflammatory diseases, and drugs.

**Vector:** Any agent, living or otherwise, that carries and transmits diseases.

**Viruses:** Small living particles that can infect cells and change how the cells function. Infection with a virus can cause a person to develop symptoms. The disease and symptoms that viruses cause depend on the type of virus and the type of cells that are infected.

### CARE SETTING

Depends on type of infection and severity of symptoms—for example, acute bacterial meningitis, especially meningococcal, is a medical emergency requiring prompt intervention/hospitalization.

### RELATED CONCERNs

Seizure disorders, page 216

Total nutritional support, page 525

Psychosocial aspects of care, page 835

### CLIENT ASSESSMENT DATABASE

#### DIAGNOSTIC DIVISION MAY REPORT

#### MAY EXHIBIT

#### ACTIVITY/REST

- Fatigue

#### FOOD/FLUID

- Nausea and/or vomiting
- Disinterest in food; lack of appetite (m)

- Poor feeding (infants [m]); loss of appetite
- Nausea, vomiting

#### NEUROSENSORY

- Stiff neck (adults and older children in meningitis [m])

- Confusion, altered mental status (mental status changes in encephalitis are usually more severe than in meningitis and range from confusion to delirium to coma)

MAY REPORT (continued)	MAY EXHIBIT (continued)
<ul style="list-style-type: none"> <li>Sensitivity to/intolerance of light (photophobia) (m)</li> <li>Sensitivity to/intolerance of sound (phonophobia) (m)</li> </ul>	<ul style="list-style-type: none"> <li>Irritability (especially infants); poor responsiveness</li> <li>Sleepiness, difficulty waking up (infants/children [e]); drowsiness (m)</li> <li>Nuchal rigidity (m)</li> <li>Unsteady gait; muscle weakness (e)</li> <li>Paralysis (e)</li> <li>Seizures ([e or m], when severe)</li> <li>Memory loss (e)</li> <li>Sudden severe dementia (e)</li> <li>Personality changes (common after e)</li> </ul>
<b>PAIN/DISCOMFORT</b>	
<ul style="list-style-type: none"> <li>Headache (m and e)</li> <li>Severe, persistent headache, considered to be extremely intense and unlike other, or usual headaches (m)</li> </ul>	
<b>SAFETY</b>	<ul style="list-style-type: none"> <li>Fever (sudden onset) (m and e)</li> <li>Spread of infection (bacterial m)</li> <li>Seizure precautions (e)</li> <li>Fall prevention</li> <li>Skin rash (West Nile virus: m or e)</li> <li>Fever</li> <li>Distinctive reddish-purple skin rash at any site on the body (meningococcal m)</li> </ul>
<b>TEACHING/LEARNING</b>	Vaccines are available for <i>Neisseria meningitidis</i> (meningococcus), <i>Streptococcus pneumoniae</i> (pneumococcus), <i>Haemophilus influenzae</i> ( <i>H. influenzae</i> ) type b also known as Hib.
<b>DISCHARGE PLAN CONSIDERATIONS</b>	<ul style="list-style-type: none"> <li>Medication regimen and therapeutic treatments</li> <li>Assistance with transportation, shopping, food preparation, self-care, and homemaker or maintenance tasks</li> </ul> <p>► Refer to section at end of plan for postdischarge considerations.</p>

<b>DIAGNOSTIC STUDIES</b>	
TEST	WHAT IT TELLS ME
<b>WHY IT IS DONE</b>	<p><b>Lumbar puncture (LP):</b> Spinal tap test performed to determine if CSF fluid is consistent with clinical diagnosis.</p> <p>Primary diagnostic tool for encephalitis and meningitis. The initial tests performed for suspected infections of the central nervous system include:</p> <p>Protein: Increases in protein are commonly seen with meningitis.</p> <p>Glucose: May decrease when cells that are not normally present metabolize the glucose. These may include bacteria or cells present due to inflammation (WBCs).</p> <p>CSF total cell counts: WBCs may be increased with central nervous system infections.</p>

(continues on page 270)

## DIAGNOSTIC STUDIES (contd.)

### WHY IT IS DONE (continued)

- **Computed tomography (CT) scan:** Uses low-radiation x-rays to create a computer-generated, three-dimensional image of the brain.
- **Magnetic resonance imaging (MRI):** Uses magnetic fields and computer technology to generate images of the internal anatomy of the brain.
- **Electroencephalogram (EEG)**

### WHAT IT TELLS ME (continued)

- CSF WBC differential: There may be an increase in neutrophils with a bacterial infection, an increase in lymphocytes with a viral infection.
- Gram stain may be done for direct observation of microorganisms. Culture and sensitivity may be done for bacteria, fungi, and viruses.
- May be done after CSF evaluation in some populations (e.g., new-onset seizures, signs suspicious for space-occupying lesions such as papilledema; prolonged fever; evidence of increased intracranial pressure [ICP]). CT is less sensitive than MRI for HSV encephalitis but is rapidly available and can exclude disorders that make lumbar puncture risky.
- Sensitive for early herpes simplex encephalitis (HSE), showing edema in the orbitofrontal and temporal areas, which HSV typically infects. May show basal ganglia and thalamic abnormalities in West Nile and eastern equine encephalitis. MRI can also exclude lesions that mimic viral encephalitis (e.g., brain abscess, sagittal sinus thrombosis).
- EEG is often abnormal in acute encephalitis. Focality in the temporal lobe region is suggestive of herpes simplex encephalitis (HSE) (Gluckman, 2016).

## ANCILLARY TESTS

- **Blood cultures**

- Determines presence of blood-borne infection and agent responsible. Gram stain may be positive or negative.
- Cultures may be positive with *H. influenzae*, *S. pneumoniae*, or *N. meningitidis*, especially when those agents are also present in the nasopharynx, respiratory secretions, or skin lesions.
- Viral cultures may be done to isolate type and appropriate treating agent.

## NURSING PRIORITIES

1. Maximize cerebral perfusion and neurological function.
2. Prevent or minimize complications.
3. Promote optimal functioning.
4. Minimize discomfort.
5. Provide information about condition, prognosis, potential complications, treatment plan, and resources.

## DISCHARGE GOALS

1. Cerebral and neurological function normal or resolving.
2. Complications prevented or minimized.
3. Activities of daily living (ADLs) met by self or with assistance of others.
4. Condition, prognosis, complications, and treatment regimen understood and available resources identified.

### NURSING DIAGNOSIS: risk for Infection [spread]

#### Possibly Evidenced By

[Hematogenous dissemination of pathogen]

Stasis of body fluid

Insufficient knowledge to avoid exposure to pathogens; exposure to disease outbreak

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Infection Severity NOC

Be afebrile, free of malaise/lethargy, and demonstrate negative cultures as appropriate.

#### Risk Control: Infectious Process NOC

Verbalize understanding of individual risk factors.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Control NIC</b>	
<b>Independent</b>	
Note client's age.	<p><b>P</b> In infections of the brain and meninges, certain age groups are more susceptible to certain types (e.g., <i>E. coli</i> infection is more common in infants, while bacterial meningitis can be more common in college-age students living in a dorm). Older adults are more likely than younger adults to have bacterial meningitis and West Nile virus infection. They also have more neurological abnormalities, laboratory and imaging abnormalities, and adverse clinical outcomes (Wang et al, 2014).</p>
Note presence or new onset of fever, chills, diaphoresis, altered level of consciousness.	Systemic infection may already be present when brain infection is diagnosed, requiring immediate and intensive medical treatment, especially in the setting of altered consciousness.
Assess for host-specific factors that affect immunity (e.g., presence of underlying disease process; presence or absence of healthy immune functioning).	Persons with systemic infections are at risk for infection of the brain, although the blood-brain barrier affords some protection. Persons with suppressed immune systems (e.g., HIV, liver diseases) are also at risk for opportunistic infections of the brain.
Implement isolation protocols, as indicated:	
Emphasize and model proper hand hygiene techniques, using antibacterial soap and running water.	These first-line defenses are for the client, healthcare providers, and the public.
Use gloves as indicated.	To minimize contamination of hands.
Provide clean, well-ventilated environment.	
Provide for respiratory isolation as indicated.	Respiratory isolation (e.g., wearing of mask) may be implemented and continued for 24 hours after antibiotics are started.
Use proper protective equipment as dictated by agency policy for particular exposure risk.	Prevent spread of pathogens to staff and other clients.
Post visual alerts instructing clients/SO/visitors to inform healthcare providers of respiratory infections or influenza-like symptoms.	These individuals should not visit for the protection of both the client and themselves.
Assist with and encourage regular position changes, early ambulation; deep breathing and coughing exercises, especially after removal from ventilator.	Reduces risk of aspiration and respiratory infection or helps promote recovery, if respiratory infection is already present (possible source of brain/meninges infections).
Maintain sterile precautions for invasive procedures (e.g., IV insertion and routine care; urinary catheter, tracheostomy, pulmonary suctioning, etc.). Provide site care and promote early removal of devices.	Reduces risk of cross-contamination and device-related infections.
<b>Collaborative</b>	
Assist with and review diagnostic studies, including blood studies and other diagnostic procedures.	Meningitis and encephalitis are most often diagnosed by a combination of interventions (i.e., clinical and laboratory evaluation, lumbar puncture, and possibly imaging studies). A series of tests performed sequentially may be needed to confirm certain pathology.
Administer appropriate antimicrobials, including:	Most medications are administered IV, initially, and may continue for a lengthy period.
Antibiotics (such as penicillin [Penicillin G or ampicillin], cefotaxime [Claforan], ceftriaxone [Rocephin], vancomycin [Vancomycin])	Bacterial infections are frequently treated with a broad-spectrum antibiotic as soon as (or even before) the cause is positively identified. This therapy may then need to be modified once culture results identify the specific bacteria and its susceptibility to antimicrobial agents. Antibiotics chosen must be able to pass through the blood-brain barrier and reach sufficient concentration in the CSF.

(continues on page 272)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Antivirals (e.g., acyclovir [Zovorax], foscarnet [Foscavir], ganciclovir [Cytovene])	For viral encephalitis or meningitis due to herpes or varicella-zoster viruses, an antiviral drug (such as acyclovir) may be prescribed. For infections due to HIV, highly active antiretroviral therapy may be required.
Antifungals, such as amphotericin B (Amphotericin B), fluconazole (Diflucan), and itraconazole (Sporanox)	Used to treat fungal infections (e.g., <i>Cryptococcus neoformans</i> , <i>Candida</i> ).
Other antimicrobial classes (e.g., sulfonamides, tetracyclines, aminoglycosides)	Determined by the causative agent.
Collaborate in providing supportive therapies, such as fluids, pain medications, antipyretics, antiepilepsy drugs, steroids, diuretics, sedatives, etc.	General medical care will include close monitoring, as well as multiple medical interventions to treat brain infection.
Administer balanced nutrition, including vitamins and trace minerals, using appropriate feeding route (e.g., oral, tube feeding, total parenteral nutrition [TPN]).	The body is in a hypermetabolic state when severe infection is present. Balanced nutrients are needed to prevent a catabolic state and to promote healing.

### NURSING DIAGNOSIS: risk for decreased intracranial Adaptive Capacity

#### Possibly Evidenced By

Brain injury/[infection]

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Tissue Perfusion: Cerebral NOC

Display blood pressure, neurological signs within client's normal range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Neurologic Monitoring NIC</b> <i>Independent</i>	
Ascertain presence of an acute neurological condition, such as toxic bacterial or viral sepsis and the potential for increased intracranial pressure (ICP).	These conditions alter the relationship between intracranial volume and pressure, potentially increasing ICP and decreasing cerebral perfusion.
Assess neurological status, noting changes in client symptom reports and deterioration in neurological findings.	In encephalitis, abnormalities in brain function are expected, including altered mental status, motor or sensory deficits, altered behavior and personality changes, and speech or movement disorders (Gluckman, 2016). If client is awake and able to report symptoms, attention must be given to reports of worsening headache, particularly when accompanied by loss of coordination, confusion, visual disturbances, difficulty understanding or using language. Client may not be able to report symptoms but may display a range of progressive neurological deficits.
Monitor vital signs:	
Blood pressure	Hypotension may be present because of severe infection (sepsis), dehydration, or effects of circulating toxins. Low blood pressure or severe hypotension causes inadequate perfusion of the brain, with adverse changes in consciousness/mentation.
Temperature	Fever is often present, associated with inflammation or brain infection, and may be detrimental to cerebral perfusion.
Respirations	Respirations are often rapid and shallow, reflecting the presence of infection, fever, hypermetabolic state, or hypoxemia.
Monitor and record cardiac rhythm as indicated.	Cardiac dysrhythmias can occur due to stimulation of the sympathetic nervous system. Bradycardia may occur with high intracranial pressure.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Observe for elevating arterial blood pressure, if hemodynamic monitoring is available.	May indicate rising intracranial pressure with need for more intensive interventions/transfer to critical care unit.
Maintain optimal head of bed (HOB) placement (e.g., 0, 15, 30 degrees).	Various studies demonstrate different perfusion responses to HOB placement but indicate reduced cerebral perfusion when HOB elevated greater than 30 degrees.
Observe client frequently and take safety precautions such as raising the side rails and keeping the bed in low position when the client is alone.	May have a range of altered mentation, varying from confusion to coma. Risk of injury also varies, from falls due to unsteady gait if client is ambulatory to potential injury during seizure activity.
Reduce environmental stimuli (e.g., provide darkened room and quiet, ambient temperature; using a soft voice, gentle touch when providing care).	To reduce central nervous system (CNS) stimulation and promote relaxation.
Protect from injury and falls.	Client may be prone to seizure activity and/or may have balance disturbances, when able to resume walking.
<b>Collaborative</b>	
Monitor pulse oximetry and/or arterial blood gases (ABGs).	PaCO <sub>2</sub> level of 28 to 30 mm Hg decreases cerebral blood flow while maintaining adequate cerebral oxygenation; a PaO <sub>2</sub> of less than 65 mm Hg may cause or exacerbate cerebral edema.
Prepare for/review results of diagnostic imaging (e.g., cerebral CT scans).	To determine severity of the condition, which can cause/exacerbate cerebral perfusion problems.
<b>Cerebral Perfusion Promotion NIC</b>	
Administer oxygen by appropriate route (e.g., mask, cannula, mechanical ventilation).	Improves cerebral and systemic oxygenation in the setting of hypoxia circulating toxins and hypermetabolic state.
Administer medications as indicated (e.g., diuretics, corticosteroids, anticonvulsants).	In addition to treatment of the underlying infective cause, medications may be given to reduce inflammatory processes, manage the risk of cerebral edema and neurological sequelae.
Administer or restrict fluids as indicated.	Fluids are needed to prevent decreased cerebral perfusion associated with hypovolemia. However, fluids may be restricted if hypertension occurs to prevent decreased cerebral perfusion associated with cerebral edema.
Provide hypothermia therapy as indicated.	To reduce effects of hypermetabolic state and risk of cerebral edema. Note: Hypothermia is well known for its ability to reduce intracranial pressure. However, research confirms that hypothermia therapy bears risks in the client with TBI, including coagulopathy and immunosuppression (Brain Trauma Foundation, 2007).

## NURSING DIAGNOSIS: impaired Comfort

### May Be Related To

Illness-related symptoms (e.g., meningeal irritation, fever); treatment regimen

### Possibly Evidenced By

Feeling of discomfort, hot  
Alteration in sleep pattern; crying; moaning; irritability; restlessness

### Desired Outcomes/Evaluation Criteria—Client Will

#### Discomfort Level NOC

Verbalize sense of comfort.  
Demonstrate relief of discomfort—appear relaxed, rest/sleep quietly.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Calming Technique NIC</b>	
<i>Independent</i>	
Note client's age, developmental level, and current condition (e.g., infant/child/obtunded adult), critically ill, ventilated, sedated.	Affects ability to report symptoms and choice of interventions.
Provide and promote quiet environment, gentle massage, change of position, passive range-of-motion (ROM) movements; parent holding child, restriction of visitors.	Makes use of therapeutic measures to relieve discomforts, and support relaxation and rest. Note: Client with severe meningeal irritation does not always tolerate touch.
Provide periods of undisturbed rest. Avoid overstimulation and consolidate care activities, where possible.	Client is in a hyperirritable state.
Maintain position of comfort. Raise head of the bed as needed. Place client on side if seizures or vomiting occur or are anticipated.	Client often assumes a position with head extended back slightly and body curled (possibly associated with meningeal irritation and neck pain). Keeping head of bed elevated can improve breathing and reduce the risk of aspiration if client vomits.
Assist with, encourage use of relaxation techniques (e.g., focused breathing, guided imagery) when client is able. Provide diversional or distraction activities (e.g., TV, radio, socialization with others).	May help client to focus on something other than pain/other discomforts.
Encourage verbalization of feelings, where possible, about discomforts, including pain, nausea, light and touch sensitivity, etc.	Evaluates coping abilities and may identify additional areas of concern.
<b>Pain Management NIC</b>	
<i>Independent</i>	
Obtain client's assessment of pain to include location, characteristics, onset, duration, where possible. Encourage client to report changes in pain. Use pain-rating scale appropriate for age and cognition (e.g., 0 to 10 scale, facial expressions [or similar] scale).	A headache may be the first (and most severe pain) at the onset of either encephalitis or meningitis. Neck pain and stiffness may also be severe, causing client to be unable to touch chin to chest or turn head. Other discomforts, including body pain, may have a slower onset and be more difficult to resolve. Note: It is probable that the client recovering from neuroinvasive meningitis will experience some degree of overall body pain for quite some time following the acute phase. Pain may become chronic in nature.
Pay attention to nonverbal cues.	<b>P</b> Infant may have a shrill cry or be lethargic and refuse to eat. Older children and adults may withdraw from touch or stimulation, be lethargic or restless and uncommunicative. Note: All clients with meningeal irritation may be highly sensitive to touch, light, and loud sounds.
Evaluate and document client's response to medications.	Helps determine the effectiveness of interventions and need for change in treatment options.
<i>Collaborative</i>	
Assist with treatment of underlying cause.	Treating the agent causing the brain and meningeal inflammation, as well as providing supportive therapies (e.g., nutrition and fluid), helps reduce the severity of pain and other discomforts.
Administer medications, as needed, by appropriate route and optimal dosage.	Medications may include analgesics, sedatives, antiemetics, and antipyretics to manage client's pain, relieve nausea and fever, and promote rest.
Administer IV fluids and electrolytes as indicated.	Needed to support body functions, improve circulation, reduce fever, and provide needed protection from electrolyte imbalances that may be contributing to meningeal irritability.
Administer nutrition by appropriate route, including parenteral.	Client is in a hypermetabolic state due to sepsis (offending agent and fever) and may or may not be able to consume food. Nutritional support may be required for some time.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, treatment plan, self-care, and discharge needs**
**May Be Related To**

Alteration in cognitive functioning or memory, [mental fatigue], insufficient information

**Possibly Evidenced By**

Insufficient knowledge  
Inaccurate follow-through of instruction or performance of activity  
Development of preventable complication

**Desired Outcomes/Evaluation Criteria—Client/Caregiver Will****Knowledge: Infection Management NOC**

Identify relationship of signs/symptoms to the disease process.  
Initiate necessary lifestyle changes and participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Ascertain client/SO level of knowledge, including anticipatory needs.	Learning needs may include disease cause and process, factors contributing to symptoms and behavior (especially in neuroinvasive disease), treatments for symptom control, and prevention of complications.
Note client's age, developmental level, social and cultural influences, as well as effects of the current disease process.	These factors affect the ability and desire to learn, assimilate new information, and assume responsibility for self-care.
Include family/caregivers in assessment of needs and planning for care after discharge.	If neurological effects persist, the client may need complete care for a period of time or require assistance with care activities or tasks requiring mental acuity.
Emphasize necessity of taking antimicrobial medications as directed (e.g., dose and length of therapy).	Medications may be required for an extended period of time. Premature discontinuation of treatment may result in the return of infection or potentiate a drug-resistant strain.
Review individual nutritional needs, appropriate exercise, and need for rest.	Enhances immune system function and promotes healing.
Discuss physical and mental fatigue, and problem-solve ways to manage fatigue (e.g., starting with tasks requiring a shorter period of concentration, using memory joggers, planning for longer rest periods for several months).	Fatigue, especially mental fatigue, is common after infection or inflammation in the central nervous system (CNS). This fatigue may remain over months or years, even after recovery from the infection. It may be difficult for the person to go back to school or work, as our high-technology society with its increasing demands on people's mental capacity does not accept anything but full engagement, even over time (Berg et al, 2010; Schmidt et al, 2006).
Encourage individuals in close contact with the client to seek medical evaluation if they develop symptoms (e.g., headache, fever, neck stiffness, change in mental status) or if they are at high risk because of fragile health status.	Family, friends, roommates of infected persons can contract the disease (if the client has a contagious form) or may need prophylactic therapy.
Discuss vaccination recommendations: for example, meningococcal polysaccharide vaccine (MPSV4 [Menomune]), meningococcal conjugate vaccine (MCV4 [Menactra]), and serogroup B meningococcal vaccine (Trumenba and Bexsero).	In the United States, there are vaccines for three types of meningococcal bacteria that can cause meningitis: <i>Neisseria meningitidis</i> , <i>Streptococcus pneumoniae</i> , and <i>Hib</i> . The CDC recommends a meningococcal vaccine for all children ages 11 to 18 years, certain younger high-risk children; anyone who has been exposed to meningitis during an outbreak; anyone traveling to or living where meningitis is common; military recruits; people with certain immune system disorders or a damaged or missing spleen (CDC, 2017a). Note: MPSV4 and MCV4 can prevent four types of meningococcal disease, which make up about 70% of the cases in the United States (Bhargava, 2015).

(continues on page 276)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Emphasize need for long-term medical and rehabilitation follow-up.	Although most people will recover without permanent neurological deficits, the client can be left with long-term conditions, including balance problems, chronic pain, epilepsy, learning difficulties, behavioral disorders, speech problems, and hearing loss. The disease can also affect long- and short-term memory (Weatherspoon, 2016).

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Fatigue**—[aftereffects of] disease state, poor physical condition
- **risk for Injury**—general weakness, balancing difficulties, cognitive impairment
- **Self-Care deficit (specify)**—decreased strength and endurance, perceptual and cognitive impairment, muscular pain
- **risk for ineffective Role Performance**—cognitive changes in one partner, stressful life events; unrealistic expectations

## SPINAL SURGERY

**I. Indications**—Degenerative disc disease (DDD) refers to a combination of spinal problems that start with damage to the disc and eventually spread to other parts of the spine. Disc changes include the breakdown of cartilage with disc bulging (or herniation), loss of joint cushioning, and narrowing of the spinal canal. These changes can compress spinal nerves, leading to pain and radiating weakness or numbness.

Treatment options for the pain and radiculopathy associated with disc disorders are medical (also called conservative) and surgical. For people without evidence of nerve root compression, nonsurgical therapies (e.g., medication, rest, exercise, and physical therapy) are recommended. Surgical treatment is used in approximately 5% of patients and includes lumbar procedures and cervical procedures (Kishner et al., 2017; Nordqvist, 2017).

- a. **Procedures**—There are two types of surgical procedures for degenerative disc disease: decompression and spinal fusion.
- i. Decompression involves removal of bone or disc material from around a compressed spinal nerve root.
  - ii. Fusion involves using a bone graft to fuse one or more vertebrae to stop vertebral joint motion, thus reducing pain. These procedures are accomplished through several different surgical options.

**II. Types**

a. **Laminectomy** is the surgical excision of a vertebral posterior arch performed for the purpose of creating space in the spinal canal, thereby relieving pressure on spinal cord nerve roots.

i. *Open laminectomy* is performed under general anesthesia; skin, muscles, and ligaments are cut, bone may be permanently removed. Procedures include combinations of disc excision, nerve decompression, and bone fusion—with or without spinal instrumentation (e.g., pedicle screws, plates, rods, fusion cages), bone grafts, or synthetic disc materials. Inpatient stay of several days may be required.

ii. *Minimally invasive spine surgery (MISS)*: Laminectomy may be under brief anesthesia; no large incisions

are made, resulting in minimal damage to muscles; no bone is removed. Client may go home on day of surgery.

iii. *Endoscopic microdiscectomy*—disc material is removed through a small puncture in the skin, using a microscope for guidance. Most patients can go home the same day or the next day after the procedure (Foster, 2017). Note: Microdiscectomy is the most common procedure performed today for a herniated or ruptured disc.

b. **Spinal fusion** is surgery to join (fuse) two or more vertebrae in the back. The most common reason for performing a spinal fusion is low back pain caused by painful motion of the vertebrae. The goal of a fusion is to eliminate the motion at a painful vertebral segment, thus reducing pain. There are several methods of spinal fusion, but all include these criteria: (1) a suitable graft must be available to bridge the vertebra, and (2) an appropriate location must be present to lay in the bone graft and allow it to heal to each vertebral segment on either end (Blahd & Keller, 2015; Rutherford et al, 2007). This is accomplished by use of:

- i. Bone (taken from the pelvic bone or from a bone bank) is used to bridge vertebrae that are next to each other. This bone graft helps new bone grow.
- ii. Metal implants are used to hold the vertebrae together until new bone grows between them.
- iii. Combined bone implants and instrumentation: The instrumentation (e.g., rods, plates, screws, cages, hooks) used in fusion surgery is not designed to replace the bony elements of the spine but to stabilize them during the fusion-healing process.

**III. Statistics**

a. Morbidity: Approximately 450 cases of herniated disc per 100,000 require surgery; 150,000 cases annually in the United States, with the average age for surgery at 40 to 45 years. Postoperative morbidity: Wound infections of the spine can have devastating consequences on the outcome after surgical procedures, including severe back pain with

fever and local tenderness in the spinal column, nerve root pain radiating from the infected area, weakness of voluntary muscles and bowel/bladder dysfunction, or paralysis. A 2011 study of over 108,000 spinal procedures reported that spinal surgeries for degenerative disc disease had a lower reported infection rate (1.4%) than other spinal procedures; regarding location, the highest rates of infection were for thoracic procedures and lowest for cervical procedures. Finally, spinal fusion had a 33% higher risk of infection than procedures without fusion (Smith et al, 2011).

- b. Mortality: Rate is between 0.8% and 1%, approximately 1000 yearly depending on whether a fusion is included with laminectomy and presence of comorbidities. Although treatment has improved greatly in recent years, the death rate from spinal infection is still an estimated 20%.
- c. Cost: Average national costs in 2012 were about \$14,000 for a single-level anterior cervical discectomy and fusion procedure and \$26,000 for a single-level posterior lumbar fusion with geographic variations (Goz et al, 2015; Pfuntner et al, 2011). Costs for microdiscectomy can range from \$15,000 to \$50,000 (Laflamme, 2016).

## G L O S S A R Y

**Bone grafts:** A surgical procedure by which new bone or a replacement material is placed into spaces between or around fractures or holes in bones (defects) to aid in healing.

**Cauda equina syndrome (CES):** A serious condition caused by nerve compression or inflammation of the nerves in the lower portion of the spinal canal. CES is considered a surgical emergency, because if left untreated, it can lead to permanent loss of bowel and bladder control and paralysis of the legs. CES is usually an emergent cause for lumbar surgery, but symptoms can also occur temporarily after lumbar disc decompression or spinal fusion (Eck, 2016).

**Discectomy:** Surgical removal of a herniated disc. Discectomy can be performed in a number of different ways, including open surgery or through less invasive procedures using microscopes, x-rays, small tools, and lasers.

**Instrumented spinal fusion:** Use of instruments such as rods, plates, screws, cages, and hooks to hold spinal bones in place while they fuse.

**Laminectomy:** Surgical removal of the lamina (back of spinal canal) and spurs inside the canal that are causing spinal nerve compression.

**Microdiscectomy, also called microdecompression or microdiskectomy:** A minimally invasive surgical procedure to remove portions of a herniated disc in order to relieve pressure on the spinal nerve column.

**Minimally invasive spine (MIS) surgery:** Developed to treat disorders of the spine with less disruption to the

muscles and less damage to nerves, blood vessels, and bone. In MIS approaches, also called “keyhole surgeries,” surgeons use a tiny endoscope with a camera on the end, which is inserted through a small incision in the skin. The camera provides surgeons with an inside view, enabling surgical access to the affected area of the spine.

**Neurosurgical spinal procedures:** treat back and neck pain, spinal arthritis and herniated discs, and spinal fractures and injuries in addition to the brain diseases.

**Percutaneous endoscopic laser discectomy:** A laser, camera, suction, irrigation, and other surgical instruments are inserted into the space through a translucent working tube. Once all the tools are in place, the surgeon uses a laser to vaporize the disc material, thus diminishing the pressure on the spinal cord and/or the spinal nerve.

**Spinal fusion:** Surgical technique in which one or more of the vertebrae of the spine are united together (“fused”) so that motion no longer occurs between them. Bone grafts and/or bone graft substitutes are placed around the spine during surgery. Potential reasons to consider fusing the vertebrae include treatment of a fractured vertebra, correction of deformity (spinal curves or slippages), elimination of pain from painful motion, treatment of instability, and treatment of some cervical disc herniations.

**Spondylosis:** An umbrella term for painful conditions of the spine resulting from the degeneration of intervertebral disks.

## CARE SETTING

Inpatient or outpatient surgical or orthopedic unit. This plan of care relates to the open surgical procedures where the client experiences a 1- to 3-day hospital stay.

## RELATED CONCERNS

Psychosocial aspects of care, page 835  
Surgical intervention, page 873

## CLIENT ASSESSMENT DATABASE

Refer to CP: Herniated Nucleus Pulposus (Ruptured Intervertebral Disc) for data (see DavisPlus).

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<b>TEACHING/LEARNING</b>	
<b>DISCHARGE PLAN CONSIDERATIONS</b> May require assistance with activities of daily living (ADLs), transportation, homemaker or maintenance tasks, vocational counseling, and possible changes in layout of home.  ► Refer to section at end of plan for postdischarge considerations.	

DIAGNOSTIC STUDIES	
TEST WHY IT IS DONE	WHAT IT TELLS ME
<b>PRIMARY DIAGNOSTIC STUDIES</b>	
• <b>Spinal x-rays:</b> Detect serious underlying structural and pathological conditions of the vertebrae and spinal cord.	May show degenerative changes in spine or intravertebral spaces. Can be used to rule out other suspected pathology, such as tumors, osteomyelitis, among others.
• <b>Magnetic resonance imaging (MRI) scan:</b> Test that uses magnetic fields to produce two- or three-dimensional images of soft tissues and bones.	MRI is the most comprehensive imaging test for providing accurate and detailed anatomic information in degenerative disc disease. Can reveal changes in bone, discs, and soft tissues. Signal changes on MRI in the vertebral body marrow (also known as Modic changes [MCs]) are seen in spondylodiscitis, disc herniation, and severe disc degeneration, among other conditions.
• <b>Computed tomography (CT) scan with and without enhancement:</b> X-ray procedure that combines many x-ray images with the aid of a computer to generate cross-sectional views and, if needed, three-dimensional images of the internal organs and structures of the body.	May reveal spinal canal narrowing or compression and disc protrusion.
• <b>Myelogram (also called myelography):</b> Radiopaque contrast dye is injected into the subarachnoid space of the spinal canal. Sometimes performed in conjunction with MRI or used in the client who cannot undergo MRI.	Although now rarely performed, the myelogram may be performed to identify a source of pain that cannot be found on MRI or CT scanning. Abnormal findings may be due to a ruptured herniated disc, spinal stenosis, or compression or injury of one (or more) nerves leaving the spinal cord (Husney, 2015).
<b>RELATED DIAGNOSTIC STUDIES</b>	
• <b>Electromyogram (EMG):</b> Measures the electrical activity of muscles at rest and during contraction.	Identifies diseases that damage muscle tissue, nerves, or neuromuscular junctions. Finds the cause of weakness, paralysis, or muscle twitching. <i>Note:</i> EMG and NCS are often done together.
• <b>Nerve conduction studies (NCS):</b> Measures how well and how fast the nerves can send electrical signals.	Can identify damage to the peripheral nervous system, including all the nerves that lead away from the spinal cord and the smaller nerves that branch out from those nerves. Can localize lesion to level of particular spinal nerve root involved in impairment and determine the effect on skeletal muscle. <i>Note:</i> EMG and NCS are often done together.

**NURSING PRIORITIES**

1. Maintain tissue perfusion and neurological function.
2. Promote comfort and healing.
3. Prevent or minimize complications.
4. Assist with return to maximum mobility.
5. Provide information about condition, prognosis, treatment needs, and limitations.

**DISCHARGE GOALS**

1. Neurological function maintained or improved.
2. Complications prevented.
3. Limited mobility achieved with potential for increasing mobility.
4. Condition, prognosis, therapeutic regimen, and behavior and lifestyle changes are understood.
5. Plan in place to meet needs after discharge.

\*\*\*\*Refer to CP: Surgical Intervention for further considerations during perioperative period.

**NURSING DIAGNOSIS:** **risk for peripheral neurovascular Dysfunction****Possibly Evidenced By**

Orthopedic surgery  
Mechanical compression—dressing, edema of operative site, hematoma formation  
Vascular obstruction

**Desired Outcomes/Evaluation Criteria—Client Will****Neurological Status: Peripheral NOC**

Report or demonstrate normal/improved sensations and movement.

**ACTIONS/INTERVENTIONS****RATIONALE****Peripheral Sensation Management NIC****Independent**

Check neurological signs periodically and compare with baseline. Assess movement and sensation of hands and arms (cervical) and lower extremities and feet (lumbar).

Changes in neurological assessments may reflect development (or resolution) of spinal cord edema or tissue inflammation due to surgical manipulation of nerve roots. Assessment findings may also indicate tissue hemorrhage that causes spinal cord compression requiring prompt medical intervention.

Monitor vital signs. Note skin color, warmth, and capillary refill.

Hypotension (especially postural), with corresponding changes in pulse rate, may reflect hypovolemia from blood loss or from restricted oral intake and vomiting.

Monitor intake and output (I&O), including wound drains (e.g., Jackson-Pratt, Hemovac), if used.

Fluid balance reflects circulatory status and points to needed fluid adjustments. Excessive or prolonged blood loss requires prompt and appropriate intervention.

Visually check and gently palpate operative site for swelling. Inspect dressing for excess drainage.

Changes in contour of operative site suggest hematoma or edema formation.

Assess extremities—particularly lower extremities—for redness, swelling, and pain.

Pain in the extremities suggests complications associated with immobility and coagulation, including deep vein thrombosis (DVT). Refer to CP: Venous thromboembolism (VTE) disease: Deep vein thrombosis (DVT) and pulmonary embolism (PE).

**Collaborative**

Administer intravenous (IV) fluids or blood, as indicated.

Fluids may be needed to balance circulating volume and promote satisfactory tissue perfusion. Postoperative fluid requirements depend on the degree of hypovolemia and severity and duration of oozing or bleeding (if occurring).

Monitor blood counts—hemoglobin (Hgb), hematocrit (Hct), and red blood cells (RBCs) and platelets, as indicated.

These laboratory tests help indicate fluid and coagulation status, and reveal fluid and blood product replacement needs.

Apply and maintain schedule for wearing antiembolic hose or sequential compression devices.

Antiembolic hose, sequential compression devices, and related products reduce the risk for venous stasis in lower extremities.

**NURSING DIAGNOSIS:** risk for [spinal] Injury**Possibly Evidenced By**

Physical—temporary weakness of vertebral column, balancing difficulties, changes in muscle coordination

**Desired Outcomes/Evaluation Criteria—Client Will****Risk Control NOC**

Maintain proper alignment of spine.

Recognize need for or seek assistance with activity, as appropriate.

**ACTIONS/INTERVENTIONS****RATIONALE****Positioning NIC***Independent*

Post sign at bedside regarding prescribed position.

Promotes ongoing communication among the members of the healthcare team and reduces risk of inadvertent strain or flexion of operative area.

Provide bed board or firm mattress.

Aids in stabilizing back.

Maintain brace-wearing schedule, as indicated.

Braces may be used to support the spinal structures during healing. Establishing a schedule generally enhances client compliance.

Limit activities such as twisting or bending, as prescribed following spinal fusion.

Restricted spinal movement promotes healing of fusion.

Logroll client from side-to-side. Have client fold arms across chest; tighten long back muscles, keeping shoulders and pelvis straight. Use pillows between knees during position change and when on side. Use turning sheet and sufficient personnel when turning, especially on the first postoperative day. Instruct client in these movements as self-care progresses.

Logrolling maintains body alignment. It prevents twisting movements that potentially disrupt alignment, interfering with the overall healing process.

Assist out of bed: logroll to side of bed, splint back, and raise to sitting position. Avoid prolonged sitting. Move to standing position in single smooth motion.

Gradual progression of activity with careful consideration of body alignment protects the surgical area. These maneuvers avoid twisting and flexing of back while arising from bed or chair.

Avoid sudden stretching, twisting, flexing, or jarring of spine.

These precautions reinforce the importance of maintaining body alignment. Certain movements may cause shifting of bone graft, delayed hematoma formation, or subcutaneous wound dehiscence.

Monitor blood pressure (BP). Note reports of dizziness or weakness. Recommend client change position slowly.

Presence of postural hypotension may result in fainting, falling, and possible injury to surgical site.

Have client wear firm, flat walking shoes when ambulating.

Reduces risk of falls.

**Collaborative**

Apply lumbar brace or cervical collar, as appropriate.

Braces or corsets may be used in and out of bed during postoperative phase to support spine and surrounding structures until muscle strength improves. Brace is applied while client is supine in bed. Spinal fusion generally requires a lengthy recuperation period in a corset or collar.

Refer to physical therapy. Implement program as outlined.

Body mechanics, range-of-motion, and strengthening exercises may be initiated during the rehabilitative phase to decrease muscle spasm and improve function.

**NURSING DIAGNOSIS:** risk for ineffective Breathing Pattern**Possibly Evidenced By**

Neurological impairment [spinal nerve compression], surgery  
Pain; fatigue

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Ventilation NOC**

Maintain a normal, effective respiratory pattern free of cyanosis and other signs of hypoxia, with arterial blood gases (ABGs) within acceptable range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b>	
<i>Independent</i>	
Inspect for edema of face and neck (cervical laminectomy), especially first 24 to 48 hours after surgery.	Tracheal edema and compression or nerve injury can compromise respiratory function.
Listen for hoarseness. Encourage voice rest.	Hoarseness may indicate laryngeal nerve injury or edema of surgical area, which can negatively affect cough and ability to clear airway.
Auscultate breath sounds. Note presence of wheezes or rhonchi.	Abnormal breath sounds suggest accumulation of secretions or need to engage in more aggressive therapeutic actions to clear airway.
Instruct in/assist with coughing, turning, and deep breathing. Encourage client's use of incentive spirometry or other devices used to aid deep breathing.	These maneuvers facilitate movement of secretions and clearing of lungs. They also reduce the risk of such respiratory complications (e.g., pneumonia, pulmonary embolus).
<i>Collaborative</i>	
Administer supplemental oxygen, if indicated.	Supplemental oxygen may be necessary for periods of respiratory distress or evidence of hypoxia.
Monitor ABGs or pulse oximetry, as indicated.	Monitors adequacy of respiratory function and oxygen therapy.

**NURSING DIAGNOSIS:** acute Pain**May Be Related To**

Physical injury agent (e.g., operative procedure), [inflammation, harvesting of bone graft]

**Possibly Evidenced By**

Self-report of intensity and characteristics  
Facial expression of pain; self-focused; narrow focus  
Expressive behavior (e.g., restlessness, crying)  
Diaphoresis, changes in physiological parameter (e.g., blood pressure, heart rate, respiratory rate, oxygen saturation)  
Guarding or protective behavior

**Desired Outcomes/Evaluation Criteria—Client Will****Pain Control NOC**

Report pain is relieved or controlled.  
Verbalize methods that provide relief.  
Demonstrate use of relaxation skills and diversional activities.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<b>Independent</b>	
Assess intensity, description, location, radiation of pain, and changes in sensation.	Pain may be mild to severe with radiation to shoulders and occipital area (cervical) or hips and buttocks (lumbar). If bone graft has been taken from the iliac crest, pain may be more severe at the donor site. Numbness or tingling discomfort may reflect return of sensation after nerve root decompression or result from developing edema causing nerve compression.
Instruct in regular use of a 0 to 10 (or similar) pain-rating scale.	Standardized tool for rating pain helps in assessment and management of pain.
Review expected manifestations or changes in intensity of pain.	Development or resolution of edema and inflammation during the immediate postoperative phase can affect pressure on various nerves and cause changes in degree of pain. Muscle spasms and improved nerve root sensation can intensify pain, especially in early days after procedure.
Encourage client to assume position of comfort, as indicated. Use logrolling for position change.	Positioning is dictated by physician preference and type of operation; for example, head of bed may be slightly elevated after cervical laminectomy. Readjustment of position aids in relieving muscle fatigue and discomfort. Logrolling avoids tension in the operative areas, maintains straight spinal alignment, and reduces risk of displacing epidural patient-controlled analgesia (PCA) when used.
Provide back rub or massage. Avoid the operative site.	Back rubs and massages relieve or reduce pain by alteration of sensory neurons and muscle relaxation.
Demonstrate and encourage use of relaxation skills, such as deep breathing, visualization.	Deep breathing and visualization refocus attention, reduce muscle tension, promote sense of well-being, and control or decrease discomfort.
Provide liquid or soft diet, provide room humidifier, and encourage voice rest.	Following anterior cervical laminectomy, such measures reduce discomfort associated with sore throat and difficulty swallowing.
Investigate client reports of return of radicular pain.	Radicular pain suggests complications, such as collapsing of disc space and shifting of bone graft, which require further medical evaluation and intervention. Note: Sciatica and muscle spasms often recur after laminectomy but should resolve within several days or weeks.
<b>Collaborative</b>	
Administer analgesics, as indicated, for example:	
Opioids, such as morphine sulfate (MS Contin), hydromorphone (Dilaudid), codeine, tramadol (Ultram), oxycodone (Percocet) and hydrocodone (Vicodin, Lortab), and fentanyl (Duragesic)	Opioids are used during the first few postoperative days. Nonopioid agents are incorporated as intensity of pain diminishes. Note: Opioids may be administered via epidural catheter and PCA initially. Some may then be given orally or by patch.
Muscle relaxants, such as cyclobenzaprine (Flexeril) and metaxalone (Skelaxin)	Muscle relaxants may be used to relieve muscle spasms.
Instruct client in use of patient-controlled analgesia (PCA).	PCA gives client control of medication administration (usually opioids) to achieve a more constant level of comfort, which may enhance healing and sense of well-being.
Provide throat sprays, lozenges, or viscous lidocaine (Xylocaine).	Sore throat may be a major complaint following cervical laminectomy.
Apply electrical stimulation, as needed.	May be used to block neural transmission of pain by small-diameter nerve fibers.

**NURSING DIAGNOSIS:** **impaired physical Mobility****May Be Related To**

Musculoskeletal/neuromuscular impairment  
Reluctance to attempt movement; prescribed movement restrictions  
Pain; pharmaceutical agents

**Possibly Evidenced By**

Discomfort  
Decrease in ROM; difficulty turning  
Postural instability; slowed movement

**Desired Outcomes/Evaluation Criteria—Client Will****Knowledge: Personal Safety NOC**

Demonstrate techniques or behaviors that enable resumption of activities.

**Mobility NOC**

Maintain or increase strength and function of affected body part.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Body Mechanics Promotion NIC</b>	
<i>Independent</i>	
Schedule activity or procedures with rest periods. Encourage participation in ADLs within individual limitations.	Activity and rest enhance healing and build muscle strength and endurance. Client participation promotes sense of independence and control.
Provide or assist with passive and active range-of-motion (ROM) and core-strengthening exercises, depending on surgical procedure.	Strengthens muscles and promotes good body mechanics.
Assist with activity or progressive ambulation.	Until healing occurs, activity is limited and advanced slowly according to individual tolerance.
Review proper body mechanics or techniques for participation in activities.	Proper body mechanics reduces the risk of muscle strain, injury to the operative area, or pain. It also increases client participation and motivation in progressive activity.
<i>Collaborative</i>	
Administer analgesics prior to exercise/therapy, as indicated.	Pain relief permits maximal effort and involvement in activity.

Refer to CP: Herniated Nucleus Pulposus (Ruptured Intervertebral Disc); ND: impaired physical Mobility, for further considerations.

**NURSING DIAGNOSIS:** **risk for Infection****Possibly Evidenced By**

Inadequate Primary Defenses: Alteration in skin integrity; [surgical incision; instrumentation]  
Increased Environmental Exposure to Pathogens: [Exposure to multiple healthcare workers]  
Inadequate Secondary Defenses: Abnormal blood profile

**Desired Outcomes/Evaluation Criteria—Client Will****Desired Outcomes/Evaluation Criteria—Caregivers Will****Knowledge: Infection Management NOC**

Be free of signs of surgical site or systemic infection.  
Achieve timely wound healing.

**Infection Severity NOC**

Identify and implement interventions to prevent or reduce risk of infection.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<b>Independent</b>	
Ascertain type of spinal procedure performed, and associated concerns.	Helps to identify specific risks for infection in the client undergoing spinal surgery, with the goal of prevention of complications. In addition to the risks common to any surgical procedure (e.g., bleeding, breathing difficulties; nausea/vomiting; advanced age), there are risks unique to the client undergoing neurospinal surgery. These elevated risk factors occur because of (1) invasion and manipulation of spinal structures and nerves, (2) vertebral level (affects organ function at the site of corresponding spinal nerves), (3) type of procedure (disc decompression vs spinal fusion), (4) implantation of hardware, and (5) number of vertebral levels involved (Fencil et al, 2015).
Ascertain if client is at higher risk for surgical site infection (SSI) or delayed healing.	Client may be at higher risk for SSIs whose surgery was required because of recent trauma or client with comorbidities (e.g., anemia, diabetes, smoking, impaired circulation, obesity, use of steroids, blood transfusions).
Observe and instruct care providers in observing at-risk client in early recovery:	
Change in skin color and warmth and increased swelling at incision and invasive line site(s)	Incisional area swelling is common at first due to inflammation but should subside over short period of time. Lasting or increasing incisional area swelling may indicate developing hematoma (early) or localized infection (later on) if accompanied by redness, warmth, and discomfort. Note: Localized infection from any site can lead to systemic infection if not treated.
Incisional area pain that does not improve or pain that gradually or suddenly increases	Because of abbreviated hospital stays, spinal surgical site infections may not be apparent when client is discharged from acute care. However, the most common presenting symptom of deep surgical site infection is back pain, usually manifesting at 2 to 4 weeks and up to 3 months after a spinal procedure (Vinas et al, 2015).
Note, document, and report drainage (if any), paying attention to amount, color, and odor	Presence of drainage is typically an ominous sign and requires immediate medical intervention.
Elevated temperature or onset of fever and chills	Early mild fever is common and associated with postoperative inflammation. Unrelieved or recurrent back or neck pain and fever is often suspicious for vertebral osteomyelitis (Vinas et al, 2015). Fever and chills could also signal onset of systemic bacteremia (sepsis), requiring urgent medical intervention.
<b>Collaborative</b>	
Monitor laboratory studies (e.g., CBC, C-reactive protein, blood glucose).	Elevated WBC count, erythrocyte sedimentation rate (ESR), and C-reactive protein beyond what are expected postoperatively can indicate infection. Note: Hyperglycemia or uncontrolled diabetes is a risk factor for delayed healing.
Administer antibiotics, as indicated.	Broad-spectrum antibiotic therapy may be given early on or be tailored to the specific organism (if blood cultures are done).

**NURSING DIAGNOSIS:** risk for [acute] Urinary Retention**Possibly Evidenced By**

[Neurological disease/trauma: cervical disc myelopathy with radiculopathy; lumbar disc herniation before surgery; post-operative edema]

**Desired Outcomes/Evaluation Criteria—Client Will****Urinary Elimination NOC**

Empty bladder in sufficient amounts.

Be free of bladder distention, with residuals after voiding within normal limits (WNL).

ACTIONS/INTERVENTIONS	RATIONALE
<b>Urinary Retention Care NIC</b> <i>Independent</i> Identify client at risk for urinary retention postoperatively.	Urinary retention is associated with both cervical and lumbar pathology, albeit with different causes. Central cord syndrome (associated with cervical spondylosis) typically occurs when an individual experiences an acute hyper-extension injury resulting in acute cord compression. The syndrome consists of greater upper extremity weakness than lower extremity weakness, varying degrees of sensory disturbances below the lesion, and myelopathic findings such as spasticity and urinary retention (Rana, 2015). Also, the client with lumbar disc herniation may have urinary retention prior to surgery because of severe nerve compression of a bundle of nerves at the end of the spinal cord (cauda equina syndrome [CES]). Nerve problems can also affect the ability of the muscles around the urethra to relax during urination. Postoperative urinary retention is likely due to edema formation and time needed for nerve healing after decompression. Occasionally, urinary retention is the first sign of spinal cord compression, a medical emergency that must be treated immediately (Ellsworth, 2016).
Ascertain whether client has sensation of bladder fullness and determine level of discomfort.	Sensation and discomfort can vary depending on the underlying cause of retention. Acute retention can be accompanied by pain in the lower abdomen.
Determine whether there has been any significant urine output in the last 6 to 8 hours; presence of frequent/small voidings; note whether dribbling is occurring.	These factors help in differentiating the type of urinary problem that may be occurring. For example, in early postoperative period, output may be reduced because of preoperative NPO status or such as dehydration/hypovolemia associated with surgery. Small frequent voidings can be a sign of urinary tract infection (especially when accompanied by burning) or may be a sign of overflow voiding if retention is occurring. Dribbling may accompany overflow or (in men) may be associated with prostatic hypertrophy.
Observe and record amount and time of voiding.	Determines adequate voiding and bladder function.
Palpate for bladder distention.	May indicate urinary retention.
Note recent amount and type of fluid intake.	Fluid intake helps maintain fluid balance and renal perfusion. Note: If client is not voiding despite adequate fluid intake, retention may be occurring. Fluids may temporarily be restricted to prevent bladder overdistension until urine flow is reestablished.
Stimulate bladder emptying by running water, pouring warm water over perineum, or having client put hand in warm water, if indicated.	These maneuvers can relax the urinary sphincter, thus stimulating urination.

(continues on page 286)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Perform ultrasound bladder scan or catheterize for residual after voiding, when indicated.	Helps determine the amount of urine in the bladder.
Drain bladder intermittently, or catheterize with indwelling catheter as indicated.	Intermittent or continuous catheterization may be necessary for several days postoperatively until swelling is decreased or nerve function is restored.

<b>NURSING DIAGNOSIS:</b> <b>deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs</b>	
<b>May Be Related To</b>	Insufficient information/knowledge of resources
<b>Possibly Evidenced By</b>	Insufficient knowledge Inaccurate follow-through of instruction
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Knowledge: Treatment Regimen NOC</b>	
Verbalize understanding of condition, prognosis, and potential complications. List signs and symptoms requiring medical follow-up. Verbalize understanding of therapeutic regimen. Initiate necessary lifestyle changes.	

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b>	
<b>Independent</b>	
Review particular condition or prognosis.	Individual needs dictate tolerance levels and limitations of activity.
Discuss the particulars of client's back surgery and possibility of unrelieved or renewed pain.	It is common for clients within the first 6 weeks to have episodes of pain similar to what they experienced before surgery. One possibility for unrelieved pain is that the operated disc was not the only cause of the pain. Failure to achieve complete pain relief is not a failure of the surgery itself, because the goals of surgery (e.g., disc decompression and vertebral stabilization) may have been achieved. The return of pain can also correlate with increased activity due to stretching of the previously traumatized nerve.
Discuss safe and appropriate use of heat, such as warm packs and heating pad.	Increased circulation to the back or surgical area transports nutrients needed for healing to the area and aids in removing pathogens or exudates. Decreases muscle spasms that may result from nerve root irritation during the healing process.
Discuss judicious use of cold packs before or after stretching activity, if indicated.	Cold packs may decrease muscle spasm in some instances more effectively than heat.
Avoid tub baths per physician recommendation.	Tub baths increase risk of falls and spine twisting or flexing.
Review dietary and fluid needs.	Nutrition should be tailored to reduce risk of constipation, reduce obesity, and avoid weight gain while meeting nutrient requirements to facilitate healing.
Review or reinforce incisional care.	Clients are usually discharged from facility care within 1 to 3 days of surgery. Correct incisional care promotes healing and reduces risk of wound infection. Note: This information is especially critical for the client's significant other (SO)/caregiver.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Identify signs and symptoms requiring notification of healthcare provider, such as fever, increased incisional pain, inflammation, wound drainage, and decreased sensation or motor activity in extremities.	Prompt evaluation and intervention may prevent complications or permanent injury.
Discuss necessity of follow-up care.	Long-term medical supervision may be needed to manage problems or complications and to reincorporate individual into desired or altered lifestyle and activities.
Review need for or use of immobilization device, as indicated.	Correct application and wearing time are important to gaining the most benefit from the brace.
Assess current lifestyle, job, finances, and home and leisure activities.	Knowledge of current situation allows nurse to highlight areas for possible intervention, such as referral for occupational or vocational testing and counseling.
Listen and communicate regarding alternatives and lifestyle changes. Be sensitive to client's needs.	Low-back pain is a frequent cause of long-term disability. According to most recently published data, 28% of adults with low-back pain report limited activity due to a chronic condition, as compared to 10% of adults who do not have low-back pain (National Center for Health Statistics, 2006). Many clients may have to stop or modify work and have had long-term or chronic pain, creating relationship and financial crises. Client may be viewed as being a malingeringer, which creates further problems in social and work relationships.
Note overt and covert expressions of concern about sexuality.	Although client may not ask directly, there may be concerns about the effect of surgery on both the ability to cope with usual role in the family and community and ability to perform sexually.
Provide written copy of all instructions.	Printed information serves as useful reference after discharge.
<b>Activity Therapy/Teaching: Prescribed NIC</b>	
Discuss return to activities. Emphasize importance of increasing activities, as tolerated.	Although the recuperative period may be lengthy, following prescribed activity program promotes muscle and tissue circulation, healing, and strengthening.
Encourage development of regular exercise program, such as walking and stretching.	Regular exercise promotes healing, strengthens abdominal and erector muscles to provide support to the spinal column, and enhances general physical and emotional well-being.
Discuss importance of good posture and avoidance of prolonged standing or sitting. Recommend sitting in straight-backed chair with feet on a footstool or flat on the floor.	Proper spine alignment prevents further injuries and stress.
Emphasize importance of avoiding activities that increase the flexion of the spine, such as climbing stairs, automobile driving or riding, bending at the waist with knees straight, lifting more than 5 pounds, and engaging in strenuous exercise and sports. Discuss limitations on sexual relations and positions.	Any of these movements, positions, or excess weight potentially can interrupt the healing process and increases risk of injury to spinal cord.
Encourage lying-down rest periods, balanced with activity.	Reduces general and spinal fatigue and assists in the healing and recuperative process.
Explore limitations and abilities.	Placing limitations into perspective with abilities allows client to understand own situation and exercise choice.
<b>Collaborative</b>	
Identify community resources as indicated, such as social services, rehabilitation and vocational counseling services.	A team effort can be helpful in providing support during the recuperative period.

(continues on page 288)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Recommend counseling, sex therapy, and psychotherapy, as appropriate.	Depression is common in conditions for which a lengthy recuperative time (2 to 9 months) is expected. Therapy may alleviate anxiety, assist client to cope effectively, and enhance healing process. Presence of physical limitations, pain, and depression may negatively affect sexual desire and performance and add additional stress to relationship.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **impaired physical Mobility**—decreased endurance, pain, prescribed movement restrictions, [immobilizing device]; decreased muscle strength
- **Self-Care deficit**—weakness, fatigue, pain, environmental barriers—immobilizing device
- **risk for Falls**—postoperative conditions; impaired balance; narcotics/opiates
- **compromised family Coping**—temporary family disorganization or role changes

## SPINAL CORD INJURY: ACUTE CARE AND REHABILITATIVE PHASE

- I. Pathophysiology**—injury or insult to spinal cord
- a. Primary mechanism of injury (Chin et al, 2016; Hausman, 2006)
    - i. Hyperflexion (sudden acceleration forward) or hyperextension (sudden acceleration forward, followed by sudden deceleration) of neck
    - ii. Compression of spine: as with fall from height landing on feet or buttocks or blow to top of head as in a diving injury
    - iii. Rotation injury: Head is rotated beyond normal range.
    - iv. Penetrating injuries
      1. Low velocity, such as knife causing direct and local injury to site
      2. High velocity, such as bullet or shrapnel causing both direct and indirect damage
  - b. Secondary mechanism of injury (Chin et al, 2016; Hausman, 2006)
    - i. Changes in blood flow in and around the spinal cord
    - ii. Highly reactive chemicals called oxidants or “free radicals” attack the body’s natural defenses and critical cell structures.
    - iii. Release of excess neurotransmitters, leading to secondary damage from overexcited nerve cells
    - iv. Neurogenic shock with hypoxemia and ischemia. *Note:* Neurogenic shock occurs only in the presence of acute SCI about T6; hypotension and shock at or below T6 are caused by hemorrhage, which may not be readily identified.
    - v. Fluid and electrolyte imbalances
    - vi. Damage to axons—nerve fibers that signal to other cells
    - vii. Nerve cells in the spinal cord below the lesion may die, disrupting spinal cord circuits that help control movement and interpret sensory information.
- c. Neurological impairment:** Is dependent on level of injury, degree of spinal shock, phase, and potential for recovery (Chin et al, 2016)
- i. *C1 to C3:* Tetraplegia with total loss of muscular and respiratory function
  - ii. *C4 to C5:* Tetraplegia with poor pulmonary capacity, complete dependency for activities of daily living (ADLs). *Note:* The most common neurologic levels of injury are C4, C5.
  - iii. *C6 to C7:* Tetraplegia with some arm and hand movement allowing some independence in upper-body ADLs
  - iv. *C7 to T1:* Tetraplegia with limited use of fingers and thumbs, increasing independence
  - v. *T2 to L1:* Paraplegia with intact arm function, varying function of intercostal and abdominal muscles, and loss of function below level of injury. *Note:* Most common level for paraplegia is T12 (Chin et al, 2016).
- II. Classifications (National Institute of Neurological Disorders and Stroke [NINDS]: the American Spinal Injury Association [ASIA] Impairment Scale, 2012)**
- a. Complete: No motor or sensory function is preserved below the level of injury, including the sacral segments S4 to S5.
  - b. Incomplete: Sensory, but not motor, function is preserved below the neurologic level and some sensation in the sacral segments S4 to S5.
  - c. Incomplete: Motor function is preserved below the neurologic level; however, more than half of key muscles below the neurologic level have a muscle grade less than 3 (i.e., not strong enough to move against gravity).
  - d. Incomplete: Motor function is preserved below the neurologic level, and at least half of key muscles below the neurologic level have a muscle grade of 3 or more (i.e., joints can be moved against gravity).

**III. Etiology (National Spinal Cord Injury Statistical Center [NSCISC], 2016; Nayduch, 2010)**

- a. In 2016, motor vehicle crashes were the leading cause of injury in the United States.
- b. The next most common cause of SCI is falls. *Note:* A recent large-scale study revealed an increase in SCI among people aged 65 to 84, largely associated with falls (Jain et al, 2015).
- c. Acts of violence (such as gunshot wounds, blast injuries, penetrating injuries). A study published in 2015 states that “among people aged 16 to 30 years, violence is the second leading cause of spinal cord injury, compared with only 14% in the 1970s” (Bumpass et al, 2015). Another study, looking at combat injuries (primarily explosive blasts) in the past decade, notes, “precipitous increases in severe orthopedic injuries, including traumatic injuries to the spine in personnel exposed to combat, and spinal trauma is identified in nearly 40% of those killed” (Belmont et al, 2016).
- d. The proportion of injuries due to sports has decreased over time while the proportion of injuries due to falls has increased.
- e. Since 2005, the percentage of persons with incomplete tetraplegia has increased while complete paraplegia and complete tetraplegia have decreased slightly (Michael-Ryan Pattison Foundation, 2017).
- f. Males account for approximately 80% of new SCI cases.

- g. Average age of injury has increased from 29 years (in the 1970s) to 42 years currently (NSCISC, 2016).

**IV. Statistics**

- a. Morbidity: Recent estimates showed that the annual incidence of spinal cord injury (SCI) in the United States is approximately 17,000 new SCI cases each year. The number of people with SCI who were alive in 2016 was estimated to be 282,000 persons (NSCISC, 2016).
 

The most common in-hospital complication rates of acute SCI between 1993 and 2012 were pulmonary embolism and infarction, deep venous thrombosis of lower extremity, and pressure ulcer (Jain et al, 2015).
- b. Mortality: Mortality rates are significantly higher during the first year after injury than during subsequent years, particularly for persons with the most severe neurological impairments. The average remaining years of life for persons with SCI remain significantly below life expectancies of persons without SCI. *Note:* A recent (2015) life expectancy study spanning 30 years concludes that long-term survival of SCI has not improved (Shavelle et al, 2015).
- c. Cost: SCI costs are estimated to be \$9.7 billion annually in the United States. Reported yearly recurring costs in 2015 range from \$68,821 for paraplegia to \$113,557 for low tetraplegia (C5–C8) and up to \$185,111 for high tetraplegia (C1–C4). These estimates do not include any indirect costs (NSCISC, 2016).

**G L O S S A R Y**

**Alignment:** Generally refers to objects being in a straight line or being positioned appropriately in relation to each other. After a spinal injury, the vertebrae may become shifted from their normal position, becoming misaligned. Various forms of surgical or nonsurgical treatment may be required to realign the vertebrae.

**Allodynia:** Pain caused by something that does not normally cause pain; for example, something cold, warm, or a very light touch to the skin can result in pain.

**Atelectasis:** Incomplete expansion of a portion of the lung or the whole lung secondary to decreased vital capacity and decreased functional residual capacity due to SCI with dysfunction of respiratory muscles.

**Autonomic dysreflexia (AD):** Potential complication of SCI; an exaggerated response of the nervous system to a specific trigger, such as an overfull bladder, that occurs because the brain is no longer able to control the body’s response to the trigger. This response leads to a rapid increase in the body’s blood pressure, severe headache, and sweating. *Note:* The occurrence of AD increases as the client comes out of spinal shock. With return of sacral reflexes, the chance for AD increases (Schottler et al, 2009).

**Axon:** The long, threadlike outgrowth and extension of a nerve cell that carries messages away from the main part of the cell; also referred to as nerve fibers.

**Bowel program:** The routine that a person uses with regard to emptying his or her bowels.

**Cervical vertebrae:** The cervical (neck) vertebrae are the upper seven vertebrae in the spinal column, designated C1

through C7 from the top down. (*Note:* Reference to C8 level below corresponds to the nerve root between C7 and T1.)

**Compression:** The act of pressing together, as in a compression fracture, nerve compression, or spinal cord compression.

**Flaccid paralysis:** Weakness or loss of muscle tone resulting from injury to the nerves innervating the muscles.

**Hyperalgesia:** An extremely painful response to what is normally only mildly painful.

**Hyperextension injury:** Occurs when person is struck from behind or falls striking chin, resulting in a sudden acceleration forward, followed by sudden deceleration.

**Hyperflexion injury:** Occurs when head is suddenly and forcefully accelerated forward, causing extreme flexion of the neck.

**Intercostal muscles:** Several groups of muscles that run between the ribs and help form and move the chest wall.

**Lumbar vertebrae:** The five lumbar vertebrae are situated between the thoracic vertebrae and the sacral vertebrae in the spinal column and are designated as L1 through L5.

**Motor:** Refers to the activity of the nerves (motor nerves) that send messages away from the brain and spinal cord.

**Neurogenic:** Starting with or having to do with the nerves or the nervous system, as in neurogenic bladder or bowel, neurogenic shock.

**Paralytic ileus:** Buildup of pressure in the small intestine that can occur in the early stages after an SCI. Symptoms include absence of normal bowel sounds and visible swelling of the abdomen. It can cause vomiting or force the stomach contents up into the airways.

(continues on page 290)

## G L O S S A R Y (continued)

**Paraplegia:** Paralysis of the lower part of the body, including the legs.

**Phrenic nerve:** Nerve that governs movement of the diaphragm during breathing.

**Quadriplegia:** Complete or incomplete paralysis from the neck downward, affecting all four limbs and the trunk as a result of damage to the spinal cord between C1 and C8 nerve root. Also called tetraplegia.

**Sensory:** Relating to sensation, to the perception of a stimulus and the voyage made by incoming (afferent) nerve impulses from the sense organs to the nerve centers.

**Spasticity:** State of increased tone of a muscle and an increase in the deep tendon reflexes.

**Spinal shock:** A period of time after an SCI lasting up to 6 weeks when the area around the damaged cord is bruised and swollen. During this time, no messages can pass through the spinal cord below the level of injury, making the loss of function below the injury appear complete. Only when the swelling subsides does the true extent of the damage become clear.

**Tetraplegia:** Complete or incomplete paralysis from the neck downward, affecting all four limbs and the trunk as a result of damage to the spinal cord between C1 and C8 nerve root. Also called quadriplegia.

**Thoracic vertebrae:** The 12 thoracic vertebrae are situated between the cervical (neck) vertebrae and the lumbar vertebrae. The thoracic vertebrae are designated as T1 through T12.

## CARE SETTING

Client is treated in inpatient acute medical-surgical, subacute, and rehabilitation units.

## RELATED CONCERNS

Spinal surgery, page 276  
Fractures, page 702  
Pneumonia, page 147  
Psychosocial aspects of care, page 835  
Total nutritional support: parenteral/enteral feeding, page 525  
Upper gastrointestinal bleeding, page 340  
Respiratory failure/Ventilatory assistance, page 187  
Venous Thromboembolism (VTE) Disease: Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE), page 120

## CLIENT ASSESSMENT DATABASE

\*\*\*\*Dependent on level of injury.

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<b>ACTIVITY/REST</b>	<ul style="list-style-type: none"><li>• Paralysis of muscles—flaccid during spinal shock—at or below level of lesion</li><li>• Muscle or generalized weakness—cord contusion and compression</li></ul>
<b>CIRCULATION</b> <ul style="list-style-type: none"><li>• Dizziness with position changes</li></ul>	<ul style="list-style-type: none"><li>• Low blood pressure (BP)</li><li>• Postural BP changes, orthostatic hypotension</li><li>• Tachycardia, or</li><li>• Bradycardia—lesions T6 and above</li><li>• Cool, pale extremities</li><li>• Absence of perspiration in affected area</li></ul>
<b>ELIMINATION</b>	<ul style="list-style-type: none"><li>• Bladder and bowel incontinence</li><li>• Urinary retention</li><li>• Abdominal distention</li></ul>

**MAY REPORT (continued)****EGO INTEGRITY**

- Denial, disbelief
- Sadness, anger

**FOOD/FLUID****HYGIENE****NEUROSENSORY**

- Absence of sensation below area of injury or opposite-side sensation
- Numbness, tingling, burning, burning, twitching of arms or legs

**PAIN/DISCOMFORT**

- Pain or tenderness in muscles
- Hyperesthesia immediately above level of injury

**RESPIRATION**

- Shortness of breath, “air hunger,” inability to breathe

**SAFETY****SEXUALITY**

- Expressions of concern about return to normal functioning

**TEACHING/LEARNING****DISCHARGE PLAN CONSIDERATIONS**

- Will require varying degrees of assistance with transportation, shopping, food preparation, self-care, finances, medications or treatment, and homemaker and maintenance tasks
- May require changes in physical layout of home or placement in a rehabilitative center

♦ Refer to section at end of plan for postdischarge considerations.

**MAY EXHIBIT (continued)**

- Loss of bowel sounds
- Melena, coffee-ground emesis or hematemesis

- Fear
- Anxiety
- Irritability, restlessness
- Withdrawal

- Abdominal distention
- Loss of bowel sounds—paralytic ileus

- Variable level of dependence in ADLs

- Flaccid paralysis—spasticity may develop as spinal shock resolves, depending on area of cord involvement.
- Loss of muscle or vasomotor tone and motor function
- Loss of or asymmetrical reflexes, including deep tendon reflexes
- Changes in pupil reaction, ptosis of upper eyelid
- Loss of sensation—varying degrees may return after spinal shock resolves

- Vertebral tenderness, deformity

- Shallow or labored respirations; periods of apnea
- Increased work of breathing and use of accessory muscles
- Poor chest wall expansion
- Diminished breath sounds, rhonchi
- Pallor, cyanosis
- Decreased coughing

- Temperature fluctuations, taking on temperature of environment

- Uncontrolled erection (priapism)
- Menstrual irregularities

## DIAGNOSTIC STUDIES

### TEST WHY IT IS DONE

### WHAT IT TELLS ME

#### PRIMARY DIAGNOSTIC STUDIES

- **Spinal x-rays:** The most important diagnostic measure to locate the level and type of bony injury (fracture, dislocation). Determines alignment and reduction after traction or surgery.
- **Computerized tomography (CT) scan (also known as computerized axial tomography or CAT scan):** Imaging procedure that uses a combination of x-rays and computer technology to produce cross-sectional images of the body.
- **Magnetic resonance imaging (MRI) scan:** Noninvasive method of obtaining images of internal soft tissue, such as the spinal cord, using powerful magnets and radio waves.

Lateral x-rays of the neck can usually detect significant cervical injuries.

Provides images of the fracture, spinal cord edema, and compression. *Note:* In many centers, CT scanning has replaced initial x-rays.

Can show bruising and other soft tissue damage (such as spinal cord hematoma, hemorrhage or edema, ligament injuries) that might not show up in other studies.

#### ANCILLARY TESTS

- **Arterial blood gases (ABGs):** Monitors effectiveness of gas exchange and ventilatory effort.
- **Pulmonary function studies, such as vital capacity (VC) and tidal volume (VT):** Measures maximum volume of inspiration and expiration.
- **Chest x-ray:** Procedure used to evaluate organs and structures within the chest.

Abnormalities may be present, depending on level of SCI and limitation of chest expansion and muscle involvement.

Test could be important in client with low cervical lesions, when making decisions about ventilator needs, or in client with thoracic lesions with possible phrenic nerve and intercostal muscle involvement.

Evaluates for lung injury, such as pneumothorax, or complications associated with SCI, such as atelectasis and pneumonia or changes in level of diaphragm reflecting respiratory muscle paralysis.

#### NURSING PRIORITIES

1. Maximize respiratory function.
2. Prevent further injury to spinal cord.
3. Promote mobility and independence.
4. Prevent or minimize complications.
5. Support psychological adjustment of client and significant other (SO).
6. Provide information about injury, prognosis and expectations, treatment needs, and possible and preventable complications.

#### DISCHARGE GOALS

1. Ventilatory effort adequate for individual needs.
2. Spinal injury stabilized.
3. Complications prevented or controlled.
4. Self-care needs met by self and with assistance, depending on specific situation.
5. Beginning to cope with current situation and planning for future.
6. Condition, prognosis, therapeutic regimen, and possible complications understood.
7. Plan in place to meet needs after discharge.

#### NURSING DIAGNOSIS: risk for ineffective Breathing Pattern

##### Possibly Evidenced By

Spinal cord injury; neuromuscular impairment  
Respiratory muscle fatigue

##### Desired Outcomes/Evaluation Criteria—Client Will

##### Respiratory Status: Ventilation NOC

Establish and maintain adequate ventilation as evidenced by absence of respiratory distress and ABGs within acceptable limits and pulse oximetry maintained at 90% or greater.  
Demonstrate appropriate behaviors to support respiratory effort.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Ventilation Assistance NIC</b>	
<i>Independent</i>	
Note client's level of injury when assessing respiratory function. Note presence or absence of spontaneous effort and quality of respirations—labored, using accessory muscles.	C1 to C3 injuries result in complete loss of respiratory function. Injuries at C4 or C5 can result in variable loss of respiratory function, depending on phrenic nerve involvement and diaphragmatic function, but generally cause decreased vital capacity and inspiratory effort. For injuries below C6 or C7, respiratory muscle function is preserved; however, weakness and impairment of intercostal muscles may reduce effectiveness of cough, ability to sigh, and take deep breaths.
Auscultate breath sounds. Note areas of absent or decreased breath sounds or development of adventitious sounds, such as rhonchi.	Hypoventilation is common and leads to accumulation of secretions, atelectasis, and pneumonia—frequent complications. Note: Respiratory complications are among the leading causes of mortality, not only during the acute stage but also later in life.
Note strength and effectiveness of cough.	Level of injury determines function of intercostal muscles and ability to cough spontaneously and move secretions. High-level paraplegics and all tetraplegics lose the ability to cough and are at greatest risk of developing atelectasis and respiratory failure.
Assist with coughing, as indicated for level of injury; for example, have client take a deep breath, hold for 2 seconds before coughing, or inhale deeply, then cough at the end of a slow exhalation. Alternatively, assist by placing hands below diaphragm and pushing upward as client exhales (“quad cough”).	Assisted coughing facilitates mobilization of respiratory secretions. Note: Quad cough procedure is generally reserved for clients with stable injuries once they are in the rehabilitation stage.
Maintain open airway: Keep head in neutral position, elevate head of bed slightly if tolerated, and use airway adjuncts, as indicated.	Client with high cervical injury and impaired gag or cough reflex requires assistance in preventing aspiration and maintaining patent airway.
Suction only as necessary. Monitor pulse oximetry and heart rate during suctioning. Document quality and quantity of secretions.	Suctioning facilitates removal of respiratory secretions. However, routine or lengthy suctioning increases the risk for bradycardia (heart rate less than 60 beats per minute) and hypoxia, especially with tetraplegia.
Provide fluids—at least 1500 to 2000 mL/d, within cardiac tolerance.	Promotes mobilization of secretions.
Reposition and turn periodically. Avoid or limit prone position, as appropriate.	Repositioning enhances ventilation of all lung segments and mobilizes secretions. It helps reduce the risks of complications such as atelectasis and pneumonia. Note: Prone position significantly decreases vital capacity and increases risk of respiratory compromise and failure.
Assess for abdominal distention and muscle spasm.	Abdominal fullness may impede diaphragmatic excursion, thus reducing lung expansion and further compromising respiratory function.
Assist client in “taking control” of respirations as indicated. Encourage deep breathing. Focus attention on the steps of breathing.	Depending on level of injury or involvement of respiratory muscles (muscle fatigue), breathing may no longer be an involuntary activity but require conscious effort.
Monitor for signs of infection (e.g., fever, changes in breath sounds, increased cough with purulent sputum).	Pneumonia is a frequent early complication possibly because of aspiration and high-dose steroids used in early treatment of the SCI.
Monitor for respiratory muscle fatigue. Observe skin color for developing cyanosis or duskeness.	Developing respiratory distress accompanied with changes in skin color may reveal impending respiratory failure and need for immediate medical evaluation and intervention/mechanical ventilation. (Refer to CP: Respiratory Failure/Ventilatory Assistance.)

(continues on page 294)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Investigate sudden onset of dyspnea, cyanosis, and other signs of respiratory distress.	Development of pulmonary emboli may be “silent” because pain perception is altered and deep vein thrombosis (DVT) is not readily recognized.
<b>Collaborative</b>	
Measure and graph:	
Vital capacity (VC), total lung volumes (VT), and inspiratory force	Determines level of respiratory muscle function. Serial measurements may predict impending respiratory failure (acute injury) or determine level of function after spinal shock phase or while weaning from ventilatory support.
Serial ABGs and pulse oximetry	Documents status of ventilation and oxygenation and identifies respiratory problems, such as hypoventilation, hypoxia, and acidosis, among others.
Assist with use of respiratory adjuncts, such as incentive spirometer or blow bottles, and aggressive chest physiotherapy, such as chest percussion.	Preventing retained secretions is essential to maximize gas diffusion and to reduce risk of pneumonia.
Administer oxygen by appropriate method: nasal prongs, mask, intubation, and ventilator.	Oxygen delivery methods are determined by level of injury, degree of respiratory insufficiency, and respiratory muscle function after spinal shock phase.
Refer to or consult with respiratory and physical therapists.	Collaboration with respiratory and physical therapists helps identify appropriate therapies that could optimize respiratory function. For example, glossopharyngeal breathing uses muscles of mouth, pharynx, and larynx to swallow air into lungs, thereby increasing vital capacity and chest expansion.

## NURSING DIAGNOSIS: risk for physical Trauma

### Possibly Evidenced By

History of trauma [instability of spinal column]  
Decrease in muscle coordination  
Alteration in sensation

### Desired Outcomes/Evaluation Criteria—Client Will

#### Bone Healing NOC

Maintain proper alignment of spine without further spinal cord damage.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Traction/Immobilization Care NIC</b>	
<b>Independent</b>	
Maintain bedrest and immobilization device(s)—usually halo ring and vest, hard cervical collars, or bed-based traction equipment.	Alignment and stabilization are needed prior to (or instead of) surgery to provide indirect decompression of the spinal cord. Note: Traction is used only for cervical spine stabilization (Wang et al, 2014).
If bed-based traction is used:	
Elevate head of traction frame or bed as indicated. Ensure that traction frames are secured, pulleys are aligned, and weights are hanging free.	Creates safe, effective counterbalance to maintain both client’s alignment and proper traction pull.
Check weights for ordered traction pull (usually 10 to 20 lb).	Weight pull depends on client’s size and amount of reduction needed to maintain vertebral column alignment.
Reposition at intervals, using adjuncts for turning and support—turn sheets, foam wedges, blanket rolls, and pillows. Use several staff members when turning or logrolling client. Follow special instructions for traction equipment, kinetic bed, and frames once halo is in place.	The use of adjuncts for turning and support maintains proper spinal column alignment and thus reduces the risk of further trauma.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
If halo ring and vest traction are used:	Advantages of the halo vest over bed-based traction include precise positional control and stabilization of the cervical spine, ease of application, minimal discomfort, and early mobilization.
Avoid using halo vest/frame to reposition client.	Grasping the brace or halo vest to turn or reposition client may cause additional injury to spine and nerves.
Monitor pin sites, document and report client reports of pain at pin sites.	Most often, pain at pin sites is associated with pins that are too loose rather than too tight, putting spinal stability at risk (Traynelis & Waziri, 2017).
<b>Collaborative</b>	
Prepare for internal stabilization surgery, such as spinal laminectomy or fusion, if indicated.	Surgery may be indicated for vertebral stabilization, spinal cord decompression, nerve decompression, and/or removal of bony fragments. Note: Currently, there are no defined standards regarding the timing of decompression and stabilization in spinal cord injury (Chin et al, 2016).
Administer medications as indicated, such as methylprednisolone (Depo-Medrol).	The use of corticosteroids in early treatment to reduce spinal cord edema has long been controversial. Although many national organizations are now changing their recommendations to include this therapy for the improvement of neurological outcome, they are not requiring it, suggesting that its benefits be weighed against the client's potential for developing sepsis (Chin et al, 2016).

### NURSING DIAGNOSIS: impaired physical Mobility

#### May Be Related To

Alteration in bone structure integrity  
Neuromuscular, musculoskeletal, or sensorioperceptual impairment; prescribed movement restriction [immobilization by traction]  
Disuse; decrease in muscle strength or control; joint stiffness or contractures  
Pain

#### Possibly Evidenced By

Decrease in range of motion; decrease in gross or fine motor skills  
Postural instability; difficulty turning; slow or spastic movement; uncoordinated movement

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Immobility Consequences: Physiological NOC

Maintain position of function as evidenced by absence of contractures and footdrop.

##### Neurological Status: Spinal Sensory/Motor Function NOC

Increase strength of unaffected and compensatory body parts.  
Demonstrate techniques or behaviors that enable resumption of activity.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bed Rest Care   NIC</b>	
<b>Independent</b>	
Assess motor function, as spinal shock and spinal cord edema resolves, by requesting client to perform certain actions, such as shrug shoulders, spread fingers, and squeeze and release examiner's hands.	Continuous motor function assessment helps determine appropriate interventions for the specific motor impairment.
Provide means to summon help, such as special sensitive call light.	Promotes the client's sense of control and reduces fear of being left alone. Note: Ventilator-dependent tetraplegic client may require continuous observation for timely interventions.

(continues on page 296)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Perform or assist with full range-of-motion (ROM) exercises on all extremities using slow, smooth movements. Include periodic hip hyperextension.	ROM exercises enhance circulation, restore or maintain muscle tone and joint mobility, and prevent disuse contractures and muscle atrophy.
Position arms at 90-degree angle for a period of time and at regular intervals.	Appropriate joint positioning prevents frozen shoulder contractures.
Maintain ankles at 90 degrees with footboard. Use high-top tennis shoes. Place trochanter rolls along thighs when in bed.	These measures prevent external rotation of the hip and footdrop.
Elevate lower extremities at regular intervals when seated. Raise foot of the bed when supine, as appropriate. Assess for edema of ankles and feet.	Loss of vascular tone and “muscle action” results in pooling of blood and venous stasis in the lower abdomen and lower extremities, with increased risk of hypotension and thrombus formation. Positioning and frequent assessment are needed to prevent associated complications.
Space periods of rest and activity. Provide uninterrupted rest periods. Encourage client involvement.	Adequate rest and optimal activity prevent fatigue and allow opportunity for maximal efforts and active client participation.
Monitor BP before and after activity in acute phases or until stable. Change position slowly. Use cardiac bed or tilt table or other specialized bed as activity level is advanced.	The loss of sympathetic innervations (especially in T6 and higher SCI) causes loss of vascular tone, resulting in hypotension and venous pooling. Side-to-side movement or elevation of head can aggravate hypotension and cause syncope.
Reposition periodically even when sitting in chair. Teach client how to use weight-shifting techniques.	Repositioning and weight shifts reduce pressure areas and promote peripheral circulation.
Prepare for weight-bearing activities, such as use of tilt table or standing frame for upright position, and strengthening and conditioning exercises for unaffected body parts.	Early weight bearing reduces osteoporotic changes in long bones and reduces incidence of urinary infections and kidney stones. Note: Fifty percent of clients develop heterotopic ossification that can lead to pain and decreased joint flexibility.
Assess for pain and intervene as indicated.	Pain is a significant problem in some spinal cord-injured patients, not only in the acute injury phase but also long-term. Whatever the pain type (i.e., central, muscle tension, neuropathic, spasticity), it can significantly affect client’s motivation and ability to participate in movement and activities. (Refer to ND: acute Pain, following.)
Encourage use of relaxation techniques.	Relaxation techniques reduce muscle tension and fatigue and may help limit pain of muscle spasms and spasticity.
Inspect skin daily. Observe for pressure areas. Provide meticulous skin care. Teach client to inspect skin surfaces and to use a mirror to look at hard-to-see areas.	Altered circulation, loss of sensation, and paralysis potentiate pressure injury development. This is a lifelong consideration. (Refer to ND: risk for Impaired Tissue Integrity/Pressure Ulcer.)
<b>Collaborative</b>	
Place client in kinetic therapy bed when appropriate.	Kinetic therapy beds effectively immobilize unstable spinal column and improve systemic circulation. They are thought to decrease complications associated with immobility.
Apply sequential compression devices (SCDs) or antiembolic hose to legs, as appropriate.	These devices limit pooling of blood in lower extremities or abdomen, thus improving vasomotor tone and reducing incidence of thrombus formation and pulmonary emboli.
Consult with physical and occupational therapists and rehabilitation team.	Collaboration helps in planning and implementing individualized exercise program. The members of the rehabilitation team identify and develop assistive devices to enhance client’s function and overall independence.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications, as indicated, for example: Muscle relaxants and antispasticity agents, as indicated, such as baclofen (Lioresal), tizanidine (Zanaflex), dantrolene (Dantrium), and abobotulinumtoxinA (Dysport)	In client with complete traumatic injury of the spinal cord, spasticity develops 1 to 12 months after the injury, when early management of spasticity will begin. Muscle relaxants and antispasticity agents may be useful in limiting or reducing pain (Yelnik et al, 2010). Note: Recently, the U.S. Food and Drug Administration (FDA) approved the expanded use of Dysport (abobotulinumtoxinA) injection to include the treatment of both upper and lower limb spasticity in adults (Henriques, 2017).

NURSING DIAGNOSIS:	[disturbed tactile/proprioception Sensory Perception]
<b>May Be Related To</b>	
[Altered sensory reception, transmission, or integration] [Insufficient environmental stimuli] [Psychological stress]	
<b>Possibly Evidenced By</b>	
[Change in sensory acuity, sensory distortions] [Change in usual response to stimuli] [Disorientation]	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Neurological Status: Spinal Sensory/Motor Function NOC</b>	Recognize sensory impairments.
<b>Knowledge: Personal Safety NOC</b>	Identify behaviors to compensate for deficits. Verbalize awareness of sensory needs and potential for deprivation or overload.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Peripheral Sensation Management NIC</b>	
<i>Independent</i>	
Assess and document sensory function or deficit, such as by means of touch, pinprick, or heat and cold, progressing from area of deficit to neurologically intact area.	Changes may not occur during acute phase, but as spinal shock resolves, dermatome charts or anatomic landmarks should document changes, such as, “2 inches above nipple line.”
Protect from bodily harm, such as falls, burns, and improper positioning of body parts.	The client may not sense pain or be aware of body position.
Assess for redness, swelling, and muscle tension of calf tissues. Record calf and thigh measurements, as indicated.	A high percentage of clients with SCI develop thrombi (altered peripheral circulation, immobilization, flaccid paralysis) and are at risk because of loss of ability to sense the discomfort that typically attends a DVT. Refer to CP: Venous Thromboembolism (VTE) disease: Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE) for related interventions.
Assist client to recognize and compensate for alterations in sensation.	Increased attention to alterations in sensation may help reduce anxiety of the unknown and prevent injury.
Explain procedures before and during care while identifying the involved body part.	These measures enhance client perception of “whole” body.
Provide tactile stimulation by touching the client in intact sensory areas, such as shoulders, face, and head.	Touching conveys caring and fulfills normal physiological and psychological needs.

(continues on page 298)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Position client to see surroundings and activities. Provide prism glasses when prone on turning frame. Talk to client frequently.	These nursing actions provide sensory input, which may be severely limited, especially when client is in prone position.
Provide diversional activities, including television, radio, music, and liberal visitation. Use clocks, calendars, pictures, bulletin boards, and so on. Encourage SO and family to discuss general and personal news.	The activities aid in maintaining reality orientation and provide some sense of normality in daily passage of time.
Provide uninterrupted sleep and rest periods.	Adequate sleep and rest reduce sensory overload, enhance orientation and coping abilities, and aid in reestablishing natural sleep patterns.
Note presence of exaggerated emotional responses and altered thought processes, including disorientation and bizarre thinking.	Exaggerated emotional responses and altered thought processes indicate damage to sensory tracts affecting reception or interpretation of stimuli, or psychological stress, requiring further assessment and intervention.

### NURSING DIAGNOSIS: acute Pain

#### May Be Related To

Physical injury [e.g., damage or dysfunction of nervous system; traction apparatus]

#### Possibly Evidenced By

Self-report of intensity and pain characteristics

Evidence of pain using standard pain scale or pain behavior scale

Expressive behavior (e.g., facial expression of pain, irritability; restlessness)

Self-focused; narrowed focus

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Control NOC

Report relief or control of pain and discomfort.

Demonstrate use of relaxation skills and diversional activities as individually indicated.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b> <i>Independent</i> Assess for presence of pain. Help client identify and quantify pain, including location, type of pain, and intensity on a pain-rating scale.	Pain is a frequent problem in most of the SCI population. Pain is complex, consisting of multiple types of pain with different characteristics, often experienced simultaneously in different regions of the body. This complexity makes effective treatment difficult, frustrating both client and clinician. The client often reports pain above the level of injury (e.g., chest, back, headache). After resolution of spinal shock phase, client may also report muscle spasms, radicular pain (described as a burning or stabbing pain radiating in a dermatomal pattern) associated with injury to peripheral nerves, or visceral pain. Pain may also be associated with overuse of muscles. Note: The International Spinal Cord Injury Pain Basic Data Set is now used in some care settings to obtain a more complete and standardized clinical picture of pain associated with SCI. This assessment tool encompasses a pain intensity rating, a classification of pain, and questions related to the temporal pattern (i.e., how pain changes over time and what causes the change) for each specific pain. The impact of pain on physical, social, and emotional function and sleep is also addressed (Widerstrom-Noga et al, 2008).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Evaluate increased irritability, muscle tension, restlessness, and unexplained vital sign changes.	Nonverbal cues indicative of pain or discomfort require timely intervention. Note: Some people with higher lesions may be unable to show changes in heart rate and blood pressure assessed by the pain score.
Assist client in identifying precipitating factors.	Burning pain and muscle spasms can be precipitated or aggravated by multiple factors, such as anxiety, tension, external temperature extremes, sitting for long periods, and bladder distention.
Provide comfort measures, such as position changes, massage, ROM exercises, and warm or cold packs, as indicated.	Nonpharmacologic measures for pain control reduce need for medication and provide emotional support.
Encourage use of relaxation techniques, such as guided imagery, visualization, and deep-breathing exercises. Provide diversional activities—television, radio, telephone, and unlimited visitors, as appropriate.	Relaxation and diversional activities refocus attention, promote sense of control, and possibly enhance coping abilities.
<b>Collaborative</b> Administer medications, as indicated, for example: opioid and nonopioid analgesics, muscle relaxants, antiepileptic drugs, and antianxiety agents.	Because of the several types of pain associated with SCI, any number of medications may be tried with varying degrees of success. In the acute setting, pain may occur because of the damage to the spinal cord, or it may occur from damage to other areas of the body at the time of injury. Opioid analgesics will most likely be used initially to alleviate pain and promote rest. Later, other medications will be added to relieve muscle spasm and pain associated with spasticity. Eventually, the client's pain will become chronic and require a lifelong management plan.

## NURSING DIAGNOSIS: **Grieving**

### May Be Related To

Loss of significant object (e.g., processes of body, job, status, role)

### Possibly Evidenced By

Anger, blame, despair

Alteration in sleep and dream patterns

Detachment; psychological distress

### Desired Outcomes/Evaluation Criteria—Client Will

#### Grief Resolution NOC

Express feelings freely and effectively.

Begin to progress through recognized stages of grief, focusing on one day at a time.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Grief Work Facilitation NIC</b> <i>Independent</i> Identify signs of grieving, such as shock, denial, anger, and depression.	Client experiences a wide range of emotional reactions to the injury and its actual and potential impact on life. These stages are not static, and the rate at which client progresses through them is variable.
<b>Shock</b> Note lack of communication or emotional response and absence of questions.	Shock is the initial reaction associated with overwhelming injury. Primary concern is to maintain life. The client may be too ill to express feelings.

(continues on page 300)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide simple, accurate information to client and SO regarding diagnosis and care. Be honest; do not give false reassurance while providing emotional support.	Client's awareness of surroundings and activity may be blocked initially, and attention span may be limited. Little is known about the outcome of client's injuries during acute phase, and lack of knowledge may add to frustration and grief of family. Therefore, early focus of emotional support may be directed toward SO/family.
Encourage expressions of sadness, grief, guilt, and fear among client, SO, family members, and friends.	Acknowledging client and SO feelings and encouraging expression could provide appropriate support.
Incorporate SO into problem-solving and planning for client's care.	Shared clinical decision making with the client and SO establishes therapeutic relationships and provides sense of control of the management of current health situation and the subsequent changes.
<b>Denial</b>	
Assist client and SO to verbalize feelings about situation. Avoid judgment about what is expressed.	Important beginning step to deal with what has happened. Helpful in identifying client's coping mechanisms.
Note comments indicating unrealistic outcomes and bargaining with God. Do not confront these comments in early phases of rehabilitation.	Denial may be a useful coping mechanism during the early phases of rehabilitation. Client may accept disability but may deny uncertainty and permanency of limitations.
Focus on present needs—ROM exercises, skin care, and so on.	Attention on "here and now" reduces frustration and hopelessness of uncertain future and may make dealing with today's problems more manageable.
<b>Anger</b>	
Identify use of manipulative behavior and reactions to caregivers.	Client may demonstrate manipulative behaviors like spitting, biting, or even pitting caregivers against each other to express anger.
Encourage client to take control when possible—establishing care routines, dietary choices, diversional activities, and so forth.	Encouraging client participation provides a sense of control and responsibility as well as reduces sense of powerlessness.
Accept expressions of anger and hopelessness, such as "let me die." Avoid arguing. Show concern for client.	Nonjudgmental communication of empathy and compassion helps the client regain sense of worth.
Set limits on acting out and unacceptable behaviors when necessary, including abusive language, sexually aggressive or suggestive behavior.	Although it is important to express negative feelings, client and staff need to be protected from violence and embarrassment. Acting out is traumatic for all involved.
<b>Depression</b>	
Note loss of interest in living, sleep disturbance, suicidal thoughts, and hopelessness. Listen to, but do not confront, these expressions. Let client know nurse is available for support.	Depression may last for weeks, months, or years. Acceptance and support are critical in facilitating resolution. The client may need psychological counseling.
Arrange visit by individual similarly affected, as appropriate.	Talking with another person who has shared similar feelings and fears and survived may help client reach acceptance of reality of condition and deal with perceived and actual losses.
<b>Collaborative</b>	
Consult with and refer to psychiatric nurse, social worker, psychiatrist, and pastor.	Client and SO need assistance to work through feelings of alienation, guilt, and resentment concerning lifestyle and role changes. The family required to make adaptive changes to a member who may be permanently "different" benefits from supportive, long-term assistance and counseling in coping with these changes and the future. Client and SO may suffer great spiritual distress, including feelings of guilt, deprivation of peace, and anger at God, which may interfere with progression through, and reconciliation of, grief process.

**NURSING DIAGNOSIS:** risk for situational low Self-Esteem**Possibly Evidenced By**

Developmental transition; functional impairment; alteration in body image  
Decrease in control over environment; unrealistic self-expectations

**Desired Outcomes/Evaluation Criteria—Client Will****Psychosocial Adjustment: Life Change NOC**

Express positive self-appraisal.  
Recognize and begin incorporating changes into self-concept without negating self-esteem.  
Demonstrate self-confidence by setting realistic goals and actively participating in life situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Esteem Enhancement NIC</b>	
<i>Independent</i>	
Acknowledge difficulty in determining degree of functional incapacity and chance of functional improvement.	During acute phase of injury, long-term effects are unknown, which delays the client's ability to integrate situation into self-concept.
Listen to client's comments and responses to situation.	Active listening provides clues to client's view of self, role changes, needs, and level of acceptance.
Assess dynamics of client and SOs, including client's role in family and cultural factors.	Client's previous role in family unit is disrupted or altered by injury. Role changes add difficulty in integrating self-concept and level of independence. A person's culture affects role perceptions and performance in the family and community.
Encourage SO to treat client as normally as possible, such as discussing home situations and family news.	Involving client in family unit reduces feelings of social isolation, helplessness, and uselessness and provides opportunity for SO to contribute to client's welfare.
Provide accurate information. Discuss concerns about prognosis and treatment honestly at client's level of acceptance.	Open discussion of treatment and prognosis may focus on current and immediate needs. Ongoing updates enable assimilation.
Discuss meaning of loss or change with client and SO. Assess interactions between client and SO/family.	Actual change in body image may be different from that perceived by client. Distortions may be unconsciously reinforced by SO/family.
Accept client and show concern for individual as a person. Identify and build on client's strengths; give positive reinforcement for progress noted.	Genuine concern and regard for the client as an individual establishes therapeutic atmosphere for self-acceptance and encouragement.
Include client and SO in care, allowing client to make decisions and participate in self-care activities, as possible.	Encouraging client participation in care decision making recognizes that client is still responsible for own life and provides some sense of control over situation. It sets the stage for future lifestyle, pattern, and interaction required in daily care. Note: Client may reject all help or may be completely dependent during this phase.
Be alert to sexually oriented jokes, flirting, or aggressive behavior. Elicit concerns, fears, and feelings about current situation and future expectations.	Anxiety develops because of perceived loss and change in masculine or feminine self-image and role. Forced dependency is often devastating, especially considering client's change in function and appearance.
Be aware of own feelings and reaction to client's sexual anxiety.	Personal reactions to client's sexual anxiety may be as disruptive as the behavior itself, creating conflicts between client and staff, and can potentially eliminate client's willingness to work through situation and participate in rehabilitation.
Arrange visit by similarly affected person, if client desires and situation allows.	Support groups can provide hope and potential future role model. They can be vital resources during difficulties after discharge.

(continues on page 302)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Refer to counseling or psychotherapy as indicated—psychiatric clinical nurse specialist, psychiatrist, social worker, or sex therapist.	The client may need additional assistance to adjust to change in body image and lifestyle.

## NURSING DIAGNOSIS: bowel Incontinence/Constipation

### May Be Related To

Neurological impairment; upper or lower motor nerve damage, dysfunctional rectal sphincter; decrease in gastrointestinal motility; abdominal muscle weakness

Deficient dietary habits

Pharmacological agent

### Possibly Evidenced By

Change in bowel pattern, characteristics of stool; inability to expel formed stool

Reports inability to feel rectal fullness or recognize urge to defecate

Changes in bowel sounds

### Desired Outcomes/Evaluation Criteria—Client Will

#### Bowel Continence NOC

Reestablish satisfactory bowel elimination pattern.

Verbalize behaviors and techniques for individual bowel program.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bowel Management NIC</b>	
<i>Independent</i>	
Auscultate bowel sounds, noting location and characteristics.	Bowel sounds may be absent during spinal shock phase. High tinkling sounds may indicate presence of ileus.
Observe for abdominal distention if bowel sounds are decreased or absent.	Impaired innervation causes paralysis of the bowel (ileus) and bowel distention. Note: Overdistention of the bowel is a trigger for autonomic dysreflexia (AD), once spinal shock subsides. (Refer to ND: risk for Autonomic Dysreflexia.)
Note reports of nausea and onset of vomiting. Check vomitus or gastric secretions (if tube in place) and stools for occult blood.	Gastrointestinal (GI) bleeding may occur in response to injury (Curling's ulcer) or as a side effect of certain therapies—steroids or anticoagulants.
Record frequency, characteristics, and amount of stool.	Assessment of bowel movement helps identify degree of impairment or dysfunction and required level of assistance.
Recognize signs of fecal impaction—no formed stool for several days, semiliquid stool, restlessness, increased feelings of fullness in or distention of abdomen, presence of nausea, vomiting, and possibly urinary retention.	Early intervention is necessary to effectively treat constipation or retained stool and reduce risk of further complications.
Establish regular daily bowel program—digital stimulation, prune juice and warm beverage, and use of stool softeners or suppositories at set intervals. Determine a routine of bowel evacuation.	A lifelong routine bowel program is necessary to control bowel evacuation. Bowel program is important to the client's physical independence and social acceptance. Note: Bowel movements in clients with upper motor neuron damage are generally regulated with suppositories or digital stimulation. Lower motor neurogenic bowel is more difficult to regulate and usually requires manual disimpaction. Incorporating elements of client's usual routine may enhance cooperation and success of program (e.g., many clients prefer morning program rather than evening schedule often practiced in acute and rehabilitation setting).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage well-balanced diet that includes bulk and roughage and increased fluid intake at least 1500 to 2000 mL/d, including fruit juices.	High fiber and fluid intake improves consistency of stool for transit through the bowel. Note: Over-the-counter (OTC) fiber products and cereals, prune juice, applesauce, and bran often provide adequate fiber for effective bowel management.
Observe for incontinence and help client relate incontinence to change in diet or routine.	Client can eventually achieve routine bowel habits, which enhances independence, self-esteem, and socialization.
Restrict intake of caffeinated beverages, such as coffee, tea, colas, or energy drinks, if indicated.	Diuretic effect of caffeine can reduce fluid available in the bowel, thus increasing the risk of dry, hard-formed stool.
Provide meticulous skin care.	Loss of sphincter control and innervation in the area potentiates risk of skin irritation and breakdown.
<b>Collaborative</b>	
Insert and maintain nasogastric (NG) tube and attach to suction if appropriate.	The NG tube may be used initially to reduce gastric distention and prevent vomiting.
Consult with dietitian or nutritional support team.	Dietary support team aids in creating dietary plan to meet nutritional needs based on digestive and bowel function.
Administer medications, as indicated:	
Stool softeners, laxatives, suppositories, enemas, such as Therevac-SB	Stool softeners, laxatives, suppositories, and enemas stimulate peristalsis and routine bowel evacuation. Suppositories should be warmed to room temperature and lubricated before insertion. Therevac-SB is a 4 mL enema of docusate and glycerin that may reduce time for bowel care by as much as 1 hour.
Antacids and histamine H <sub>2</sub> antagonists, such as cimetidine (Tagamet) and ranitidine (Zantac)	Antacids and histamine antagonists neutralize gastric acid to lessen gastric irritation and risk of bleeding.

### NURSING DIAGNOSIS: impaired urinary Elimination

#### May Be Related To

Sensory motor impairment  
Urinary tract infection (UTIs)

#### Possibly Evidenced By

Urinary incontinence  
Urinary retention

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Urinary Continence NOC

Verbalize understanding of condition.  
Maintain balanced intake and output (I&O), with clear, odor-free urine; free of bladder distention or urinary leakage.  
Verbalize or demonstrate behaviors and techniques to prevent retention and urinary infection.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Urinary Elimination Management NIC</b>	
<i>Independent</i>	
Determine type of urinary problem anticipated depending on the level of spinal cord injury.	In paraplegic and quadriplegic individuals, the brain cannot send messages below the level of injury, and messages from organs innervated by regions below the level of injury cannot reach the brain. Immediately after the SCI, the bladder becomes atonic, distended, and, if neglected, exhibits continuous overflow dribbling during the “spinal shock” phase. Injury to the sacral and lumbar segments produces a flaccid paralysis of the bladder with overfilling, while upper cord lesions (thoracic and cervical) produce a spastic reflex bladder that empties spontaneously (Husney & Greenwald, 2015; Carter, 2017).

(continues on page 304)

**ACTIONS/INTERVENTIONS (continued)**

Assess voiding pattern, including frequency and amount. Compare urine output with fluid intake. Note specific gravity.

Palpate for bladder distention, perform bladder scan, and observe for overflow voiding.

Encourage fluid intake of 1500 to 2000 mL/d, including acid ash juices such as cranberry.

Begin bladder retraining per protocol when appropriate, with fluids between certain hours, digital stimulation of trigger area, contraction of abdominal muscles, and so forth.

Observe for changes in urine characteristics—cloudy, bloody, foul odor, and so forth. Test urine with dipstick, as indicated.

Cleanse perineal area and keep dry. Provide catheter care, as appropriate.

**Collaborative**

Monitor blood urea nitrogen/creatinine (BUN/Cr), white blood cell (WBC) count, and urinalysis (UA).

Administer vitamin C or urinary antiseptics, such as methenamine mandelate (Mandelamine), as indicated.

Administer other medications as appropriate, for example, anticholinergics such as oxybutynin (Ditropan) and propantheline (Pro-Banthine)

Cholinergics, such as bethanechol (Urecholine)

Alpha-blockers such as terazosin (Hytrin) and midodrine (ProAmatine)

**RATIONALE (continued)**

Voiding pattern identifies characteristics of bladder function, including effectiveness of bladder emptying, renal function, and fluid balance. Multiple complications can occur when innervation to the bladder and urinary sphincter is impaired. These can include urinary retention, urinary incontinence, urinary tract infections, AD, and bladder stones. Note: Urinary complications are a major cause of mortality.

Bladder dysfunction is variable but may include loss of bladder contraction and inability to relax urinary sphincter, resulting in urine retention and reflux incontinence. Note: Bladder distention can precipitate AD. (Refer to ND: risk for Autonomic Dysreflexia, following.)

Adequate fluid intake helps maintain kidney and bladder function. Note: Cranberries have been used widely for several decades for the prevention and treatment of urinary tract infections (UTIs). However, in a recent Cochrane Evidence review of 24 studies about the use of cranberry juice in prevention of UTIs, the authors state that “evidence that the benefit for preventing UTI is small, therefore, cranberry juice cannot currently be recommended for the prevention of UTIs” (Jepson et al, 2012).

Timing and type of bladder program depend on type of injury—upper or lower neuron involvement. Note: Bladder expression using the Credé maneuver (pushing on the abdomen to forcefully express urine) is included in some programs to promote continence and ensure adequate bladder evacuation.

Changes in urine characteristics may indicate UTI and increased risk of sepsis. Multistrip dipsticks can provide a quick determination of pH, nitrite, and leukocyte esterase that suggest presence of infection or urinary disease. Note: Presence of bacteria in urine is not uncommon if client has indwelling catheter or performs intermittent catheterization. If bacteria are present, the client must be assessed for other signs of developing UTI, and medications may be indicated.

Perineal care decreases risk of skin irritation, breakdown, and development of ascending infection.

These laboratory tests reflect renal function and identify complications.

These medications maintain acidic environment and prevent bacterial growth.

Anticholinergics calm the bladder muscles and may prevent uncontrollable bladder spasms that force urine out of the bladder.

Can help the bladder to squeeze better, thereby forcing out the urine.

When cholinergics are used, alpha adrenergic blocking agents may also be used to help relax the muscles that hold urine in the bladder.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Refer for further evaluation for bladder control mechanisms.	Clinical research continues in the technology of electronic bladder control. For example, an implantable device that sends electrical signals to the spinal nerves controlling the bladder can create improved bladder capacity and compliance. Note: Recent patent-pending stimulator innovations include a mechanism for (1) activating bladder voiding upon command and (2) preventing hyperreflexia by attaining tonicity of the pelvic floor muscle of the bladder (National Institute of Biomedical Imaging and Bioengineering, 2014).
<b>Urinary Catheterization NIC</b> Keep bladder empty by means of indwelling catheter initially. Determine postvoid residuals, then consider intermittent catheterization program, as appropriate.	Bladder scans are useful in determining postvoid residuals. During the acute phase, an indwelling catheter is used to prevent urinary retention because of neurogenic bladder and to monitor urinary output. Intermittent catheterization may be implemented to reduce complications associated with long-term use of indwelling catheters. A suprapubic catheter may also be inserted for long-term management.
Measure residual urine via postvoid bladder scan, ultrasound, or catheterization if scan not available.	Measuring postvoid residual is helpful in detecting urinary retention and effectiveness of bladder training program. Note: Use of ultrasound is noninvasive and reduces the risk of bladder colonization.

### NURSING DIAGNOSIS: risk for Pressure Ulcer/Impaired Tissue Integrity

#### Possibly Evidenced By

Alteration in sensation; impaired circulation  
Mechanical factors (e.g., pressure, shearing forces); skin moisture  
Impaired mobility/physical immobilization (traction apparatus)  
Imbalanced nutrition state  
Self-care deficit

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Risk Control NOC

Identify individual risk factors.  
Verbalize understanding of treatment needs.  
Participate to level of ability to prevent skin breakdown.

#### Tissue Integrity: Skin & Mucous Membrane NOC

Display healthy, intact skin and mucous membranes.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Skin Surveillance NIC</b> <i>Independent</i>	Skin is especially prone to breakdown because of changes in peripheral circulation, inability to sense pressure, immobility, and altered temperature regulation.
Inspect all skin areas, noting capillary blanching and refill, redness, and swelling. Pay particular attention to back of head, skin under halo frame or vest, and folds where skin continuously touches.	These sites are prone to inflammation and infection and provide route for pathological microorganisms to enter cranial cavity.
Assess mucous membranes, including oral mucosa/lips and eyes.	Allows for early identification and management of mucous membrane concerns (e.g., dry mouth, retained secretions, dry eyes).

(continues on page 306)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Elevate lower extremities periodically, if level of injury allows, or as tolerated.	Elevation of lower extremities enhances venous return and reduces edema formation.
Avoid or limit injection of medication below the level of injury.	Areas below the level of injury have reduced circulation and sensation and are at risk for delayed absorption, local reaction, and tissue necrosis.
<b>Pressure Ulcer Prevention NIC</b>	
Reposition frequently, whether in bed or in sitting position. Place in prone position periodically, if not contraindicated by respiratory status.	Repositioning improves skin circulation and reduces pressure on bony prominences.
Keep bedclothes dry and free of wrinkles, crumbs, and creases. Provide toe pleats when making bed.	Preventing excessive moisture and friction reduces skin irritation. Toe pleats prevent pressure on toes.
Protect pressure points by use of elbow or heel pads, lamb's wool, foam padding, and egg-crate mattress or cushion.	Tetraplegic and paraplegic clients require lifelong protection from pressure injury formation, which can cause extensive tissue necrosis and sepsis.
Encourage optimal nutrition and fluid intake. Include client preferences for fluids and menu choices.	Promotes skin and tissue health and healing as well as general well-being. Fluids replenish transdermal water loss.
Encourage continuation of regular exercise program.	Exercise stimulates circulation that enhances cellular nutrition and oxygenation.
<b>Skin Care: Topical Treatment NIC</b>	
Massage and lubricate skin with bland lotion or oil. Apply skin-hardening agents, such as tincture of benzoin, karaya, or Sween cream, if appropriate.	Skin care and massage enhance circulation and protect skin surfaces, thus reducing risk of pressure ulcers.
Provide regular oral care and apply lubricant to lips as indicated.	Promotes comfort, maintains integrity of tissues, and decreases colonization of oropharynx.
Wash and dry skin, especially in high-moisture areas such as perineum. Take care to avoid wetting the lining of brace or halo vest.	Clean, dry skin is less prone to excoriation or breakdown.
Cleanse halo or tong insertion sites routinely and apply antibiotic ointment per protocol.	Halo and tong insertion site care helps prevent local infection and reduces risk of cranial infection.
<b>Eye Care NIC</b>	
Apply lubricating eye drops or tape eyes shut as appropriate.	Prevents dryness/corneal damage especially if blink reflexes impaired or client unable to protect eyes (e.g., during sleep).
<b>Pressure Ulcer Prevention NIC Collaborative</b>	
Provide kinetic therapy or alternating-pressure mattress as indicated.	Kinetic therapy and alternating-pressure mattress improve systemic and peripheral circulation and reduce pressure on skin and risk for breakdown.

### NURSING DIAGNOSIS: **deficient Knowledge regarding condition, prognosis, potential complications, treatment, self-care, and discharge needs**

#### May Be Related To

Insufficient information; insufficient knowledge of resources  
Misinformation presented by others  
Insufficient interest in learning

#### Possibly Evidenced By

Insufficient knowledge  
Inaccurate follow-through of instruction  
Development of preventable complication(s)  
Inappropriate behavior—agitated, apathetic, hostile

<b>NURSING DIAGNOSIS:</b> <b>deficient Knowledge regarding condition, prognosis, potential complications, treatment, self-care, and discharge needs</b> (continued)	
<b>Desired Outcomes/Evaluation Criteria—Client/Caregiver Will</b>	
<b>Knowledge: Disease Process NOC</b> Verbalize understanding of condition, prognosis, and treatment.	
<b>Adaptation to Physical Disability NOC</b> Correctly perform/monitor necessary procedures and explain reasons for the actions. Initiate necessary lifestyle changes and participate in treatment regimen.	
ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i>	Open discussion regarding disease process, current prognosis, and future expectations. This provides a common knowledge base necessary for making informed choices for meeting client's needs and determining caregiver's ability and commitment to the therapeutic regimen. Note: A recent report notes that 89.8% of all persons with SCI who are discharged from healthcare systems are sent to private, noninstitutional residences (in most cases their homes before injury) (Michael-Ryan Pattison Foundation, 2017).
Provide information and demonstrate the following:	
Positioning and weight shifting	Positioning promotes circulation and reduces tissue pressure and risk of complications.
Use of pillows, supports, braces, and splints	Keeps the spine aligned and prevents or limits contractures, thus improving overall function and independence.
Encourage continued participation in daily exercise and conditioning program.	Daily exercise and conditioning programs reduce spasticity complications and risk of thromboembolism (common complication), as well as increase mobility, muscle strength, and tone for improving organ and body function. Suggested activities are (1) squeezing rubber ball and arm exercises enhance upper body strength to increase independence in transfers and wheelchair mobility, (2) tightening and contracting rectum or vaginal muscles improves bladder control, and (3) pushing abdomen up, bearing down, and contracting abdomen strengthen trunk and improve GI function in paraplegic clients.
Identify energy conservation techniques and stress importance of pacing activities, having adequate rest, and avoiding fatigue.	Fatigue is common. It limits client's ability to participate in or manage care, decreases quality of life, and increases feelings of helplessness and hopelessness.
Review drug regimen, noting desired effects and expected and adverse side effects, as well as medication interactions.	Medications used to treat spasticity can exacerbate fatigue, necessitating a change in drug choice or dosage.
Have SO/caregivers participate in client care and demonstrate proper procedures, such as applications of splints, braces, suctioning, positioning, skin care, transfers, bowel and bladder program, checking temperature of bath water, and food.	Participation in client care allows home caregivers to become adept and more comfortable with the care tasks and reduces risk of injury or complications.
Instruct caregiver in techniques to facilitate cough, as appropriate.	Quad coughing is performed to facilitate expectoration of secretions or to move them high enough to be suctioned out.
Recommend applying abdominal binder before arising (tetraplegic) and remind to change position slowly.	Appropriate use of abdominal binders reduces pooling of blood in abdomen and pelvis and minimizes postural hypotension.

(continues on page 308)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Use safety belt and adequate number of people during bed-to-wheelchair transfers.	Performing transfers with adequate help prevents falls and related injuries to client and caregivers.
Instruct in proper skin care, inspecting all skin areas daily, using adequate padding—foam, silicone gel, water pads—in bed and chair, and keeping skin dry. Emphasize importance of regularly monitoring condition and positioning of support surfaces, such as cushions, mattresses, and overlays.	Proper skin care reduces skin irritation, thus decreasing incidence of decubitus ulcers. Timely recognition of product fatigue, improper placement, or other misuse can reduce risk of pressure injury/ulcer formation.
Discuss necessity of preventing or managing excessive diaphoresis by using tepid bathwater; providing comfortable environment, such as by using fans; and removing excess clothing.	Management of excessive diaphoresis promotes cooling as well as reduces skin irritation and possible breakdown.
Review nutritional needs, including adequate bulk and roughage. Problem-solve solutions to alterations in muscular strength, tone, and GI function.	Adequate nutrition helps meet the energy needs of the client. Bulk and roughage prevent complications like constipation, abdominal distention, and gas formation.
Review pain management strategies. Discuss the potential for future pain management therapies. Recommend avoidance of OTC drugs without approval of healthcare provider.	Review of pain management enhances client safety and may improve cooperation with specific regimen. Note: Pain often becomes chronic in clients with SCI and may be mechanical (e.g., overuse syndrome involving joints), radicular (e.g., injury to peripheral nerves), or central, with burning and aching just below level of injury. Dysesthetic pain, which is distal to site of injury, is extremely disabling and is similar to phantom pain. Treatment for these painful conditions may include a team pain management approach; medications, such as gabapentin (Neurontin), clonazepam (Klonopin), amitriptyline (Elavil); or electrical stimulation.
Discuss ways to identify and manage AD.	Prompt and appropriate management of AD hinges on client and caregiver identification of signs and symptoms, prevention of precipitating and risk factors, and timely management. (Refer to ND: risk for Autonomic Dysreflexia.)
Identify symptoms to report immediately to healthcare provider, for example, infection, especially urinary and respiratory; skin breakdown; unresolved AD; and suspected pregnancy.	Early identification allows intervention to prevent or minimize complications.
Emphasize importance of continuing with rehabilitation team to achieve specific functional goals and continue long-term monitoring of therapy needs.	No matter what the level of injury, individual may ultimately be able to exercise some independence—manipulating electric wheelchair with mouth stick (C3/C4); being independent for dressing, transfers to bed, car, toilet (C7); or achieving total wheelchair independence (T1 to T4). Over time, new discoveries will continue to modify equipment and therapy needs and increase client's potential.
Evaluate home layout and make recommendations for necessary changes. Identify equipment, medical supply needs, and resources.	Physical changes may be required to accommodate client and support equipment. Prior arrangements facilitate the transfer to the home setting.
Arrange for transmitter, computer, or other type of emergency call system.	Provides reassurance for safety and prompt assistance.
Discuss sexual activity and reproductive concerns. Review alternative sexual activities, positions, and spasticity management, as indicated, such as opposing pressure on area of spasm, using pillows for support, regular stretching and ROM exercises, and appropriate medications.	Concerns about individual sexuality or resumption of activity are frequently an unspoken concern that needs to be addressed. SCI affects all areas of sexual functioning. In addition, choice of contraception is impacted by level of SCI and side effects or adverse complications of specific method. Finally, some female clients may develop AD during intercourse or labor and delivery.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Identify community resources and supports, such as health agencies, visiting nurse, financial counselor, service organizations, and Spinal Cord Injury Foundation.	These support resources enhance independence, assist with home management, and provide respite for caregivers.
Coordinate cooperation among community and rehabilitation resources.	Various agencies, therapists, and individuals in community may be involved in the long-term care and safety of client. Coordination can ensure that needs are not overlooked and optimal level of rehabilitation is achieved. Note: SCI injuries are occurring at more advanced ages, creating new challenges in care as SCI clients deal with the effects of aging.
Plan for alternate caregivers and identify respite services, as needed.	Respite care provides for preventing caregiver strain, illness, and emergencies.

NURSING DIAGNOSIS: <b>risk for Autonomic Dysreflexia</b>
<b>Possibly Evidenced By</b>
Bladder (distention, UTI, calculi), bowel (constipation/impaction), cutaneous stimulation—tactile, pain, thermal/sunburn Esophageal reflux disease; gastric ulcers Sexual intercourse, ejaculation; menstruation/pregnancy Extreme environmental temperatures/temperature fluctuations Deep vein thrombosis; pulmonary emboli
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>
<b>Symptom Control NOC</b> Recognize signs and symptoms of syndrome. Identify preventive and corrective measures.
<b>Neurological Status: Autonomic NOC</b> Experience no episodes of dysreflexia.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Dysreflexia Management NIC</b> <i>Independent</i> Identify and monitor precipitating or risk factors, such as bladder or bowel distention or manipulation; bladder spasms, stones, and infection; skin or tissue-pressure areas and prolonged sitting position; and temperature extremes or drafts.	Visceral distention is the most common cause of AD, which is considered an emergency. Treatment of acute episode must be carried out immediately by removing stimulus or treating unresolved symptoms, and then interventions must be geared toward prevention.
Observe for signs and symptoms of syndrome—changes in blood pressure, paroxysmal hypertension, tachycardia or bradycardia, autonomic responses, such as sweating, flushing above level of lesion, pallor below injury, chills, goose flesh, piloerection, nasal stuffiness, and severe pounding headache, especially in occiput and frontal regions. Note associated symptoms, such as chest pains, blurred vision, nausea, metallic taste, Horner's syndrome—contraction of pupil, partial ptosis of eyelid, and sometimes loss of sweating over one side of the face.	Early detection and immediate intervention are essential to prevent serious consequences or complications. Note: Average systolic BP in a tetraplegic client—after spinal shock has resolved—is 120 mm Hg; therefore, readings greater than 140 mm Hg are considered elevated.
Stay with client during episode.	This is a potentially fatal complication. Continuous monitoring and intervention may reduce client's level of anxiety.
Monitor BP frequently (every 3 to 5 minutes) during acute AD. Take action to eliminate stimulus. Continue to monitor BP at intervals after symptoms subside.	Aggressive therapy and removal of stimulus may drop BP rapidly, resulting in a hypotensive crisis, especially in those clients who routinely have low BP. In addition, AD may recur, particularly if stimulus is not eliminated.

(continues on page 310)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Elevate head of bed to 45-degree angle or place client in sitting position.	Elevation of the head of bed lowers BP to prevent intracranial hemorrhage, seizures, or even death. Note: Placing the tetraplegic client in sitting position automatically lowers BP.
Correct or eliminate causative stimulus as able, such as bladder, bowel, and skin pressure, including loosening tight leg bands or clothing; removing abdominal binder and elastic stockings; and temperature extremes.	Removing noxious stimulus usually terminates episode and may prevent more serious AD; for example, in the presence of sunburn, topical anesthetic should be applied. Removal of constrictive clothing or restrictive devices also promotes venous pooling to help lower BP. Note: Removal of bowel impaction must be delayed until cardiovascular condition is stabilized.
Inform client and SO of warning signals and how to prevent or limit onset of syndrome.	This lifelong problem can be largely controlled by avoiding pressure from overdistention of visceral organs or pressure on the skin.
<b>Collaborative</b> Provide kinetic therapy or alternating-pressure mattress as appropriate.	Kinetic therapy and alternating-pressure mattress improve systemic and peripheral circulation and reduce pressure on skin and risk for breakdown.
Administer medications, as indicated (intravenous [IV], parenteral, oral, or transdermal) and monitor response:  Diazoxide (Hyperstat) and hydralazine (Apresoline), nifedipine (Procardia), and 2% nitroglycerin ointment (Nitrostat)	These medications reduce BP if severe or sustained hypertension occurs.
Morphine sulfate	Sublingual administration usually effective in absence of IV access for diazoxide (Hyperstat) but may require repeat dose in 30 to 60 minutes. These short-acting drugs may be used in conjunction with topical nitroglycerin.
Miscellaneous other medications, such as phenoxybenzamine (Dibenzyline) and mecamylamine (Inversine)	Morphine sulfate relaxes smooth muscle to aid in lowering BP and muscle tension.
Obtain urinary culture as indicated.	Various medications are being used to alleviate symptoms associated with AD and are not limited to the few mentioned here.
Apply local anesthetic ointment to rectum. Remove impaction if indicated after symptoms subside.	UTI is a common trigger for AD.
Prepare client for pelvic or pudendal nerve block or posterior rhizotomy if indicated.	Ointment blocks further autonomic stimulation and eases later removal of impaction without aggravating symptoms.
	Procedures may be considered if AD does not respond to other therapies.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **risk for Disuse Syndrome**—paralysis, mechanical immobilization
- **Autonomic Dysreflexia**—bladder or bowel distention, skin irritation, deficient caregiver knowledge
- **Self-Care deficit**—neuromuscular impairment, weakness, fatigue, pain, depression
- **risk for imbalanced Nutrition/Overweight**—dysfunctional eating pattern, excessive or inadequate intake in relation to metabolic need/physical activity
- **ineffective Role Performance/Sexual Dysfunction**—neurological deficits, pain, fatigue, depression
- **interrupted Family Processes**—situational crisis and transition, shift in health status of family member
- **impaired Social Interaction**—impaired mobility, environmental barrier, disturbance of self-concept, absence of significant other (SO)
- **risk for caregiver Role Strain**—recent discharge home with significant care needs, extended duration of caregiving required, complexity of care activities

## MULTIPLE SCLEROSIS (MS)

### I. Pathophysiology (Luzzio & Dangond, 2017)

- a. Chronic, irregular demyelination of the brain and spinal cord, resulting in varying degrees of cognitive, motor, and sensory dysfunction
- b. Often characterized by periods of exacerbations and remissions but is unrelenting in some individuals
- c. Research suggests that in addition to destruction of myelin sheaths, underlying nerve fibers are also damaged or severed, which may account for the permanent neurological impairment.

### II. Classification: Types and Modifiers (Lublin et al, 2014; Luzzio & Dangond, 2017; National Multiple Sclerosis Society, 2017)

#### Types:

- a. Relapsing-remitting multiple sclerosis (RRMS) is the most common subtype (85%), wherein symptoms appear for several days to weeks, then resolve partially or completely.
- b. Secondary-progressive multiple sclerosis (SPMS): After a period of time, RRMS may transition to a secondary progressive pattern characterized by continued progression, with increasing disability in approximately 80% of cases. Relapses may be seen in early SPMS but become uncommon as disease progresses.
- c. Primary-progressive multiple sclerosis (PPMS): About 15% of clients have manifestations that gradually progress from onset, without ever having remissions. Men and women are almost equally affected in this form.
- d. Clinically isolated syndrome (CIS) was not included in the initial MS clinical descriptors but is now recognized as a possible first clinical presentation of disease characteristics of inflammatory demyelination (i.e., it could be MS but has yet to fulfill criteria of disease dissemination over time) (Miller et al, 2005). For patients with CIS, initiation of interferon-beta 1a or glatiramer acetate (Copaxone) treatment (after an initial clinical event indicative of MS) has been associated with delays in the progression to clinically definite MS (CDMS) as well as improvements in measures of neurological damage on MRI (Kennedy, 2013).

#### Modifiers:

Modifiers help clinicians arrive sooner at a diagnosis of MS or recognize changes in established MS (Durand, 2016). For example, descriptive terms (e.g., “active/not active” or “progressing/not progressing”) incorporate information from MRIs, relapse history, and degree of disability into the diagnosis or progression of MS. “Active” or “not active”

denotes relapses (exacerbations), while “progressing” and “not progressing” indicate the **accumulation of disability**. An additional modifier of disease course is whether there is **clinical evidence** of disease progression, independent of relapses.

### III. Etiology

- a. An autoimmune inflammatory disease, possibly related to viral infection that produces a limited disruption in the blood-brain barrier, thus allowing beta-lymphocyte clones to colonize the central nervous system (CNS).
- b. Genetics may play a role in person’s susceptibility.
- c. Affects two to three times more women than men (National Multiple Sclerosis Society, 2017).
- d. Environmental and geographic factors are being investigated.
- e. Predominant CNS disorder among young adults, between the ages of 15 and 45 years; however, it can occur in persons of any age. The average age at diagnosis is 29 years in women and 31 years in men (Luzzio & Dangond, 2017).
- f. Individual prognosis variable and unpredictable, thereby presenting complex physical, psychosocial, and rehabilitative issues.

### IV. Statistics

- a. Morbidity: Because the Centers for Disease Control and Prevention (CDC) does not require U.S. physicians to report new cases, and because symptoms can be completely invisible, the prevalence of MS can only be estimated. Thus, it is estimated that approximately 400,000 people in the United States live with MS (Luzzio & Dangond, 2017; National Multiple Sclerosis Society, n.d.).
- b. Mortality: Exact figures are difficult to determine, because average life expectancy is approximately 95% of normal. Death usually results from secondary complications (e.g., pulmonary or renal causes) but can also be due to primary disease complications, suicide, and causes unrelated to MS. The Marburg variant of MS is an acute and clinically fulminant form of the disease that can lead to coma or death within days (Luzzio & Dangond, 2017).
- c. Cost: Because MS is a lifelong, chronic disease—diagnosed primarily in young adults who have an essentially normal life expectancy—estimates place the total direct and indirect costs for all people with MS in the United States at approximately \$28 billion annually.

## GLOSSARY

**Ataxia:** Incoordination and unsteadiness due to the brain’s failure to regulate the body’s posture and strength and direction of limb movements.

**CDMS:** Clinically definite MS. This diagnostic category is, as the term implies, an absolute or definite diagnosis of MS that can be substantiated based on exclusively clinical evidence.

**CIS:** Clinically isolated syndrome. A single attack of neurological symptoms lasting at least 24 hours, caused by inflammation or demyelination.

**Clonus:** Sign of spasticity in which involuntary shaking or jerking of the leg occurs when the toe is placed on the floor with the knee slightly bent.

**Contracture:** Permanent shortening of the muscles and tendons adjacent to a joint that can result from severe, untreated spasticity and that interferes with normal movement around the affected joint.

**Demyelination:** Destruction, loss, or removal of the protective myelin sheath coating the axons, resulting in their inability to transmit impulses.

(continues on page 312)

## GLOSSARY (continued)

**Dysarthria:** Poorly articulated speech that results from dysfunction of the muscles controlling speech, usually caused by damage to the central nervous system (CNS) or a peripheral motor nerve. The content and meaning of the spoken words remain normal, however.

**Exacerbations (also called relapses):** MS attacks last at least 24 hours, separated from previous exacerbation by at least 30 days. May last from few to several months.

**Immune mediated:** An abnormal process of the body's immune system directed against the CNS. The exact target that the immune cells are sensitized to attack is not known, which is why MS is considered an "immune-mediated disorder" rather than "autoimmune disease."

**Intention tremor:** Condition where goal-directed movements produce shaking in the moving body parts, most noticeably in the hands. Tremor is more obvious when performing delicate fine movements than broad sweeping ones.

**Kurtzke's Expanded Disability Status Scale (EDSS) and Functional Systems Scale (FSS):** Although it is not the only scoring tool available to evaluate MS-related disability, the EDSS is the oldest and most widely accepted tool (along with MRI evaluation) to clinically measure MS persons' level of functioning (Kurtzke, 1983; Stachowiak, 2017). EDSS scores below 4.0 are determined by the FSS scores alone. People with EDSS scores of 4.0 and above have some degree of gait impairment; however, scores between 4.5 and 9.5 are determined by gait abilities plus the FSS scores. Thus, the higher the scores, the greater the disease effect and functional disability.

**Myelin:** Protective coating around nerve fibers in the CNS, a primary target of the immune attack in MS.

**Neurogenic bladder:** Loss of nerve supply to the bladder, which results in an inability to voluntarily control the bladder. It is characterized by a failure to empty, failure to store, or a combination of the two, resulting in such symptoms as urinary urgency, frequency, hesitancy, nocturia, and incontinence.

**Nystagmus:** The jerking to and fro movement of the eyes that occurs when disorder affects the muscles controlling eye movement.

**Optic neuritis (ON):** A demyelinating inflammation of the optic nerve that often occurs in association with MS. Up to 75% of female patients and 35% of male patients initially presenting with optic neuritis ultimately develop MS. For most persons with ON, visual function begins to improve 1 week to several weeks after onset. However, permanent residual deficits in color vision and contrast and brightness sensitivity are common (Ergene & Machens, 2016; Luzzio & Dangond, 2017).

**Paresis:** Partial or incomplete paralysis characterized by weakness and reduction in muscular power.

**Paresthesia:** Abnormal sensations, such as burning, tingling, or a pins and needles feeling.

**Scotoma:** Blind spot caused by diminished or total lack of function of the retina or optic nerve in a limited area. It may be unnoticed or be seen as a black area in the visual field.

**Self-efficacy:** The extent or strength of one's belief in one's own ability to complete tasks and reach goals.

## CARE SETTING

Clients often require community or long-term care with intermittent hospitalization for disease-related exacerbations and complications.

## RELATED CONCERNS

Extended/Long-term care, page 896

Pneumonia, page 147

Psychosocial aspects of care, page 835

Sepsis/septic shock page 772

## CLIENT ASSESSMENT DATABASE

Symptoms depend on the stage, extent of disease, and areas of neuronal involvement. For example, common signs associated with motor systems of the cerebellum include, and are not limited to, ataxia, diplopia, dizziness, dysphagia, fatigability, and tremors. Signs associated with motor systems of the corticospinal tract include, but are not limited to, Babinski's sign, bladder dysfunction, fatigue, heat sensitivity, paralysis, and trigeminal neuralgia. The following range of symptoms may be present at a given time or over time.

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Extreme intractable fatigue, reported in about 70% of clients (Luzzio & Dangond, 2017)
- Weakness, exaggerated intolerance to activity
- Limitation in usual activities, employment, hobbies

### MAY EXHIBIT

- Generalized weakness; trunk or limb weakness
- Decreased muscle tone or mass
- Spasticity
- Hyperreflexia
- Use of mobility aids such as braces, cane, walker, wheelchair

MAY REPORT (continued)	MAY EXHIBIT (continued)
<ul style="list-style-type: none"> <li>• Numbness, tingling in the extremities</li> <li>• Intolerance of temperature extremes, especially heat, such as with summer weather or hot tubs</li> <li>• Not sleeping; awakening early or frequently for multiple reasons</li> </ul>	<ul style="list-style-type: none"> <li>• Intention tremors or decreased fine motor skills</li> <li>• Staggering or dragging of feet; gait disturbances</li> <li>• Sleep disturbances</li> </ul>
<b>CIRCULATION</b>	
<ul style="list-style-type: none"> <li>• Swelling of feet</li> </ul>	<ul style="list-style-type: none"> <li>• Blue (mottled), puffy extremities</li> <li>• Capillary fragility, especially on face</li> </ul>
<b>EGO INTEGRITY</b>	
<ul style="list-style-type: none"> <li>• Statements reflecting loss of self-esteem or body image</li> <li>• Personal tragedies, such as divorce, abandonment by significant other (SO) or friends</li> <li>• Expressions of grief</li> <li>• Feelings of helplessness, hopelessness, or powerlessness (loss of control)</li> <li>• Anxiety, irritability or fear of disease process, such as exacerbations, progression of symptoms, pain, disability, social rejection, or pity</li> </ul>	<ul style="list-style-type: none"> <li>• Keeping illness confidential</li> <li>• Denial or rejection of diagnosis</li> <li>• Mood changes, irritability, restlessness, lethargy, euphoria, depression, or anger</li> <li>• Depression (common symptom); euphoria (less common than depression); bipolar disorder</li> <li>• Dementia</li> </ul>
<b>ELIMINATION</b>	
<ul style="list-style-type: none"> <li>• Bladder, bowel, and sexual dysfunction (spinal cord autonomic symptoms)</li> <li>• Urinary or bowel hesitancy or urgency</li> <li>• Voiding at night</li> <li>• Constipation or bowel incontinence</li> <li>• Recurrent urinary tract infections (UTIs)</li> <li>• History of bladder stones or kidney damage</li> </ul>	<ul style="list-style-type: none"> <li>• Incontinence of varying severity</li> <li>• Loss of urinary or rectal sphincter control</li> <li>• Incomplete bladder emptying or retention with overflow</li> </ul>
<b>FOOD/FLUID</b>	
<ul style="list-style-type: none"> <li>• Nausea</li> <li>• Hiccups, possibly lasting for extended periods</li> <li>• Food intolerance</li> <li>• Loss of appetite</li> <li>• Difficulty feeding self</li> <li>• Difficulty chewing or swallowing</li> <li>• Sense of food sticking in throat</li> </ul>	<ul style="list-style-type: none"> <li>• Decreased bowel sounds—slowed peristalsis</li> <li>• Abdominal bloating</li> <li>• Problems getting food to mouth—related to intention tremors of upper extremities</li> <li>• Coughing or choking with swallowing</li> <li>• Gurgly voice</li> <li>• Weight loss</li> </ul>
<b>HYGIENE</b>	
<ul style="list-style-type: none"> <li>• Use of assistive devices</li> <li>• Need for individual caregiver</li> </ul>	<ul style="list-style-type: none"> <li>• Difficulty with or dependence in some or all activities of daily living (ADLs)</li> </ul>
<b>NEUROSENSORY</b>	
<ul style="list-style-type: none"> <li>• Client/SO report of impairment of short-term memory, disorientation, confusion, mood swings</li> <li>• Difficulty with problem-solving and decision making</li> <li>• Difficulty retrieving or recalling, sorting out information (cerebral involvement)</li> <li>• Difficulty with speech</li> <li>• Difficulty talking</li> <li>• Weakness, dyscoordination, nonsymmetrical paralysis of muscles (may affect one, two, or three limbs, usually worse in lower extremities or may be unilateral)</li> <li>• Sensory changes (e.g., difficulty feeling or hearing or seeing)</li> <li>• Balance problems</li> </ul>	<ul style="list-style-type: none"> <li>• Mental status screening may reveal problems with attention, concentration, and mental processing speed.</li> <li>• Irritability, apathy, lack of judgment</li> <li>• Behavior indicative of depression, euphoria (either or both)</li> <li>• Communication difficulties, disturbance in speech articulation (dysarthria); coining words</li> <li>• Scanning speech, slow and hesitant speech, poor articulation</li> <li>• Changes in muscle tone</li> <li>• Loss of fine or major motor skills</li> <li>• Ataxia, decreased coordination, tremors</li> <li>• Hyperreflexia, positive Babinski's sign, ankle clonus, absent superficial reflexes (especially abdominal)</li> </ul>

(continues on page 314)

**CLIENT ASSESSMENT DATABASE (contd.)**

MAY REPORT (continued)	MAY EXHIBIT (continued)
<ul style="list-style-type: none"><li>• Pins and needles sensation, crawling feelings under skin (paresthesias)</li><li>• Problems with vision such as needing to move head back and forth while watching television, difficulty driving (distorted visual field), blurred vision (difficulty focusing)</li><li>• Partial or total loss of vision in one eye</li><li>• Scotomas (holes in peripheral vision)</li><li>• Seizures</li></ul>	<ul style="list-style-type: none"><li>• Impaired touch, pain sensation</li><li>• Positional and vibratory senses may be impaired or absent</li><li>• Spastic paresis or total immobility (advanced stages)</li><li>• Facial or trigeminal nerve involvement, nystagmus, diplopia (brainstem involvement)</li><li>• Loss of vision (usually one eye and temporary) (optic neuritis)</li><li>• Seizure activity</li></ul>
<b>PAIN/DISCOMFORT</b>	
<ul style="list-style-type: none"><li>• Painful muscle cramping, spasms (spinal cord motor symptoms)</li><li>• Burning pain along nerve pathways</li><li>• May be sporadic, intermittent, or constant</li><li>• Facial pain; eye pain (optic neuritis)</li><li>• Dull back pain</li><li>• Pain or pressure around waist, torso, or neck ("MS hug")</li></ul>	<ul style="list-style-type: none"><li>• Distraction behaviors (restlessness, moaning), guarding</li><li>• Self-focusing</li><li>• Bilateral facial weakness; twitching of facial muscles</li></ul>
<b>SAFETY</b>	
<ul style="list-style-type: none"><li>• Fear of falling because of weakness, decreased vision, slowed reflexes, loss of position sense</li><li>• History of falls or accidental injuries</li><li>• Heat intolerance</li><li>• Verbalizes doesn't want to live; suicidal thoughts (ideation)</li></ul>	<ul style="list-style-type: none"><li>• Wall or furniture walking</li><li>• Use of ambulation devices</li><li>• Risky attention-getting behaviors</li><li>• Suicide attempts</li></ul>
<b>SEXUALITY</b>	
<ul style="list-style-type: none"><li>• Disturbances in sexual functioning (affected by nerve impairment, fatigue, bowel and bladder control, sense of vulnerability, and effects of medications)</li><li>• Enhanced or decreased sexual desire</li><li>• Genital anesthesia or hyperesthesia, decreased lubrication (female)</li><li>• Problems with positioning</li><li>• Impotence/nocturnal erections or ejaculatory difficulties (male)</li><li>• Relationship stresses</li></ul>	
<b>SOCIAL INTERACTION</b>	
<ul style="list-style-type: none"><li>• Feelings of isolation (increased divorce rate and loss of friends)</li><li>• Difficult time with employment because of excessive fatigue, cognitive dysfunction, physical limitations</li></ul>	<ul style="list-style-type: none"><li>• Withdrawal from interactions with others</li><li>• Lack of social activities and involvement</li></ul>
<b>TEACHING/LEARNING</b>	
<ul style="list-style-type: none"><li>• Family history of disease, possibly due to common environmental or inherited factors</li><li>• Use of prescription and over-the-counter (OTC) medications; forgetting to take medication</li><li>• Use of complementary and alternative products and practices, trying out cures, or doctor shopping</li></ul>	
<b>DISCHARGE PLAN CONSIDERATIONS</b>	
<ul style="list-style-type: none"><li>• May require assistance in ADLs and instrumental activities of daily living (IADLs), depending on individual situation</li><li>• Change in physical layout of home</li><li>• May eventually need total care or placement in assisted living or extended-care facility</li></ul>	
<p>► Refer to section at end of plan for postdischarge considerations.</p>	

## DIAGNOSTIC STUDIES

There are no definitive diagnostic tests for MS. However, tests are indicated to support a clinical diagnosis.

TEST WHY IT IS DONE	WHAT IT TELLS ME
<p><b>ANCILLARY STUDIES</b></p> <ul style="list-style-type: none"> <li>• <b>Magnetic resonance imaging (MRI) scan:</b> Uses a magnetic field to create detailed images of the brain and spinal cord and to detect lesions in the white matter of the brain. May use gadolinium to enhance the images.</li> <li>• <b>CT scan with enhancement:</b> Demonstrates acute brain lesions and ventricular enlargement or thinning.</li> <li>• <b>Evoked potential tests:</b> Evoked potentials (visual, brainstem, auditory, and somatosensory) are electrical signals generated by the nervous system in response to stimuli. In these tests, nerves responsible for each type of function are stimulated electronically, and responses are recorded using electrodes placed over the CNS (brain and spine) and peripheral nerves (median nerve in the wrist, peroneal nerve in the knee).</li> <li>• <b>Lumbar puncture:</b> Needle is inserted between two lower spine (lumbar) vertebrae allowing for the collection and analysis of cerebrospinal fluid (CSF).</li> </ul>	<p>MS is diagnosed based on clinical findings and supporting evidence from ancillary tests. Clinically, the attack must be compatible with the pattern of neurologic deficits seen in MS, which typically means that the duration of deficit is days to weeks (Luzzio &amp; Dangond, 2017).</p> <p>MRI is the mainstay in confirming the diagnosis of MS by revealing multifocal white matter lesions (i.e., plaques that are due to nerve sheath demyelination). MRI shows brain abnormalities in 90% to 95% of MS clients and spinal cord lesions in up to 75%, especially in elder clients (Fazekas et al, 1988; Luzzio &amp; Dangond, 2017).</p> <p>Differentiates active or relapsing state versus remission as lesions do not enhance in stable disease.</p> <p>In most cases, persons with MS will demonstrate a slowed conduction of nerve impulses.</p> <p>Although not used routinely, this test may be of use when MRI is unavailable or MRI findings are nondiagnostic. CSF is evaluated for oligoclonal bands (OCBs) and intrathecal immunoglobulin G (IgG) production, as well as for signs of infection. OCBs are found in 90% to 95% of people with MS, and intrathecal IgG production is found in 70% to 90%. Although these findings are not specific for MS, CSF analysis is the only direct test capable of proving that the patient has a chronic inflammatory CNS condition (Luzzio &amp; Dangond, 2017).</p>

## NURSING PRIORITIES

1. Maintain optimal functioning.
2. Assist with or provide for maintenance of ADLs.
3. Support acceptance of changes in body image, self-esteem, and role performance.
4. Provide information about disease process, prognosis, therapeutic needs, and available resources.

## DISCHARGE GOALS

1. Remain active within limits of individual situation.
2. ADLs are managed by client and caregivers.
3. Changes in self-concept are acknowledged and being dealt with.
4. Disease process, prognosis, and therapeutic regimen are understood and resources identified.
5. Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: Fatigue

### May Be Related To

Physiological condition (disease state); physical deconditioning  
Environmental barrier—ambient humidity/temperature  
Stressors; anxiety, depression

(continues on page 316)

**NURSING DIAGNOSIS:** **Fatigue** (continued)**Possibly Evidenced By**

Insufficient energy, impaired ability to maintain usual routines/physical activity  
Ineffective role performance  
Alteration in concentration; disinterest in surroundings  
Increase in physical symptoms, rest requirements

**Desired Outcomes/Evaluation Criteria—Client Will****Energy Conservation NOC**

Identify basis of fatigue and individual areas of control.  
Participate in recommended treatment program.  
Report improved sense of energy.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Energy Management NIC</b> <i>Independent</i> Note and accept presence of fatigue.	Persistent fatigue is the most commonly reported symptom, affecting at least two-thirds of people with MS. Assessment can be difficult as it is a subjectively perceived lack of physical and/or mental energy interfering with intended activities (Penner & Calabrese, 2010). Studies indicate that the fatigue is cognitive as well as physical, occurs with expenditure of minimal energy, is more frequent and severe than “normal” fatigue, has a disproportionate impact on ADLs, has a slower recovery time, and may show no direct relationship between fatigue severity and the clinical neurological status (Bakshi, 2003). Knowledge of these factors provides an opportunity to develop effective measures to maintain or improve mobility.
Assess for and intervene as needed in secondary causes of fatigue.	Other concerns (e.g., depression, medication side effects, pain, psychosocial stressors, anemia, vitamin deficiencies, sleep disorders) may be adding to the fatigue experienced because of MS neuropathology (Johnson, 2008).
Identify or review factors affecting fatigue level now (e.g., inadequate food intake, insomnia, use of medications, or time of day).	Activity intolerance can vary from moment to moment and the precipitating cause is not always apparent, making it difficult to plan and manage life.
Maintain realistic expectations. Accept when client is unable to think clearly or perform activities.	Nonjudgmental acceptance of client’s evaluation of day-to-day functioning provides opportunity to promote independence and self-esteem.
Determine need for mobility aids, for example, canes, braces, walker, wheelchair, or scooter. Review safety considerations.	Mobility aids can decrease fatigue, enhance independence and comfort, and promote safety.
Keep client cool during exercises or in hot weather. Investigate use of air-conditioning, cooling vest, light-colored clothing, and wide-brimmed hats, if appropriate.	Fatigue commonly worsens when exposed to high temperatures due to weather, environmental heat, exercise, or fever. Some clients report lessening of fatigue with stabilization of body temperature.
Schedule ADLs and other activities in the morning or over time or throughout the course of the day during peak energy levels.	Completing ADLs requires high energy expenditure. Poor planning of activities can cause early fatigue, persisting through the rest of the day. Consistent rest and activity reduces fatigue and aggravation of muscle weakness.
Plan care with consistent rest periods between activities. Encourage afternoon nap. Avoid interrupting sleep.	Helps in reducing impact of fatigue; allows for restoration of energy.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Allow sufficient time to perform task(s). Display patience when movements are slow.	Decreased motor skills and spasticity may interfere with ability to manage simple activities. Note: Hand dysfunction (including loss of strength and/or coordination) is common with MS, potentially affecting abilities and speed of task performance (Krishnan & Jaric, 2008). Also, a disabling tremor is a common feature, occurring in almost 80% of patients at some point in their disease (Mills et al, 2007).
<p><b>Collaborative</b></p> <p>Perform/assist with use of fatigue assessment tool such as the Modified Fatigue Impact Scale (MFIS).</p>	Formal assessment tool(s) may be used in determining a level of physical or mental functional disability associated with fatigue.
Recommend participation in support groups that involve fitness, exercise, and other issues related to MS.	Participating can motivate the client to remain at optimal level of activity. Group activities must be carefully selected to meet client's medical needs and prevent discouragement or anxiety.
Administer medications, as indicated, for example:	Treatment of MS has two aspects: immunomodulatory therapy (IMT) for the underlying immune disorder and therapies to relieve or modify symptoms. These medications should (1) prevent disease progression, (2) reduce the frequency and severity of relapses (also called attacks or exacerbations), and (3) slow the accumulation of disability for many people with MS.
<p><b>Disease-modifying therapies:</b></p> <p>Oral medications (e.g., teriflunomide [Augavio]; fingolimod [Gilenya]); injectable beta interferons (e.g., interferon beta-1a [Avonex, Rebif], interferon beta-1b [Betaseron, Extavia], glatiramer acetate [Copaxone; Glatopa]); infused medications (e.g., ocrelizumab [Ocrevus], alemtuzumab [Lemtrada], mitoxantrone [Novantrone])</p>	Most of the disease-modifying agents for MS (DMAMS) have been approved for use only in relapsing forms of MS (Luzzio & Dangond, 2017; National Multiple Sclerosis Society, 2017). All treatments target CNS inflammation with the goal of reducing relapse rates and slowing disease progression by decreasing the formation of new and active lesions as detected on MRI. Note: The U.S. Food and Drug Administration has recently approved a new infusion (Ocrevus) (Montalban et al, 2017) for primary progressive or relapsing progressive forms of MS and two single-use autoinjectors (Rebidose or Avonex) of interferon beta-1a in the treatment of relapsing forms of MS (Jeffrey, 2013; Shelly, 2012).
Immunosuppressants: for example, azathioprine (Azasan, Imuran) and methotrexate (Rheumatrex, Trexall)	These drugs are used for their ability to suppress immune reactions. While not approved by the FDA for use in MS, they have shown modest effects on relapses and progression of disease (Luzzio & Dangond, 2017).
Steroids, such as prednisone (Deltasone), dexamethasone (Decadron), and methylprednisolone (Solu-Medrol)	Corticosteroids remain the standard in managing MS exacerbations, as well as the first acute events that might develop into MS. Corticosteroids are thought to reduce the inflammatory response in the CNS and may also repair a damaged blood-brain barrier or inhibit the synthesis of immunoglobulin G in cerebrospinal fluid.
Antineoplastic agents, such as cyclophosphamide (Cytoxin) and mitoxantrone (Novantrone)	Antineoplastic agents may be given to reduce neurological disability and frequency of relapses in clients with SPMS, worsening or aggressive RRMS.
<p>Medications to manage fatigue: for example,</p> <p>Amantadine (Symmetrel), modafinil (Provigil), pemoline (Cylert), and fluxoxetine (Prozac)</p>	Off-label use of CNS stimulants and selective serotonin reuptake inhibitors (SSRIs) may be useful in managing fatigue. Common side effects include increased spasticity, insomnia, and paresthesia of hands and feet.

(continues on page 318)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Tricyclic antidepressants, such as amitriptyline (Elavil) and nortriptyline (Pamelor)	Tricyclic antidepressants can be used to treat emotional lability, manage neurogenic pain and associated sleep disorders that can worsen fatigue.
Amphetamines: for example, methylphenidate (Concerta, Ritalin), modafinil (Provigil), and dextroamphetamine (ProCentra, Zenzedi)	Amphetamines are less commonly used agents in the management of increasing fatigue by stimulating the cerebral cortex (Luzzio & Dangond, 2017; Penner & Calabrese, 2010).
Prepare for plasma exchange treatment as indicated.	While not used as a common form of treatment, research suggests that plasmapheresis may benefit individuals experiencing severe, acute exacerbations not responding to standard high-dose steroid therapy (Cortese et al, 2011).

### NURSING DIAGNOSIS: **Self-Care deficit (specify)**

#### May Be Related To

Neuromuscular impairment; [sensory]-perceptual impairment; impaired mobility or transfer ability  
Pain, discomfort, fatigue  
Weakness  
Decreased motivation

#### Possibly Evidenced By

Inability to perform tasks of self-care

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Self-Care: Status NOC

Identify individual areas of weakness, needs.  
Demonstrate techniques and lifestyle changes to meet self-care needs.  
Perform self-care activities within level of own ability.  
Identify personal and community resources that provide assistance.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Care Assistance NIC</b> <i>Independent</i> Note presence of MS-related clinical manifestations and associated symptoms.	Clinical manifestations that can impact the individual's self-care abilities include abnormalities of vision, motor skills, coordination and gait, and sensory disturbances. Associated symptoms include (and are not limited to) fatigue and generalized weakness, pain, impaired movement, loss of protective sensations (e.g., ability to see well or to sense water temperature or excessive pressure on tissues), as well as cognitive and emotional disabilities.
Determine current activity level or physical conditioning. Assess degree of functional impairment using a 0 to 4 (or similar standardized) scale.	Functional assessment provides information to develop plans for both treatment and rehabilitation. Note: Physical activity is markedly decreased in MS populations, and this appears to be related to disease severity but may also be impacted by emotional factors, such as depression or fear of disease progression (Motl, 2008).
Evaluate and continuously monitor client's cognitive and emotional status, as well as ability to move safely in environment, and to perform the hand/finger tasks required for self-care activities. Provide assistance with ADLs as indicated.	Cognitive impairment (affecting awareness and judgment), depression, pain, muscle spasticity, gait disturbances, and hand tremors can impair coordination needed for self-care, intermittently or all the time. Note: Individuals with MS report a high incidence of falling (one out of two reporting a fall in the previous 6 months). Falls have been found to be associated with reduced participation and quality of life (Sosnoff et al, 2013).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess presence/degree of pain, using 0 to 10 (or similar) scale. Evaluate impact of pain as well as effectiveness of pain management strategies on self-care.	Pain (acute and chronic) is a complex symptom of MS and usually involves the sensory system (Halper & Ross, 2010). Pain management interventions include (1) pharmacological (e.g., multiple and various classes of medications), (2) nonpharmacological (e.g., physical and occupational therapy, avoidance of noxious stimuli, massage, guided imagery, and other relaxation techniques), and (3) other medical interventions (e.g., electrical stimulation, surgical intervention for intractable pain).
Review medication regimen. Discuss potential for medication changes with client and physician, as indicated.	Many medications (including those given for conditions other than MS) have side effects that can impact alertness/mentation, energy level, balance, and perception.
Encourage client input in planning schedule. Prioritize tasks and allow as much autonomy as possible.	Client's quality of life is enhanced by participation in the planning of care and performance of self-care. Whatever client is able to do can ease the frustration over perceived loss of independence.
Promote client's/significant other's (SO's) participation in problem identification and desired goals and decisions. Active-listen concerns. Assist in setting realistic goals for physical activities.	Exhibits regard for client's/SO's values, beliefs, needs, and goals. Enhances commitment to plan, optimizing outcomes.
Encourage client to perform at optimal level of function; however, avoid rushing client.	Encouragement promotes independence and sense of control, which may decrease feelings of helplessness.
Note presence of and accommodate for fatigue. Refer to ND: Fatigue for related interventions.	Fatigue can be very debilitating and greatly impacts ability to participate in ADLs, as well as quality of life (QOL). The subjective nature of reports of fatigue can easily be misinterpreted as manipulative or a form of secondary gain.
Assist with active or passive range-of-motion (ROM) and stretching and toning exercises on a regular schedule. Encourage use of medications, cold packs, and adaptive and functional aids (e.g., braces, splints, cane/walker, footboard), as indicated.	These interventions prevent or reduce problems associated with muscle pain, dysfunction, and disuse. They help maintain muscle tone, muscle strength, joint mobility, and proper body alignment. They decrease spasticity and risk of calcium loss from bones. Note: Resistance exercise has been found to exert a positive effect on function in clients with MS, improving muscle strength and functional capacity (Dalgas et al, 2009).
Encourage exercise as therapy.	Exercise has been identified as an effective tool in improving muscle function and mobility-related activities (Rietberg et al, 2005). Exercise also has been shown to benefit self-efficacy (see Glossary), which in turn reduces fatigue, pain, and depression (McAuley et al, 2010).
Ascertain that client can chew and swallow safely. Refer for evaluation and interventions if client is reporting or demonstrating that it takes a long time to eat a meal, experiences coughing or choking while eating or drinking, has a history of heartburn/indigestion, or has frequent respiratory infections.	It is estimated that 30% to 35% of people with MS develop a problem with swallowing (dysphagia). The specific nature of swallowing problems that occur in MS depends on the location of lesions in the CNS. Swallowing involves about 30 muscles in the mouth and throat and is controlled by eight different cranial nerves (Logemann, 2012).
Implement or reinforce safe swallowing practices.	Techniques may include proper positioning, double swallow, chin tuck when swallowing, dietary modifications to ensure consistency in texture of liquids and solids (among other individualized techniques).
Provide strategies to promote independent feeding, such as wrapping fork handle with tape, cutting food, using Sippy cup for fluids.	These strategies promote independence and adequate nutritional intake.
<b>Collaborative</b>	To enhance client's capabilities and maximize rehabilitation potential.
Collaborate in treatment of underlying condition(s).	(continues on page 320)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Consult with physical and occupational therapists, rehabilitation specialists, home-care modification or assistance services, medical equipment/adaptive aids providers, counselors, etc.	Interdisciplinary consultations provide appropriate interventions that manage mobility disturbances, relieve muscle spasticity, improve motor functioning, prevent or reduce muscular atrophy and contractures, and promote optimal level of function, independence, and self-worth.
Administer medications, as indicated, for example:	
Tizanidine (Zanaflex), baclofen (Lioresal), dantrolene (Dantrium), clonazepam (Klonopin), carbamazepine (Tegretol), gabapentin (Neurontin), and dalfampridine (Ampyra)	Several drugs are effective for reducing pain spasticity and tremors, promoting muscle relaxation, and inhibiting reflexes at the spinal nerve root level. This may allow client to move more easily and perform ADLs more efficiently.
Meclizine (Antivert) and scopolamine patches (Transderm-Scop)	These agents reduce dizziness and vertigo, allowing for increased and safer mobility.
Duloxetine hydrochloride (Cymbalta), venlafaxine (Effexor), and bupropion (Wellbutrin)	These medications (and others like them) may be helpful in relieving depression and fatigue symptoms, allowing the client more energy for self-care and life activities.
Prepare for additional interventions (e.g., use of various types of electrical stimulation device[s], balance-and-eye movement training, stem cell clinical trials, as appropriate).	Research is focused on controlling immune response, helping the nervous system recover from damage, controlling disease progression, improving body functioning, and managing symptoms (e.g., spasticity, footdrop, upright posture control, speed of walking).

### NURSING DIAGNOSIS: impaired urinary Elimination

#### May Be Related To

Sensory motor impairment  
Urinary tract infection (UTI)

#### Possibly Evidenced By

Urinary incontinence, nocturia, frequent voiding  
Urinary retention

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Urinary Continence NOC

Verbalize understanding of condition.  
Demonstrate behaviors and techniques to prevent or minimize infection.  
Empty bladder completely and regularly, voluntarily or by catheter, as appropriate.  
Be free of urine leakage between voiding.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Urinary Elimination Management NIC</b>	

*Independent*

Note reports of urinary frequency, urgency, leaking, urge incontinence, nocturia, absence of voiding, and changes in size and force of urinary stream.

The first symptom with MS is often urgency. There are three types of bladder dysfunction that occur with MS: (1) storage (overactive detrusor muscle, which results in symptoms of urgency, frequency, nocturia, and incontinence), (2) emptying (demyelination in the spinal cord that signals the voiding and emptying results in symptoms of urgency, dribbling, hesitancy, and incontinence), and (3) combined (resulting from lack of coordination between muscle groups, causing symptoms of urgency, dribbling, hesitancy, and incontinence). These problems can be difficult to sort out, can lead to kidney problems, and can seriously impact quality of life (Holland, 2016; Rantel, 2009). Urinary tract infection (UTI) is not always easily identified, because many symptoms seem the same as MS symptoms (e.g., urgency, frequency). UTIs can lead to a pseudo-exacerbation (MS symptom flare without underlying disease activity), kidney infection, and sepsis.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess client for bladder problems unrelated to MS functional symptoms.	Multiple other factors must be considered that might contribute to bladder dysfunction (such as medication side effects), other diseases (comorbidities) the client may have; constipation, fatigue, pregnancy, enlarged prostate, etc.
Review drug regimen, including prescribed, OTC, and street drug use.	Many medications, including some antispasmodics, antidepressants, and opioid analgesics; OTC medications with anticholinergic or alpha-agonist properties; or recreational drugs such as cannabis, may interfere with bladder emptying.
Assess environmental factors that may impact elimination, noting client's abilities in management of toileting or continence.	Issues may include a multitude of varying factors (e.g., ease of access to facilities, height of toilet seat; loss of functional ability to remove clothing, use of certain medications).
Institute bladder training program or timed voiding, as appropriate.	Bladder training program helps restore bladder functioning and reduces incontinence and bladder infection.
Encourage drinking enough fluids to keep urine light yellow, avoiding caffeine and use of aspartame, and limiting fluids before starting activity where no bathroom is available, as well as in the late evening and at bedtime. Recommend use of cranberry tablets or juice and vitamin C.	Sufficient hydration promotes urinary output and aids in preventing infection. Note: Cranberry has been found helpful in preventing UTIs but may also increase urgency or irritation because of its acidity.
Assist client in planning for bladder issues when being out and about. Discuss such things as using continence protection when needed, wearing easily removable clothes, and carrying a change of clothes, underwear, pads, wipes, catheters, paper towels, etc. in tote or backpack.	Management of incontinence or other bladder dysfunction is crucial to client's quality of life and overall health.
Recommend good hand-washing and perineal care.	Reduces risk of bladder and ascending infections.
Encourage client/care provider to observe for sediment, blood in urine, foul odor, fever, or unexplained increase in MS symptoms, such as spasticity and dysarthria.	Urinary symptoms indicate infection that requires further evaluation and prompt treatment.
<b>Collaborative</b>	
Collaborate in treatment of underlying conditions.	Treating the whole body is important in managing symptoms of bladder dysfunction.
Refer to urinary continence specialist for testing and treatment, as indicated.	Testing can include many factors, including postvoid residual testing via diagnostic catheterization or bladder ultrasound to evaluate bladder capacity, and urine flow and storage (urodynamic testing). Treatments may include additional strategies to manage bladder dysfunction such as surgical interventions to manage spasticity or electrical stimulation of sacral nerves. The continence specialist helps develop individual plan of care to meet client's specific needs using the latest techniques and continence products.
Refer to other resources as indicated (e.g., physical therapy, continence nurse, durable medical equipment sources).	Can assist client in learning behaviors and exercises to reduce urinary urgency, frequency, and loss of bladder control. Adaptive equipment and clothing can help to conserve energy and promote safety in toileting efforts. Note: Pelvic floor physical therapy may include pelvic floor training (Kegel exercises), biofeedback, neuromuscular stimulation, and home exercises to enhance flexibility, strength, and endurance.
Administer medications to treat storage dysfunction, as indicated, such as darifenacin (Enablex), fesoterodine (Toviaz), tolterodine (Detrol), oxybutynin (Ditropan), terazosin (Hytrin), mirabegron (Myrbetriq), desmopressin (DDAVP nasal spray), and onabotulinumtoxinA (Botox).	These medications reduce bladder spasticity and associated urinary symptoms of frequency, urgency, incontinence, and nocturia. Note: Common side effects noted following Botox injection can include urinary retention, blood in urine, UTI, fatigue, and insomnia.

(continues on page 322)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications for combined emptying and storage, as indicated, such as antispasticity agents (e.g., baclofen [Lioresal], tizanidine [Zanaflex]) and alpha-adrenergic blocking agents (e.g., alfuzosin [Uroxatral], tamsulosin [Flomax]).	In addition to ISC to remove residual urine and a medication (described above) to reduce bladder overactivity, these medications may help manage combination types of bladder dysfunction (Holland, 2016).
Catheterize, as indicated.	Treatment of emptying dysfunction is catheterization (for client retaining more than 100 mL of urine after voiding). Depending on symptoms, catheterization may be necessary three to four times/day to relieve urinary retention.
Teach intermittent self-catheterization (ISC) as appropriate. Instruct in use and care of indwelling catheter, when used.	Self-catheterization may be used for chronic urinary retention to improve continence and to preserve renal function. ISC helps maintain client autonomy and encourages self-care when the client's neurological impairment allows. Indwelling catheter may be required for short-term (days, not weeks), depending on client's urinary problem. Note: The practice of regular ISC is like physical therapy for the bladder, with some people having a return to normal bladder function in weeks or months. With others, the practice remains part of everyday life.
Obtain periodic urinalysis (UA) and urine culture and sensitivity, as indicated.	Monitors kidney and bladder function and identifies presence of UTI. Colony count over 100,000 indicates presence of infection requiring treatment.
Administer anti-infective agents, as necessary, such as co-trimoxazole (Bactrim, Septra), ciprofloxacin (Cipro), and norfloxacin (Noroxin).	Bacteriostatic agents inhibit bacterial growth and destroy susceptible bacteria. Prompt treatment of infection is necessary to prevent serious complications of ascending urinary infection, sepsis, and shock.

## NURSING DIAGNOSIS: risk for Constipation/bowel Incontinence

### Possibly Evidenced By

Neurological impairment; abdominal muscle weakness; decrease in gastrointestinal motility; [spastic pelvic floor muscles]  
Eating habit change; insufficient fiber or fluid intake  
Daily physical activity less than recommended; [fatigue]; depression

### Desired Outcomes/Evaluation Criteria: Client will

#### Bowel Continence NOC

Establish or regain effective pattern of bowel functioning.  
Participate in bowel program as indicated.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bowel Management NIC</b> <i>Independent</i> Note presence/type of MS when assessing for causes of constipation. Ask if client feels urge to defecate.	Loss of myelin in the brain or spinal cord may prevent or interfere with the signals from the bowel to the brain indicating the need for a bowel movement and/or the responding signals from the brain to the bowel that maintain normal functioning. Note: Constipation is the most common bowel complaint in MS (Holland & Frames, 2014).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss usual elimination patterns, including typical time for elimination, characteristics of stool, and need for/use of pharmacological agents. Initiate an elimination diary if indicated.	Provides baseline for comparison and promotes recognition of changes. Note: Presence of loose stools and impaction is not uncommon in client with constipation associated with MS.
Review daily dietary regimen, noting if diet is deficient in fiber.	Inadequate dietary fiber (e.g., vegetables, fruits, whole grains) or highly processed foods contribute to poor intestinal function. MS-related gastrointestinal dysfunction, as well as client's loss of ability to prepare or eat foods best for bowel health, can exacerbate the issues.
Determine fluid intake to note deficits.	The client may not drink enough fluids, because of habit, or because one is contending with urinary problems (e.g., urgency, frequency, leaking, or loss of bladder control).
Note energy levels, activity patterns, and emotional state.	Lack of physical activity or regular exercise is often a factor in managing bowel function, especially if the client with MS is fatigued or depressed (Holland & Frames, 2014).
Review medication regimen.	Certain medications common to managing MS symptoms, exacerbations, or complications (e.g., steroids, antibiotics) can contribute to constipation.
Assess environmental factors that may impact elimination, noting client's abilities in management of toileting or continence.	Issues may include a multitude of varying factors (e.g., ease of access to facilities, height of toilet seat, loss of functional ability to remove clothing, use of medications).
Assist client in implementing or maintaining consistent elimination behaviors.	Bowel management strategies include (1) behaviors (e.g., same time of day for elimination and when client has most energy, food and fluid adjustments, digital stimulation) and (2) medications (see below).

**Collaborative**

Administer medications as indicated: for example, docusate (Colase), psyllium hydrophilic mucilloid (Metamucil), glycerin (Sani-Supp) suppository, and sodium phosphate (Fleet) enema.

Management of bowel dysfunction includes not only medications for treatment of MS but also elimination aids, such as stool softeners, fiber additives, suppositories, and enemas to promote regularity.

**NURSING DIAGNOSIS:** **risk for ineffective Coping****Possibly Evidenced By**

High degree of threat; impairment of nervous system—sensory or perceptual impairment  
Uncertainty; insufficient sense of control  
Inability to conserve adaptive energies

**Desired Outcomes/Evaluation Criteria—Client Will****Coping NOC**

Recognize relationship between disease process (cerebral lesions) and emotional responses and changes in thinking and behavior.  
Verbalize awareness of own capabilities and strengths.  
Display effective problem-solving skills.  
Demonstrate behaviors and lifestyle changes to prevent or minimize changes in mentation and maintain reality orientation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Coping Enhancement</b> <b>NIC</b> <i>Independent</i> Assess current functional capacity and limitations; note presence of distorted thinking processes, labile emotions, and cognitive dissonance. Determine how these affect coping abilities.	Organic or psychological effects may cause client to be easily distracted and to display difficulties with concentration, problem-solving, dealing with what is happening, and being responsible for own care.

(continues on page 324)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Determine client understanding of current situation and previous methods of dealing with life problems.	Client understanding of current health situation provides clues on coping abilities, support system, individual resources, and other needs.
Discuss ability to make decisions, care for children or dependent adults, and handle finances. Identify available options.	Impaired judgment, confusion, and inadequate support systems may interfere with ability to meet own needs and needs of others. Conservatorship, guardianship, or adult protective services may be required until client is able to manage own affairs (if ever).
Maintain an honest, reality-oriented relationship.	Honest, reality-based relationship reduces confusion and minimizes painful, frustrating struggles associated with adaptation to altered environment and lifestyle.
Provide clues for orientation, such as calendars, clocks, note cards, organizers, and date book.	Memory aids facilitate client orientation and coping.
Suggest client tape-record important information and listen to the recording periodically.	Repetition puts information in long-term memory, where it is more easily retrieved, and can support decision making and problem-solving process.
Encourage verbalization of feelings and fears. Accept client statements in a nonjudgmental manner. Note statements reflecting sense of powerlessness and inability to cope. (Refer to ND: risk for chronic low Self-Esteem/Powerlessness.)	Nonjudgmental approach may diminish client's fear, establish trust, provide opportunities to identify problems, and facilitate the problem-solving process.
Observe nonverbal communication—posture, eye contact, movements, gestures, and use of touch. Correlate with verbal content. Clarify meaning, as appropriate.	Careful assessment of both verbal and nonverbal forms of communication provides insight into client response to the health condition and effective coping strategies.
Note presence of depression, impaired thought processes, and expression of suicidal ideation; evaluate on a scale of 1 to 10.	Adapting to a long-term, progressively debilitating, incurable condition is a difficult emotional adjustment. In addition, cognitive impairment may affect adaptation to life changes. A depressed individual may believe that suicide is the best way to deal with what is happening.
<b>Collaborative</b>	
Refer to cognitive retraining program.	Improving cognitive abilities can enhance basic thinking skills, including attention span, information processing, learning new skills, insight, judgment, and problem-solving.
Refer to counseling, psychiatric clinical nurse specialist, or psychiatrist, as indicated.	Collaboration with psychiatric services may help resolve issues of self-esteem and regain effective coping skills.
Administer medications, as appropriate, such as amitriptyline (Elavil), fluoxetine (Prozac), escitalopram (Lexapro), venlafaxine (Effexor), and nefazodone (Serzone).	These medications improve mood and restful sleep as well as help combat depression and relieve fatigue.

## NURSING DIAGNOSIS: **risk for chronic low Self-Esteem/Powerlessness**

### Possibly Evidenced By

Unpredictability of illness trajectory; anxiety  
Ineffective coping with loss(es); low self-esteem  
Repeated negative reinforcement; insufficient social support  
Pain

### Desired Outcomes/Evaluation Criteria—Client Will

#### **Self-Esteem NOC**

View self as a capable person.  
Participate in and assume responsibility for meeting own needs, self-care/ADLs.  
Recognize and incorporate changes in self-concept and role without negating self-esteem.

#### **Personal Resiliency NOC**

Identify and verbalize feelings clearly and appropriately.  
Identify areas over which individual has control.  
Use available community resources.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Esteem Enhancement NIC</b>	
<i>Independent</i>	
Establish or maintain a therapeutic nurse-client relationship. Discuss fears and concerns.	Conveys an attitude of caring and aids in developing a sense of trust between client and caregiver. The client is free to express fears of rejection, loss of previous functioning, changes in appearance, feelings of helplessness, and powerlessness. Open communication promotes a sense of support and well-being.
Note withdrawn behaviors, use of denial, or excessive concern with disease process.	These behaviors serve as initial protective responses. If prolonged, these behaviors may impede effective coping.
Support initial use of defense mechanisms. Allow the client to deal with the information in own time and way.	Confronting client with reality of situation may result in increased anxiety and lessened ability to cope with actual or perceived changes. Note: Prolonged use of denial can interfere with adaptation to changes as disease progresses.
Discuss reality of grieving process related to actual or perceived changes. Help client deal realistically with feelings of anger and sadness.	The nature of the disease leads to ongoing losses and life changes. It could potentially block individual growth and adjustment to reality.
Explain that labile emotions are not unusual. Problem-solve ways to deal with these feelings.	Therapeutic communication relieves anxiety and promotes expression and management of emotions.
Assess interaction between client and SO. Note changes in relationship.	SO may unconsciously or consciously reinforce negative attitudes and beliefs of client, or issues of secondary gain may interfere with progress and ability to manage situation.
Provide an open environment for client and SO to discuss concerns about sexuality, including management of fatigue, spasticity, arousal, and changes in sensation.	Physical and psychological changes often create stress in the relationship, affect usual roles and expectations, and potentially further impair self-concept.
Discuss use of medications and adjuncts to improve sexual function.	Client and partner may want to explore trial of medications, such as papaverine (Pavabid), dinoprostone (Prostin E <sub>2</sub> ), or other avenues of improving sexual relationship.
Discuss plans for the future. Suggest visiting alternative care facilities and taking a look at the possibilities for care as condition changes.	Planning promotes sense of control and hope.
<b>Self-Responsibility Facilitation NIC</b>	
Acknowledge reality of situation, at the same time expressing hope for client.	Although the prognosis may be discouraging, remissions may occur, and because the future cannot be predicted, hope for some quality of life should be expressed and encouraged. Additionally, research is ongoing, and new treatment options may become available.
Review information (in writing and verbally) about course of disease, possibility of remissions, and prognosis with client and SO/family.	Information regarding the course of the disease helps empower the client to make decisions regarding daily functioning and healthcare decisions with support from SO/family.
Determine degree of life mastery and locus of control.	Life mastery helps determine success in adjusting to the health condition. The locus of control relates to the ability to manage outcomes related to the disease process. An external locus of control would benefit from positive affirmation.
Discuss needs openly, and facilitate actions to meet individual needs.	Open discussion empowers the client. It also helps to deal with manipulative behaviors.
Assist client to identify factors that are under own control, listing things that can or cannot be controlled.	Knowing and accepting what is beyond individual control can reduce helpless and acting-out behaviors and promote focusing on areas individual can control.
Encourage client to assume control over as much of own care as possible.	The client can help plan and supervise own care and participate in health decision making.

(continues on page 326)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage and assist client to identify activities she or he would like to be involved in, such as volunteer work, within the limits of own abilities.	Staying active and interacting with others helps counteract feelings of helplessness.
Incorporate client's daily routine in home-care schedule or hospital stay, as possible.	Routines maintain a sense of control, self-determination, and independence.
<b>Collaborative</b>	
Identify community resources, such as Meals on Wheels, home-care agencies, adult day enrichment program, and MS support groups.	Enhances ability to meet own needs/manage care. Participation in structured activities can reduce sense of isolation and may enhance feeling of self-worth. These resources also provide respite to caregivers.
Consult with occupational therapist and rehabilitation team.	Useful in determining appropriate assistive devices/equipment needs to enhance overall function, participation in activities, and sense of well-being.
Refer to vocational rehabilitation/employment counselor as indicated.	Can assist in development and implementation of a vocational plan that incorporates specific interests and abilities.
Refer to psychiatric clinical nurse specialist, social worker, or psychologist as indicated.	In-depth, supportive counseling may help resolve conflicts and deal with life changes.

## NURSING DIAGNOSIS: risk for compromised family Coping

### Possibly Evidenced By

Family disorganization; role change  
Prolonged disease that exhausts the capacity of support person; insufficient reciprocal support  
Insufficient understanding/misunderstanding of information by support person

### Desired Outcomes/Evaluation Criteria—Family Will

#### Family Coping NOC

Identify or verbalize resources within themselves to deal with the situation.  
Express more realistic understanding and expectations of client.  
Interact appropriately with client and healthcare providers providing support and assistance as indicated.  
Verbalize knowledge and understanding of disability, disease process, and community resources.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Family Involvement Promotion NIC</b>	
<i>Independent</i>	
Note length and severity of illness. Determine client's role in family and how illness has changed the family organization.	Chronic or unresolved illness, accompanied by changes in role performance and responsibility, often exhausts supportive capacity and coping abilities of SO and family.
Determine SO's understanding of disease process and expectations for the future.	Inadequate information or misconception regarding disease process and unrealistic expectations affect ability to cope with current situation. Note: A particular area of misconception is the fatigue experienced by clients with MS. Family members may view client's inability to perform activities as manipulative behavior rather than an actual physiological deficit.
Discuss with SO and family members their willingness to be involved in care. Identify other responsibilities and factors impacting participation.	Individuals may not have desire or time to assume responsibility for care. If several family members are available, they may be able to share tasks.
Assess other factors that are affecting abilities of family members to provide needed support, such as own emotional problems and work concerns.	Individual members' preoccupation with own needs and concerns can interfere with providing needed care and support for stresses of long-term illness. Additionally, caregiver(s) may incur decrease or loss of income and risk losing own health insurance if they alter their work hours.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss underlying reasons for client's behaviors.	Helps SO/family understand and accept and deal with behaviors that may be triggered by emotional or physical effects of MS.
Encourage client and SO to develop and strengthen problem-solving skills to deal with situation.	Family may or may not have handled conflict well before illness. The stress of long-term debilitating condition can create additional problems, including unresolved anger.
Encourage free expression of feelings, including frustration, anger, hostility, and hopelessness.	Individual members may be afraid to express "negative" feelings, believing it will discourage client. Free expression promotes awareness and can help with resolution of feelings and problems (especially when done in a caring manner).
<b>Collaborative</b>	
Identify community resources, such as local MS organization, support groups, home-care agencies, and respite programs.	Community resources provide information, opportunities to share with others who are experiencing similar difficulties, and potential sources of assistance.
Refer to social worker, financial adviser, psychiatric clinical nurse specialist, or psychiatrist, as appropriate.	Client, SO, and family may need more in-depth assistance from professional sources.

### NURSING DIAGNOSIS: risk for caregiver Role Strain

#### Possibly Evidenced By

Illness severity of the care receiver, alteration in cognitive functioning in care receiver; instability in care receiver's health  
Unpredictability of illness trajectory  
Extended duration of caregiving required, excessive caregiving activities, caregiving task complexity  
Partner is caregiver; family/caregiver isolation, insufficient caregiver respite or recreation

#### Desired Outcomes/Evaluation Criteria—Caregiver Will

##### Caregiver Performance: Direct Care NOC

Identify individual risk factors and appropriate interventions.  
Demonstrate and initiate behaviors or lifestyle changes to prevent development of impaired function.

##### Caregiver Performance: Indirect Care NOC

Use available resources appropriately.  
Report satisfaction with plan and support available.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Caregiver Support NIC</b>	
<b>Independent</b>	
Note physical and psychosocial condition. Identify client ability to comply with therapeutic regimen.	Careful assessment of physical and psychosocial conditions determines individual needs for planning care and helps identify strengths and needs requiring assistance and accommodation.
Determine caregiver's level of commitment, responsibility, involvement, and anticipated length of care. Use assessment tool, such as Burden Interview, to further determine caregiver's abilities, as appropriate.	Progressive debilitation taxes caregiver and may alter ability to meet client's and own needs. (Refer to ND: risk for compromised family Coping.)
Discuss caregiver's view of the situation.	Open discussion allows ventilation and clarification of concerns and promotes understanding.
Determine available resources and social support.	Organizations, such as the National Multiple Sclerosis Society and local support groups, can provide information regarding adequacy of supports and identify needs and possible options.
Facilitate family conference to share information and develop plan for involvement in care activities, as appropriate.	Family conference helps clarify different roles and responsibilities, facilitates coping, and promotes participation and involvement.

(continues on page 328)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Identify adaptive equipment needs, resources for the home, and transportation.	Adaptive devices enhance independence and safety for the client and the caregivers.
Provide information and demonstrate techniques for dealing with acting-out, violent, or disoriented behavior.	Information and effective techniques for dealing with such behavior help the caregiver maintain a sense of control and competency and enhance safe care.
Emphasize importance of self-nurturing, such as pursuing self-development interests, personal needs, hobbies, and social activities.	Taking time for self can lessen risk of burnout or being overwhelmed by situation.
Assist with short-term and long-term care planning to meet the current and future needs of the recipient of care, including placement in alternative levels of care, extended care, hospice, and so forth.	Short-term and long-term care planning provides ongoing assessment and evaluation of client needs and clinical outcomes and realization of changes in the level of care.
<b>Collaborative</b>	
Identify alternate care sources, such as sitter or day-care facility, and senior care services, for example, Meals on Wheels, respite care, and home-care agency.	As client's condition worsens, SO may need additional help to maintain client at home.
Discuss additional resources to include financial and legal assistance.	These areas of concern can add to burden of caregiving if not adequately resolved.
Refer to supportive services, as indicated.	Medical case manager or social services consultant may be needed to develop ongoing plan to meet changing needs of client and SO/family.

## NURSING DIAGNOSIS: readiness for enhanced Health Management

### Possibly Evidenced By

Expresses desire to enhance management of illness  
Expresses desire to enhance choices of daily living for meeting goals

### Desired Outcomes/Evaluation Criteria—Client/Caregiver Will

#### Self-Management: Multiple Sclerosis NOC

Participate in learning process.  
Assume responsibility for own learning and begin to look for information and to ask questions.  
Verbalize understanding of condition, disease process, and treatment.  
Initiate necessary lifestyle changes.  
Participate in prescribed treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Learning Facilitation NIC</b>	
<b>Independent</b>	
Evaluate motivation and readiness to learn of the client, SO, and caregivers.	Motivation and readiness to learn help determine appropriate and pertinent level of information.
Note signs of emotional lability or dissociative states (loss of affect and inappropriate emotional responses).	Client will not process or retain information and has difficulty learning during this time.
Provide information in varied formats based on client perceptual and cognitive abilities and locus of control.	Effective teaching strategies, such as verbal instruction, books, pamphlets, and audiovisual and computer materials, are based on understanding the client's attitude toward learning and locus of control.
Encourage active participation of client and SO in learning process, including use of self-paced instruction, as appropriate.	Active participation of client and SO enhances sense of independence and control as well as strengthens compliance with therapeutic regimen.
<b>Teaching: Disease Process NIC</b>	
Review disease process, prognosis, effects of climate, emotional stress, overexertion, and fatigue.	Clarifies client and SO understanding of current health and living situation.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Identify signs and symptoms that require further evaluation.	Prompt intervention may help limit severity of exacerbation and complications.
Discuss importance of daily routine of rest, exercise, activity, and nutrition. Focus on current capabilities. Instruct in use of appropriate devices to assist with ADLs, such as eating utensils, walking aids, among others.	Discussions on the importance of rest, activity, and nutrition help reduce fatigue and maintain a level of independence.
Emphasize importance of weight control.	Excess weight can interfere with balance and motor abilities and make care more difficult.
Review possible problems such as decreased perception of heat and pain, susceptibility to skin breakdown and infections, especially UTIs, and complications.	These effects of demyelination and associated complications may compromise client's safety and precipitate an exacerbation of signs and symptoms.
Identify measures to promote safety and overall health, such as avoiding exposure to individuals with respiratory infections; avoiding hot baths; regular skin monitoring and care; safe transfers to walker, wheelchair, or scooter; and adequate nutrition and hydration.	Review of safety and preventive measures maintains optimal level of function as well as prevents complications.
Discuss increased risk of osteoporosis and review preventive measures—regular exercise, increased intake of calcium and vitamin D, reduced intake of caffeine, cessation of smoking, hormone replacement therapy (HRT), and fall prevention measures such as wearing low-heeled shoes with nonskid soles, use of handrails and grab bars in bathroom and along stairwells, and removal of small area rugs.	These measures reduce the risk for osteoporosis and complications.
Identify bowel elimination concerns. Recommend adequate hydration and intake of fiber; use of stool softeners, bulking agents, suppositories, or possibly mild laxatives; and bowel training program.	Constipation is common. Bowel urgency and accidents may occur as a result of dietary deficiencies or fecal impaction.
Review medications. Recommend avoidance of OTC drugs.	Avoidance of OTC medications reduces likelihood of drug interactions or adverse effects and enhances cooperation with treatment regimen.
Discuss concerns regarding sexual relationships, contraception and reproduction, and effects of pregnancy on the female client. Identify alternative ways to meet individual needs; counsel regarding use of artificial lubrication (females) and provide genitourinary (GU) referral for males regarding available medication and sexual aids.	Pregnancy may be an issue for the young client relative to issues of genetic predisposition and ability to manage pregnancy or parenting. Increased libido is not uncommon and may require adjustments within the existing relationship or in the absence of an acceptable partner. Information about different positions and techniques and other options for sexual fulfillment, such as fondling and cuddling, may enhance personal relationship and feelings of self-worth.
Encourage client to set goals for the future while focusing on the present and what can be done today.	Setting future goals provides opportunity for the client to develop insight and perspective regarding realities of the current situation and uncertainty of the future.
Identify financial concerns.	Loss or change of employment for client or SO impacts income, insurance benefits, and level of independence, requiring additional family or social support.
Refer for vocational rehabilitation, as appropriate.	Assessment of capabilities or job retraining may be indicated due to limitations associated with disease progression.
Recommend contact with local and national MS organizations and other support resources.	Ongoing contact such as mailings informs client of programs and services available and can update client's knowledge base. Support groups can provide role modeling and sharing of information and enhance problem-solving ability and individual and family coping.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition, presence of complications, personal resources, and life responsibilities)

- **risk for Trauma**—weakness, poor vision, balancing difficulties, reduced sensation, reduced muscle or hand-eye coordination, cognitive or emotional difficulties, economically disadvantaged
- **impaired Home Maintenance**—disease, impaired functioning, insufficient finances, unfamiliarity with neighborhood resources, inadequate support systems
- **risk for Disuse Syndrome**—paralysis, immobilization, severe pain
- **ineffective Health Management**—economic difficulties, family conflict, social support deficit

## PARKINSON'S DISEASE (PD)

**I. Pathophysiology**—Parkinson's disease (PD) is a progressive neurodegenerative disease that causes **characteristic** motor symptoms of tremor, bradykinesia (see Glossary), and postural instability (Capriotti & Terzakis, 2016; Parkinson's.org, 2009). However, PD includes both motor and nonmotor symptoms. Motor symptoms, including tremor, bradykinesia, rigidity, and postural instability, have been the focus of numerous medical studies. Nonmotor symptoms, including sleep disturbance, pain, fatigue, behavioral and mood changes, and autonomic symptoms, are less well studied (Vernon, 2009).

### II. Etiology

It is not known what triggers Parkinson's disease (Olanow & Brundin, 2013), but it occurs when the nerve cells that produce dopamine (a substance that helps transmit signals between different parts of the brain that are involved in the production of smooth, purposeful movement) become impaired or die.

- a. Genetic factors may play a role (about 15%–25% report a relative with PD). For example, alpha-synuclein has been found to be associated with dementia in Parkinson's disease, as well as with the young-onset form of sporadic Parkinson's disease (Venda et al, 2010).
- b. Environmental toxins: Epidemiological research has identified several factors that may be linked to PD, including rural living, well water, manganese, and pesticides. Some studies have demonstrated that prolonged occupational exposure to certain biochemicals (some insecticides, herbicides, fungicides, Agent Orange) is associated with an elevated risk of PD (Tanner, 2011).
- c. Occupation: Certain occupational categories (e.g., welding of metals) or job titles have been associated with a higher incidence of PD, but results have been inconsistent. A higher frequency of PD has been associated with many other occupations, but only a few occupations have been associated with PD in multiple studies, including agricultural and industrial workers.

### III. Stages (Lava, 2017)

- a. During the initial phase of the disease, a person usually experiences mild symptoms, such as tremors or shaking in a limb. During this stage, friends and family can usually detect changes caused by Parkinson's such as poor posture, loss of balance, and abnormal facial expressions.
- b. In the second stage, a person's symptoms are bilateral, affecting both limbs and both sides of the body. The

person usually encounters problems walking or maintaining balance and may be unable to complete normal physical tasks.

- c. Stage 3 symptoms can be severe and include the inability to walk straight or to stand. There is a noticeable slowing of physical movements.
- d. In stage 4, walking may still occur but is often limited, and rigidity and bradykinesia are visible. Most individuals are unable to complete day-to-day tasks and cannot live on their own. The tremors or shakiness of the earlier stages of the disease, however, may lessen or become nonexistent for unknown reasons during this time.
- e. In the fifth or final stage of PD, the person is usually unable to care for self and may not be able to stand or walk. Dementia may develop with symptoms, including disorientation at night, confusion, and memory loss.

### IV. Statistics

- a. **Morbidity:** Parkinson's disease, following Alzheimer's disease, is the second-most common neurodegenerative disorder in the United States. PD affects approximately 1% to 2% of adults over age 65 and 4% of adults over age 80. An estimated 630,000 people in the United States had been diagnosed PD in 2010, with diagnosed prevalence likely to double by 2040 (Kowal et al, 2013).
- b. **Mortality:** Parkinson's disease is not by itself a fatal disease, but it does get worse with time. The average life expectancy of a PD patient is generally the same as for people who do not have the disease. In the late stages of the disease, Parkinson's may cause complications such as choking, pneumonia, and falls that can lead to death. However, a recent retrospective study reports that their findings confirm that PD is associated with increased mortality in both men and women, although women have a greater reduction in life span compared to men. Study authors also found that patients with early onset PD (onset at the age of 50 or before) have reduced survival relative to PD patients with later ages of onset (Morgan et al, 2014).
- c. **Cost:** Morgan et al found that in 2010, the national economic burden of PD exceeded \$14.4 billion (approximately \$22,800 per patient). Indirect costs (e.g., reduced employment) are conservatively estimated at \$6.3 billion (or close to \$10,000 per person with PD) (Morgan et al, 2014).

## G L O S S A R Y

**Akathisia:** A condition of motor restlessness in which there is a feeling of muscular quivering, an urge to move about constantly, and an inability to sit still.

**Alpha-synuclein gene:** First gene to be linked to Parkinson's disease (PD) that encodes a small, presynaptic protein (called alpha-synuclein protein) that misfolds and accumulates in Lewy bodies in the brain.

**Bradykinesia:** Slow movement. Bradykinesia is often associated with an impaired ability to adjust the body's position. Bradykinesia can be a symptom of nervous system disorders, particularly Parkinson's disease, or a side effect of medications.

**Dyskinesia:** Abnormal muscle movements. These occur as a side effect of long-term drug treatment in PD and may worsen in response to stress.

**Dysphagia:** Difficulty swallowing.

**Dysphonia:** Abnormal voice.

**Lewy body:** Brain cells that have abnormal pigmented spheres inside. They are found in damaged parts of the brain in some persons with PD and may be a cause of Lewy body dementia.

**Micrographia:** Very small handwriting often due to difficulty with fine motor movements; common in PD.

**Neurogenic orthostatic hypotension (nOH):** Autonomic nervous system-related form of orthostatic hypotension (low blood pressure that happens when standing up from a sitting or lying-down position). nOH can cause dizziness or lightheadedness in the person with PD.

**Oropharyngeal dysphagia:** Dysphagia caused by difficulty in *initiating* the swallowing process, so that solids and liquids cannot move out of the mouth properly (common with PD).

**Postural instability:** Difficulty with balance.

**Prion:** A small proteinaceous infectious disease-causing agent that is believed to be the smallest infectious particle. A prion is neither bacterial, fungal, nor viral and contains no genetic material. Prions have been held responsible for a number of degenerative brain diseases.

**Propulsive gait:** Disturbance of gait typical of people with symptoms of Parkinson's in which, during walking, steps become faster and faster with progressively shorter steps that pass from a walking to a running pace and may precipitate falling forward.

**Resting tremor:** The tremor consists of a shaking or oscillating movement and usually appears when a person's muscles are relaxed, or at rest, hence the term *resting tremor*. The affected body part trembles when it is not performing an action. Typically, the fingers or hand will tremble when folded in the lap or when the arm is held loosely at the side (i.e., when the limb is at rest). The tremor usually ceases when a person begins an action (Parkinson's Disease Foundation [PDF], 2017).

**Shuffling gait:** Parkinson's disease symptom in which a person, when walking, takes small steps with the front of his or her feet sliding along on the ground and may also be leaning forward a bit.

## CARE SETTING

Community, as well as assisted living or long-term care

## RELATED CONCERNS

Dementias, page 851  
Extended/long-term care, page 896  
Multiple sclerosis (MS), page 311  
Pneumonia, page 147

## CLIENT ASSESSMENT DATABASE

DIAGNOSTIC DIVISION  
MAY REPORT

MAY EXHIBIT

### ACTIVITY/REST

- Tiredness, exhaustion, debilitating lack of energy that limits activities; may be worsened by emotional stress; may decrease after exercise
- Loss of energy
- Problems sleeping
- Problems with walking

- Sleep disturbances
- Shuffling gait, with forward-leaning (stooped) posture
- “Freezing” of gait

### EGO INTEGRITY

- Fear, anxiety, helplessness
- Stress in every area of life
- Avoiding doctor's appointments or refusing to take medication
- Expressing fear that people (friends, family, employers) will look at them differently

- Mood disorders (early nonmotor symptom)
- Trying to hide symptoms in the early stages

(continues on page 332)

**CLIENT ASSESSMENT DATABASE** (contd.)**MAY REPORT** (continued)**MAY EXHIBIT** (continued)**ELIMINATION**

- Constipation (early and common nonmotor symptom)
- Bladder problems (distressing nonmotor symptom)

**FOOD/FLUID**

- Difficulty chewing and swallowing
- Drooling and excess saliva
- Weight loss or gain
- Problems with indigestion

**NEUROSENSORY**

- Difficulty with memory, slowed thinking
- Tremor of body part (e.g., foot, arm) either at rest or when extended (often the first symptom)
- Action tremor (when movement is initiated such as writing or lifting a cup)
- Feeling of muscular quivering, an urge to move about constantly, and an inability to sit still
- Neck or limb stiffness
- Difficulty rising from seated position
- Difficulty maintaining an upright posture
- Problems with balance
- Dragging leg
- Hesitating before stepping forward (feel as if feet are glued to the floor)
- Problems with walking
- Falling
- Problems speaking (dystonia)
- Uncontrollable blinking (dystonia)
- Loss of sense of smell (early nonmotor symptom)

- Coughing or choking with swallowing
- Gurgly voice
- Weight loss

- Mental status changes ranging from confusion to (in some cases) dementia
- Resting tremor in hand or foot one side of body (about 70% experience this)
- Slight tremor of jaw or face or head
- Mask-like expression (facial expression is not animated)
- Akathisias (secondary motor symptom; see Glossary)
- Muscle rigidity affecting limbs, neck, and trunk
- Uncontrollable muscle spasms and contractions (dystonia)
- Muscle tightness of neck, shoulders, and legs
- Decreased range of motion related to continual stiffness
- Postural instability
- Swaying backward when rising from chair, standing, or turning
- Backward falling
- Difficulty pivoting, making turns, or quick movements
- Shuffling gait, with forward-leaning (stooped) posture
- Walking with short steps and without swinging arms
- “Freezing” of gait
- Unexpected accelerations (e.g., movements are too fast, not too slow), especially in movement and speech
- Softness of voice or slurred speech (caused by lack of muscle control [dystonia])
- Blepharospasm (type of dystonia that affects the eyes)

**PAIN/DISCOMFORT**

- Discomfort or pain associated with muscle rigidity

**SAFETY**

- Falls
- Skin problems (e.g., dry skin or scaling of face or scalp)
- Increased oily skin at the side of nose, forehead, and scalp
- *Seborrheic dermatitis*: greasy, scaly, and flaky skin similar in appearance to “cradle cap” seen with babies

**SEXUALITY**

- Sexual dysfunction associated with fatigue, embarrassment over physical changes, loss of desire
- Altered libido: Lower libido is typical, but hypersexuality can result from taking levodopa and dopamine agonists
- Erectile dysfunction in males; vaginal dryness (females)

**SOCIAL INTERACTION**

- Problems with communication
- Changes in family roles
- Withdrawal from social circles
- Feeling lonely, isolated

**TEACHING/LEARNING****DISCHARGE PLAN CONSIDERATIONS**

- May require assistance in ADLs and instrumental activities of daily living (IADLs), depending on individual situation
- May eventually need total care or placement in assisted living or extended-care facility

► Refer to section at end of plan for postdischarge considerations.

TEST WHY IT IS DONE	WHAT IT TELLS ME
<ul style="list-style-type: none"> <li>• <b>Positron emission topography (PET) scan:</b> Nuclear medicine technique enabling the estimation of physiological parameters (e.g., glucose metabolism and neuroreceptor binding). Provides 3D images of the brain.</li> <li>• <b>Single-photon emission computed tomography (SPECT):</b> Is used along with a radiolabeled compound that binds onto dopamine receptors in the brain.</li> <li>• <b>Olfactory system testing</b> (e.g., smelling a variety of odors and then making a choice from a variety of possible answers for each one)</li> <li>• <b>Brain imaging tests:</b> <ul style="list-style-type: none"> <li>• <b>Magnetic resonance imaging (MRI):</b> Technique that uses a magnet, radio waves, and a computer to produce images of the body.</li> <li>• <b>Computed tomography (CT) scan:</b> Uses x-rays and computers to produce images of inside of brain. <b>Note: Types of CT scans include positron emission tomography (PET) and single-photon emission tomography (SPECT).</b></li> </ul> </li> </ul>	<p>In research, the PET scan has increased understanding surrounding the differential diagnosis of PD, the progression of the disease, complications arising from dopamine-antagonist (DA) medications, and the nonmotor symptoms of the disease (Loane &amp; Politis, 2011).</p> <p>Allows for measurement of dopamine depletion, which is a hallmark of PD. The SPECT diagnosis has a sensitivity of 98% and specificity of 97% of clinical diagnosis (Peck, 2002).</p> <p>It is now well established that Parkinson's sufferers have impaired function of sense of smell. Therefore, impairments in this system can be an indicator of PD (Parkinson's.org, 2009).</p> <p>To date, conventional MRI cannot detect early signs of Parkinson's, although promising research is being reported (Oxford University, 2014; Pyatigorskaya et al, 2014).</p> <p>To date, the most frequently used imaging techniques are PET and SPECT scanning for PD biomarkers measuring dopaminergic dysfunction in the brain (Brücke et al, 2000).</p>

**NURSING PRIORITIES**

1. Maintain optimal functioning.
2. Assist with or provide for maintenance of ADLs.
3. Support acceptance of changes in body image, self-esteem, and role performance.
4. Provide information about disease process, prognosis, therapeutic needs, and available resources.

**DISCHARGE GOALS**

1. Remain active within limits of individual situation.
2. ADLs are managed by client and caregivers.
3. Changes in self-concept are acknowledged and being dealt with.
4. Disease process, prognosis, and therapeutic regimen are understood and resources identified.
5. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS: impaired physical Mobility/impaired Walking****May Be Related To:**

[Neurodegenerative disease]; neuromuscular or sensorioperceptual impairment

**Possibly Evidenced By**

Alteration in gait; postural instability; impaired balance; impaired vision

(continues on page 334)

## NURSING DIAGNOSIS: **impaired physical Mobility/impaired Walking** (continued)

Movement-induced tremor; slowed movement; difficulty turning  
Decrease in fine or gross motor skills  
Impaired ability to walk required distances

### Desired Outcomes/Evaluation Criteria—Client Will

#### Ambulation **NOC**

Maintain strength and function.  
Be able to move about within environment as needed or desired within limits of ability or with appropriate adjuncts.  
Participate in activities of daily living (ADLs) and desired activities.

#### Knowledge: Body Mechanics **NOC**

Verbalize understanding of situation, individual treatment regimen, and safety measures.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Exercise Therapy: Muscle Control **NIC**

##### Independent

Determine suspicion of/presence of diagnosis that contributes to impaired movement.

Parkinson's disease is considered a long-term degenerative disorder of the central nervous system that mainly affects the motor system. This condition can cause physiological and psychological problems that can seriously impact physical, social, and economic well-being.

Note client's age, developmental level, ease and capability of movement, posture, balance, tremor, and gait.

Aids in determining presence and characteristics of client's unique impairment and guides choice of interventions.

Note client reports of tightness, pain, and weakness, especially in the muscles and joints. Determine degree of functional impairment using 1 to 4 (or similar scale).

These PD symptoms affect client's ability to move and be active as desired. Using a scoring system helps identify client's current strengths and deficits (e.g., ability to ambulate with or without assistance) and points to safety issues and level of needed assistance.

Evaluate cognitive, behavioral, and emotional status.

Because PD is a neurodegenerative disease originating in the brain and central nervous system, some degree of impairment may be present in intellect, thought processes, and motivation. While physical impairments no doubt affect movement and involvement in desired activities, so too do apathy and depression. Cognitive problems include difficulty initiating projects, inability to follow complex instructions, short-term memory loss, and difficulty in switching gears midstream.

Ascertain presence and degree of fatigue. (For additional related interventions, refer to CP: Multiple Sclerosis (MS), ND: Fatigue.)

One of Parkinson's more insidious symptoms is fatigue. Fatigue may be described as profound, often varies from one day to the next or at different times during a given day and from one task to the next. The body is working overtime to accomplish the simplest of tasks (e.g., taking a shower, answering the phone, pouring milk). Fatigue has been shown to negatively affect quality of life and increase disability in persons with PD (Bruno & Sethares, 2015; Friedman et al, 2010). Different types of fatigue are described in PD: (1) central (attributed to subcortical dysfunction), (2) physical (from expending energy through motor tasks), (3) mental (experienced as a struggle to start and sustain mental tasks), and (4) peripheral (muscle fatigue or physiological process in which a muscle loses strength with repeated contractions) (Friedman et al, 2011).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Determine if client has lightheadedness when getting upright from lying-down or seated position, and check lying and standing blood pressure readings. Note history of falls.	Lightheadedness can contribute to functional impairments and falls. Note: Orthostatic hypotension is common in people with PD and can be severe with certain forms of the disease. Orthostatic hypotension can be caused by the disease itself or by the medications used to treat PD (Senelick, 2017).
Review medications with client and physician.	Because some drugs can cause severe orthostatic hypotension, physician may first try reducing dosage of some medicines or may switch client to another type of medicine. These changes may improve client's abilities to be upright and more active when needed/desired.
Note emotional responses and behavioral responses of client/SO to problems with mobility, especially walking.	These impairments can negatively affect self-esteem, self-concept, and independence. Social, occupational, and relationship roles can change, leading to isolation and economic consequences.
Assist with walking and ADLs as needed. Encourage self-care efforts, and provide client with ample time to perform mobility-related tasks. (For additional related interventions, refer to CP: Multiple Sclerosis (MS), ND: Self-Care Deficit (Specify).)	Client will require varying amounts of assistance depending on stage of disease and degree of impairment.
Implement fall precautions, for high-risk clients (e.g., advancing PD, frail, elderly, ill, visually or cognitively impaired).	To reduce risk of accidental injury and further loss of mobility and independence.
Encourage participation in social, occupational, diversional, and recreational activities.	Enhances self-concept and sense of independence.
Provide for and instruct client/SO in safety measures. Provide cueing, as indicated (e.g., lift foot higher, use walker as trained).	Safety issues will be determined by client's unique situation and may include strategies to improve concentration and focus on task at hand, as well as management of environment.
<b>Collaborative</b>	
Assist in evaluating function, as indicated using Unified Parkinson's Disease Rating Scale (UPDRS), Hoehn and Yahr Scale, Schwab and England Daily Activities Scale, Parkinson's Fatigue Scale (PFS), or similar scale.	These scales are used to monitor disease progression, as well as functional disabilities. Note: Neurologists use the UPDRS (especially the motor section) to follow the progression of a person's Parkinson's disease and measure benefits from a given therapy in a more unified and accepted rating system (Fahn et al, 1987).
Collaborate with/refer to physical medicine and rehabilitation specialists, including physical therapy, occupational therapy, psychologist.	Can help to design/implement interventions to help with balance and movement issues, as well as to identify and supply needed assistive devices and mobility aids.
Assist with treatment of the underlying condition causing dysfunction, such as:	To maximize client's potential for mobility and function.
Administer medications as indicated:	The goal of treatment in PD is to increase the levels of dopamine in the brain. The pharmacologic treatment of PD can be further divided into neuroprotective and symptomatic therapy. Note: Medications for nonmotor symptoms (e.g., depression, sleep disorders, dementia) are not included here.
Dopamine agonists: for example, Sinemet (L-dopa, Levodopa/Carbidopa), amantadine (Symmetrel), and deprenyl (Eldpryl, Jumex)	These drugs improve PD symptoms by increasing the amount of the brain chemical dopamine or by slowing down the breakdown of dopamine. Note: Levodopa is the most commonly prescribed (and most effective) drug for controlling PD symptoms of bradykinesia and rigidity. Note: Accumulating clinical trial data suggest that levodopa either slows the progression of PD or has a prolonged benefit even after the drug has been stopped (Tarsy, 2016).

(continues on page 336)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Anticholinergic drugs: for example, trihexyphenidyl (Artane) and benzotropine (Cogentin)	These drugs decrease the action of the nerve chemical acetylcholine, helping to reduce rigidity and tremor.
CNS stimulants: for example, modafinil (Provigil), CNS stimulant plus dopamine antagonist (methylphenidate [Ritalin, Concerta]), and monoamine oxidase type B inhibitors (e.g., selegiline [Eldepryl], rasagiline [Azilect])	These agents may be given to improve energy and combat fatigue.
Prepare client for other interventions (e.g., placement of deep brain stimulation electrodes, pallidotomy, thalamotomy).	Neurostimulation or precise destruction of a very small area in a deep part of the brain may be desired to improve client's quality of life when medications are not able to control distressing PD symptoms such as tremors or dystonia. Note: Studies have shown that with deep brain stimulation (DBS), most patients with PD are able to reduce both symptoms and medication dosages, which can decrease adverse reactions. DBS for essential tremors can reduce hand tremors by 60% to 90% and may improve head and voice tremors. DBS for dystonia may be one of the most effective treatments of symptoms (Katz et al, 2015).

## NURSING DIAGNOSIS: **impaired Swallowing**

### May Be Related To:

Neurological problems: conditions associated with hypotonia; facial paralysis; decreased or absent gag reflex; decreased or absent excursion of muscles involved in mastication (chewing)

### Possibly Evidenced By

Incomplete lip closure; insufficient chewing; food pushed out of or falls from mouth  
 Difficult, delayed, or repetitive swallowing; inability to clear oral cavity  
 Coughing, choking, or gaging before or during a swallow  
 Gurgly voice quality; drooling  
 Fevers of unknown etiology; recurrent pulmonary infection

### Desired Outcomes/Evaluation Criteria—Client Will

#### Swallowing Status NOC

Pass food and fluid safely from mouth to stomach.  
 Achieve or maintain desired body weight.  
 Be free of complications, such as dehydration, or aspiration of food or fluid.

### Desired Outcomes/Evaluation Criteria—Client/Caregiver Will

#### Risk Control: Aspiration NOC

Verbalize understanding of causative or contributing factors.  
 Demonstrate feeding methods appropriate to individual situation.  
 Demonstrate emergency measures in the event of choking.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Swallowing Therapy NIC</b> <i>Independent</i> Assess client/SO for history/presence of swallowing problems, for example: <ul style="list-style-type: none"> <li>• Problems getting food or liquids to go down on the first try</li> <li>• Feeling that food is getting stuck</li> <li>• Gagging, choking, or coughing when swallowing</li> <li>• Having food or liquids come back up through throat, mouth, or nose after swallowing</li> <li>• Losing weight because of swallowing difficulties</li> <li>• Refusing to eat</li> </ul>	Difficulty swallowing (dysphagia) can happen at any stage of Parkinson's disease. Signs and symptoms can range from mild to severe. Note: The leading cause of death in Parkinson's is aspiration pneumonia due to swallowing disorders (Clucci, 2013).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Note presence of abnormal voice (dysphonia) and speech articulation (dysarthria).	These are signs of motor dysfunction of the structures involved in oral and pharyngeal swallowing (common in PD).
Assess client's cognitive and sensory-perceptual status.	Sensory awareness, orientation, concentration, and motor coordination affect desire and ability to swallow safely and effectively.
Note presence of constant drooling.	Excess saliva is common problem with PD and can increase incidence of choking and aspiration.
Ascertain presence/strength of gag reflex.	Diminished or absent gag reflex increases client's potential for aspiration (overt or silent).
Review client's medication timing.	If client is taking medications for PD, waiting to eat until after the medication has taken effect (usually 1 hour) can improve function of eating as well as swallowing.
Assess skin and mucous membranes, urinary output, and weight.	Helps evaluate hydration and nutrition status. Dry skin/mucous membranes and scant urine output indicate that client is dehydrated. Declining weight (along with small oral intake) most likely means that client is not eating enough.
Observe client during the act of swallowing (e.g., with a few ounces of tap water) if possible.	In normal persons, swallowing is initiated promptly, and no significant amount of material is retained after a swallow. Drooling, delayed swallow initiation, coughing, throat clearing, or a change in voice quality may indicate a swallowing problem in the person with PD (Palmer et al, 2000).
Listen for coughing (even when not eating), gurgly voice, constant clearing of throat. Auscultate breath sounds, noting presence of crackles.	These signs are associated with aspiration, with the potential for pneumonia.
Be alert to client's refusing to eat or isolating when eating.	Tremors and difficulty swallowing can cause client to refrain from eating, affecting client's nutrition status, general health, and social interactions.
Implement behaviors/techniques to assist with swallowing and reduce risk of aspiration, for example:	
Provide cognitive clues, where indicated.	Reminding client with cognitive impairments to chew and swallow may enhance concentration on the tasks and performance of the swallowing sequence.
Sitting upright for meals and staying upright for 30 to 45 minutes after meals, where possible.	Reduces risk of regurgitation and aspiration.
Allow ample time for eating/feeding.	May help reduce fatigue and frustration with the process.
Manage size of bites. Cut all solids into smaller bites.	Small bites of $\frac{1}{2}$ tsp or less are usually easier to swallow.
Provide the consistency of fluids and foods that client can most easily swallow. Incorporate client's food preferences where possible.	A person can usually receive adequate oral hydration with thin or thick liquids. However, client may be limited to fluids and foods of pudding consistency if liquids are freely aspirated. Incorporating favorite foods can enhance intake. Note: Most individuals with significant dysphagia are unable to eat meats or similarly chewy foods safely. For this reason, they require a mechanical soft diet (Palmer et al, 2000).
Instruct client and/or SO(s) in emergency measures in event of choking.	To help prevent aspiration or more serious complications.
<b>Collaborative</b>	
Prepare for/assist with diagnostic testing of swallowing activity.	Various studies may be done (e.g., chest x-ray; reflex cough test, swallowing electromyography; transnasal or esophageal endoscopy; video-fluorographic swallow studies) to identify the pathophysiology and effects of swallowing disorder.

(continues on page 338)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Consult with dysphagia specialist/refer for swallow therapy, if indicated.	Swallow therapy can be divided into three types: compensatory techniques (i.e., postural maneuvers), indirect therapy (exercises to strengthen swallowing muscles), and direct therapy (exercises to perform while swallowing). Maintaining oral feeding often requires compensatory techniques to reduce aspiration or improve pharyngeal clearance.
Consult with nutritionist/dietician as needed.	To establish optimum dietary plan and adjust as needed.
Refer to rehabilitation specialists as indicated.	These professionals initiate interventions (e.g., facial exercises, postures that enhance swallowing) and can provide assistive devices to improve client's feeding abilities and safety with swallowing.

### NURSING DIAGNOSIS: risk for chronic Confusion

#### Possibly Evidenced By

Progressive alteration in cognitive function; alteration in interpretation or response to stimuli  
Alteration in alteration in short-term or long-term memory  
Impaired social functioning; alteration in personality

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Dementia Level NOC

Remain safe and free from harm.  
Maintain usual level of orientation.

#### Desired Outcomes/Evaluation Criteria—Family/Significant Other/Caregiver Will

##### Knowledge: Dementia Management NOC

Verbalize understanding of the disease process, prognosis, and client's needs.  
Provide for maximal independence while meeting the safety needs of the client.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Dementia Management NOC</b> <i>Independent</i>	
Perform mental status screening (e.g., reality orientation, memory, attention span, interpretation of visual information, style and content of speech).	While the main symptoms of PD are movement related, continued damage to the brain can lead to secondary symptoms, including progressing confusion, memory loss, and dementia. Note: An estimated 50% to 80% of those with Parkinson's eventually experience dementia as their disease progresses. The average time from onset of Parkinson's to developing dementia is about 10 years (alz.org, n.d.). When severe, dementia often surpasses the motor features of PD as a major cause of disability and mortality (Rodnitzky, 2017).
Talk with significant others (SOs) regarding baseline behaviors, length of time since onset, and progression of problem and other pertinent information and concerns for the client.	If the history reveals an insidious decline over months to years, and if abnormal perceptions, inattention, and memory problems are concurrent with confusion, a diagnosis of dementia is probable.
Involve family/SOs in planning and care activities as needed/desired. Maintain frequent interactions with SOs.	Helps in relaying information, implementing care strategies, addressing safety issues, and promoting social support.
Provide educational materials and identify appropriate community resources.	Provides client/SO with support, assists in problem-solving and coping with long-term care and life issues.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<p><b>Collaborative</b> Refer for and collaborate in in-depth testing and treatment strategies, as appropriate.</p>	<p>Cognitive impairment and dementia pose particular challenges in the management of patients with Parkinson's disease (PD). Recent studies have focused on understanding not only PD dementia but also the mild cognitive impairment often present in PD, which may represent a prodromal (early symptoms) stage for dementia (Goldman &amp; Weintraub, 2015). Distinguishing the type of dementia present in the person with PD is often difficult (and sometimes not possible except at autopsy). There are two sets of clinical symptoms that occur in both Parkinson's disease dementia (PDD) and dementia with Lewy bodies (DLB): those affecting the body and those affecting the brain. Both types of dementia are characterized by the presence of Lewy bodies in the brain. However, the biggest difference between PDD and DLB is the order of onset of the cognitive symptoms. Thus, a person who has PD with motor problems for 1 year or more before developing dementia is classified as having PD (not Lewy body) dementia (Heerema, 2017; Khul, 2014).</p>

\*\*\*\*For additional related assessments and interventions, refer to CP: Dementias.

**POTENTIAL CONSIDERATIONS** (dependent on client's age, physical condition, presence of complications, personal resources, and life responsibilities)

- **impaired verbal Communication**—central nervous system impairment
- **risk for Trauma**—weakness, poor vision, balancing difficulties, reduced sensation, reduced muscle or hand-eye coordination, cognitive or emotional difficulties, economically disadvantaged
- **impaired Home Maintenance**—disease, impaired functioning, insufficient finances, unfamiliarity with neighborhood resources, inadequate support
- **ineffective Health Management**—economic difficulties, family conflict, social support deficit
- **risk for caregiver Role Strain**—chronic illness, alteration in cognitive functioning in care receiver; extended duration of caregiving required; insufficient caregiver respite/recreation

# CHAPTER 5

## Gastrointestinal Disorders

### UPPER GASTROINTESTINAL BLEEDING

#### I. Pathophysiology

Upper gastrointestinal (GI) bleeding includes hemorrhage originating from the esophagus to the ligament of Treitz (connective tissue surrounding the celiac artery and superior mesenteric artery) and is commonly defined as bleeding arising from the esophagus, stomach, or duodenum. Variceal bleeding often arises from esophageal or gastric varices from the coronary vein or short gastric veins in portal hypertension.

#### II. Etiology

- a. Peptic ulcers are localized erosions of the innermost mucosal layer of the digestive tract and remain the most common cause of upper GI bleeding (Cerulli & Iqbal, 2016; Wilkins et al, 2011).
- b. Duodenal ulcers affect the upper part of the small intestine (more common than gastric ulcers in the United States). Duodenal ulcers are more likely to erode into large vessels, causing more severe bleeding (Wang et al, 2010; Wilkins et al, 2011).
- c. Gastric ulcers affect the lining of the stomach. Five types of gastric ulcers occur, based on their location and acid-secretory status (Cerulli & Iqbal, 2016).
- d. With the increased prevalence of bariatric surgery, anastomotic or ischemic ulcers were common at one time. Although GI bleeding following gastric bypass surgery is now rare, it can occur, usually originating in the esophagus, gastric pouch, and Roux limb just distal to the anastomosis (Pandolfino et al, 2004). Recently, preoperative assessment of gastric bypass candidates often includes endoscopy to assess for the presence of *Helicobacter pylori* ulcer disease and will be treated if *H. pylori* is the diagnosis (Chen & Freeman, 2011).
- e. Common causes of ulcers include infection with *Helicobacter pylori*; alcohol, aspirin, and aspirin-containing medicines; and various other medicines, such as nonsteroidal anti-inflammatory drugs (NSAIDs).

- f. Tear in the mucosa at the gastroesophageal junction (Mallory-Weiss tears) can occur because of severe vomiting, trauma, or seizures.
- g. Hemorrhagic gastritis or stress ulceration can occur because of severe physiological stress, such as trauma, burns, surgery, or alcohol abuse (Anand, 2017).
- h. Esophageal varices are generally associated with alcoholic or posthepatitis (B or C) cirrhosis of the liver; between 25% and 40% of such patients experience hemorrhage (Runyon, 2016).
- i. Esophageal or gastric cancer
- j. Hiatal hernia, hemophilia, leukemia, and disseminated intravascular coagulation (DIC) are less common causes of upper gastrointestinal bleeding (UGIB).
- k. An aortoenteric fistula (erosion of a segment of the aorta into an adjacent portion of the GI tract) is a rare but life-threatening form of upper or lower GI bleeding associated with abdominal aortic aneurysm (Doney & Vilke, 2012).

#### III. Statistics

- a. Morbidity: Upper gastrointestinal bleeding is twice as common in men as in women and increases in prevalence with age (Wilkins et al, 2011). Researchers found no change in the annual incidence of upper gastrointestinal hemorrhage (UGIH) between 1989 and 2009. However, length of hospital stay decreased from 4.52 days in 1989 to 2.85 days in 2009 (Kling, 2012).
- b. Mortality: Between 1989 and 2009, there was a steady decrease in the overall mortality rate of upper GI hemorrhage (4.69% in 1989 to 2.13% in 2009) for both variceal and nonvariceal bleeding, although variceal bleeding mortality remained higher than nonvariceal bleeding mortality rates (Kling, 2012).
- c. Cost: The overall economic burden of UGIH increased from \$3.279 billion in 1989 to \$7.636 billion in 2009 (Kling, 2012).

## G L O S S A R Y

**Esophageal varices:** Veins in esophagus and stomach become engorged and fragile due to high blood pressure in the portal vein.

**Gastrin:** Hormone secreted by the stomach into the gastric venous circulation to stimulate the stomach glands to release gastric acid.

**Gastroesophageal reflux disease (GERD):** Disorder in which there is recurrent backflow of stomach contents into the esophagus, frequently causing heartburn and possibly leading to esophageal ulcer formation.

**Gastrointestinal bleeding (sometimes called GI bleed, may be upper or lower)—upper GI bleed may be designated (UGIB) or upper gastrointestinal hemorrhage (UGIH):** Refers to bleeding in the upper gastrointestinal tract, commonly defined as bleeding arising from the esophagus, stomach, or duodenum.

**Helicobacter pylori infection (*H. pylori*):** Most common chronic bacterial infection in humans and now recognized to be an important cause of gastric and duodenal ulcers.

**Hematemesis:** Bloody vomitus, whether fresh or partially digested (“coffee-ground” emesis). Hematemesis very strongly suggests an upper GI source of bleeding.

**Hematochezia:** Sometimes used (incorrectly) as a synonym for lower GI bleeding. The term means literally “to defecate blood” and refers to the passage of blood that still resembles blood—that is, it is red or maroon and recognizable to the person as blood.

**Melena:** Black, tarry feces due to digestion of blood in stool and suggests an upper GI source of bleeding.

**Peptic ulcer disease:** Peptic ulcers are eroded areas that form in the lining of the gastrointestinal tract. They usually occur in the stomach duodenum. The two primary causes of peptic ulcers are infection with specific bacteria (*H. pylori*) and use of NSAID medications.

**Portal hypertension:** Obstruction of portal vein due to hardening of liver from cirrhosis, causing venous blood from intestines and spleen to seek alternate routes to right atrium.

**Sclerosant:** An injectable irritant used to treat varices by producing thrombi in them.

## CARE SETTING

Generally, a client with severe, active bleeding is admitted directly to a critical care unit; however, a client may develop GI bleeding on the medical-surgical unit or be admitted there for evaluation or treatment of subacute bleeding.

\*\*\*\*This care plan also addresses ulcers as an etiology for bleeding; thus, general ulcer care and gastritis care are included in interventions. This client will be followed in the community.

## RELATED CONCERNS

Cirrhosis of the liver, page 494  
 Fluid and electrolyte imbalances, see DavisPlus  
 Gastrectomy/gastric resection, see DavisPlus  
 Psychosocial aspects of care, page 835

## CLIENT ASSESSMENT DATABASE OF CLIENT WITH ACTIVE BLEEDING

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- Weakness, fatigue

- Tachycardia
- Tachypnea, hyperventilation in response to activity

#### CIRCULATION

- Palpitations
- Dizziness with position change

- Hypotension, including postural
- Tachycardia, dysrhythmias related to hypovolemia and hypoxemia
- Weak and thready peripheral pulse
- Capillary refill slow or delayed due to vasoconstriction
- Mental status changes, confusion (if blood loss is severe)
- **Skin color:** Pallor, cyanosis depending on the amount of blood loss
- Skin and mucous membrane moisture exhibiting diaphoresis reflecting shock state, acute pain, and possible emotional reactions

(continues on page 342)

**CLIENT ASSESSMENT DATABASE (contd.)****MAY REPORT (continued)****MAY EXHIBIT (continued)****EGO INTEGRITY**

- Acute or chronic stress factors due to finances, relationship, or employment
- Feelings of helplessness

**ELIMINATION**

- Change in usual bowel patterns and characteristics of stool

- Signs of anxiety, such as restlessness, pallor, diaphoresis, narrowed focus, trembling, quivering voice

**NEUROSENSORY**

- Fainting, dizziness, lightheadedness, or weakness

- Abdominal tenderness, distention
- Bowel sounds are often hyperactive during bleeding, hypoactive after bleeding subsides.
- Coffee-ground-like emesis
- **Character of stool:** Diarrhea; dark or bright red bloody; tarry; constipation may occur due to changes in diet or antacid use.
- Hematochezia (clots, bright red or maroon-colored blood from rectum) may be seen if upper GI bleeding is massive.
- Urine output may be decreased or concentrated.

**PAIN/DISCOMFORT**

- Pain described as sharp, dull, burning, gnawing, sudden, excruciating (perforation)
- Nocturnal pain experienced by many
- Vague sensation of discomfort or distress following large meals and relieved by food (acute gastritis)
- Left to midepigastic pain that can radiate to the back, often accompanied by vomiting after eating and relieved by antacid (gastric ulcers)
- Localized right to midepigastic pain, gnawing, burning, occurring about 2 to 3 hours after meals when stomach is empty and relieved by food or antacids (duodenal ulcers)
- Midepigastic pain and burning with regurgitation, seen frequently with chronic GERD
- Absence of pain seen frequently with esophageal varices
- Elderly more likely to be asymptomatic and present with a decreased appetite and weight loss

- **Mental status:** Level of consciousness (LOC) may be altered, ranging from slight drowsiness, disorientation, and confusion to stupor and coma.

- Facial grimacing
- Guarding of affected area
- Narrowed focus

**SAFETY**

- History of previous hospitalizations for GI bleeding or related GI problems, such as peptic or gastric ulcer, gastritis, gastric surgery, irradiation of gastric area
- Recent, current, or chronic use of prescription or over-the-counter (OTC) drugs containing acetylsalicylic acid (ASA) or NSAIDs such as meloxicam (Mobic), piroxicam (Feldene).  
*Note: NSAIDs are leading cause of drug-induced GI bleeding.*
- Previous or current use of clopidogrel (Plavix), warfarin (Coumadine), or selective serotonin reuptake inhibitor (SSRI) antidepressants, such as escitalopram (Lexapro), sertraline (Paxil)
- Use of corticosteroids
- Chronic use of alcohol or recreational drugs

## MAY REPORT (continued)

## MAY EXHIBIT (continued)

**DISCHARGE PLAN CONSIDERATIONS**

- May require changes in therapeutic and medication regimens
- ▶ Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****TEST  
WHY IT IS DONE****WHAT IT TELLS ME****DIAGNOSTIC STUDIES**

- ***Esophagogastroduodenoscopy (EGD):*** Allows direct visualization and therapeutic treatment of abnormal conditions of esophagus, stomach, and duodenum.

Procedure of choice for evaluation of upper GI structures and function and allows for the possibility of a therapeutic intervention (stomach biopsy, hemostatic therapy for bleeding ulcers and esophageal varices). Studies showed an increase in the proportion of both inpatient diagnostic and therapeutic endoscopies (total endoscopy rate increased from 69% to 85%), and among total endoscopies, therapeutic endoscopies increased from 2% to 27% between 1989 and 2009 (Kling, 2012). *Note:* Urgent endoscopy is indicated when patient presents with hematemesis, melena, or postural changes in blood pressure.

- ***H. pylori tests:*** Four tests are available: blood antibody test, urea breath test, stool antigen test, and stomach biopsy.

Determines whether an infection with *H. pylori* bacteria may be causing an ulcer or irritation of the stomach lining. *Note:* Rapid urease tests for detection of *H. pylori* are considered the diagnostic test of choice and are performed at time of gastroscopy with biopsy (Anand, 2017). However, the stool antigen is a less expensive test to see if substances that trigger the immune system to fight an *H. pylori* infection are present in feces (stool). *Note:* The *H. pylori* infection rate in the United States is between 20% and 30%, but it is higher in Hispanics, African Americans, and the elderly (Wedro, 2016).

- ***Occult blood/guaiac testing:*** Used to evaluate the contents of the rectum for occult blood when the presence of melena or hematochezia is in doubt.

The test can be positive for up to 2 weeks after a bleed, and its lack of specificity for acute bleeding means that it is generally more useful in the diagnosis of chronic occult bleeding. *Note:* The ingestion of some foods (e.g., red meat) may lead to false-positive occult blood testing (Fletcher, 2001).

- ***CT scan and ultrasonography***

May be indicated for evaluation of liver disease with cirrhosis, cholecystitis with hemorrhage, and other potential sources of upper GI bleeding, when hemorrhage does not originate in the stomach or duodenum (Frattaroli et al, 2009).

- ***Nasogastric lavage (NGL):*** Insertion of a large-bore flexible tube through the nose down into the stomach, where saline is used to rinse blood from stomach and suction applied to empty stomach contents.

Gastric lavage is commonly performed to clear the stomach of blood, increasing the success of endoscopic localization of the source of bleeding. May confirm recent bleeding (coffee ground appearance), active bleeding (red blood in the aspirate that does not clear), or a lack of blood in the stomach (active bleeding less likely but does not exclude an upper GI lesion below the stomach) (Cerulli & Iqbal, 2016).

(continues on page 344)

## DIAGNOSTIC STUDIES (contd.)

### WHY IT IS DONE (continued)

### WHAT IT TELLS ME (continued)

#### BLOOD TESTS

- **Complete blood count (CBC):** Battery of screening tests that typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; white blood cell (WBC) count and differential. Serial CBC or hemoglobin and hematocrit (H&H) tests should be performed to look at trending of values.
- **Blood urea nitrogen (BUN):** Determines presence of end products or breakdown of blood in GI tract.

CBC will indicate whether client is anemic (low Hgb) and will also give an idea of the extent of the bleeding (Hgb and Hct) and how chronic it may be. RBC count and platelets may be decreased. WBC count may be elevated, reflecting the body's response to injury. CBC also aids in establishing blood and fluid replacement needs and monitoring effectiveness of therapy. Note: Hct levels may not accurately reflect blood loss for at least 24 hours after acute bleeding begins.

Elevated within 24 to 48 hours as blood proteins are broken down in the GI tract and kidney filtration is decreased. BUN greater than 40 with normal creatinine level indicates major bleeding. BUN should return to client's normal level approximately 12 hours after bleeding has ceased.

#### NURSING PRIORITIES

1. Control hemorrhage.
2. Achieve and maintain hemodynamic stability.
3. Promote stress reduction.
4. Provide information about disease process and prognosis, treatment needs, and potential complications.

#### DISCHARGE GOALS

1. Hemorrhage curtailed.
2. Hemodynamically stable.
3. Anxiety and fear reduced to manageable level.
4. Disease process and prognosis, therapeutic regimen, and potential complications understood.
5. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: **deficient Fluid Volume**

#### May Be Related To

Active fluid loss (hemorrhage), gastric intubation

#### Possibly Evidenced By

Decrease in blood pressure, pulse pressure/volume, venous filling  
Dry skin/mucous membranes  
Decrease in urine output  
Thirst, weakness

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Blood Loss Severity NOC

Be free of signs of bleeding in GI aspirate or stools, with stabilization of Hgb and Hct.

Identify individual risk factors and engage in appropriate behaviors or lifestyle changes to prevent or reduce frequency of bleeding episodes.

#### Hydration NOC

Demonstrate improved fluid balance as evidenced by individually adequate urinary output with normal specific gravity, stable vital signs, moist mucous membranes, good skin turgor, and prompt capillary refill.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bleeding Reduction: Gastrointestinal</b> <b>NIC</b> <i>Independent</i> Note color and characteristics of vomitus, nasogastric (NG) tube drainage, and stools.	The first step in managing bleeding is to determine its location. Bright red blood that does not clear signals recent or acute arterial bleeding, perhaps caused by gastric ulceration; dark red blood may be old blood that has been retained in intestine or venous bleeding from varices. Coffee-ground appearance is suggestive of partially digested blood from slowly oozing area. Undigested food indicates obstruction or gastric tumor. In a rapid upper GI bleed, stool color may be red or maroon because of rapid transit time through the GI tract.
Monitor vital signs; compare with client's normal and previous readings. Take blood pressure (BP) in lying, sitting, and standing positions when possible.	Changes in BP and pulse may be used for rough estimate of blood loss; BP less than 90 mm Hg and pulse greater than 110 with postural hypotension suggest a 15% to 35% decrease in volume, or approximately 1000 mL. Note: Heart rate may not rise above normal until up to 30% of total blood volume is lost (Kolecki & Menckhoff, 2016).
Note client's individual physiological response to bleeding, such as changes in mentation, weakness, restlessness, anxiety, pallor, diaphoresis, and tachypnea.	Symptomatology is useful in gauging severity and length of bleeding episode. Worsening of symptoms may reflect continued bleeding, inadequate fluid replacement, and shock. Note: If client's mental status or breathing is impaired, endotracheal intubation and mechanical ventilation may be needed for airway protection.
Measure central venous pressure (CVP) if available.	Reflects circulating volume and cardiac response to bleeding and fluid replacement. CVP values between 5 and 20 cm H <sub>2</sub> O usually reflect adequate volume.
Monitor intake and output (I&O) and correlate with weight changes. Measure blood and fluid losses via emesis, gastric suction or lavage, and stools.	Provides guidelines for fluid replacement.
Keep accurate record of subtotals of solutions and blood products during replacement therapy.	Potential exists for overtransfusion of fluids, especially when volume expanders are given before blood transfusions.
Maintain bedrest, if indicated; prevent vomiting and straining at stool.	Activity and vomiting increase intra-abdominal pressure and can predispose to further bleeding.
Note signs of renewed bleeding after cessation of initial bleed.	Increased abdominal fullness and distention, nausea or renewed vomiting, and bloody diarrhea may indicate return of bleeding.
Observe for secondary bleeding from nose or gums, oozing from puncture sites, or appearance of ecchymotic areas following minimal trauma.	Loss of or inadequate replacement of clotting factors may precipitate development of a clotting disorder (such as disseminated intravascular coagulation [DIC]).
<b>Collaborative</b> Prepare for urgent endoscopy.	Indicated within 24 hours of acute UGIB for diagnosis and intervention when client presents with hematemesis, melena, or postural changes in blood pressure.
Monitor laboratory studies: Hgb, Hct, RBC count, and BUN/Cr levels.	Aids in establishing blood replacement needs and monitoring effectiveness of therapy; for example, 1 unit of whole blood should raise Hct two to three points. Levels may initially remain stable because of loss of both plasma and RBCs. Note: Levels may not accurately reflect early or sudden blood loss, and low baseline levels may indicate preexisting anemia. BUN greater than 40 with normal creatinine level indicates major bleeding. BUN should return to client's normal level approximately 12 hours after bleeding has ceased.

(continues on page 346)

**ACTIONS/INTERVENTIONS (continued)**

Administer intravenous (IV) fluids or volume expanders, as indicated:

Fresh whole blood or packed RBCs

Platelets

Fresh-frozen plasma (FFP)

Insert and maintain large-bore NG tube in acute bleeding.

Perform gastric lavage with cool or room-temperature saline until aspirate is light pink or clear and free of clots. Simultaneous low-pressure gastric suctioning and continuous saline infusion through the air port of a Salem sump tube may also be used.

Administer medications, as indicated, such as acid suppressors:

Proton pump inhibitors (PPIs), such as omeprazole (Prilosec), lansoprazole (Prevacid), rabeprazole (Aciphex), pantoprazole (Protonix), and esomeprazole (Nexium), administered by appropriate route (e.g., may initially be IV followed by oral long-term therapy)

**RATIONALE (continued)**

Either colloid or crystalloid solutions may be used to achieve volume restoration prior to administering blood products. Note: A Cochrane review demonstrated no statistical difference between crystalloids and a wide range of colloids (hydroxyethyl starch, modified gelatins, dextrans, and colloid in hypertonic crystalloid). This review also showed no difference in outcomes between the use of 4.5% human albumin solution and normal saline in the resuscitation of critically ill ICU patients (Cerulli & Iqbal, 2016; SIGN, 2008). Note: Use of lactated Ringer's solution may be contraindicated in the presence of hepatic failure because metabolism of lactate is impaired and lactic acidosis may develop.

Most gastric bleeding can be managed without transfusion of blood products. Fresh whole blood is indicated only for acute bleeding with severe circulating volume or RBC depletion and Hgb <7 because stored blood may be deficient in clotting factors. Packed red blood cells (PRCs) are adequate for stable clients with subacute or chronic bleeding to increase oxygen-carrying capability. Note: PRCs are preferred for clients with heart failure (HF) to prevent fluid overload.

Platelets are given to correct deficits in platelet number and clotting function. Clotting factors and blood components are depleted by two mechanisms: hemorrhagic loss and the clotting process at the site of bleeding.

FFP is an excellent source for clotting factors. Administered to clients with coagulation deficiencies who are bleeding or about to undergo an invasive procedure.

Provides route for removing blood and clots, reduces nausea and vomiting, and facilitates diagnostic endoscopy.

Flushes out and breaks up clots and may reduce bleeding by local vasoconstriction. Facilitates visualization by endoscopy to locate bleeding source. Note: There is lack of definitive research to show that iced saline is more effective than room-temperature solution in controlling bleeding, although it persists in practice today. Recent authors argue against iced saline as best practice as "it does not slow bleeding, is uncomfortable and can lower core body temperature" (Anand & Pruthi, 2012). Although controversy also exists as to whether benefit is obtained from **any** gastric lavage (other than improving endoscopy view), consensus seems to support its use (Sood & Cho, 2007).

Acid suppression is the general pharmacologic principle of medical management of acute bleeding from a peptic ulcer. Reducing gastric acidity is believed to improve hemostasis primarily through the decreased activity of pepsin in the presence of a more alkaline environment. Two classes of acid-suppressing medications currently in use are proton pump inhibitors and histamine-2 receptor antagonists.

Immediate initiation of intravenous PPIs is highly recommended in medical practice until the cause for bleeding has been determined by endoscopy (Wilkins et al, 2011). PPIs are also highly effective after GI bleed to reduce recurrence of bleeding (Cerulli & Iqbal, 2016; Chen & Freeman, 2011).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Somatostatin analogues: for example, octreotide (Sandostatin) and vaptoreotide (Sanvar)	Helps control esophageal bleeding by decreasing blood flow to the gut, thereby lowering pressure to the portal system. These drugs have been shown to be more useful as adjuncts after endoscopy than gastric acid secretion suppression. Somatostatins have also proven useful in the treatment of nonvariceal bleeding, particularly in the presence of peptic ulcer disease (Campbell, 2008).
Vitamin K	May be used for bleeding caused by coagulation disorder such as prothrombin deficiency.
Vasopressin (Pitressin)	Administration of intra-arterial vasoconstrictors may be needed in severe, prolonged bleeding in varices. Note: Effects of Pitressin are systemic, whereas octreotide is more regional.
Anti-infectives, such as metronidazole (Flagyl), amoxicillin (Amoxil), and clarithromycin (Biaxin)	Oral antimicrobials are generally combined with PPIs or histamine blockers to treat <i>H. pylori</i> infections causing chronic gastritis or peptic ulcers.
Assist with and prepare client for GI procedure, such as the following:	There are a number of endoscopic therapies in current use. Newer endoscopic therapies being implemented include over-the-scope clipping (OTSC) of ulcers, ablation cryotherapy, hemostatic sprays and glues, and esophageal stents. Some of these therapies are awaiting final approval in the United States while others are being tested in larger gastroenterology practice centers (Sauer, 2016).
EGD with control of GI bleed, such as:	Hemostasis clips are applied directly to bleeding site, closing bleeding vessel. Note: Early endoscopy is associated with an overall lower cost of care, shortened hospital stays, and improved outcomes. In fact, some clients may be discharged directly home after endoscopy is performed in the ED.
Injection therapies	Epinephrine 1:10,000 causes vasoconstriction when injected directly into bleeding site. Epinephrine injection alone is generally not adequate but has been shown to be more effective when combined with banding or thermal coagulation (Chen & Freeman, 2011).
Thermal coagulation	The objective of thermal coagulation is to ablate the bleeding blood vessel while minimizing damage to underlying and surrounding tissues to prevent complications such as perforation (Chen & Freeman, 2011).
Endoscopic variceal ligation (EVL)/banding	Performed during endoscopy, this banding technique is considered the definitive treatment to control active variceal hemorrhage (Cerulli & Iqbal, 2016). EVL avoids the use of sclerosant and thus eliminates the deep damage to the esophageal wall that can occur after endoscopic sclerotherapy (ES) (Goff, 2015).
Endoscopic injection sclerotherapy (EIS)	Performed during endoscopy, an irritating (sclerosing) agent is injected into varices to stop bleeding and prevent recurrence after initial bleeding is controlled. Esophageal varices are most effectively treated with band ligation with small elastic rubber bands or sclerotherapy with agents (e.g., ethanolamine [Ethamolin], polidocanol [Asclera], sodium tetradecyl sulfate [Sotradecol]). Fundic gastric varices are treated with endoscopic injection of tissue adhesives (e.g., N-butyl-2-cyanoacrylate [Histoacryl]) to close off large variceal complexes, as band ligation is not effective (Anand, 2017; Chen & Freeman, 2011).

(continues on page 348)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Balloon tamponade	Short-term intervention (when endoscopic hemostasis and vasoconstrictor therapy are not available [or are ineffective] to treat variceal hemorrhage) using Sengstaken-Blakemore tube to compress varices, reduce esophageal blood flow, or protect airway in patient with uncontrolled bleeding (Campbell, 2008; Treger, 2016).
Electrocoagulation or photocoagulation (laser) therapy	Provides direct coagulation of bleeding sites, such as those due to gastritis, duodenal ulcer, tumor, and esophageal (Mallory-Weiss) tear.
Radiological interventions, such as transjugular intrahepatic portosystemic shunt (TIPS)	Shunting procedures may be required for acute variceal bleeding that cannot be successfully controlled with medical treatment, including sclerotherapy. TIPS placement is an effective means of lowering portal venous pressure and thereby controlling acute and recurrent variceal bleeding in about 90% of clients. Unlike surgically placed shunts, TIPS does not alter the extrahepatic anatomy; therefore, it is a feasible nonsurgical alternative in many people (Boyer and Haskal, 2010; Novelli et al, 2017).
Surgical intervention (e.g., partial or total gastrectomy; shunt procedures)	When endoscopic therapy fails to stop ongoing ulcer or variceal bleeding, emergency surgery may be necessary. Surgery currently is reserved for perforations, clients who have failed nonsurgical treatment, and those who remain hemodynamically unstable despite aggressive resuscitation (Westhoff & Holt, 2004).

### NURSING DIAGNOSIS: risk for Shock

#### Possibly Evidenced By

Hypotension, hypovolemia, hypoxemia

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Circulation Status NOC

Display hemodynamic stability as evidenced by stabilized vital signs, warm skin, palpable peripheral pulses, usual level of mentation, ABGs within client norms, and adequate urine output.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Shock Prevention NIC</b>	
<i>Independent</i>	
Investigate changes in level of consciousness and reports of dizziness or headache.	Changes may reflect inadequate cerebral perfusion because of reduced arterial blood pressure. Note: Changes in sensorium may also reflect elevated ammonia levels or hepatic encephalopathy in bleeding client with liver disease.
Investigate reports of chest pain. Note location, quality, duration, and what relieves pain.	May reflect cardiac ischemia related to decreased perfusion. Note: Impaired oxygenation status resulting from blood loss can bring on myocardial infarction (MI) in client with cardiac disease.
Auscultate apical pulse. Monitor cardiac rate and rhythm, if continuous electrocardiogram (ECG) monitoring available and indicated.	Dysrhythmias and ischemic changes can occur because of hypotension, hypoxia, acidosis, electrolyte imbalance (shock state), or cooling near the heart if cold saline lavage is used to control bleeding.
Assess skin for coolness, pallor, diaphoresis, delayed capillary refill, and weak, thready peripheral pulses.	Vasoconstriction is a sympathetic response to lowered circulating volume in shock state and may also occur as a side effect of vasopressin administration.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Note urinary output and specific gravity. Insert Foley catheter to accurately measure urine, as indicated.	Decreased systemic perfusion may cause kidney ischemia and failure, manifested by decreased urine output. Acute tubular necrosis (ATN) may develop if hypovolemic state is prolonged.
Note reports of abdominal pain, especially sudden, severe pain or pain radiating to shoulder.	Pain caused by gastric ulcer is often relieved after acute bleeding because of buffering effects of blood. Continued severe or sudden pain may reflect ischemia due to vasoconstrictive therapy, bleeding into biliary tract (hematobilia), or perforation with onset of peritonitis.
Observe skin for pallor or localized redness. Change position frequently if bedfast; implement skin protective measures, as indicated.	Compromised peripheral circulation increases risk of skin breakdown as demonstrated by redness over bony prominence that does not blanch when digital pressure applied.
<b>Collaborative</b>	
Monitor ABGs and pulse oximetry.	Identifies hypoxemia and effectiveness of and need for therapy.
Provide supplemental oxygen by appropriate route (e.g., nasal prongs, mask) if indicated.	Treats hypoxemia and lactic acidosis during acute bleed.
Administer IV fluids and blood products, as indicated.	Replaces and maintains circulating volume and perfusion. A guideline for fluid replacement is 3 mL of fluid for each 1 mL of blood lost. (Refer to ND: deficient Fluid Volume, above.)

### NURSING DIAGNOSIS: Anxiety [specify level]

#### May Be Related To

Change in health status, threat of death

#### Possibly Evidenced By

Increased tension, restlessness, irritability, fear  
Trembling, increased pulse, increased perspiration  
Poor eye contact, focus on self  
Reports concerns due to change

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Anxiety Self-Control NOC

Discuss fears and concerns recognizing healthy versus unhealthy fears.

Verbalize appropriate range of feelings.

Appear relaxed and report anxiety is reduced to a manageable level.

Demonstrate problem-solving and effective use of resources.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction NIC</b>	
<b>Independent</b>	
Monitor physiological responses, such as tachypnea, palpitations, dizziness, headache, tingling sensations, and behavioral cues, such as restlessness, irritability, lack of eye contact, and combativeness or attack behavior.	May be indicative of the degree of fear client is experiencing—client may feel out of control of the situation or reach a state of panic. However, symptoms may also be related to physical condition or shock state.
Encourage verbalization of concerns. Assist client in expressing feelings by active listening.	Establishes a therapeutic relationship. Assists client in dealing with feelings and provides opportunity to clarify misconceptions.
Acknowledge that this is a fearful situation and that others have expressed similar fears.	When client is expressing fear, the validation that these feelings are normal can help client to feel less isolated.

(continues on page 350)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide accurate, concrete information about what is being done, including sensations to expect and usual procedures undertaken.	Involves client in plan of care and decreases unnecessary anxiety about unknowns.
Provide a calm, restful environment.	Removing client from outside stressors promotes relaxation and may enhance coping skills.
Encourage significant other (SO) to stay with client, as able. Respond to call signal promptly. Use touch and eye contact, as appropriate.	Helps reduce fear of going through a frightening experience alone.
Provide opportunity for SO to express feelings and concerns. Encourage SO to project positive, realistic attitude.	Helps SO to deal with own anxiety and fears that can be transmitted to client. Promotes a supportive attitude that can facilitate recovery.
Demonstrate and encourage relaxation techniques such as visualization, deep-breathing exercises, and guided imagery.	Learning ways to relax can be helpful in reducing fear and anxiety. Because client with GI bleeding may be a person who has difficulty relaxing, learning these skills can be important to recovery and prevention of recurrence.
Help client identify and initiate positive coping behaviors used successfully in the past.	Successful behaviors can be fostered in dealing with current fear, enhancing client's sense of self-control, and providing reassurance.
Encourage and support client in evaluation of lifestyle.	Changes may be necessary to avoid recurrence of ulcer condition.
<b>Collaborative</b>	
Administer medications, as indicated, such as diazepam (Valium), clorazepate (Tranxene), and alprazolam (Xanax).	Sedatives and antianxiety agents may be used on occasion to reduce anxiety and promote rest, particularly in client with an ulcer.
Refer to psychiatric clinical nurse specialist, social services, and/or spiritual advisor.	May need additional assistance during recovery to deal with consequences of the emergency situation and adjustments to required and desired changes in lifestyle.

## NURSING DIAGNOSIS: acute Pain

### May Be Related To

Chemical agent (gastric acid burn of gastric mucosa/oral cavity)  
Biological injury (ischemia)  
Physical response (such as reflex muscle spasm in the stomach wall)

### Possibly Evidenced By

Self-report of pain intensity and characteristics using standardized pain scale/instrument  
Guarding or protective behavior (e.g., abdominal guarding, rigid body posture)  
Facial expression of pain (e.g., grimace); expressive behavior (e.g., restlessness, crying); narrowed focus  
Changes in physiological parameter (e.g., blood pressure/pulse/respirations)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Level NOC

Report pain is relieved or controlled.  
Demonstrate relaxed body posture and can sleep or rest appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b> <i>Independent</i> Note reports of pain, including location, duration, and intensity (0 to 10, or similar coded scale). Review factors that aggravate or alleviate pain.	Pain is not always present, but if present, should be compared with client's previous pain symptoms. This comparison may assist in diagnosis of etiology of bleeding and development of complications.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Note nonverbal pain cues such as restlessness, reluctance to move, abdominal guarding, tachycardia, and diaphoresis. Investigate discrepancies between verbal and nonverbal cues.	Nonverbal cues may be both physiological and psychological and may be used in conjunction with verbal cues to evaluate extent and severity of the problem.
Provide small, frequent meals, as indicated for individual client.	Food can have an acid-neutralizing effect. Small meals prevent distention and the release of gastrin.
Encourage client to avoid smoking.	Smoking causes peptic ulcer disease in people who also are infected with <i>H. pylori</i> . Smoking is associated with increased risk for complications such as bleeding and perforated ulcers and a greater risk of dying from the disease (Quit Staff, 2017).
Provide frequent oral care.	Halitosis from bleeding and stagnant oral secretions is unappetizing and can aggravate nausea.
<b>Collaborative</b>	
Provide and implement prescribed dietary modifications.	Client may receive nothing by mouth (NPO) during active bleeding. When oral intake is allowed, a special diet is not usually indicated for client with ulcers. However, a common-sense approach in the beginning of treatment might be to avoid certain foods or beverages (e.g., spicy foods, orange juice, tomatoes, coffee) that could increase acid production in the stomach and duodenum, resulting in pain.
Administer medications, as indicated:	
Analgesics, such as morphine sulfate, ketorolac (Toradol)	Helps relieve acute or severe pain. Morphine also reduces peristaltic activity, and Toradol exerts anti-inflammatory effects.
Antacids	Can reduce epigastric discomfort rapidly.
Histamine-2 receptor antagonists (H2RAs) such as cimetidine (Tagamet), ranitidine (Zantac), famotidine (Pepcid), and nizatidine (Axid)	These drugs help reduce the production of stomach acids. This helps existent ulcers heal faster and diminishes pain.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding disease process, prognosis, treatment, self-care, and discharge needs**

**May Be Related To**

Insufficient information; insufficient knowledge of resources; insufficient interest in learning  
Misinformation presented by others

**Possibly Evidenced By**

Reports the problem  
Inaccurate follow-through of instructions  
Development of preventable complication

**Desired Outcomes/Evaluation Criteria—Client Will**

**Knowledge: Acute Illness Management NOC**

Verbalize understanding of cause of bleeding episode, if known, and treatment modalities used.  
Begin to discuss own role in preventing recurrence.  
Identify and implement necessary lifestyle changes.  
Participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process</b>	
<b>Independent</b>	
Determine client perception of cause of bleeding.	Establishes knowledge base and provides some insight into how the teaching plan needs to be constructed for this individual.

(continues on page 352)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide and review information regarding etiology of bleeding, relationship of lifestyle behaviors, and ways to reduce risk and contributing factors. Encourage questions.	Provides knowledge base from which client can make informed choices and decisions about future and control of health problems.
Review drug regimen, possible side effects, and interaction with other drugs, as appropriate.	Helpful to client understanding of reason for taking antiulcer drugs (e.g., PPIs and histamine blockers) and what symptoms are important to report to healthcare provider.
Encourage client to inform all healthcare providers of bleeding history.	Bleeding history may affect future therapy choices and prescriptions.
Emphasize importance of reading labels on OTC drugs and avoiding products containing aspirin. Discuss use of other NSAIDs for pain relief, and recommend alternatives.	Research has shown that NSAID use is responsible for approximately one-half of perforated ulcers, which occur most commonly in older patients who are taking aspirin or other NSAID (Ramakrishnan & Salinas, 2007). The client must work together with healthcare providers to weigh the benefits and risks of using NSAIDs, even when they have caused an ulcer. Client with a current or resolved NSAID-induced ulcer who needs the benefits of NSAIDs can promote healing and reduce the risk of ulcer recurrence by taking the NSAID with a meal, using the lowest effective dose possible, quitting smoking, and avoiding or limiting alcohol (National Digestive Diseases Information Clearinghouse [NDDIC], 2014).
Review significance of signs and symptoms such as coffee-ground emesis, tarry stools, abdominal distention, and severe epigastric and abdominal pain radiating to shoulder or back.	Prompt medical evaluation and intervention are required to prevent more serious complications, such as perforation and severe bleeding.
Discuss importance of cessation of smoking. Refer to support groups and healthcare provider for assistance, as client desires, with treatments such as nicotine replacement gums or antismoking drugs.	Ulcer healing may be delayed in people who smoke, particularly in those who use cimetidine (Tagamet). Smoking stimulates gastric acidity and is associated with increased risk of peptic ulcer development and recurrence. Note: Many support services are available to the client who wants to stop smoking.
Refer to support groups or counseling, as indicated.	Client may desire and/or need lifestyle and behavior changes to reduce risk factors (e.g., misuse of alcohol) for ulcer disease and/or life-threatening bleeding.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **ineffective Health Management**—decisional conflicts (e.g., use of NSAIDs for arthritic and chronic pain condition; continued use/abuse of alcohol), perceived barriers/benefits, economic difficulties

## INFLAMMATORY BOWEL DISEASE (IBD): ULCERATIVE COLITIS, CROHN'S DISEASE

- I. **Pathophysiology**—abnormal response of the immune system, leading to chronic inflammation of various portions of the alimentary tract
  - a. The peak age of onset for IBD is 15 to 30 years, although it may occur at any age. About 10% of cases occur in individuals younger than 18 years (Centers for Disease Control and Prevention [CDC], 2017).
  - b. Affects men and women equally; tends to run in families (20% of people with ulcerative colitis [UC] or Crohn's have a blood relative with IBD).
- c. **P** Pediatric IBD, especially Crohn's disease (CD), is often associated with impaired growth and skeletal development. This is the result of the direct effect of proinflammatory mediators upon growing bone, as well as poor nutritional intake and impaired caloric utilization in the setting of increased metabolic demand (Stephens et al., 2010).

### II. Classifications

### a. ULCERATIVE COLITIS (UC)

Ulcerative colitis (1) is limited to the large intestine (colon and rectum), (2) may involve part or all of the colon, (3) appears in a continuous (not patchy) pattern, and (4) inflammation occurs in the innermost lining (not the entire wall) of the intestine. Symptoms range from mild to very severe (fulminant) with varying effects on the body, including potentially fatal complications.

#### i. Four types of UC

1. Ulcerative proctitis: Usually confined to less than the 6 inches of the rectum. Occurring in about 30% of UC clients, it tends to be a milder form associated with fewer complications and a better outlook than more widespread disease. Symptoms include rectal bleeding and pain, feeling of urgency (Crohn's & Colitis Foundation of America [CCFA], 2016a).
  2. Proctosigmoiditis: Affects the rectum and sigmoid colon (lower segment of colon located right above the rectum). Symptoms include bloody diarrhea, pain in lower left side of abdomen, and constant feeling of need to pass stool.
  3. Left-sided colitis: Continuous inflammation that begins at the rectum and extends as far as a bend in the colon near the spleen. Symptoms include bloody diarrhea, loss of appetite, and weight loss.
  4. Pan-ulcerative colitis: Affects the entire colon. Symptoms include bloody diarrhea, loss of appetite, and weight loss. Potentially serious complications include massive bleeding and acute dilation of the colon (toxic megacolon), which may lead to perforation. Serious complications may require surgery.
- ii. Affects the innermost layer of the intestinal wall (closest to stool).
  - iii. Intermittent, with acute exacerbation and long remissions; however, 30% to 40% of individuals have continuous symptoms.
  - iv. Sometimes causes inflammation outside the intestine (extraintestinal) in areas such as the eyes, skin, and joints.
  - v. Cure is accomplished only by total removal of colon and rectum.

### b. CROHN'S DISEASE (CD)

Crohn's disease (CD) is a chronic flaring/relapsing inflammatory disease. It differs from ulcerative colitis in that (1) inflammation may develop anywhere in the GI tract from the mouth to the anus, (2) it most commonly occurs at the end of the small intestine, (3) it may occur in patches, and (4) it can extend through the entire thickness of the bowel wall.

- i. Five types of Crohn's disease with symptoms ranging from mild to very severe (Blahd, 2015; Crohn's & Colitis, 2016)
- 1. Ileocolitis, *the most common form*, affects the distal ileum (lowest part of the small intestine) and the proximal colon (large intestine). About half the people have ileocolic disease, 30% have ileal disease only, and 20% have colonic disease only (Lu & Hunt, 2013). Symptoms include weight loss, diarrhea, and cramping in middle or right lower abdomen.
- 2. Ileitis affects the ileum. Symptoms include weight loss, diarrhea, and cramping or pain in middle or right lower abdomen.

3. Jeunoileitis causes spotty patches of inflammation in the top half of the small intestine or jejunum. Symptoms include weight loss, diarrhea, and mild to strong abdominal pain and cramping following meals.

4. Gastroduodenal disease causes inflammation in the stomach and first part of the small intestine (duodenum). Symptoms include loss of appetite, weight loss, nausea, and vomiting.

5. Crohn's colitis. Affects the colon. Symptoms include diarrhea, rectal bleeding, and diseases around the anus (abscesses, fistulas, ulcers).

ii. Affects all layers of the intestinal wall; however, the submucosal layer is most affected (Wilkins et al, 2011).

*Note:* P As the disease progresses, the intestine's mucosal absorptive surface may be disrupted resulting in nutritional deficiencies, causing retardation of growth and physical development in children (Smith & Harris, 2014).

iii. Slowly progressive chronic inflammatory disease, believed to be an overreaction of the immune system; no known cure, and with intermittent acute episodes.

iv. Besides GI effects, nearly 25% of all patients have some extraintestinal manifestations (e.g., anemia, inflammatory arthropathies, osteoporosis, kidney stones) (Lu & Hunt, 2013; Wilkins et al, 2011).

### III. Etiology

- a. Unknown, but may result from a complex interplay between genetic and environmental factors. Examples of contributing environmental factors include exposure to air pollution, consumption of diet with excessive amounts of sugar and polyunsaturated fats, and exposure to cigarette smoke (active and passive) (Baumgart & Sandborn, 2012).
- b. Inability to downregulate immune responses, and consequently, the mucosal immune system remains chronically activated and the intestine chronically inflamed.
- c. Additional risk factors in CD include use of nonsteroidal anti-inflammatory drugs (NSAIDs) or isotretinoin (Acutane).
- d. Periods of remission are interspersed with episodes of acute inflammation, characterized by frequent episodes of diarrhea, abdominal pain, fever, and weight loss.

### IV. Statistics

- a. Morbidity: IBD is a chronic condition without a medical cure and commonly requires a lifetime of care (CDC, 2017). As many as 70,000 new cases of IBD are diagnosed in the United States each year (Loftus et al, 2014). P There are approximately 80,000 children in the United States with IBD (CCFA, 2014). In 2015, an estimated 3.1 million U.S. adults had ever received a diagnosis of IBD.
- b. Mortality: Death due to either UC or CD or their complications is uncommon. However, people with Crohn's disease have a slightly higher overall mortality rate than the general population (CCFA, 2014).
- c. Cost: IBD is one of the five most prevalent gastrointestinal disease burdens in the United States. Results of a study published in 2015 showed that patients with UC had significantly higher adjusted total direct (\$15,548 vs \$4812) and indirect costs (\$4125 vs \$1961) in 2013 than in 2005 (Cohen et al, 2015). A study published in 2012 states that CD is associated with substantial direct costs (e.g., hospitalizations), estimated at \$18,000 to \$19,000 per patient per year in the United States, and indirect costs (e.g., work absenteeism), estimated at \$7260 per patient per year (Kitchen et al, 2012).

## G L O S S A R Y

- Alimentary tract:** Organs comprising the pharynx, esophagus, stomach, small intestine, and large intestine, all of which are involved in digestion and absorption.
- Borborygmus:** Loud, rumbling bowel sounds caused by peristalsis.
- Erythema nodosum:** Inflammatory process with raised, tender, red nodules located under the skin, which are 1 to 5 cm in size.
- Ileoanal anastomosis, or pull-through operation:** Removes the colon and the inside of the rectum, leaving the outer muscles of the rectum. The surgeon then attaches the ileum to the inside of the rectum and the anus, creating a pouch in which waste is stored and passed through the anus in the usual manner.
- Ileostomy:** Creates a small opening in the abdomen, called a stoma, and attaches the end of the small intestine, called

the ileum, to it. Waste travels through the small intestine and exits the body through the stoma. A pouch is worn over the opening to collect waste, and the client empties the pouch as needed.

- Inflammatory bowel disease (IBD):** Name of a group of disorders in which the intestines (small and large intestines [bowels]) become inflamed due to a recurring immune response. The most common forms of IBD are ulcerative colitis (UC) and Crohn's disease (CD).
- Peristalsis:** Progressive, involuntary rippling motion of muscles in the digestive tract.
- Steatorrhea:** Foul-smelling and fatty stools seen in some malabsorption syndromes.
- Stomatitis:** Inflammation or ulceration of the mouth, including the lips, tongue, and mucous membranes.

## CARE SETTING

Care is usually handled at the community level; however, severe exacerbations requiring advanced pain control, nutrition, and rehydration may necessitate a short stay in an acute care medical unit.

## RELATED CONCERNS

- Fecal diversions: postoperative care of ileostomy and colostomy, page 368
- Fluid and electrolyte imbalances, see *DavisPlus*
- Peritonitis, page 389
- Psychosocial aspects of care, page 835
- Total nutritional support: parenteral/enteral feeding, page 525
- Surgical intervention, page 873

## CLIENT ASSESSMENT DATABASE (ULCERATIVE COLITIS)

DIAGNOSTIC DIVISION  
MAY REPORT

MAY EXHIBIT

### ACTIVITY/REST

- Weakness, fatigue, malaise, exhaustion, insomnia, not sleeping through the night because of diarrhea
- Feeling restless
- Restriction of activities or work due to effects of disease process

### CIRCULATION

- Tachycardia—response to fever, dehydration, inflammatory process, and pain
- **Blood pressure:** Hypotension, including postural changes
- Bruising, ecchymotic areas—insufficient vitamin K intake

### EGO INTEGRITY

- Anxiety, apprehension, emotional upsets, such as feelings of helplessness, hopelessness
- Acute or chronic stress factors, such as family and job related, expense of treatment

- Withdrawal, narrowed focus
- Depression

**MAY REPORT (continued)****MAY EXHIBIT (continued)****ELIMINATION**

- Stool texture varying from soft-formed to mushy or watery
- Sudden and constant sense of needing to pass stool (tenesmus)
- Persistent diarrhea accompanied by abdominal pain and blood in the stool
- Passing blood, pus, or mucus with or without passing feces; grossly bloody stools
- Constipation (may be primary symptoms in UC limited to rectum and can proceed to bowel obstruction)

**FOOD/FLUID**

- Anorexia (gastroduodenal and left-sided colitis)
- Nausea, vomiting (gastroduodenal and left-sided colitis)
- Weight loss (left-sided colitis) and may be significant (pan-ulcerative colitis)

**PAIN/DISCOMFORT**

- Moderate lower left abdominal pain (proctosigmoiditis)
- Severe left-sided abdominal pain (left-sided colitis)

**SAFETY**

- History of systemic lupus erythematosus (SLE), hemolytic anemia, vasculitis
- Temperature elevation 104°F to 105°F (40°C to 40.6°C) (acute exacerbation)
- Blurred vision
- Allergies to foods—release of histamine into bowel has an inflammatory effect

**SEXUALITY**

- Reduced frequency, avoidance of sexual activity
- Loss of normal menstrual cycle

**SOCIAL INTERACTION**

- Relationship or role problems related to condition
- Inability to be socially active

**TEACHING/LEARNING**

- Family history of inflammatory bowel disease (IBD), immune disorders
- Use of multiple medications or over-the-counter (OTC) medications for bowel health and use of herbal remedies, such as peppermint, psyllium, and chamomile
- Discuss immunizations for children and adults

**DISCHARGE PLAN CONSIDERATIONS**

- Assistance with dietary requirements, medication regimen, psychological support

► Refer to section at end of plan for postdischarge considerations.

- Diminished or hyperactive bowel sounds, absence of peristalsis or presence of visible peristaltic waves

- Mucous membranes pale; sore, dry, inflamed buccal cavity; cracking of tongue due to dehydration or malnutrition

- Abdominal tenderness, distention, rigidity

- Fever may be first warning sign of a flare.

## DIAGNOSTIC STUDIES (ULCERATIVE COLITIS)

### TEST WHY IT IS DONE

### WHAT IT TELLS ME

#### DIAGNOSTIC STUDIES

- **Endoscopic examinations (proctosigmoidoscopy or colonoscopy):** Gold standard for diagnosing UC, especially when biopsy is included.
- **Computerized axial tomography (CT or CAT scan):** Combines a series of x-ray views taken from many different angles and computer processing to create cross-sectional images of soft tissues. May be done with or without contrast media.
- **Rectal biopsy and cytology:** Biopsy removes a small piece of rectal (anal) tissue for examination. Cytology is a study of the cells.
- **Barium enema (also called lower GI series):** X-ray of the rectum, colon, and lower part of the small intestine. Barium is given rectally to coat the lining of the colon so that abnormal areas will show up on the x-ray.

#### ASSOCIATED TESTS

- **Complete blood count (CBC):** Battery of screening tests that typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; white blood cell (WBC) count and differential.
- **Serum iron levels:** Measures the level of iron in the liquid part of client's blood.
- **C-reactive protein (CRP):** Measures general levels of inflammation the body.
- **Electrolytes:** Charged minerals that, in solution, conduct an electric current to transport nutrients and wastes across cell membranes, regulate fluid balance, and help maintain pH level.
- **Prealbumin/albumin/total proteins:** Measurement of level of proteins in plasma to determine nutritional status.
- **Stool specimens:** Used in initial diagnosis and in following disease progression.

Used to determine the extent of the disease and evaluate structured areas and pseudopolyps. Identifies inflamed and lacerated tissues, deep ulcerations, adhesions, and changes in luminal wall; rules out bowel obstruction.

May reveal signs of ulcerative colitis or complication from the disease. May also reveal how much of the colon is inflamed.

Neoplastic changes can be detected as well as characteristic inflammatory infiltrates, called crypt abscesses.

Assesses the extent of the disease and can detect complications such as strictures and carcinoma. May be performed after visual examination, although rarely done during acute, relapsing stage because it can exacerbate condition.

May show hyperchromic anemia (active disease generally present because of blood loss and iron deficiency); leukocytosis may occur, especially in fulminating or complicated cases and in clients on steroid therapy. Platelets may be increased (thrombocytosis) because of inflammatory process.

May be decreased because of blood loss, poor dietary intake, or malabsorption.

Increased if inflammation is present, which may indicate active disease or disease flare.

Decreased levels of potassium, magnesium, and zinc because of malabsorption; common in severe disease.

Decreased because of loss of plasma proteins, disturbed liver function, acute and chronic inflammation, infections, malabsorption, and decreased dietary intake.

Mainly composed of mucus, blood, pus, and intestinal organisms, especially *Entamoeba histolytica* (active stage). Fecal leukocytes and RBCs indicate inflammation of gastrointestinal (GI) tract. Stool that is positive for bacterial pathogens, ova, and parasites or *Clostridium* indicates infection. Stool positive for fat indicates malabsorption.

## CLIENT ASSESSMENT DATABASE (CROHN'S DISEASE)

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- Weakness, fatigue, malaise, exhaustion
- Feelings of restlessness
- Restriction of activities or work due to effects of disease process

**MAY REPORT (continued)****MAY EXHIBIT (continued)****EGO INTEGRITY**

- Anxiety, apprehension, emotional upsets, feelings of helplessness, hopelessness
- Acute or chronic stress factors, such as family and job related, expense of treatment

**ELIMINATION**

- Unpredictable, intermittent, frequent, uncontrollable episodes of diarrhea (may be bloody)
- Sense of urgency and abdominal cramping; sensation of incomplete evacuation
- Intermittent constipation, which may lead to bowel obstruction

**FOOD/FLUID**

- Anorexia; nausea, vomiting (gastroduodenal Crohn's)
- Weight loss (ileocolitis or gastroduodenal Crohn's)
- **P** Failure to grow (when occurs in younger children)

**PAIN/DISCOMFORT**

- Mild to intense abdominal pain and cramps along with diarrhea following meals (jejunoileitis Crohn's)
- Middle or right lower abdomen pain with diarrhea (ileocolitis Crohn's)
- Rectal pain
- Migratory joint pain, tenderness (arthritis) (granulomatous Crohn's)
- Migratory joint pain, tenderness (arthritis)
- Eye pain, sensitivity to light (photophobia)

**SAFETY**

- History of arthritis, SLE, hemolytic anemia, vasculitis
- Temperature elevation—low-grade fever
- Blurred vision
- High risk for venous thromboembolic events (VTE) after GI surgery (Lu & Hunt, 2013)

**SOCIAL INTERACTION**

- Relationship or role problems related to condition; inability to be active socially

**TEACHING/LEARNING**

- Family history of IBD, immune disorders, cultural factor—increased prevalence in Jewish population, northern European and Anglo-Saxon derivation
- Use of multiple medications or OTC medications for bowel health and use of herbal remedies, such as aloe, chamomile, flax, garlic, boswellia, echinacea, and goldenseal
- Discuss immunizations for children and adults

**DISCHARGE PLAN CONSIDERATIONS**

- Assistance with dietary requirements, medication regimen, psychological support

► Refer to section at end of plan for postdischarge considerations.

- Withdrawal, narrowed focus, depression

- Hyperactive bowel sounds with gurgling, splashing sound
- Visible peristalsis

- Decreased subcutaneous fat and muscle mass
- Weakness, poor muscle tone, and skin turgor
- **P** Growth retardation may be the only presenting sign of IBD in young patients (Rowe & Lichtenstein, 2016).

- Abdominal tenderness, distention
- Fistulas, or inflammatory abscesses, may form in the lower right section of the abdomen (ileocolitis Crohn's). *Note:* Approximately 80% of patients will require surgery for fistula over a lifetime (Hoentjjen et al, 2012).

- Skin lesions may present: erythema nodosum on face, arms; pyoderma gangrenosum on trunk, legs, ankles
- Perianal fissures, abscesses, ulcerations (granulomatous Crohn's)

- Loss of normal menstrual cycle

## DIAGNOSTIC STUDIES (CROHN'S DISEASE)

### TEST WHY IT IS DONE

### WHAT IT TELLS ME

#### DIAGNOSTIC STUDIES

- **Endoscopic examination—colonoscopy with biopsy:** Gold standard for diagnosis, especially when biopsy included.
- **Capsule endoscopy:** Technology that uses a swallowed video capsule to take photographs of the inside of the esophagus, stomach, and small intestine.
- **Endoscopic ultrasound:** Ultrasound probe is attached to endoscope to examine deep below lining of intestines.
- **Computerized tomography (CT) scan:** Combines a series of x-ray views taken from many different angles and computer processing to create cross-sectional images of soft tissues. May be done with or without contrast media.
- **CT enterography:** A special CT scan that provides better images of the small bowel. This test has replaced barium x-rays in many medical centers.
- **Magnetic resonance imaging (MRI):** Scan that uses a magnetic field and radio waves to create detailed images of organs and tissues.
- **Double balloon endoscopy:** For this test, a longer scope is used to look further into the small bowel where standard endoscopes don't reach.
- **Barium swallow or barium enema:** Radiographic studies of the upper GI tract or rectum, colon, and lower part of the small intestine. Barium is given orally or rectally to coat the lining of the GI tract so that abnormal areas will show up on the x-ray.

May reveal clusters of inflammatory cells called granulomas, which help confirm the diagnosis of Crohn's disease because granulomas don't occur with ulcerative colitis (Mayo Clinic Staff, 2017).

Can diagnose Crohn's disease in the small intestine.

Most often used to look at fistulae in the rectal area.

May reveal extent of disease, particularly in the small bowel, or confirm complications such as partial blockages, abscesses, or fistulas.

This test is helpful in diagnosing and managing Crohn's disease and is particularly useful for evaluating a fistula around the anal area (pelvic MRI) or the small intestine (MRI enterography) (Mayo Clinic Staff, 2017).

This technique is useful when capsule endoscopy shows abnormalities, but the diagnosis is still in question. It allows for biopsy of the abnormal area.

Barium swallow may demonstrate luminal narrowing in the terminal ileum, stiffening of the bowel wall, mucosal irritability, or ulceration. Fistulas are common and are usually found in the terminal ileum but may be present in segments throughout the GI tract.

#### BLOOD TESTS

- **Complete blood count (CBC):** Battery of screening tests that typically includes Hgb; Hct; RBC count, morphology, indices, and distribution width index; platelet count and size; WBC count and differential.
- **ESR and C-reactive protein (CRP):** Nonspecific test, but measures amount of inflammation in the body.
- **Prealbumin/albumin/total proteins:** Measures levels of protein in plasma to determine nutritional status.
- **Electrolytes:** Charged minerals that, in solution, conduct an electric current to transport nutrients and wastes across cell membranes, regulate fluid balance, and help maintain pH level.
- **Antibody blood tests:** Looks for proteins (antibodies) produced by the immune system that indicate the presence of one disease (UC) or the other (Crohn's).

Anemia (low Hgb and hypochromic, occasionally macrocytic RBCs) may occur because of blood loss from the mucosa and iron deficiency. WBCs are usually increased.

Increased in client with active disease or experiencing a flare.

Decreased because of loss of intestinal proteins.

Potassium, calcium, and magnesium may be decreased due to malabsorption.

Tests are not conclusive by themselves.

#### NURSING PRIORITIES

1. Control diarrhea and promote optimal bowel function.
2. Minimize or prevent complications.
3. Promote optimal nutrition.
4. Minimize mental and emotional stress.
5. Provide information about disease process, treatment needs, and long-term aspects and potential complications of recurrent disease.

#### DISCHARGE GOALS

1. Bowel function stabilized.
2. Complications prevented or controlled.
3. Dealing positively with condition.
4. Disease process, prognosis, therapeutic regimen, and potential complications understood.
5. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS:** **Diarrhea****May Be Related To**

Gastrointestinal inflammation, irritation, infection, or malabsorption  
Anxiety  
Presence of toxins

**Possibly Evidenced By**

Hyperactive bowel sounds  
Liquid stools >3 in 24 hours  
[Abdominal pain; urgency, cramping]

**Desired Outcomes/Evaluation Criteria—Client Will****Bowel Elimination NOC**

Report reduction in frequency of stools and return to more normal stool consistency.  
Identify and avoid contributing factors.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Diarrhea Management</b>	
<i>Independent</i>	
Observe and document stool frequency, characteristics, amount, and precipitating factors.	Helps differentiate individual disease and assesses severity of episode.
Promote bedrest, if indicated, and provide bedside commode.	Rest decreases intestinal motility and reduces the metabolic rate when infection or hemorrhage is a complication. Urge to defecate may occur without warning and be uncontrollable, thus increasing risk of incontinence and falls if facilities are not close at hand.
Remove stool promptly. Provide room deodorizers.	Reduces noxious odors to avoid/reduce embarrassment.
Discuss client's usual diet. Have client/SO identify foods and fluids (if any) that precipitate client's diarrhea and/or cramping pain.	Food is not the cause of IBD in adults, but people can have food intolerances, and certain foods or beverages can aggravate symptoms. In addition, severe IBD can cause malabsorption and malnutrition. Therefore, dietary needs and limitations must be individualized, depending on which disease the client has and what part of the intestine is affected (CCFA, 2016a). <b>P</b> Note: A recent small study in children has shown promise in producing remission of active IBD without drugs with a therapy called "specific carbohydrate diet (SCD)" (Suskind et al, 2016).
Restart oral fluid intake gradually, if client has been on bowel rest (NPO) during treatment. Offer clear liquids hourly and avoid cold fluids.	Provides colon rest by omitting or decreasing the stimulus of foods and fluids. Gradual resumption of liquids may prevent cramping and recurrence of diarrhea; however, cold fluids can increase intestinal motility.
Provide opportunity to vent frustrations related to disease process.	Presence of disease with unknown cause that is difficult to cure and that may require surgical intervention can lead to stress reactions that may aggravate condition.
Observe for fever, tachycardia, lethargy, leukocytosis, decreased serum protein, anxiety, and prostration.	May signify that toxic megacolon or perforation and peritonitis are imminent or have occurred, necessitating immediate medical intervention.
<i>Collaborative</i>	
Administer medications, as indicated:	<ol style="list-style-type: none"> <li>1) Symptomatic care (relief of symptoms and mucosal healing) is usual in a stepwise approach until a positive response is achieved. These steps are common to both UC and CD (in adults and children) and include aminosalicylates, antibiotics, corticosteroids, and immunomodulators. Some clinical research treatments may also be provided (not included in this list).</li> </ol>

(continues on page 360)

**ACTIONS/INTERVENTIONS (continued)**

Aminosalicylates (5-ASA) (oral, enema, suppository), such as olsalazine (Dipentum) and balsalazide (Calazal), sulfasalazine (Azulfidine), and mesalamine (Asacol)

Anti-infectives, such as metronidazole (Flagyl), ciprofloxacin (Cipro), and rifaximin (Xifaxan)

Corticosteroids (IV, oral, topical, rectal) such as hydrocortisone (Cortenema, Cortifoan), prednisone (Deltasone), prednisolone (Delta-Cortect), methylprednisolone, and budesonide (Symbicort)

Immunosuppressant agents: for example, azathioprine (Imuran), 6-mercaptopurine (6-MP, Purinethol), methotrexate (MTX), and cyclosporine (Sandimmune)

Biological response modifiers (also called immunomodulators or tumor necrosis factor inhibitors), such as infliximab (Remicade), adalimumab (Humira), certolizumab (Cimzia), and monoclonal antibodies (e.g., natalizumab [Tysabri], vedolizumab [Takeda])

H<sub>2</sub>-receptor antagonists: for example, omeprazole (Prilosec), ranitidine (Zantac), and famotidine (Pepcid)

Proton pump inhibitors (PPIs): for example, lansoprazole (Prevacid), rabeprazole (Aciphex), and pantoprazole (Protonix)

Prepare for surgical intervention, such as colectomy, proctocolectomy, or ileostomy.

**RATIONALE (continued)**

ASA agents work at the level of the lining of the GI tract to decrease inflammation. They are thought to be effective in treating mild-to-moderate episodes of IBD (more effective for UC than CD) and are useful in preventing relapses of the disease. They work best in the colon and are not particularly effective if the disease is limited to the small intestine (Allen et al, 2011; Rowe & Lichtenstein, 2016).

Used to treat bacterial overgrowth in the small intestine caused by stricture, fistulas, or prior surgery. Most commonly used for perianal disease and intrabdominal inflammatory masses in CD. Used sparingly in UC. May be part of a long-term treatment regimen (Allen et al, 2011).

Long-term treatment with corticosteroids or use to maintain remission is undesirable but may be given during acute flares (Allen et al, 2011). **P** **Corticosteroids should be used sparingly in children with weaning to other medications as soon as possible, as they are implicated in growth disturbances and bone disease, acne, and excess body fat when used long term (Amil-Dias et al, 2017).**  
**Note:** Steroids are contraindicated if intra-abdominal abscesses are suspected.

May be given to block inflammatory response, decrease steroid requirements, and promote healing of fistulas (Allen et al, 2011).

These drugs are effective for steroid-sparing action, and may be primary treatment for fistulas and maintenance of persons intolerant of or not responsive to aminosalicylates.

They block tissue necrosis factor (TNF), a component of inflammatory response thereby helping to control inflammation, trigger remission, and allow fistulas to close (Allen et al, 2011; Hussar, 2015; Rowe & Lichtenstein, 2016).

A class of drugs used to block the action of histamine on parietal cells in the stomach, decreasing the production of acid by these cells. Used to treat or prevent ulcers.

PPIs are a group of drugs whose main action is a pronounced and long-lasting reduction of gastric acid production.

Surgery (a colectomy) can cure UC and can help, but not cure, Crohn's disease. Two-thirds to three-quarters of patients with CD will require surgery at some point during their lives (generally for complications, such as stricture, fistula, bleeding, or abscess) (Allen et al, 2011; Rowe & Lichtenstein, 2016). Surgery in UC is generally to remove the colon and rectum (proctocolectomy) followed by ileostomy or ileoanal anastomosis. If the client isn't critically ill and the anal sphincter is free from lesions, the surgeon may remove the colon and rectum but leave the anus intact. An internal pouch is then formed from the distal ileum and connected to the anal sphincter, allowing the client to have continent bowel movements. (Refer to CP: Fecal Diversions for additional interventions, as needed.)

**NURSING DIAGNOSIS:** risk for deficient Fluid Volume**Possibly Evidenced By**

Active fluid volume loss: excessive loss through normal routes—diarrhea, vomiting  
 Factors influencing fluid needs (hypermetabolic state—inflammation, fever)  
 Deviations affecting intake—nausea, anorexia

**Desired Outcomes/Evaluation Criteria—Client Will****Hydration NOC**

Maintain fluid volume at a functional level as evidenced by moist mucous membranes, good skin turgor, and capillary refill; stable vital signs; and balanced intake and output (I&O) with urine of normal concentration and amount.  
 Identify individual risk factors and appropriate interventions.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid/Electrolyte Management NIC</b>	
<i>Independent</i>	
Monitor I&O. Note number, character, and amount of liquid stools; estimate insensible fluid losses (e.g., diaphoresis). Measure urine-specific gravity and observe for oliguria.	Provides information about overall fluid balance, renal function, and bowel disease control, as well as guidelines for fluid replacement.
Assess vital signs (blood pressure [BP], pulse, temperature).	Hypotension (including postural), tachycardia, and fever can indicate response to and effect of fluid loss.
Weigh daily or per protocol.	Indicator of overall fluid and nutritional status.
<i>Collaborative</i>	
Monitor serial electrolytes and metabolic panel.	Reveals imbalances associated with fluid and electrolyte loss through vomiting and diarrhea.
Administer IV fluids and electrolytes, as indicated.	May be needed to replenish fluid volume and reduce risk of complications associated with electrolyte imbalances.

**NURSING DIAGNOSIS:** imbalanced Nutrition: less than body requirements**May Be Related To**

Inability to absorb nutrients; inability to ingest food (medically restricted intake)  
 Biological factors (hypermetabolic state)  
 Psychological factors (fear that eating may cause diarrhea)

**Possibly Evidenced By**

Insufficient interest in food; food aversion perceived inability to ingest food; food intake less than recommended daily allowances  
 Weight loss  
 Abdominal pain, cramping  
 Hyperactive bowel sounds, diarrhea, steatorrhea  
 Pale mucous membranes

**Desired Outcomes/Evaluation Criteria—Client Will****Nutritional Status NOC**

Demonstrate stable weight or progressive gain toward goal with normalization of laboratory values and absence of signs of malnutrition.  
 Verbalize understanding of causative factors when known and necessary interventions.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Therapy NIC</b>	
<i>Independent</i>	
Assess weight, age, body mass, strength, and activity and rest levels. Ascertain stage of disease process and its effects on client's nutritional status.	Provides comparative baseline.

(continues on page 362)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Inspect oral mucosa.	May reveal ulcerations and/or provide information about the integrity of the entire GI tract, affecting ability to eat and absorb nutrients.
Evaluate client's appetite.	Appetite may be suppressed because of altered taste, early satiety, meal-related cramping, diarrhea, or medications, or a combination of these factors.
Weigh periodically.	Provides information about dietary needs and effectiveness of therapy.
Encourage daytime rest periods and limited activity during acute phase of illness.	Decreasing metabolic needs aids in preventing caloric depletion and conserves energy.
Recommend rest before meals.	Quiets peristalsis and increases available energy for eating.
Provide oral hygiene.	A clean mouth can enhance the taste of food.
Serve foods in well-ventilated, pleasant surroundings, with unhurried atmosphere and congenial company.	Pleasant environment aids in reducing stress and is more conducive to eating.
Encourage client to eat a healthy, varied diet as much as possible, incorporating several small meals and snacks per day.	Will promote achieving and maintaining healthy weight and a stronger, active lifestyle.
Encourage client to avoid or limit foods that might cause or exacerbate abdominal cramping and other uncomfortable symptoms, such as dairy products (if client is lactose intolerant), foods high in fiber (e.g., raw vegetables) or fat (e.g., fried foods, nuts, ice cream), alcohol, or foods and drinks containing caffeine.	Individual tolerance varies, depending on stage of disease and area of bowel affected.
<p><b>P</b> Discuss special dietary concerns with child/teenager/caregivers. Offer choices, when possible, that child/teenager may find acceptable to personal taste and in social settings.</p>	Children with IBD face special challenges, and finding foods that children and teenagers like to eat is a challenge. A healthy diet is a priority for growth and development, while needing to address food intolerances and those foods that can exacerbate disease symptoms. Parents might think that there's no place in a healthy diet for fast food, but this may not be true. Some of these foods provide a valuable supply of nutrients as well as calories. For example: in pizza, the cheese offers calcium, protein, and vitamin D; the tomato sauce provides vitamins A and C; and the crust supplies B vitamins (CCFA, 2008).
Record intake and changes in symptomatology.	Useful in identifying specific deficiencies and determining GI response to foods.
Promote client participation in dietary planning as possible.	Provides sense of control for client and opportunity to select foods desired and enjoyed, which may improve appetite and food intake.
Encourage client to verbalize feelings concerning resumption of diet, when client has been on bowel rest (NPO).	Hesitation to eat may be the result of fear that food will cause exacerbation of symptoms.
<b>Collaborative</b>	
Keep client on nothing-by-mouth (NPO) status, as indicated.	Resting the bowel decreases peristalsis and diarrhea, limiting malabsorption and loss of nutrients. Note: Client with toxic colitis is NPO and placed on parenteral nutrition.
Resume or advance diet as indicated—clear liquids progressing to bland, low-residue, and then high-protein, high-calorie, caffeine-free, nonspicy, and low-fiber food, as indicated.	Allows the intestinal tract to readjust to the digestive process. Protein is necessary for tissue-healing integrity. Low bulk decreases peristaltic response to meal. Note: Dietary measures depend on client's condition; for example, if disease is mild, client may do well on low-residue, low-fat diet high in protein and calories with lactose restriction. In moderate disease, elemental enteral products may be given to provide nutrition without overstimulating the bowel.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide nutritional support, for example:	
Enteral feedings, such as Ultra Clear Plus via nasogastric (NG) tube, percutaneous endoscopic gastrostomy (PEG), or J-tube	Many clinical studies have shown early enteral feeding is beneficial in reducing the effects of malabsorption and providing essential nutrients. Although elemental enteral solutions cannot provide all needed nutrients, they can prevent gut atrophy. Recently, there has been significant evidence to support the use of exclusive enteral nutrition (EEN) as therapy for patients with Crohn's disease. Accomplishing an EEN diet requires the exclusive use of special liquid formulas and the exclusion of all other forms of food for the duration of this therapy. Note: <b>P</b> Studies suggest that this type of diet can be successfully used as an alternative to medications such as corticosteroids to induce remission in pediatric patients with Crohn's disease (Crohn's & Colitis Foundation, 2014).
Intravenous total parenteral nutrition (TPN)	This regimen rests the GI tract completely while providing essential nutrients. Short-term TPN is indicated during periods of disease exacerbation when bowel rest is needed. The client might also receive enteral nutrition while on TPN to provide nutrients directly to the gut. (Refer to CP: Total Nutritional Support: Parenteral/Enteral Feeding.)
Monitor nutritional studies and client's symptoms for deficits and administer vitamins and minerals as individually indicated.	Various supplements may be needed, depending on many factors, such as the client's individual disease, whether disease is active all the time or in remission at times, or if the client has had surgery that requires lifelong supplementation.

### NURSING DIAGNOSIS: Anxiety [specify level]

#### May Be Related To

Maturational or situational crises; stressors

[Threat to self-concept]

Major change (e.g., current or health status, environment, economic status, role function)

#### Possibly Evidenced By

Increased tension, distress, apprehension, fear

Reports worry about change in life

Awareness of physiological symptoms; insomnia

Focus on self

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Anxiety-Self Control NOC

Appear relaxed and report anxiety reduced to a manageable level.

Verbalize awareness of feelings of anxiety and healthy ways to deal with them.

Use resources/support systems effectively.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction NIC</b>	
<b>Independent</b>	
Note behavioral clues—restlessness, irritability, withdrawal, lack of eye contact, and demanding behavior.	Indicators of degree of anxiety or stress; for example, client may feel out of control at home or work managing personal problems. Stress may develop because of physical symptoms of condition and the reaction of others.

(continues on page 364)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage verbalization of feelings. Provide feedback.	Establishes a therapeutic relationship. Assists client/significant others (SOs) in identifying problems causing stress. Client with severe diarrhea may hesitate to ask for help for fear of becoming a burden to the staff.
Acknowledge that the anxiety and problems are similar to those expressed by others. Active-listen to client's concerns.	Validation that feelings are normal can help reduce stress/isolation and belief that "I am the only one."
Provide accurate, concrete information about what is being done, such as reason for bedrest, restriction of oral intake, and procedures.	Involving client in plan of care provides sense of control and helps decrease anxiety.
Provide a calm, restful environment.	Removing client from outside stressors promotes relaxation and helps reduce anxiety.
Encourage staff/SO to project caring, concerned attitude.	A supportive manner can help client feel less stressed, allowing energy to be directed toward healing and recovery.
Help client identify and initiate positive coping behaviors used in the past.	Successful behaviors can be fostered in dealing with current problems or stress, enhancing client's sense of self-control.
Assist client to learn new coping mechanisms, such as stress management techniques and organizational skills.	Learning new ways to cope can be helpful in reducing stress and anxiety, enhancing disease control.
<b>Collaborative</b>	
Administer medications, as indicated, for example, antianxiety agents, such as diazepam (Valium) and alprazolam (Xanax).	May be used to reduce anxiety and to facilitate rest, particularly in the client with UC.
Refer to psychiatric clinical nurse specialist, social services, and/or spiritual advisor.	May require additional assistance in regaining control and coping with acute episodes or exacerbations, as well as learning to deal with the chronicity and consequences of the disease and therapeutic regimen.

## NURSING DIAGNOSIS: acute Pain

### May Be Related To

Biological and physical injury agents (e.g., hyperperistalsis, prolonged diarrhea, skin and tissue irritation, perirectal excoriation, fissures, fistulas)

### Possibly Evidenced By

Self-report of intensity and characteristics of pain using a standardized pain scale

Guarding or distraction behaviors, restlessness

Facial mask; self-focusing

### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Level NOC

Report pain is relieved or controlled.

Appear relaxed and able to sleep and rest appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<b>Independent</b>	
Encourage client to report pain.	May try to tolerate pain rather than request analgesics.
Assess reports of abdominal cramping or pain, noting location, duration, and intensity (using a 0 to 10 or similar coded scale). Investigate and report changes in pain characteristics.	Colicky intermittent pain occurs with Crohn's disease. Predefecation pain frequently occurs in UC with urgency, which may be severe and continuous. Changes in pain characteristics may indicate spread of disease or developing complications, such as bladder fistula, perforation, and toxic megacolon.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Note nonverbal cues, such as restlessness, reluctance to move, abdominal guarding, withdrawal, and depression. Investigate discrepancies between verbal and nonverbal cues.	Body language or nonverbal cues may be both physiological and psychological and may be used in conjunction with verbal cues to determine extent and severity of the problem.
Review factors that aggravate or alleviate pain.	May pinpoint precipitating or aggravating factors (e.g., stressful events, food intolerance) or identify developing complications.
Provide comfort measures (e.g., back rub, reposition) and diversional activities.	Promotes relaxation, refocuses attention, and may enhance coping abilities.
Cleanse rectal area with mild soap and water (or wipes) after each stool and provide skin care with a moisture barrier ointment.	Protects skin from bowel acids, preventing excoriation.
Provide sitz bath, as appropriate.	Enhances cleanliness and comfort in the presence of perianal irritation and fissures.
Observe for perianal ulcerations or fistulas.	Fistulas may develop from erosion and weakening of intestinal wall.
Observe and record abdominal distention, increased temperature, and decreased BP.	May indicate developing intestinal obstruction from inflammation, edema, and scarring.
<b>Collaborative</b>	
Implement prescribed dietary modifications; for example, commence with liquids and increase to solid foods as tolerated.	Bowel rest can reduce pain and cramping.
Administer medications as indicated, for example:	
Analgesics	Pain varies from mild to severe and necessitates management of client's particular symptoms and medication tolerances to facilitate adequate rest and recovery. Note: Opiates should be used with caution because they may precipitate toxic megacolon.
Anticholinergics: for example, dicyclomine (Bentyl) and hyoscyamine (Levbid, Oscimin)	May be given to relieve spasms of GI tract and resultant colicky pain.
Suppositories, enemas, foams (e.g., 5-ASA suppositories, cortisone or Asacol foam enemas, Cortifoam)	These products deliver direct treatment to rectal tissues and can reduce tissue pain and spasms.

### NURSING DIAGNOSIS: **ineffective Coping**

#### May Be Related To

Situational crises; inadequate opportunity to prepare for stressors

Uncertainty—unpredictable nature of disease process

Severe/chronic pain

Inadequate level of confidence in ability to cope

#### Possibly Evidenced By

Inability to deal with a situation

Ineffective coping strategies; risk-taking behavior; inability to meet role expectation/basic needs

Insufficient goal-directed behavior, problem-solving or problem resolution

Sleep pattern disturbance; fatigue

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Coping NOC

Assess the current situation accurately.

Identify ineffective coping behaviors and consequences.

Acknowledge own coping abilities.

Demonstrate necessary lifestyle changes to limit or prevent recurrent episodes.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Coping Enhancement NIC</b>	
<b>Independent</b>	
Assess client's/SO's understanding and previous methods of dealing with disease process.	Enables the nurse to deal more realistically with current problems. Anxiety and other problems may have interfered with previous health teaching and client learning.
Determine outside stressors, such as family, relationships, and social or work environment.	Stress can alter autonomic nervous response, affecting the immune system and contributing to exacerbation of disease. Even the goal of independence in the dependent client can be an added stressor.
Provide opportunity for client to discuss how illness has affected relationships, including sexual concerns.	Stressors of illness affect all areas of life, and client may have difficulty coping with embarrassment, fatigue, and pain in regard to relationship and sexual needs.
<b>P</b> Determine child's general well-being regarding social functioning and effects of disease (e.g., is not participating in sports, missing school, declining dates).	Child may tend to be tired, underweight, or small, impairing ability to maintain same activity involvement as peers. Adolescent or young adult of dating age may be avoiding relationships and intimacy because of embarrassment over frequent diarrhea or presence of ostomy. Differences in appearance and energy, as well as an overall anxiety over symptoms, can affect the way the child relates to parents, teachers, friends, dates, and coworkers if employed.
Help client identify individually effective coping skills.	Use of previously successful behaviors can help client deal with current situation and plan for the future.
Provide emotional support:	
Active-listen in a nonjudgmental manner.	Aids in communication and understanding client's viewpoint. Can enhance client's feelings of self-worth.
Maintain nonjudgmental body language when caring for client.	Prevents reinforcing client's feelings of being a burden, for example, frequent need to empty bedpan or commode.
Assign same staff as much as possible.	Provides a therapeutic environment and lessens the stress of constant adjustments to different people when client is dealing with embarrassment and depression.
Provide uninterrupted sleep or rest periods.	Exhaustion brought on by the disease tends to magnify problems, interfering with ability to cope.
Encourage use of stress management skills, such as relaxation techniques, visualization, guided imagery, and deep-breathing exercises.	Refocuses attention, promotes relaxation, and enhances coping abilities.
<b>Collaborative</b>	
Include client/SO in team conferences to develop individualized program.	Promotes continuity of care and enables client/SO to feel a part of the plan, imparting a sense of control and increasing cooperation with therapeutic regimen.
Administer medications as indicated, for example, antianxiety agents, such as lorazepam (Ativan) and alprazolam (Xanax).	Aids in psychological and physical rest. Conserves energy and may strengthen coping abilities.
Refer to resources, as indicated, such as local support group, social worker, psychiatric clinical nurse specialist, or spiritual advisor.	Additional support and counseling can assist client/SO in dealing with specific stress or problem areas.

### NURSING DIAGNOSIS: **ineffective Health Management**

#### May Be Related To

Complexity of therapeutic regimen; insufficient knowledge of therapeutic regimen  
 Perceived seriousness of condition, benefits/barriers  
 Decisional conflicts, excessive demands  
 Powerlessness; insufficient social support

**NURSING DIAGNOSIS:** **Ineffective Health Management** (continued)**Possibly Evidenced By**

Difficulty with prescribed regimen  
Failure to include treatment regimen in daily living or to take action to reduce risk factors  
Unexpected acceleration of illness symptoms

**Desired Outcomes/Evaluation Criteria—Client Will****Knowledge: Inflammatory Bowel Disease Management NOC**

Verbalize understanding of disease processes and possible complications.  
Identify stress situations and specific action(s) to deal with them.  
Verbalize understanding of therapeutic regimen.  
Participate in problem-solving of factors interfering with integration of therapeutic regimen.  
Initiate necessary lifestyle changes.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Determine client's perception of disease process.	Establishes knowledge base and provides some insight into individual learning needs.
Review disease process, cause-and-effect relationship of factors that precipitate symptoms, and identify ways to reduce contributing factors. Encourage questions.	Precipitating or aggravating factors are individual; therefore, client needs to be aware of what foods, fluids, and lifestyle factors can precipitate symptoms. Accurate knowledge base provides opportunity for client to make informed decisions or choices about future and control of chronic disease. Although most clients know about their own disease process, they may have outdated information or misconceptions.
Review medications, purpose, frequency, dosage, and possible side effects.	Promotes understanding and may enhance cooperation with regimen.
Remind client to observe for side effects of steroids (such as ulcers, facial edema, and muscle weakness) if used on a long-term basis.	Steroids may be used to control inflammation and to effect a remission of the disease; however, drug may lower resistance to infection and cause fluid retention, as well as increase risk of death when taken over time.
Emphasize importance of good skin care, including proper handwashing and perineal skin care.	Reduces spread of bacteria and risk of skin irritation or breakdown and infection.
Recommend cessation of smoking. Refer to antismoking resources, if client is desirous of support and assistance.	Smoking can increase intestinal motility and cause vasoconstriction of intestinal blood vessels, aggravating disease.
Emphasize need for long-term follow-up and periodic reevaluation.	Clients with IBD have a lifelong remitting/flaring condition that requires ongoing monitoring and therapeutic interventions. In addition, clients with IBD are at increased risk for colorectal cancer (CRC), and regular diagnostic evaluations may be prudent/required. Note: Two of the main factors associated with increased cancer risk are disease duration and the extent of the colon involved. People whose entire colon is involved have the greatest risk, and those with inflammation that only involves the rectum have the lowest risk (Crohn's & Colitis Foundation, 2017).
<b>P</b> Recommend and refer for close monitoring of laboratory studies (e.g., CBC, WBC, platelets, liver enzymes) for adverse effects of disease and prescribed drugs on body systems.	Drug interactions and adverse effects of drugs can occur in all populations, but owing to the smaller size of children as well as ongoing changes in their bodies, adverse drug effects can occur more readily and with more harmful long-term consequences. Examples: The known adverse effects of thiopurines include hepatotoxicity, pancreatitis, allergic reactions, fever, rash, infectious complications, and bone marrow suppression, with increased risk for cancer. Corticosteroids increase the risk of infection and may worsen the complications of abscesses and fistulae.

(continues on page 368)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<p>P Discuss with client/caregiver use of vaccines in children with IBD. Encourage caregivers to address this issue with healthcare providers ongoing throughout child's appropriate age to receive immunizations.</p>	Depending on age of child at diagnosis and anticipated drug therapy, certain guidelines will be followed. For example: Live vaccines are contraindicated while on some thiopurines (e.g., 6-MP) or immunomodulators (e.g., infliximab). However, immunization guidelines suggest that protection against vaccine-preventable illness is beneficial in immunocompromised IBD patients and that most attenuated vaccines can be administered. Some immunizations (e.g., HPV, varicella) may be administered prior to initiating thiopurines or immunomodulators (Boroujerdi-Rad & Melmed, 2011; Stevens et al, 2011).
Identify appropriate community resources, such as Crohn's & Colitis Foundation of America (CCFA), United Ostomy Association of America (UOAA), North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHN); home healthcare providers and visiting nurse services, nutritionist, and social services.	Client/caregivers may benefit from the supports and services of these agencies in coping with chronicity of the disease and evaluating treatment options.
<b>POTENTIAL CONSIDERATIONS</b> following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)	
<ul style="list-style-type: none"> <li>• <b>acute Pain</b>—physical agents (hyperperistalsis, skin and tissue irritation—perirectal excoriation, fissures, fistulas)</li> <li>• <b>ineffective Coping</b>—uncertainty (unpredictable nature of disease process); severe pain; situational crisis</li> <li>• <b>risk for Infection</b>—traumatized tissue, change in pH of secretions, altered peristalsis, suppressed inflammatory response, chronic disease, malnutrition</li> <li>• <b>ineffective Health Management</b>—complexity of therapeutic regimen; perceived benefit; powerlessness; social support deficit</li> <li>• <b>[risk for disproportionate Growth]</b>—malnutrition, anorexia; chronic illness P</li> </ul>	

## FECAL DIVERSIONS: POSTOPERATIVE CARE OF ILEOSTOMY AND COLOSTOMY

- I. **Procedures**—Incontinent diversions (primary focus of this plan of care), laparoscopic colectomy, and continent diversions, such as the Kock pouch and the ileoanal reservoir (Francone, 2017)
  - a. **Ileostomy**
    - i. Performed when the entire colon, rectum, and anus must be removed, in which case the ileostomy is permanent, or a temporary ileostomy can be done to provide complete bowel rest in conditions such as with chronic colitis and in some trauma cases or when ileoanal anastomosis has been preformed
    - ii. Most frequently performed for complications of inflammatory bowel disease—Crohn's disease and ulcerative colitis—including intestinal perforation or intestinal stricture causing obstruction, abscess, or massive hemorrhage (Gutman, 2011)
    - iii. May also be done because of intestinal trauma; polyps; cancer of the bowel, bladder, and reproductive organs; or complications from cancer (Gutman, 2011)
  - b. **Colostomy (may be performed at several locations: the ascending, transverse, descending, or sigmoid colon)**
    - i. Ascending colostomy is positioned in the upper right side of the abdomen.
    - ii. Transverse colostomy is positioned in the mid-to-right upper abdomen.
    - iii. Descending/sigmoid colostomy is positioned in the lower left side of the abdomen.
- II. **Etiology**—Dependent on underlying pathology requiring procedure (e.g., cancer, ulcerative colitis, Crohn's disease, diverticulitis, bowel obstruction, bowel trauma)
- III. **Statistics**
  - a. Morbidity: According to the United Ostomy Association of America (UOAA), over 750,000 Americans are living with an ostomy, and over 130,000 new ostomy surgeries occur in the United States annually (UOAA, n.d.).

- b. Mortality: There is a scarcity of recent published data regarding deaths associated with ostomy surgery. One recent retrospective cohort study of over 4000 ostomies performed between 2006 and 2011 in a single state in the United States (looking for quality improvement data) reported a 10.7% mortality rate (Sheetz et al, 2014). It is unknown if this can be generalized across the country.
- c. Cost: A recent study looking at the economic burden of ostomy patients experiencing hospital readmission for complications (i.e., peristomal skin complications [PSCs]) within 120 days of original surgery reported total healthcare costs over 120 days were almost \$80,000 higher for patients with PSCs than those without PSCs (Taneja et al, 2017).

## G L O S S A R Y

- ACD (Allergic contact dermatitis):** Red, itchy rash that can occur from impaired skin barrier around stoma.
- Anus:** Terminal part of the rectum.
- Appliance:** Formal term for an ostomy pouch or ostomy bag.
- Colectomy:** Surgical removal of the colon (also known as the large intestine). Depending on what's necessary, a colectomy can be a partial or a total removal of the colon.
- Colon:** Part of the intestine that stores digested food and absorbs water. Also referred to as the large intestine or the large bowel.
- Colostomy:** Surgical opening to bring a portion of the colon (large) intestine through the abdominal wall to form a stoma. Colostomy may be temporary (e.g., to facilitate healing of perianal sepsis, relief of bowel obstruction, to prevent intestinal perforation) or permanent (e.g., abdominal perineal cancer, total abdominal proctocolectomy for severe Crohn's disease or ulcerative colitis).
- Effluent:** Waste from the ostomy.
- Film-forming liquid acylates:** Products that are applied as liquids that dry on skin contact, forming a protecting film. They are translucent, allowing visualization of wound margins, which makes them an ideal preparation to be used under an ostomy appliance.
- Ileostomy:** Opening that is surgically constructed in the ileum with the intestine brought through the abdominal wall to form a stoma.
- Ileum:** Lowest part or end of the small intestine.
- Irrigation:** Enema that is brought through the stoma, used by some colostomates, to regulate the passage of stool.
- Kock pouch:** An internal continent ileal reservoir. Usually limited to people who desire a continence mechanism but are not candidates for an ileal-anal pouch.
- Ostomy:** Umbrella term that refers to the surgically created opening in the body for the discharge of body wastes. Types of ostomies for fecal diversion include colostomy and ileostomy.
- Peristalsis:** Progressive waves of motion, which occur without voluntary control, to push contents through the intestine.
- Pouching system:** Device worn over the stoma, which acts as a reservoir for the stool that empties out of the stoma. Pouching systems are made of two primary components: a wafer (also called a skin barrier or faceplate) and a pouch. The pouch can be transparent or opaque, drainable or a "closed end" (disposable), and offered in different sizes and styles.
- Prolapse:** A "falling out" in which the stoma becomes longer.
- Rectum:** Lowest portion of the large intestine.
- Skin barrier:** Solid square or round piece of adhesive material that is used to protect the skin from stool.
- Stenosis:** Narrowing or tightness of the stoma, which may cause obstruction.
- Stoma:** Opening at the end of the colon or ileum; this is brought through the surface of the skin. Stomas may protrude above skin level (preferable), be flush at skin level, or retracted below skin level (may be a complication) (Butler et al, 2012).

## CARE SETTINGS

Care is handled in an inpatient acute care surgical unit.

## RELATED CONCERNs

- Cancer—general considerations, page 945  
 Fluid and electrolyte imbalances, see *DavisPlus*  
 Inflammatory bowel disease (IBD): ulcerative colitis, Crohn's disease, page 352  
 Pediatric considerations, page 993  
 Psychosocial aspects of care, page 835  
 Surgical intervention, page 873  
 Total nutritional support: parenteral/enteral feeding, page 525

## CLIENT ASSESSMENT DATABASE

Data depend on the underlying problem, duration, and severity (e.g., obstruction, perforation, inflammation, congenital defects).

DIAGNOSTIC DIVISION  
MAY REPORT

MAY EXHIBIT

### TEACHING/LEARNING

#### DISCHARGE PLAN CONSIDERATIONS

- Assistance with dietary concerns
- Management of ostomy
- Acquisition of supplies

► Refer to section at end of plan for postdischarge considerations.

### NURSING PRIORITIES

1. Assist client/significant other (SO) in psychosocial adjustment.
2. Prevent complications.
3. Support independence in self-care.
4. Provide information about procedure, prognosis, treatment needs, potential complications, and community resources.

### DISCHARGE GOALS

1. Adjusting to perceived or actual changes.
2. Complications prevented or minimized.
3. Self-care needs met by self or with assistance depending on specific situation.
4. Procedure, prognosis, therapeutic regimen, and potential complications understood and sources of support identified.
5. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: disturbed Body Image

#### May Be Related To

Alteration in [normal] body function (due to disease, surgery, loss of control of bowel elimination)

Alteration in self-perception [altered body structure (presence of stoma)]

[Significance of body part or functioning with regard to age, gender, developmental level]

#### Possibly Evidenced By

Alteration in body structure and function—ostomy

Verbal or nonverbal response to actual or perceived change in body (e.g., appearance, structure, function); refusal to verify actual change

Negative feelings about body, fear of reaction by others

Avoids touching or looking at one's body [stoma]; hiding of body part

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Body Image NOC

Demonstrate beginning acceptance by viewing and touching stoma and participating in self-care.

Verbalize feelings about stoma and illness; begin to deal constructively with situation.

Verbalize acceptance of self in situation, incorporating change into self-concept without negating self-esteem.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Body Image Enhancement NIC

##### Independent

Ascertain whether support and counseling were initiated when the possibility and/or necessity of ostomy was first discussed.

Provides information about client's/SO's level of knowledge and anxiety about individual situation.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage client/SO to verbalize feelings regarding the ostomy. Acknowledge normality of feelings of anger, depression, and grief over loss. Discuss daily “ups and downs” that can occur.	Helps client realize that feelings are not unusual and that feeling guilty about them is not necessary or helpful. Client needs to recognize feelings before they can be dealt with effectively.
Review reason for surgery and future expectations.	Client may find it easier to deal with an ostomy done to correct long-term disease than for traumatic injury or bowel perforation, even if ostomy is only temporary. Also, client who will be undergoing a second procedure to convert ostomy to a continent or anal reservoir may possibly experience less severe self-image problems because body function eventually will be “more normal.”
Be sensitive to client’s fears and concerns, noting religious, familial, cultural, relationship, and spiritual beliefs that may be impacting the situation.	Recovery from this surgery requires some mental toughness, as well as ongoing support from family/SOs. The client is rallying from surgery and from whatever disease necessitated the ostomy. He or she may be weak and depressed at the same time having to cope with an unpleasant change in body image and function. Concerns can be associated with fear (e.g., of pain, mortality, managing life roles, and sexuality issues). A client’s support systems, as well as religious, cultural, and spiritual beliefs, impact not only the current situation but also future expectations and outcomes (Borwell, 2011).
Provide opportunities for client/SO to view and touch stoma, using the moment to point out positive signs of healing, normal appearance, and so forth. Remind client that it will take time to adjust, both physically and emotionally.	Although integration of stoma into body image can take months or even years, looking at the stoma and hearing comments made in a normal, matter-of-fact manner can help client with this acceptance. Touching stoma reassures client/SO that it is not fragile and that slight movements of stoma actually reflect normal peristalsis.
Provide opportunity for client to deal with ostomy through participation in self-care.	Independence in self-care helps improve self-confidence and acceptance of situation.
Plan care activities with client.	Promotes sense of control and gives message that client can handle situation, enhancing self-concept.
Maintain positive approach during care activities, avoiding expressions of disdain or revulsion. Do not take angry expressions of client/SO personally.	Assists client/SO to accept body changes and feel good about self. Anger is most often directed at the situation and lack of control or powerlessness individual has over what has happened—not with the caregiver.
Note behaviors of withdrawal, increased dependency, manipulation, or noninvolvement in care.	Suggestive of problems in adjustment that may require further evaluation and more intensive interventions.
Ascertain client’s desire to visit with a person with an ostomy. Make arrangements for visit, if desired. Refer for psychological interventions, as indicated.	A person who is living with an ostomy can be a good support system and role model for the new ostomate. Shared experiences help reinforce teaching and facilitate acceptance of change as client realizes “life does go on” and can be relatively normal.

### NURSING DIAGNOSIS: acute Pain

#### May Be Related To

Physical injury agent—disruption of skin or tissues (incisions, drains, skin irritation/injury)  
 Biological injury agent—activity of disease process (inflammation, neoplasm, trauma)  
 [Psychological factors—fear, anxiety]

#### Possibly Evidenced By

Self-report of intensity or characteristics of pain; self-focusing  
 Guarding and expressive behaviors—restlessness, self-focus/narrow focus, crying  
 Changes in physiological parameter (e.g., blood pressure, heart or respiratory rate)

(continues on page 372)

**NURSING DIAGNOSIS:** **acute Pain** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Pain Level NOC**

Verbalize that pain is relieved or controlled.  
Appear relaxed and able to sleep or rest appropriately.

**Pain Self-Control NOC**

Demonstrate use of relaxation skills and general comfort measures, as indicated for individual situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b> <i>Independent</i> Assess pain, noting location, characteristics, and intensity (such as 0 to 10 or similar coded scale).	Helps evaluate degree of discomfort and effectiveness of analgesia or may reveal developing complications. Because abdominal pain usually subsides gradually by the third or fourth postoperative day, continued or increasing pain may reflect delayed healing or peristomal skin irritation. Note: Pain in anal area associated with abdominal-perineal resection may persist for months.
Encourage client to verbalize concerns. Active-listen to these concerns, and provide support by acceptance, remaining with client, and giving appropriate information.	Reduction of anxiety and fear can promote relaxation and comfort.
Provide comfort measures, such as back rub, and repositioning. Assure client that position change will not injure stoma.	Reduces muscle tension, promotes relaxation, and may enhance coping abilities.
Encourage use of relaxation techniques such as guided imagery and visualization. Provide diversional activities.	Helps client rest more effectively and refocuses attention, thereby reducing pain and discomfort.
Assist with range-of-motion exercises and encourage early ambulation.	Reduces muscle and joint stiffness. Ambulation returns organs to normal position and promotes return of usual level of functioning.
Avoid prolonged sitting position.	Edema, packing, and drains ( <i>if perineal resection has been done</i> ) increase discomfort and create a sense of needing to defecate. Frequent position changes, reduced sitting time, and walking can help reduce perineal pressure.
Investigate and report abdominal muscle rigidity, involuntary guarding, and rebound tenderness.	Suggestive of peritoneal inflammation, which requires prompt medical intervention.
<b>Collaborative</b> Administer medication, such as opioids, analgesics, and by appropriate route (e.g., IV, patch, oral, patient-controlled analgesia [PCA]), as indicated.	Relieves pain, enhances comfort, and promotes rest. PCA may be beneficial initially, especially following anal-perineal resection/repair.

**NURSING DIAGNOSIS:** **risk for impaired Skin Integrity****Possibly Evidenced By**

Humidity/moisture/chemical agent (e.g., excretions—character and flow of effluent from stoma; improper fitting or care of appliance/skin; [reaction to product or chemicals used])

**Desired Outcomes/Evaluation Criteria—Client Will****Ostomy Self-Care NOC**

Maintain skin integrity around stoma.  
Identify individual risk factors.  
Demonstrate behaviors or techniques to promote healing and/or prevent skin breakdown.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Ostomy Care NIC</b>	
<i>Independent</i>	
Inspect stoma and peristomal skin area with each pouch change. Note unusual skin color (dark, bluish color), irritation, or rashes.	Identifies areas of concern and need for further evaluation and intervention. Stoma should be red and moist. Note: An early postoperative complication (possibly within 24 hours) is stoma ischemia or necrosis due to vascular insufficiency with subsequent retraction and stenosis, with potential early surgical revision (Borwell, 2011). Peristomal-associated skin damage may be due to stool coming in contact with skin. For example, in client with an ileostomy, the effluent is rich in enzymes, increasing the likelihood of skin excoriation. This type of dermatitis requires a better fit of the collection bag or (in rare instances) revision of the stoma (Alavi et al, 2016).
Support surrounding skin when gently removing appliance. Apply adhesive removers as indicated, and then wash thoroughly.	Prevents tissue irritation and destruction associated with “pulling” pouch off.
Clean peristomal skin with warm water and pat dry. Use soap only if area is covered with sticky stool. If paste has collected on the skin, let it dry, and then peel it off.	Maintaining a clean and dry area helps prevent skin breakdown and increases adherence of appliances.
Evaluate appliance fit and skin barrier in ongoing basis.	Provides opportunity for problem-solving. Determines need for further intervention.
Verify that the opening on the skin barrier is no more than 1/8 inch (2 to 3 mm) larger than the base of the stoma, with adequate adhesive barrier to apply pouch.	Prevents trauma to the stoma tissue and protects the peristomal skin. Adequate adhesive area prevents the skin barrier wafer from being too tight. Note: Too tight a fit may cause stomal edema or injure the stoma.
Apply appropriate skin barrier—hydrocolloid wafer, extended-wear skin barrier, or similar products.	Protects skin from pouch adhesive, enhances adhesive-ness of pouch, and facilitates removal of pouch when necessary. Note: Sigmoid colostomy may not require an appliance if elimination is regulated through irrigation.
Investigate reports of burning, itching, or blistering around stoma. Be aware of allergens in ostomy-related products.	May be indicative of reaction to effluent leakage with peristomal irritation, infection (e.g., <i>Candida</i> ), or acute contact dermatitis (ACD), requiring intervention. Note: Research reveals an increasing incidence of ACD with ostomy products, including appliances and adhesives (Alavi et al, 2016).
Use a transparent, odor-proof, drainable pouch.	The appliance can be either one-piece (pouch is permanently attached to skin barrier) or two-piece (pouch snaps onto skin barrier). A transparent appliance during the first 4 to 6 weeks allows easy observation of stoma without necessity of removing pouch and irritating skin.
Empty, rinse with water, and cleanse ostomy pouch on a routine basis (usually when pouch is half full), using appropriate equipment.	Emptying and rinsing the pouch with the proper solution removes bacteria and odor-causing stool and flatus.
Measure stoma periodically—at least weekly for first 6 weeks, then once a month for 6 months. Measure both width and length of stoma.	As postoperative edema resolves, the stoma shrinks and the opening in the appliance must be altered to ensure proper fit so that effluent does not contact the skin. Note: Ulcerated areas on stoma may be from a pouch opening that is too small or a faceplate that cuts into stoma.

(continues on page 374)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Consult with certified wound, ostomy, continence (WOC) nurse.	Knowledgeable specialist in the care and teaching of clients with ostomies is helpful in choosing products appropriate for client's particular needs (e.g., ostomy appliance and protective barriers); can assist with evaluation and problem-solving in client's physical and emotional needs and capabilities in handling self-care.
Apply corticosteroid aerosol spray, antifungal powder, or other product, as indicated.	Assists in healing if peristomal irritation persists and fungal infection develops. These products can have potent side effects and should be used sparingly.

## NURSING DIAGNOSIS: risk for Infection

### Possibly Evidenced By

Alteration in skin integrity: [disruption of skin layers—presence of abdominal or perineal incision and sutures; status of body fluids; drainage]  
 Chronic illness (e.g., cancer, inflammatory bowel disease; diabetes); malnutrition; obesity, smoking  
 Immunosuppression [e.g., cancer or cancer treatments]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Wound Healing: Primary Intention NOC

Achieve timely wound healing free of signs of infection.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Wound Care NIC</b> <b>Independent</b> Observe incisions and wounds, noting progress toward healing and characteristics of any drainage (e.g., bloody, purulent, malodorous).	Abdominal wounds may be either incisions or laparoscopic stab wounds and usually heal without complication, unless client is severely immunocompromised or malnourished. Postoperative hemorrhage is rare and is most likely to occur during the first 48 hours, whereas infection may develop at any time. Note: One of the most common complications after colorectal operations (typically done because of cancer) is infection (Kirchhoff et al, 2010). Collectively, the combination of an unclean surgical field, major surgery, and debilitated clients is often associated with perineal wound infection (Wiatrek et al, 2008).
Keep perineal area as dry as possible. Change dressings as needed.	Large amounts of serous drainage require that dressings be changed frequently to reduce skin irritation/breakdown and potential for infection.
Encourage side-lying position with head elevated. Avoid prolonged sitting.	Promotes drainage from perineal wound/drains, reducing risk of pooling. Prolonged sitting increases perineal pressure, reducing circulation to wound, and may delay healing.
Observe client's intake, noting deficient in nutrition and fluid.	Client may not be able to ingest (or tolerate) enough food or fluids in the early postoperative period to promote healing, thereby increasing risk of infection.
<b>Collaborative</b> Assist in treatments of underlying conditions (e.g., cancer, diabetes, trauma, immunosuppressive conditions, malnutrition, dehydration).	Client may have a disease that directly affects the immune system or may be weakened by prolonged disease conditions or their treatments. All of the factors impact tissue healing and risk for infections.
Administer antibiotics, as indicated.	Antibiotics may be given prophylactically or to target specific organisms.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Irrigate wound as indicated, using normal saline (NS) or specified antimicrobial solution, if indicated.	May be required (if surgical wound is open) to treat to preoperative infection or intraoperative contamination.
Provide sitz baths, if indicated, based on surgical procedure.	Promotes perineal cleanliness and facilitates healing, especially after packing is removed—usually days 3 to 5.

### NURSING DIAGNOSIS: risk for deficient Fluid Volume

#### Possibly Evidenced By

Excessive losses through normal routes—preoperative emesis and diarrhea; high-volume ileostomy output

Loss of fluid through abnormal routes—nasogastric (NG) or intestinal tube, perineal wound drainage tubes

Deviations affecting intake—medically restricted intake, absorption of fluid—loss of colon function

Factors influencing fluid needs—hypermetabolic states (inflammation, healing process)

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Hydration NOC

Maintain adequate hydration as evidenced by moist mucous membranes, good skin turgor and capillary refill, stable vital signs, and individually appropriate urinary output.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid/Electrolyte Management NIC</b>	
<i>Independent</i>	
Note presence of conditions/processes that may lead to fluid loss.	Client may have both preoperative conditions (e.g., constant diarrhea, bowel obstruction, age or disease limited fluid intake [intentional or nonintentional], vomiting) and operative processes (blood and other fluid losses) that lead to fluid deficits.
Monitor intake and output (I&O) carefully and measure ostomy effluent. Weigh regularly.	Provides direct indicators of fluid balance. Note: Maintaining an appropriate fluid intake and electrolyte balance is significant for the ileostomist due to loss of the colon and its water-absorbing properties.
Monitor vital signs, noting postural hypotension and tachycardia. Evaluate skin turgor, capillary refill, and mucous membranes.	Reflects hydration status and influences fluid replacement interventions.
Limit intake of ice chips during period of gastric intubation.	Ice chips can stimulate gastric secretions and wash out electrolytes.
Resume oral fluid as soon as client can tolerate. For client with <b>ileostomy</b> : Provide and recommend increasing daily fluid intake by at least 500 mL over usual intake (unless contraindicated by cardiovascular conditions).	Loss of normal colon function of conserving water and electrolytes can lead to dehydration and electrolyte-related organ dysfunctions. Note: Average output for ileostomy ranges from 500 to 1300 mL a day and contains significant amounts of sodium and potassium, leaving the patient at risk for dehydration (Landman, 2017; Prinz et al, 2015).
Discuss possible need to decrease salt intake.	Salt can increase ileal output, potentiating risk of dehydration and increasing frequency of ostomy care needs and client's inconvenience.
<i>Collaborative</i>	
Monitor laboratory results, such as Hct and electrolytes.	Detects homeostasis or imbalance and aids in determining replacement needs.
Administer intravenous (IV) fluid and electrolytes as indicated.	May be necessary to maintain adequate tissue perfusion and organ function.

## NURSING DIAGNOSIS: risk for imbalanced Nutrition: less than body requirements

### Possibly Evidenced By

Inability to ingest food (prolonged anorexia, altered intake preoperatively)  
Inability to digest food/absorb nutrients (diarrhea)  
[Hypermetabolic state—preoperative inflammatory disease; healing process]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Nutritional Status NOC

Maintain weight or demonstrate progressive weight gain toward goal with normalization of laboratory values and be free of signs of malnutrition.  
Plan diet to meet nutritional needs and limit gastrointestinal (GI) disturbances.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Therapy NIC</b>	
<i>Independent</i>	
Obtain a thorough nutritional assessment, including dietary history, food preferences, and intolerances associated with current condition.	Identifies deficiencies and needs to aid in choice of interventions.
Auscultate bowel sounds.	Return of intestinal function indicates readiness to resume oral intake.
Resume solid foods slowly.	Reduces incidence of abdominal cramps and nausea.
Identify odor-causing foods, for instance, cabbage, fish, and beans, and temporarily restrict from diet. Gradually reintroduce one food at a time.	Sensitivity to certain foods is not uncommon following intestinal surgery. Client can experiment with food several times before determining whether it is creating a problem.
Recommend client increase use of yogurt, buttermilk, and acidophilus preparations, if needed.	May help prevent gas and decrease odor formation.
Suggest client with <b>ileostomy</b> limit foods that may thicken stool (e.g., bananas, rice, peanut butter, pasta); also limit foods with nondigestible fibrous peels (e.g., apples, corn, dried fruits, nuts, popcorn, foods with large seeds).	These products increase ileal effluent. High-fiber foods may thicken stool (causing constipation) or cause a blockage as digestion of cellulose requires colonic bacteria that are no longer present (ileostomy) (Prinz et al, 2015).
Discuss mechanics of swallowed air as a factor in the formation of flatus and some ways client can exercise control. Discuss use of a pouch with a filter to help with the management of gassiness.	Drinking through a straw, snoring, anxiety, smoking, ill-fitting dentures, and gulping down food increase the production of flatus. Too much flatus not only necessitates frequent emptying but also can cause leakage from too much pressure within the pouch.
<i>Collaborative</i>	
Consult with dietitian and nutrition specialist.	Helpful in assessing client's nutritional needs in light of changes in digestion and intestinal function, including absorption of vitamins and minerals.
Advance diet from liquids to low-residue food when oral intake is resumed (client with ileostomy).	Low-residue diet may be maintained during first 6 to 8 weeks because of bowel edema and to provide adequate time for intestinal healing. Note: Dietary modification is usually unnecessary for client with colostomy because nutritional absorption is not affected (Prinz et al, 2015).
Administer enteral or parenteral feedings when indicated.	In the presence of severe debilitation or intolerance of oral intake, parenteral or enteral feedings may be given to supply needed nutrients for healing and prevention of catabolic state. (Refer to CP: Total Nutritional Support: Parenteral/Enteral Feeding.)

**NURSING DIAGNOSIS:** risk for Constipation/Diarrhea**Possibly Evidenced By**

Physiological: [placement of ostomy]; change in gastrointestinal motility; malabsorption; treatment regimen  
 Eating habit change (e.g., foods); insufficient fiber or fluid intake; dehydration  
 Stress, anxiety

**Desired Outcomes/Evaluation Criteria—Client Will****Bowel Elimination NOC**

Establish an elimination pattern suitable to physical needs and lifestyle with effluent of appropriate amount and consistency.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bowel Management NIC</b> <i>Independent</i> Investigate delayed onset or absence of effluent. Auscultate bowel sounds.	Postoperative paralytic or adynamic ileus usually resolves within 48 to 72 hours, and ileostomy should begin draining within 12 to 24 hours. Delay may indicate persistent ileus or stomal obstruction, which may occur postoperatively because of edema, improperly fitting pouch (too tight), prolapse, or stenosis of the stoma.
Review dietary pattern and amount and type of fluid intake.	Adequate intake of fiber and roughage provides bulk, and fluid is an important factor in determining the consistency of the stool.
Review foods that are, or may be, a source of flatus, such as carbonated drinks, beer, beans, cabbage, onions, fish, and highly seasoned foods, or odor, such as onions, cabbage, eggs, fish, and beans.	These foods may be restricted or eliminated, based on individual reaction, for better ostomy control, or it may be necessary to empty the pouch more frequently if these foods are ingested.
Emphasize importance of chewing food well, adequate intake of fluids with and following meals, only moderate use of high-fiber foods, and avoidance of cellulose.	Reduces risk of bowel obstruction in client with <b>ileostomy</b> .
Inform client with <b>ileostomy</b> that initially the effluent is liquid. If constipation occurs, it should be reported to ostomy nurse or physician immediately.	Although the small intestine eventually begins to take on water-absorbing functions to permit a more semisolid consistency, pasty discharge or absence of output may indicate an obstruction. Absence of stool requires emergency medical attention.
Discuss colostomy irrigation, if indicated.	If client is in immediate postoperative period, irrigations will not yet be initiated. Once completely healed, the client with a permanent colostomy and whose stoma is in the descending or sigmoid portion (stools will tend to be more formed) may be able to irrigate. Note: It may take 6 to 8 weeks to achieve a predictable bowel pattern with routine irrigation. Once mastered, the irrigation procedure may eliminate the need for some clients to wear standard appliances (a quality-of-life [QOL] issue for some) (Blahd, 2017; Landman, 2017).
Discuss and/or demonstrate use of irrigation equipment, if appropriate. Provide hands-on experience with client as well as verbal teaching. Refer client/SO to physician or ostomy nurse for guidance.	This knowledge helps client understand individual care needs. Note: A recent study found that while colostomy irrigation is a well-established procedure, at least half the patients in the study indicated they were not taught how to do it by nurses (Cobb et al, 2015).
Inform client about the use of a patch, stoma cap, dressing, or adhesive strip once successful bowel control is achieved.	May enable client to participate in more desired lifestyle activities (e.g., sports, dating), to dress more in keeping with usual style, and to feel more comfortable socially.

## NURSING DIAGNOSIS: disturbed Sleep Pattern

### May Be Related To

Nonrestorative sleep pattern [e.g., necessity of ostomy care; physical discomfort/pain; stress, anxiety]

### Possibly Evidenced By

Difficulty maintaining sleep state; dissatisfaction with sleep, feeling unrested

Difficulty in daily functioning

### Desired Outcomes/Evaluation Criteria—Client Will

#### Sleep NOC

Sleep or rest between disturbances.

Report increased sense of well-being and feeling rested.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Sleep Enhancement NIC</b>	
<i>Independent</i>	
Explain necessity to monitor intestinal function in early postoperative period.	Client is more apt to be tolerant of disturbances by staff if he or she understands the reasons for, and importance of, ostomy care.
Provide adequate pouching system. Empty pouch before retiring and, if necessary, on an agreed-upon schedule or when half full.	Excessive gas or effluent can occur despite interventions. Emptying on a regular schedule, or when half full, minimizes threat of leakage.
Let client know that stoma will not be injured when sleeping.	Client will be able to rest better if feeling secure about stoma and ostomy function.
Restrict intake of caffeine-containing foods and fluids.	Caffeine may delay client's falling asleep and interfere with REM (rapid eye movement) sleep, resulting in client not feeling well rested.
Support continuation of usual bedtime rituals.	Promotes relaxation and readiness for sleep.
<i>Collaborative</i>	
Determine cause of ostomy issues in early postoperative phase (e.g., excessive flatulence or effluent) and pursue corrective actions (e.g., consulting dietitian or ostomy nurse).	Corrective measures of irritating ostomy issues can promote sleep or rest.
Administer analgesics or sedatives at bedtime, as indicated.	Pain and anxiety can interfere with client's ability to fall, or remain, asleep. Timely medication can enhance rest or sleep during initial postoperative period. Note: Pain pathways in the brain lie near the sleep center and may contribute to wakefulness.

## NURSING DIAGNOSIS: risk for Sexual Dysfunction

### Possibly Evidenced By

Alteration in body structure and function (due to surgery)

Vulnerability, [psychological concern about response of significant other]

Insufficient knowledge/misinformation about sexual function

### Desired Outcomes/Evaluation Criteria—Client Will

#### Sexual Functioning NOC

Verbalize understanding of relationship of physical condition to sexual problems.

Identify satisfying and acceptable sexual practices and explore alternative methods.

Resume sexual relationship as appropriate.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Sexual Counseling NIC</b>	
<i>Independent</i>	
Determine client's and SO's sexual relationship before the disease or surgery and whether they anticipate problems related to presence of ostomy.	Identifies future expectations and desires. Perception of mutilation and loss of privacy and control of a bodily function can affect client's view of personal sexuality. When coupled with the fear of rejection by SO, the desired level of intimacy can be greatly impaired. Sexual needs are very basic, and client will be rehabilitated more successfully when a satisfying sexual relationship is continued or developed as desired.
Review with client and SO sexual functioning in relation to own situation.	Understanding if nerve damage has occurred and how it will alter sexual functioning (e.g., erection) helps client and SO to understand the need for exploring alternative methods of satisfaction.
Reinforce information given by the physician. Encourage questions. Provide additional information as needed.	Reiteration of data previously given assists client and SO to hear and process the knowledge again, moving toward acceptance of individual limitations or restrictions and prognosis, such as that it may take up to 2 years to regain potency after a radical procedure or that a penile prosthesis may be necessary.
Discuss likelihood of resumption of sexual activity in approximately 6 weeks after discharge, beginning slowly and progressing, such as cuddling and caressing until both partners are comfortable with body image and function changes. Include alternative methods of stimulation, as appropriate.	Knowing what to expect in progress of recovery helps client avoid performance anxiety and reduce risk of "failure." If the couple is willing to try new ideas, this can assist with adjustment and may help to achieve sexual fulfillment.
Encourage dialogue between partners, acknowledging that the situation is difficult but that restoration of sexual intimacy is most likely possible over time.	An ostomy can certainly impact feelings about desirability and cause worries about ability to function sexually (e.g., ability to have an erection or experience orgasm). The emotional issues can be hard for both the client and the healthy partner. In some instances where a client has had surgery for debilitating health problems, the healthy partner helps to take care of the ostomate and "certain" bodily functions. Working through these hard times without sex can take a toll on the sex life, and it can take time for these couples to adjust and regain confidence to resume a healthy sexual lifestyle again (Ostomyguide Staff, 2010).
Suggest wearing a mini-pouch, or pouch cover, T-shirt, short nightgown, or special underwear designed for sexual contact.	Disguising ostomy appliance may aid in reducing feelings of self-consciousness and embarrassment during sexual activity.
Emphasize awareness of factors that might be distracting—fear of hurting the stoma or unpleasant odors and pouch leakage.	Promotes resolution of solvable problems (e.g., assuring partner that stoma cannot be injured, emptying pouch before sex, use of pouch deodorizer).
Encourage use of sense of humor.	Laughter can help individuals deal more effectively with difficult situation and promote positive sexual experience.
Problem-solve alternative positions for coitus.	Minimizing awkwardness of appliance and physical discomfort can enhance satisfaction.
Discuss and role-play possible interactions or approaches when dealing with new sexual partners.	Rehearsal is helpful in dealing with actual situations when they arise, reducing self-consciousness about "different" body image.

(continues on page 380)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Offer reading lists and other resources (e.g., healthcare professional, local and national ostomy organizations, websites/blogs, ostomy support groups), as indicated.	Identifies future expectations and desires. Mutilation and loss of privacy and control of a bodily function can affect client's view of personal sexuality. When coupled with the fear of rejection by SO, the desired level of intimacy can be greatly impaired. Sexual needs are very basic, and client will be rehabilitated more successfully when a satisfying sexual relationship is continued or developed as desired.
Provide birth control information as appropriate and emphasize that impotence does not necessarily mean client is sterile.	There is a wealth of available information and support available to provide client and partner with answers, solutions to problems, and hope that they can look forward to a healthy sex life.
<b>Collaborative</b> Arrange meeting with an ostomy visitor, if appropriate.	Most women can still conceive after ostomy surgery without any problem, so birth control may still be needed/desired. Most men remain fertile, even if they cannot achieve an erection for a period after surgery.
Refer to counseling or sex therapy, as indicated.	Sharing of how these problems have been resolved by others can be helpful and reduce sense of isolation. If problems persist longer than several months after surgery, a trained therapist may be required to facilitate communication between client and partner.

## NURSING DIAGNOSIS: **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

### May Be Related To

Insufficient information; misinformation; insufficient interest in learning  
Insufficient knowledge of resources

### Possibly Evidenced By

Reports insufficient knowledge  
Inaccurate follow-through of instruction or performance on a procedure (ostomy care)  
Inappropriate or exaggerated behaviors—hostile, agitated, apathetic  
Development of preventable complication

### Desired Outcomes/Evaluation Criteria—Client Will

#### Knowledge: Ostomy Care NOC

Verbalize understanding of condition, disease process, prognosis, and potential complications.  
Verbalize understanding of therapeutic needs.  
Participate in learning process to correctly perform necessary procedures and explain reasons for actions.  
Initiate necessary lifestyle changes.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Learning Facilitation NIC</b> <i>Independent</i> Evaluate client's emotional, cognitive, and physical capabilities. Include written and picture (photo, video, Internet) learning resources.	These factors affect client's ability to master care tasks and willingness to assume responsibility for ostomy care. Provides reference for obtaining support, equipment, and additional information after discharge to support client efforts for independence in self-care.
<b>Teaching: Disease Process NIC</b> Review anatomy, physiology, and implications of surgical intervention. Discuss future expectations, including anticipated changes in character of effluent.	Provides knowledge base from which client can make informed choices and offers an opportunity to clarify misconceptions regarding individual situation.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct client/SO in stomal and pouch care. Allot time for return demonstrations and provide positive feedback for efforts.	Promotes positive management and reduces risk of improper ostomy care and development of complications.
Identify symptoms of electrolyte depletion, such as anorexia, abdominal muscle cramps, feelings of faintness or cold in arms and legs, general fatigue or weakness, bloating, and decreased sensations in extremities.	Loss of the colon function of regulating fluid and electrolyte absorption may result in sodium- and potassium-related symptoms. Deficits require dietary correction with foods and fluids higher in sodium (e.g., bouillon, tomato juice, Gatorade) or potassium (e.g., orange juice, prunes, tomatoes, bananas).
Discuss need for periodic evaluation and administration of supplemental vitamins and minerals, as appropriate.	Depending on portion and amount of bowel resected, lack of absorption may cause deficiencies.
Discuss resumption of presurgery level of activity. Suggest emptying the ostomy appliance before leaving home and carrying fresh supplies. Recommend resources for obtaining attractive appliances and decorative cummerbunds as appropriate.	With a little planning, client should be able to manage same degree of activity as previously enjoyed and in some cases increase activity level. A cummerbund can provide both physical and psychological support when client is involved in activities such as tennis and swimming.
Talk about the possibility of sleep disturbance, anorexia, and loss of interest in usual activities.	“Homecoming depression” may occur, lasting for months after surgery, requiring patience, support, and ongoing evaluation as client adjusts to living with a stoma.
Explain necessity of notifying healthcare providers and pharmacists of type of ostomy and avoidance of sustained-release medications for client with ileostomy.	Presence of ostomy may alter rate and extent of absorption of oral medications and increase risk of drug-related complications such as diarrhea, constipation, or peristomal excoriation. Liquid, chewable, or injectable forms of medication are preferred for clients with ileostomy to maximize absorption of drug (Prinz et al, 2015).
Counsel client concerning medication use and problems associated with altered bowel function. Refer to pharmacist for teaching or advice, as appropriate.	Client with an ostomy has two key problems: altered disintegration and absorption of oral drugs and unusual or pronounced adverse effects. Some of the medications that client may respond to differently include salicylates, H <sub>2</sub> -receptor antagonists, antibiotics, and diuretics.
Emphasize necessity of close monitoring of chronic health conditions requiring routine oral medications.	Monitoring of clinical symptoms and/or serum blood levels of routine medications is indicated because of altered drug absorption, which may require changes in dosage or use of another medication.
Identify community resources, such as United Ostomy Association of America (UOAA), the Crohn’s & Colitis Foundation of America (CCFA), local ostomy support group, certified WOC nurse, visiting nurse, and pharmacy and medical supply house.	Continued support after discharge is essential to facilitate the recovery process and client’s independence in care. WOC nurse can be very helpful in solving appliance problems, identifying alternatives to meet individual client needs.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client’s age, physical condition and presence of complications, personal resources, and life responsibilities)

- **risk for impaired Skin Integrity**—excretions (character and flow of effluent and flatus from stoma)
- **ineffective Coping**—situational crises
- **impaired Social Interaction**—self-concept disturbance (concern for loss of control of bodily functions)
- **risk for ineffective Health Management**—complexity of therapeutic regimen, economic difficulties, perceived barriers, powerlessness

# APPENDECTOMY

## I. Pathophysiology of Appendicitis (Alder & Minkes, 2017; Marks, 2017; Wesson, 2017)

The events associated with acute appendicitis occur so rapidly that the whole process can take about 1 to 3 days from the start of pain to rupture. Initially, the appendix (a tube-shaped sac attached to and opening into the lower end of the large intestine) becomes blocked. The blockage may be due to a buildup of thick mucus inside the appendix or to stool that enters the appendix from the cecum (beginning of the large intestine).

Appendicitis begins when the blockage causes distention and reduced blood supply to the appendix wall, resulting in ischemia and the accumulation of toxins. The body responds by mounting an attack on the bacteria (inflammation), manifested by abdominal pain and fever. If the symptoms of appendicitis are not recognized and the inflammation progresses, the appendix can rupture, followed by spread of bacteria outside of the appendix. Thus, the treatment of appendicitis constitutes a medical emergency.

## II. Staging—stages are divided into early, suppurative, gangrenous, perforated, phlegmonous, spontaneous resolving, recurrent, and chronic (Craig, 2017).

### a. Early stage

- i. Individual may experience spontaneous recovery from inflammation at this stage or it may progress.
- ii. Obstruction of the opening of the appendix leads to formation of edema, distention due to accumulated fluid, bacterial migration, and increasing pressure.
- iii. Patient perceives mild perumbilical or epigastric pain lasting 4 to 6 hours.

### b. Suppurative stage

- i. Increasing pressure allows bacteria and fluid invasion of appendiceal wall.
- ii. Patient experiences a shift of the pain from perumbilical area to the right lower quadrant (RLQ) of the abdomen, becoming continuous and more severe.

### c. Gangrenous stage

- i. Spontaneous regression never occurs.
- ii. Venous or arterial thromboses occur, which result in death of tissues.
- iii. Peritonitis can be present.

### d. Perforated stage

- i. Tissue ischemia and resulting tissue death cause perforation of the appendix.
- ii. Localized or generalized peritonitis is present.

### e. Phlegmonous stage

- i. Inflamed or perforated appendix can be walled off.
- ii. An abscess forms, confirming the inflammation and infection.

### f. Spontaneously resolving appendicitis

- i. Occurs when the obstruction to the appendix is relieved prior to gangrene setting in.
- ii. Acute appendicitis may resolve without treatment.

### g. Recurrent appendicitis

- i. Occurs in approximately 10% of cases (Craig, 2017)
- ii. Diagnosed if client has similar RLQ pain that is shown to be resulting from an inflamed appendix after removal.

### h. Chronic appendicitis

- i. Occurs in approximately 1% of cases (Craig, 2017).
- ii. Client has history of RLQ pain lasting at least 3 weeks.

iii. Pain is relieved after appendectomy.

iv. Symptoms are the result of chronic inflammation of the appendix wall or fibrosis of the appendix.

## III. Epidemiology

- a. **P** Appendicitis is the most common indication for emergent abdominal surgery in childhood, occurring most commonly in the second decade of life (Wesson, 2017).
- b. Appendicitis rates are 1.5 times higher in Caucasians than in other ethnicities (Detillo & Davis, 2014).
- c. Appendicitis occurs more commonly in males than in females.
- d. Peak incidence occurs in the third quarter of the year (July–September). *Note:* Numerous studies around the world appear to support seasonal variation of acute appendicitis (occurs more often in summer than in winter), although the reason(s) are unknown (Bernstein et al, 2012).
- e. The rate of **perforation** varies from 16% to 40%, with a higher frequency occurring in younger age groups (40%–57%) and in patients older than 50 years (55%–70%) (Craig, 2017). **P** *Note:* Because of the short time from obstruction of the appendix to perforation, 20% to 35% of children present with acute appendicitis that has already perforated (within 72 hours of symptom onset) (Alder & Minkes, 2017).

## IV. Surgical Procedures—Inflamed appendix may be removed using a single incision (open appendectomy [OA]) or using a laparoscopic approach (laparoscopic appendectomy [LA]), where several smaller incisions are made and special surgical tools are inserted through the incisions to remove the appendix.

- a. Presence of multiple adhesions, retroperitoneal positioning of the appendix, or the likelihood of rupture may necessitate an open appendectomy (OA)/traditional procedure.
- b. Although it does involve a longer operative time, LA results in significantly less postoperative pain, lower wound infection rate, and faster return to normal activities (Wei et al, 2011). *Note:* Certain contraindications exist for LA, including extensive adhesions, radiation or immunosuppressive therapy, severe portal hypertension, first-trimester pregnancy, and coagulopathies (Santacroce & Ochoa, 2017). Numerous studies have concluded that most clients (even those older than 65, those with comorbidities, and those with complicated appendicitis) benefit more from the laparoscopic approach than with open appendectomy with respect to the length of hospital stay, the rate of routine discharge, and postoperative morbidity and mortality rates (Mazziotti & Minkes, 2015; Yeh et al, 2011).

## V. Statistics

- a. Morbidity: Approximately 250,000 cases are reported annually in the United States.
- b. Mortality: Death is rare but can occur in patients who have profound peritonitis and sepsis. No reports were available concerning mortality in patients with a nonperforated appendix. Mortality is lower than 1% if appendiceal perforation exists. An exception is elderly patients, who have a mortality that approaches 5% (Wesson, 2017).
- c. Cost: Based on Healthcare Bluebook, fair price for an appendectomy is \$14,000, which would put the estimated total annual cost close to \$3.5 billion (Healthcare Bluebook, 2017a).

## G L O S S A R Y

**Abscess:** Collection of pus in any part of the body that is surrounded by inflammation and infection.

**Appendicolith:** A calcified deposit within the appendix.

**P** They are present in a large number of children with **acute appendicitis** and may be an incidental finding on an abdominal x-ray or CT. Overall, they are seen in 10% of patients, with 90% subsequently going on to develop appendicitis (Butler et al, 2012).

**Appendix:** A small out-pouching from the beginning of the ascending colon; formerly called the vermiform appendix because it was thought to be wormlike.

**Epigastric:** Lying on or above the stomach.

**Erythema:** Redness of tissues.

**McBurney's point:** Name given to the point over the right side of the abdomen that is one-third of the distance from the anterior superior iliac spine to the umbilicus.

**Necrosis:** Death of part of an organ.

**Perforation:** Rupture of the appendix caused by swelling and infection.

**Peritonitis:** Inflammation of the peritoneum, the tissue layer of cells lining the inner wall of the abdomen and pelvis.

**Periumbilical:** Situated adjacent to the umbilicus.

**Phlegmonous:** Purulent inflammation of the appendix.

**Rebound tenderness:** Pain felt upon removal of pressure (rather than application of pressure) to the abdomen; a symptom of peritoneal inflammation. Sometimes both applying and relieving pressure anywhere on the abdomen triggers pain in the RLQ (with appendicitis).

**RLQ:** Right lower quadrant (area of abdomen): common area where pain localizes with appendicitis.

## CARE SETTING

Laparoscopic appendectomy is typically associated with inpatient hospitalization averaging between 1 and 2 days. However, laparoscopic appendectomies may be performed as an outpatient procedure in adults meeting certain criteria (uncomplicated procedure and absence of perforation/peritonitis) (Fazee et al, 2016). Although many of the interventions included here are appropriate for the short-stay client, this plan of care addresses the traditional appendectomy care provided on a surgical unit, after being diagnosed in the emergency department (ED).

## CONCERNS

Pediatric considerations, page 993

Peritonitis, page 389

Psychosocial aspects of care, page 835

Surgical intervention, page 873

## CLIENT ASSESSMENT DATABASE (PREOPERATIVE)

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Malaise

#### CIRCULATION

### MAY EXHIBIT

- Tachycardia

#### ELIMINATION

- Constipation of recent onset
- Diarrhea (occasional)

- Abdominal distention, tenderness
- Rebound tenderness, rigidity
- Decreased or absent bowel sounds
- Abdominal rigidity

#### FOOD/FLUID

- Anorexia (74%–78%)
- Nausea (61%–92%)
- Vomiting nearly always follows onset of pain.

(continues on page 384)

## CLIENT ASSESSMENT DATABASE (PREOPERATIVE) (contd.)

### MAY REPORT (continued)

### MAY EXHIBIT (continued)

#### PAIN/DISCOMFORT

- Abdominal pain around the umbilicus, which may have a gradual onset and become increasingly severe.
- Pain may localize in right lower quadrant (RLQ).
- Pain aggravated by walking, hopping on one foot (children); sneezing, coughing, or deep breathing
- Increasingly severe, generalized pain or the sudden cessation of severe pain suggests perforation or infarction of the appendix.

#### RESPIRATION

- Guarding behavior; lying on side or back with knees flexed
- Palpation may elicit pain in RLQ, at McBurney's point.
- Increased RLQ pain with flexion and internal rotation of right leg (obturator sign)
- Rebound tenderness on left side
- Limping and right hip pain (children)

#### SAFETY

- Tachypnea, shallow respirations
- Fever, usually low grade

#### TEACHING/LEARNING

- History of other conditions associated with abdominal pain, such as Crohn's disease, irritable bowel syndrome, peptic ulcer, painful ovulation, that may require differentiation from current pain problem
- May occur at any age

#### DISCHARGE PLAN CONSIDERATIONS

- May need brief assistance with transportation and homemaker tasks

► Refer to section at end of plan for postdischarge considerations.

#### DIAGNOSTIC STUDIES

##### TEST

##### WHY IT IS DONE

- **CLINICAL SCORING (MANTRELS):** M=migration of pain to RLQ (1 point [pt]); A=anorexia (1 pt); N=nausea and vomiting (1 pt); T=tenderness in RLQ (2 pts); R=rebound pain (1 pt); E=elevated temperature (1 pt); L=leukocytosis (2 pts); S=shift of WBC count to left (1 pt).

##### WHAT IT TELLS ME

Scoring range system (based on a study of over 300 adults with acute abdominal pain) for the early diagnosis of appendicitis where score of <5 indicates that appendicitis is unlikely and a score of 9 or 10 predicts that appendicitis is highly likely. Intermediate scores indicate "possible" or "likely" diagnosis of appendicitis (Alvarado, 1986).  **Note:** A different clinical 10-point rating scale (Pediatric Appendicitis Score [PAS]) is used for children. A PAS score >7 has been shown to have a 78% to 96% frequency of appendicitis (Wesson, 2017).

#### BLOOD TESTS

- **Complete blood count (CBC):** Battery of screening tests that typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; white blood cell (WBC) count with differential.

WBCs are often elevated above 10,000/mm<sup>3</sup>; absolute neutrophil count (ANC) often elevated to greater than 75%.

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li><b>C-reactive protein (CRP):</b> Protein produced by the liver when bacterial infections occur.</li> </ul>	<p>CRP levels greater than 1 mg/dL are commonly reported in client with appendicitis. High levels of CRP (greater than 5 mg/dL) have been shown to be a significant indicator of necrotic appendicitis and indicative of the need for surgical intervention (Yokoyama et al, 2009). However, CRP normalization occurs 12 hours after onset of symptoms, so test is not useful for chronic appendicitis or acute appendicitis when tests for it are performed late. <b>P Note:</b> In some children, a combination of characteristic clinical findings and elevations in WBC, ANC, or CRP is sufficient to diagnose appendicitis (Gronroos &amp; Gronroos, 1999).</p>

### ASSOCIATED DIAGNOSTIC STUDIES

- Abdominal and pelvic computed tomography (CT) scan, also called CAT scan:** X-ray procedure, using a contrast medium that produces a detailed picture of a cross section of abdominal and pelvic structures.
- Ultrasonography:** Technique for imaging internal structures of the body by measuring and recording the reflection of pulsed or continuous high-frequency sound waves.

Preferred test for differentiation of appendicitis from other causes of abdominal pain, such as perforating ulcer, cholecystitis, and reproductive organ infections, or to localize drainable abscesses, particularly for those clients in which perforation is suspected.

Method for quickly scanning abdomen without using radiation. **P** Is highly accurate in children suspected of having acute appendicitis (Krishnamoorthi et al, 2011).

### NURSING PRIORITIES

- Prevent complications.
- Promote comfort.
- Provide information about surgical procedure, prognosis, treatment needs, and potential complications.

### DISCHARGE GOALS

- Complications prevented or minimized.
- Pain alleviated or controlled.
- Surgical procedure, prognosis, therapeutic regimen, and possible complications understood.
- Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: risk for Infection/risk for Surgical Site Infection

#### Possibly Evidenced By

Inadequate primary defenses: alteration in tissue integrity; perforation (rupture) of the appendix, peritonitis, abscess formation  
Increased environmental exposure to pathogens— invasive procedures, surgical incision

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Wound Healing: Primary Intention NOC

Achieve timely wound healing, free of signs of infection and inflammation, purulent drainage, erythema, and fever.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Infection Prevention NIC

##### Independent

Be aware of host-specific factors that affect immunity (e.g., age, presence of chronic health conditions, nutritional and immune function status, use of certain medications).

Although the client with appendicitis may present as a young healthy individual, appendicitis occurs in all age groups. Thus, it is common for many factors to be present that can affect healing.

Practice and instruct in good handwashing and aseptic wound care.

Reduces risk of spread of bacteria.

Inspect incision and dressings. Note characteristics of drainage from wound or drains (if inserted) and presence of erythema.

Provides for early detection of developing infectious process and monitors resolution of preexisting peritonitis.

(continues on page 386)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor vital signs. Note onset of (or continued) fever, chills, diaphoresis, changes in mentation, and reports of increasing abdominal pain.	Suggestive of presence of infection and possibly developing sepsis, internal abscess(es), or peritonitis.
Obtain drainage specimens, if indicated.	Gram's stain, culture, and sensitivity testing are useful in identifying causative organism and most appropriate choice of therapy.
<b>Collaborative</b>	
Administer antibiotics as appropriate: typically broad-spectrum gram-negative, aerobic and anaerobic agents.	Antibiotics given before appendectomy are primarily for prophylaxis of wound infection/peritonitis and are not usually continued postoperatively. Therapeutic antibiotics are administered if the appendix is ruptured or abscessed, or peritonitis has developed and continues based on clinical signs and symptoms. In both adults and children, <b>P</b> perforated appendicitis, peritonitis, or sepsis necessitates a longer hospital stay for intravenous (IV) antibiotic treatment (Craig, 2017; Maziotti & Minkes, 2015).
Prepare for and assist with incision and drainage (I&D) if indicated.	May be necessary to drain contents of localized abscess. Occasionally abscesses may be drained for about 2 weeks while antibiotics are given to treat any infection. The remaining appendix is then removed 6 to 8 weeks later when infection and inflammation are under control.

## NURSING DIAGNOSIS: risk for deficient Fluid Volume

### Possibly Evidenced By

Active fluid losses through normal routes—preoperative vomiting  
Deviations affecting intake—postoperative restrictions (nothing by mouth [NPO])  
Factors influencing fluid needs—hypermetabolic state (fever, healing process)  
[Inflammation of peritoneum with sequestration of fluid]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Hydration NOC

Maintain adequate fluid balance as evidenced by moist mucous membranes, good skin turgor, stable vital signs, and individually adequate urinary output.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Monitoring NIC</b>	
<i>Independent</i>	
Monitor vital signs.	Variations help identify fluctuating intravascular volumes or changes in vital signs associated with immune response to inflammation.
Inspect mucous membranes; assess skin turgor and capillary refill.	Indicators of adequacy of peripheral circulation and cellular hydration.
Monitor intake and output (I&O); note urine color and concentration and specific gravity.	Decreasing output of concentrated urine with increasing specific gravity suggests dehydration and need for increased fluids.
Auscultate bowel sounds. Note passing of flatus and bowel movement.	Indicators of return of peristalsis and readiness to begin oral intake. Note: This may not occur in the hospital if client has had a laparoscopic procedure and been discharged in less than 24 hours.
Provide clear liquids in small amounts when oral intake is resumed, and progress diet as tolerated.	Reduces risk of gastric irritation and vomiting to minimize fluid loss.
Give frequent mouth care with special attention to protection of the lips.	Dehydration results in drying and painful cracking of the lips and mouth.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b>	
Monitor lab tests (e.g., electrolytes, BUN/creatinine). Maintain nasogastric (NG) and intestinal suction, as indicated.	These tests provide important information about fluid balance. Although not frequently needed, an NG tube may be inserted preoperatively and maintained in immediate postoperative phase to decompress the bowel, promote intestinal rest, and prevent vomiting.
Administer intravenous (IV) fluids and electrolytes.	Needed to promote homeostasis for general well-being and postoperative healing. Note: If peritonitis exists, the peritoneum reacts to irritation and infection by producing large amounts of intestinal fluid, pulling fluid from the vascular space and possibly reducing the circulating blood volume, resulting in dehydration and relative electrolyte imbalances.

### NURSING DIAGNOSIS: acute Pain

#### May Be Related To

Physical injury agents—presence of surgical incision, distention of intestinal tissues  
Biological injury agents—infection: [inflammation, peritonitis], abscess

#### Possibly Evidenced By

Self-report or proxy report (e.g., family member) of characteristics and intensity of pain  
Guarding and expressive behaviors (e.g., crying, restlessness, facial grimacing, muscle guarding)  
Changes in vital signs

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Pain Level NOC

Report pain is relieved or controlled.  
Appear relaxed, able to sleep, and rest appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<b>Independent</b>	
Note client's age, developmental level, and current condition (infant/child, critically ill, ventilated, sedated, or cognitively impaired).	Impacts ability to report pain parameters.
Assess pain reports, noting location, characteristics, and severity (0 to 10 [or similar] scale). Investigate and report changes in pain, as appropriate.	Pain is a subjective experience. Ongoing assessment is needed for evaluating effectiveness of medication and progression of healing. Changes in characteristics of pain may indicate developing abscess or peritonitis, requiring prompt medical evaluation and intervention.
Observe nonverbal cues and pain behaviors (e.g., how client holds body, facial expressions such as grimacing, withdrawal, narrowed focus, crying).	Nonverbal cues may or may not support client's pain intensity but may be the only indicator if client is unable to verbalize.
Monitor skin color and temperature, as well as vital signs (e.g., heart rate, blood pressure, respirations).	May be altered by acute pain.
Keep at rest in semi-Fowler's position.	Gravity localizes inflammatory exudate into lower abdomen or pelvis, relieving abdominal tension, which is accentuated by supine position.
Encourage early ambulation.	Promotes normalization of organ function; stimulates peristalsis and passing of flatus, reducing abdominal discomfort.
Provide comfort measures (e.g., touch, repositioning, quiet environment, focused breathing).	To promote nonpharmacological pain management.
Provide diversional activities (e.g., music, TV, computer games).	Refocuses attention, promotes relaxation, and may enhance coping abilities.

(continues on page 388)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Keep NPO and maintain NG suction initially.	Decreases discomfort of early intestinal peristalsis and gastric irritation or vomiting.
Administer analgesics (often morphine), as indicated, to maximum dosage needed to maintain comfort.	Promotes comfort and facilitates cooperation with other therapeutic interventions, such as ambulation. Note: Morphine is often the analgesic of choice because of its reliable and predictable effects, safety profile, and ease of reversibility with naloxone (Narcan) (Craig, 2017).
Place ice bag on abdomen periodically during initial 24 to 48 hours, as appropriate.	<b>P</b> Morphine may be supplemented by medications such as parenteral ketorolac (Toradol), with conversion to oral agents (e.g., ibuprofen [Motrin], acetaminophen [Tylenol], or hydrocodone combination drugs [e.g., Vicodin, Lortab]) once the client is drinking well (Wesson, 2017).  Soothes and relieves pain through desensitization of nerve endings. Note: Do not use heat because it may cause tissue congestion and increase edema formation.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

**May Be Related To**

Insufficient information or knowledge of resources

**Possibly Evidenced By**

Reports insufficient knowledge  
Inaccurate follow-through of instruction  
Development of preventable complication

**Desired Outcomes/Evaluation Criteria—Client Will**

**Knowledge: Acute Illness Management NOC**

Verbalize understanding of disease process, treatment regimen, and potential complications.  
Participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b>	
<b>Independent</b>	
Identify symptoms requiring medical evaluation—increasing pain, edema and erythema of wound, presence of drainage, and fever.	Prompt intervention reduces risk of serious complications, such as delayed wound healing and peritonitis.
Review postoperative activity restrictions—heavy lifting, exercise, sexual activity, sports, and driving.	Provides information for client to plan for return to usual routines without untoward incidents.
Encourage progressive activities as tolerated with periodic rest periods.	Prevents fatigue, promotes healing and feeling of well-being, and facilitates resumption of normal activities.
Recommend use of mild laxative or stool softeners as necessary and avoidance of enemas.	Assists with return to usual bowel function; prevents undue straining for defecation.
Discuss care of incision, including dressing changes, bathing restrictions, and return to physician for suture and staple removal.	Understanding promotes cooperation with therapeutic regimen, enhancing healing and recovery process.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition, presence of complications, personal resources, and life responsibilities)

- **risk for ineffective Health Management**—perceived seriousness or susceptibility, perceived benefit, demands made on individual (family, work), economic difficulties

# PERITONITIS

## I. Pathophysiology

Peritonitis is the result of inflammation of the serosal membrane that lines the inner walls of the abdomen and pelvis. It is most often caused by the introduction of an infection into an otherwise sterile environment through organ perforation or other irritants (e.g., foreign bodies, bile, gastric acid, peritoneal dialysate, infected fallopian tube). Infections of the peritoneum are divided into **generalized** (peritonitis) and **localized** (intra-abdominal abscess).

## II. Classification and Etiologies

Categorized as primary, secondary, tertiary, chemical, and peritoneal abscess (Daley, 2017).

- Primary or bacterial peritonitis occurs spontaneously when the peritoneum is infected via the blood and lymphatic circulation. Also called spontaneous bacterial peritonitis (SBP), this condition occurs in both children and adults. SBP resulting from chronic liver disease is the most common etiology of primary peritonitis. Untreated SBP has a mortality rate of up to 50%, but with prompt diagnosis and treatment of the condition, this figure may be reduced to 20%.
- Secondary peritonitis is related to a pathological process in a visceral organ of the abdomen or pelvis. This process occurs because of some type of structural disruption to an internal organ, resulting in direct spillage into the peritoneum. Sources of infection include:
  - Gastrointestinal (GI) tract: Ruptured appendix, perforated gastric or duodenal ulcer, cholecystitis with stone perforation, perforated colon caused by diverticulitis or cancer, pancreatitis, ulcerative colitis, and Crohn's disease
  - Ovaries and uterus: Pelvic inflammatory disease, ovarian cyst
  - Traumatic injuries: Blunt and penetrating trauma
  - Iatrogenic trauma to GI tract, such as during endoscopic procedures; inadvertent bowel injury or anastomosis leak or dehiscence; instrumentation such as occurs with peritoneal dialysis or percutaneous stent placement
- Tertiary peritonitis is a persistent or recurrent infection after initial therapy. It often develops in immunocompromised persons and in those with significant comorbid conditions.

d. Chemical peritonitis may be caused by irritants (e.g., bile, blood, barium, peritoneal dialysate) or by transmural (through the wall) inflammation of visceral organs (e.g., Crohn's disease) (Nouri-Majalan, 2010).

e. Peritoneal abscess describes an encapsulated, infected fluid collection, usually occurring subsequent to secondary peritonitis, and is the leading cause of persistent infection and the development of tertiary peritonitis.

## III. Infecting Agents

- Most common pathogens include gram-negative organisms (e.g., *Escherichia coli* and *Enterobacter/Klebsiella*), gram-positive organisms (e.g., *Streptococcus* and *Staphylococcus*), and anaerobic microorganisms (e.g., *Bacteroides*).
- Resistant and unusual organisms, such as *Enterococcus*, *Candida*, and *Enterobacter*, are found in a significant proportion of tertiary cases.

## IV. Potential Complications

Complications of peritonitis are many and can include intra-abdominal abscess, bowel obstruction, gangrenous bowel, intraperitoneal adhesions, scarring of fallopian tubes resulting in infertility, tertiary peritonitis, infection or dehiscence of a surgical site, enterocutaneous fistulae, abdominal compartment syndrome, and enteric insufficiency and life-threatening septic shock.

## V. Statistics

- Morbidity: As many as 70% of survivors of primary peritonitis have a recurrent episode within 1 year; dialysis-related secondary peritonitis rate is approximately 1 in 24 patient-treatment months (Daley, 2017).
- Mortality: It is difficult to isolate mortality rates because of the many and varied conditions that can be associated with peritonitis in death reports. Peritonitis has been reported as high as 40% in those who also have cirrhosis. As many as 10% may die from secondary peritonitis (Kahtri, 2017).
- Cost: The Medicare released billing data from 1233 hospitals for "Major Gastrointestinal Disorders & Peritoneal Infections With Complications" in 2011 revealed an average per patient medical billing charge of \$30,332.29 (CMS.gov, 2011). No recent data were found for medical costs relating only to peritonitis.

## GLOSSARY

**Ascites:** Accumulation of serous fluid in the peritoneal cavity.  
**Borborygmus:** Intermittent loud, rushing bowel sounds.

**Enterocutaneous fistula:** One in which there is communication between the intestinal tract and the skin. Some fistulas are created surgically (e.g., gastrostomy, esophagostomy, colostomy). Others may result from surgical trauma, breakdown of an intestinal anastomosis, or erosions around a surgical drain or tube. Enterocutaneous fistulae can lead to ongoing (potentially large) volume, protein, and electrolyte losses; inability to use the gut for

nutritional support; and associated long-term complications (Reed et al, 2014).

**Iatrogenic:** Due to the activity of a healthcare provider or medical intervention. For example, an iatrogenic complication resulting in peritonitis could be perforation of an organ of the GI tract during endoscopic procedures.

**Peritoneum:** Serous membrane that lines the abdominal cavity and covers the visceral organs.

**Peritonitis:** Inflammation of the peritoneum that may be generalized throughout the peritoneum, affecting the

(continues on page 390)

## G L O S S A R Y (continued)

visceral and parietal surfaces of the abdominal cavity, or localized in one area as an abscess.

**Postural hypotension:** A drop in blood pressure (hypotension) due to a change in body position (posture) when a person moves to a more vertical position.

### Rebound tenderness (also known as Blumberg's sign):

Pressing a hand on the abdomen elicits less pain than releasing the hand abruptly, which will aggravate the pain, as the peritoneum snaps back into place.

**Viscera:** Internal organs enclosed within the abdominal cavity.

## CARE SETTING

The client is admitted to an inpatient acute medical or surgical unit.

## RELATED CONCERNS

Appendectomy, page 382

Inflammatory bowel disease (IBD): ulcerative colitis, Crohn's disease, page 352

Pancreatitis, page 511

Pediatric considerations, page 993

Peritoneal dialysis (PD), page 635

Psychosocial aspects of care, page 835

Sepsis/septic shock, page 772

Surgical intervention, page 873

Total nutritional support: parenteral/enteral feeding, page 525

Upper gastrointestinal/esophageal bleeding, page 340

## CLIENT ASSESSMENT DATABASE

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### CIRCULATION

- Tachycardia, diaphoresis, pallor, hypotension (signs of shock)
- Tissue edema

#### ELIMINATION

- Inability to pass stool or flatus
- Occasional diarrhea

- Hiccups
- Decreased urinary output, dark color
- Decreased or absent bowel sounds (ileus)
- Intermittent loud, rushing bowel sounds
- Abdominal rigidity, distention, rebound tenderness; hyperresonance or tympani (ileus)
- Loss of dullness over liver (free air in abdomen)

#### FOOD/FLUIDS

- Loss of appetite
- Nausea, vomiting
- Thirst

- Hypoactive bowel sounds (generalized ileus)
- Ascites
- Projectile vomiting
- Dry mucous membranes, swollen tongue, poor skin turgor

#### PAIN/DISCOMFORT

- Sudden, severe, or persistent severe abdominal pain
- Pain may be generalized, localized, referred to shoulder, intensified by movement

- Abdominal distention, rigidity
- Rebound tenderness
- Distraction behaviors, restlessness, self-focus
- Muscle guarding of abdomen, flexion of knees
- Lying in rigid position, almost unmoving

**MAY REPORT (continued)****MAY EXHIBIT (continued)****RESPIRATION**

- Shallow respirations
- Tachypnea

**SAFETY**

- Fever—usually greater than 101°F (38°C), although hypothermia may be present with severe sepsis
- Chills
- Signs of hepatic failure (e.g., jaundice)

**SEXUALITY**

- History of pelvic organ inflammation (salpingitis), endometriosis, puerperal infection, septic abortion, retroperitoneal abscess

**TEACHING/LEARNING**

- History of recent trauma with abdominal penetration (e.g., gunshot or stab wound) or blunt trauma to the abdomen. Perforation or rupture of visceral organs (e.g., bladder, gallbladder, ulcers of stomach or intestines); perforated carcinoma of the stomach, gangrenous obstruction of the bowel, perforation of diverticulum, ulcerative colitis (UC), regional ileitis, strangulated hernia

**DISCHARGE PLAN CONSIDERATIONS**

- Assistance with homemaker and maintenance tasks
- ▶ Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****TEST  
WHY IT IS DONE****WHAT IT TELLS ME****DIAGNOSTIC STUDIES**

- **Abdominal x-ray:** Imaging test to look at organs and structures in the **abdomen**. Shows edematous and gaseous distention of the small and large bowel. With perforation of a visceral organ, the x-ray shows air in the abdominal cavity and an elevation of the diaphragm.
- **Computed tomography (CT) scan (abdominal/pelvic):** X-ray procedure that uses a computer to produce a detailed picture of a cross section of the body. Reveals fluid and inflammation. CT scanning is indicated in all cases in which the diagnosis cannot be established on clinical grounds along with findings on abdominal x-rays. CT scans of the abdomen and pelvis remain the diagnostic study of choice for peritoneal abscess and related internal organ pathology.
- **Ultrasound scan (abdominal/pelvic):** Scan that uses sound waves to produce an electronic image of the organs of the pelvis. Can often diagnose cause of peritonitis, such as cholecystitis, perihepatic abscess, pancreatitis, ruptured appendix, ovarian abscess, or diverticulitis. Ultrasonography can also detect increased amounts of ascites and peritoneal fluid.
- **Magnetic resonance imaging (MRI):** An imaging technique that uses strong magnetic fields, radio waves, and field gradients to generate images of the organs in the body. MRI is an emerging imaging modality for the diagnosis of suspected intra-abdominal abscesses (Daley, 2017).
- **Peritoneal tap or lavage (paracentesis):** Puncture of the wall of a cavity with a needle in order to draw off excess fluid and to obtain a sample for cell count with differential, culture analysis for antimicrobial sensitivity. The neutrophil count is the single best predictor of infection, and one greater than 250 to 500 cells/mm<sup>3</sup> is indicative of infection (Tan et al, 2008).

(continues on page 392)

## DIAGNOSTIC STUDIES (contd.)

### WHY IT IS DONE (continued)

### WHAT IT TELLS ME (continued)

#### ASSOCIATED TESTS

- **Complete blood count (CBC):** Battery of screening tests that typically includes hemoglobin (Hgb), hematocrit (Hct), red blood cell (RBC) count, white blood cell (WBC) count and differential.
- **Serum protein/albumin:** Visceral proteins considered to be markers for fluid and nutrition status.
- **Serum amylase and lipase:** Enzymes produced by the pancreas, which aid in digestion of starches and fats.
- **Serum electrolytes:** Substances that dissociate into ions in solution and acquire the capacity to conduct electricity. Common electrolytes include sodium, potassium, chloride, calcium, and phosphate. Provides baseline data and can be used to evaluate and monitor fluid and electrolyte balance.
- **Body fluid cultures:** Specimens may be taken from blood, exudate, or secretions; ascites fluid; peritoneal fluid; or peritoneal dialysate to evaluate source and causative organism (aerobic and anaerobic).
- Stool cultures

WBCs are elevated—sometimes more than 20,000—except in elderly or immunocompromised person, or client with certain infections, such as fungal or cytomegalovirus, who may demonstrate leukopenia. RBCs, Hgb, and Hct may be increased, indicating hemoconcentration secondary to extracellular fluid loss into the peritoneal cavity.

May be decreased because of fluid shifts, lack of food intake, and nothing by mouth (NPO) status.

Usually elevated when pancreatitis is cause.

Water and electrolytes are lost in vomitus and drainage from the gastrointestinal tubes, and the client cannot take anything by mouth. Large quantities of body fluids and electrolytes collect in the peritoneal cavity instead of circulating normally throughout the body, increasing the problems of water and electrolyte imbalance.

Causative organisms, including *E. coli* or streptococci, are often cultured. Rarely, pneumococcus is the cause. Sensitivities may also be done to identify effective antimicrobial agent. Gram's stain and aerobic and anaerobic cultures can show multiple organisms. *Note:* Blood culture results are positive for the offending agent in as many as 33% of individuals with SBP and may help guide antibiotic therapy (Daley, 2017).

Specific cultures (i.e., *Salmonella*, *Shigella*, cytomegalovirus [CMV]) may be done in client with diarrhea if history suggests infectious enterocolitis as cause for peritonitis.

#### NURSING PRIORITIES

1. Control infection.
2. Restore and/or maintain circulating volume.
3. Promote comfort.
4. Maintain nutrition.
5. Provide information about disease process, possible complications, and treatment needs.

#### DISCHARGE GOALS

1. Infection resolved.
2. Complications prevented or minimized.
3. Pain relieved.
4. Disease process, potential complications, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: risk for Infection [spread]

#### Possibly Evidenced By

Inadequate primary defenses—alteration in skin integrity, traumatized tissue; stasis of body fluids; altered peristalsis; [invasive procedures]

Inadequate secondary defenses—immunosuppression

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Infection Status NOC

Achieve timely wound healing, be free of purulent drainage or erythema, and be afebrile.

#### Risk Control NOC

Verbalize understanding of the individual causative or risk factor(s).

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Control NIC</b>	
<i>Independent</i>	
Assess for host-specific factors that affect immunity (e.g., extremes of age, presence of underlying disease, lifestyle, nutritional status, trauma, certain medications).	Consideration of the whole person is essential because of (1) the effects of the current inflammatory process, (2) considerable potential for severe complications, and (3) types of recent and planned interventions. Peritonitis is most often the result of other pathology in the body (e.g., recent bowel obstruction with surgical repair and anastomotic leak; ruptured appendix, pelvic inflammatory disease; or penetrating trauma). However, peritonitis is known to occur more frequently in persons who have multiple comorbid conditions (e.g., chronic diseases such as cancer, advanced kidney disease, ulcerative colitis). This individual may be malnourished and chronically debilitated on multiple medications and therefore at higher risk of healthcare-associated infections.
Note individual risk factors (e.g., abdominal trauma, acute appendicitis with rupture, cirrhosis, peritoneal dialysis).	Focuses assessments and influences choice of interventions.
Assess and monitor all vital signs as well as intake and output (fluid status), noting changes.	Depending on client's cause for peritonitis, fever associated with inflammatory process may be present upon admission. Fever and dehydration may also be the result of fluid deficits because of vomiting, NPO status, insufficient fluid replacement for active loss, and fluid shifts.
Be alert for elevated temperature progressing to fever, especially if accompanied by chills and hypotension.	Fever and chills are highly associated with bacterial peritonitis (about 80%) (Daley, 2017). In addition, a hypermetabolic state is associated with early sepsis and may be manifested by progressive fever, chills, and falling blood pressure. (Refer to ND: risk for Shock, following, and CP: Sepsis/Septicemia.)
Evaluate surgical incisions for signs of infection, delayed healing, or dehiscence. Observe drainage from wounds or drains.	Patients with severe abdominal infections demonstrate higher incidences of wound dehiscence and incisional hernia development, necessitating later reoperation (Peralta & Napolitano, 2015).
Perform and model consistent and thorough handwashing technique. Monitor staff and client compliance with hand sanitizing, instructing as necessary.	Reduces risk of cross-contamination and spread of infection.
Maintain strict aseptic technique in caring for incisions, open wounds, dressings, and invasive sites. Cleanse wounds with appropriate solution, and provide invasive device site care per protocol. Provide isolation measures when indicated.	Limits spread of infecting organisms and cross-contamination.
Monitor for signs of new infections (e.g., urinary tract infection, peripheral and central venous catheter site infection, ventilator-associated pneumonia).	These patients are critically ill, usually hospitalized for a long time, and receiving prolonged antibiotic therapy, placing them at increased risk for the development of secondary, opportunistic infections.
Monitor catheter exit sites when peritoneal dialysis (PD) care is part of client urinary elimination routine. Practice prescribed site care routinely, and maintain meticulous hand hygiene during the dialysate exchanges.	Peritonitis is a common and serious complication of PD, with exit-site and catheter-tunnel infections being major predisposing factors. Infection can occur if the exit site becomes infected or if the catheter becomes contaminated during connection or disconnection from the dialysate bags. Care is required to prevent onset of infection that could result in peritonitis. Note: Peritonitis is the direct or major contributing cause of death in around 16% of PD patients (Li et al, 2016). For related interventions, see CP: Peritoneal Dialysis.
Monitor or restrict visitors and staff, as appropriate. Provide protective isolation if indicated.	Reduces risk of exposure to, or acquisition of, secondary infection in immunosuppressed client.

(continues on page 394)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage/assist with early ambulation, deep breathing/coughing; advocate for early removal of invasive devices (e.g., urinary catheter, ET tube, nasal or oral feeding tubes). Refer to appropriate providers (e.g., physical therapy, respiratory therapy) for assistance and interventions.	These measures are beneficial in reducing risks of secondary infections.
Review nutritional needs and refer to nutritionist as indicated.	The client with peritonitis has a dysfunctional gut with anorexia, vomiting, and malabsorption. Client may need and benefit from parenteral nutrition during acute stage to promote healing. Refer to ND: risk for imbalanced Nutrition, following, and CP: Total Nutritional Support: Parenteral/Enteral Feeding.
<b>Collaborative</b>	
Prepare for/assist with treatment of underlying cause, as indicated:	The goal of treatment of peritonitis is to (1) correct the underlying process (e.g., surgical removal of infectious source), (2) eliminate toxins (e.g., administration of systemic antimicrobials), and (3) provide supportive therapy (including hemodynamic, fluid, and nutritional support) to prevent or limit secondary complications due to organ system failure.
Obtain specimens for culture and monitor results of serial blood, urine, wound, and stool cultures.	Culture identifies causative microorganisms and helps in assessing effectiveness of antimicrobial regimen.
Assist with peritoneal aspiration, if indicated.	May be done to remove fluid and to identify infecting organisms so appropriate antibiotic therapy can be instituted.
Administer antimicrobials, for example: cephalosporins, such as cefotaxime (Claforan); extended-spectrum penicillins, such as piperacillin/tazobactam (Zosyn); carbapenems, such as meropenem (Merrem), cilastatin/imipenem (Primaxim); fluoroquinolones, such as norfloxacin (Noroxin); macrolides, such as clindamycin (Cleocin); antifungals, such as metronidazole (Flagyl); aminoglycosides, such as gentamicin (Garamycin); glycycline antibiotics, such as tigecycline (Tygacil)	Therapy for peritonitis is systemic and directed at the particular identified organism(s), such as anaerobic bacteria, fungus, and gram-negative bacilli. Optimal duration of antimicrobial therapy depends on the underlying pathology, severity of infection, and speed and effectiveness of source control. Antimicrobials may initially be selected from those that can be administered intravenously (IV) or by intraoperative lavage (Daley, 2017; Reed et al, 2014).
Prepare for open abdominal (OA) or laparoscopic exploration (e.g., debridement and lavage; abscess drainage, removal of diseased organ; bowel resection), as indicated.	Surgery may be treatment of choice and curative in acute, localized peritonitis, for example, to drain localized abscess; remove peritoneal exudates, ruptured appendix, or gallbladder; plicate perforated ulcer; or resect bowel. The operative approach is directed by the underlying disease process and the type and severity of the intra-abdominal infection. Intraoperative lavage may be used to remove necrotic debris and treat inflammation that is poorly localized or diffuse. Multiple additional operations may be needed to control source of infection, drain abscesses, or clean out necrotic material. In this instance, the abdominal closure is temporary, using various dressings and coverings or a vacuum-assisted closure device, thus providing ready access to affected area while also preventing contamination from the outside. Later surgical procedures may also be required for permanent closure or repair of abdominal wall (Peralta & Napolitano, 2015).
Ostomy procedure	Temporary fecal diversion procedure may be performed if the colon is source of infection, such as in ruptured diverticulum, to facilitate treatment of the infection and bowel healing. (Refer to CP: Fecal Diversion.)

**NURSING DIAGNOSIS:** risk for Shock**Possibly Evidenced By**

Hypotension, hypovolemia, hypoxemia  
Infection, sepsis

**Desired Outcomes/Evaluation Criteria—Client Will****Shock Severity: Septic NOC**

Display hemodynamic stability as evidenced by vital signs and oxygenation within client's usual range, prompt capillary refill, moist skin and mucous membranes, adequate urinary output, and usual level of mentation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Shock Prevention NIC</b>	
<b>Independent</b>	
Note presence of medical procedures or disease processes that can result in one or more types of shock (such as recent abdominal surgery for ruptured appendix or peritoneal dialysis) or conditions (such as cirrhosis with ascites, ischemic colitis, pancreatitis, peptic ulcer with perforation).	Depending on underlying condition, client can be at risk for <b>hypovolemic shock</b> (e.g., hemorrhage associated with major abdominal surgery, gastrointestinal losses). In addition, client with peritonitis (infection) is at risk for <b>distributive shock</b> where inadequate tissue perfusion is caused by loss of the normal responses of vascular smooth muscle to vasoconstrictive agents, coupled with a direct vasodilating effect. This causes fluid shifts out of the vascular space, resulting in a circulating fluid deficit along with excess fluid elsewhere (e.g., edema, ascites) (Lessnau & Peralta, 2015). Note: This client is very ill and will likely require critical care placement and interventions.
Evaluate state of consciousness and mentation, noting anxiety, restlessness, confusion, and progressive lethargy leading to poor responsiveness.	Changes can occur because of (1) impaired cerebral oxygenation; (2) fluid, electrolyte, and acid-base imbalances; and (3) circulating toxins associated with sepsis.
Assess vital signs frequently, noting unresolved or progressing hypotension, decreased pulse pressure, tachycardia, fever, and tachypnea.	Circulating endotoxins eventually produce vasodilation, shift of fluid from circulation, and a low cardiac output state.
Maintain accurate intake and output (I&O) and correlate with daily weights. Include measured and estimated losses (such as urine output, gastric suction, drains, dressings, and diaphoresis). Measure abdominal girth for third spacing of fluid.	Reflects overall hydration status. Urine output may be diminished because of hypovolemia and decreased renal perfusion, but weight may still increase, reflecting tissue edema or ascites accumulation (third spacing). Gastric suction losses may be large, and a great deal of fluid can be sequestered in the bowel and peritoneal space (ascites).
Measure urine-specific gravity.	Reflects hydration status and changes in renal function, which may warn of developing acute renal failure in response to hypovolemia and effect of toxins. Note: Many antibiotics also have nephrotoxic effects that may further affect kidney function and urine output.
Observe skin and mucous membrane dryness and turgor. Note peripheral and sacral edema.	Hypovolemia, fluid shifts, and nutritional deficits contribute to poor skin turgor and fragile, edematous tissues.
Change position frequently, provide frequent skin care, and maintain dry, wrinkle-free bedding.	Edematous tissue with compromised circulation is prone to breakdown.
<b>Collaborative</b>	
Collaborate in treatment of underlying conditions. Prepare for/assist with medical and surgical interventions.	Peritonitis is a complex condition that may require multiple medical interventions, including surgery (e.g., reoperation for anatomic leak, wound dehiscence, drainage of abscesses) to remove contamination and prevent infectious process from progressing to sepsis and septic shock.
Monitor laboratory studies: ABGs, O <sub>2</sub> saturation, Hgb/Hct, electrolytes, protein, albumin, BUN, and creatinine (Cr).	Provides information about hydration, oxygenation, and organ function. Significant consequences to systemic function are possible as a result of fluid shifts, hypovolemia, hypoxemia, circulating toxins, and necrotic tissue products.

(continues on page 396)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer oxygen by appropriate route (e.g., nasal prongs, mask, ventilator).	To maximize oxygenation of tissues. Note: Person requiring ventilation will need critical care placement and interventions.
Administer plasma, blood, fluids, electrolytes, and diuretics, as indicated.	Replenishes and maintains circulating volume and electrolyte balance to reduce risk of shock state. Colloids, such as plasma or blood, help move water back into intravascular compartment by increasing osmotic pressure gradient. Diuretics may be used to assist in excretion of toxins and to enhance renal function.

## NURSING DIAGNOSIS: acute Pain

### May Be Related To

Biological injury agent—irritation of the parietal peritoneum (toxins); infection  
Physical injury agent—tissue trauma, accumulation of fluid in abdominal and peritoneal cavity (abdominal distention)

### Possibly Evidenced By

Self-report of pain intensity and characteristics  
Guarding and expressive behavior—restlessness, moaning, irritability, positioning to ease pain  
Facial mask, self-focus  
Diaphoresis; changes in physiological parameters (e.g., blood pressure, heart and respiratory rate)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Self-Control NOC

Report pain is relieved or controlled.  
Demonstrate use of relaxation skills or other methods to promote comfort.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<i>Independent</i>	
Note client's age, developmental level, and current condition (infant/child, critically ill, ventilated, sedated, or cognitively impaired).	Impacts ability to report pain parameters.
Investigate pain reports, noting location, duration, intensity (0 to 10 [or similar] scale), and characteristics such as dull, sharp, or unrelenting/progressing.	Changes in location or intensity are not uncommon but may reflect developing complications. Pain tends to become constant, rapidly more intense, and diffuse over the entire abdomen as inflammatory process accelerates; pain may localize if an abscess develops.
Assess for migrating pain and rebound tenderness.	Abdominal pain is the usual chief complaint of patients with peritonitis. Initially, the pain may be dull and poorly localized (visceral peritoneum); often, it progresses to steady, severe, and more localized pain (parietal peritoneum). The positive Blumberg's sign (rebound tenderness) is <b>indicative of peritonitis</b> .
Observe nonverbal cues and pain behaviors (e.g., how client holds body, facial expressions such as grimacing, withdrawal, narrowed focus, crying).	Nonverbal cues may or may not support client's pain intensity but may be the only indicator if client is unable to verbalize.
Provide and promote nonpharmacological pain management, such as quiet environment, staying with client in severe pain, providing information about what's happening and expectations, touching and other comfort measures, focused breathing, visualization, diversional activities.	All these nursing interventions can assist the client in managing pain and the accompanying fear, anxiety, and stress.
Maintain semi-Fowler's position as indicated.	Facilitates fluid and wound drainage by gravity, reducing diaphragmatic irritation and abdominal tension, thereby reducing pain.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Administer medications, as indicated, for example:	
Opioid (and other) analgesics, as indicated	Reduces metabolic rate and intestinal irritation from circulating and local toxins, which aid in pain relief and promote healing. Note: Pain is usually severe and may require opioid pain control.
Antiemetics, such as dolasetron (Azemet) and metoclopramide (Reglan)	Reduces the nausea and vomiting that can increase abdominal pain.
Antipyretics, such as acetaminophen (Tylenol)	Reduces discomfort associated with fever.

### NURSING DIAGNOSIS: risk for imbalanced Nutrition: less than body requirements

#### Possibly Evidenced By

Inability to ingest food—nausea, vomiting  
Inability to digest food/absorb nutrients—intestinal dysfunction, metabolic abnormalities  
[Increased metabolic needs]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Nutritional Status NOC

Be able to ingest food as desired; display normalization of nutritional laboratory values, and be free of signs of malnutrition.  
Maintain or regain usual weight and positive nitrogen balance.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Management NIC</b>	
<b>Independent</b>	
Auscultate bowel sounds, noting absent and hyperactive sounds.	Although bowel sounds are frequently absent, inflammation of the intestine may be accompanied by intestinal hyperactivity, diminished water absorption, and diarrhea.
Monitor NG tube output. Note presence of vomiting and diarrhea.	Large amounts of gastric aspirant, or severe vomiting and diarrhea, suggest bowel obstruction, requiring further evaluation.
Measure abdominal girth.	Provides quantitative evidence of changes in intestinal distention and accumulation of ascitic fluid.
Assess abdomen frequently for return to softness, reappearance of normal bowel sounds, and passage of flatus.	Indicates return of normal bowel function and ability to resume oral intake.
Weigh regularly.	Initial losses or gains reflect changes in hydration, but sustained losses suggest nutritional deficit.
<b>Collaborative</b>	
Monitor BUN, protein, prealbumin or albumin, glucose, and nitrogen balance, as indicated.	Reflects organ function and nutritional deficits and needs.
Administer enteral or parenteral feedings, as indicated.	Enteral feedings, even at low volumes, have been shown to maintain gut mucosal integrity and to reduce the incidence of infectious complications, making the choice of enteral feedings preferable over parenteral solutions whenever possible. (Refer to CP: Total Nutritional Support: Enteral/Parenteral Feedings.)
Advance diet as tolerated—clear liquids to soft food.	Client may have some degree of gut dysfunction for quite some time, making it necessary for careful progression of diet when oral intake is resumed.

## NURSING DIAGNOSIS: Anxiety [specify level]

### May Be Related To

Situational crisis  
Threat of death; change in health status

### Possibly Evidenced By

Apprehensive, uncertainty, worried  
Focus on self; irritability; increased tension  
Increased pulse, respirations, blood pressure; restlessness

### Desired Outcomes/Evaluation Criteria—Client Will

#### Anxiety Self-Control NOC

Verbalize awareness of feelings and healthy ways to deal with them.  
Report anxiety is reduced to a manageable level.  
Appear relaxed.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction NIC</b> <i>Independent</i>	
Evaluate anxiety level, noting client's perception of situation and verbal and nonverbal responses. Encourage free expression of emotions.	Apprehension may be escalated by severe pain, severity of illness, urgency of diagnostic procedures, and possibility of surgery.
Review physiological factors present, such as sepsis or toxins related to infection, medications, and metabolic imbalances.	These factors are present in seriously ill client and can cause or contribute to anxiety.
Provide ongoing information regarding disease process and anticipated treatment.	Knowing what to expect can reduce anxiety for both client and significant other (SO). Also, ongoing review helps to identify those factors, adding to anxiety that could be changed—client getting more uninterrupted sleep or adding or deleting medications.
Provide presence. Acknowledge anxiety and fear. Do not deny or reassure client that everything will be all right. Be accurate and factual in providing information. Correct misconceptions about disease process and possible treatments.	Affirms client's value as a human being in need of assistance in dealing with a serious health threat; helps client and SO identify and deal with reality.
Schedule adequate rest and uninterrupted periods for sleep.	Limits fatigue, conserves energy, and can enhance coping ability.
Provide comfort measures: family presence, quiet environment, soft music, back rub, and therapeutic touch (TT).	Promotes relaxation and enhances ability to deal with situation.

\*\*\*\*\*Refer to CP: Psychosocial Aspects for Care, for additional interventions.

## NURSING DIAGNOSIS: deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs

### May Be Related To

Insufficient information  
Insufficient knowledge of resources

### Possibly Evidenced By

Insufficient knowledge  
Inaccurate follow-through of instruction

### Desired Outcomes/Evaluation Criteria—Client Will

#### Knowledge: Acute Illness Management NOC

Verbalize understanding of disease process and potential complications.  
Identify relationship of signs and symptoms to the disease process and correlate symptoms with causative factors.  
Verbalize understanding of therapeutic needs.  
Correctly perform necessary procedures and explain reasons for actions.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process</b> <b>NIC</b>	
<b>Independent</b>	
Review underlying disease process and recovery expectations.	Provides knowledge base from which client can make informed choices.
Discuss medication regimen, schedule, and possible side effects.	Antibiotics may be continued for varying periods of time after discharge depending on extent of the infection and length of stay in acute care facility.
Recommend gradual resumption of usual/desired activities, allowing for adequate rest.	Helps to manage the fatigue that may be present for a long while and enhances feeling of well-being.
Review activity limitations, such as avoiding heavy lifting.	Reduces chance of undue intra-abdominal pressure and muscle tension.
Demonstrate sterile or clean dressing change as appropriate. Have client/SO demonstrate ability to manage these procedures.	Client/SO may have a long period of home management of surgical wound(s), depending on extent of infection and treatment. Slow recovery time is often associated with such a complex condition.
Emphasize importance of medical follow-up care.	Necessary to monitor resolution of infection and effectiveness of therapeutic interventions.
Refer to community resources, as needed or desired, such as visiting nurse, home healthcare, and durable medical equipment suppliers.	Supports transition to home, promotes self-care, and increases likelihood of successful outcome.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition, presence of complications, personal resources, and life responsibilities)

- **Fatigue**—stress; anxiety; disease state
- **acute Pain**—chemical agent—irritation of the peritoneum
- **ineffective Health Management**—complexity of therapeutic regimen; perceived seriousness of condition; susceptibility, benefit, or barrier; insufficient social support

## CHOLECYSTITIS WITH CHOLELITHIASIS

### I. Pathophysiology

(Heuman et al, 2017; Pak & Lindseth, 2016; Siddiqui, 2016)

Cholecystitis is an acute or chronic infection of the gallbladder wall, which is almost always associated with gallstones (cholelithiasis), although it is possible to have either one without the other or both together.

- a. Migration of a gallstone into the opening of the cystic duct can block the outflow of bile during gallbladder contraction, resulting in a characteristic type of pain (biliary colic). Persistent cystic duct obstruction leads to acute gallbladder inflammation (acute cholecystitis).
- b. A less common but more serious problem occurs if gallstones become lodged in the bile ducts between the liver and the small intestine. This condition (cholangitis) can block bile flow from the gallbladder and liver, causing pain, jaundice, and fever.
- c. Gallstones may also interfere with the flow of digestive fluids into the small intestine, leading to an inflammation of the pancreas (pancreatitis).
- d. Gallstones are more likely to occur in people over 40 years of age and are more common in women than men. Approximately 80% persons with gallstones are asymptomatic (Pak & Lindseth, 2016). The remainder have symptoms ranging from a biliary colic to life-threatening cholangitis.

tomatic (Pak & Lindseth, 2016). The remainder have symptoms ranging from a biliary colic to life-threatening cholangitis.

- e. Prolonged blockage of any of the ducts can cause severe damage to the gallbladder, liver, or pancreas, which can be fatal.

### II. Etiology

- a. Ninety percent of cases involve stones in the cystic duct (calculous cholecystitis), whereas the other 10% involve cholecystitis without stones (acalculous cholecystitis) (Bloom, 2017; Huffman & Schenker, 2010).
- b. Gallstone formation is multifactorial. Stones are made up of cholesterol (about 80%), calcium bilirubinate, or a mixture caused by changes in the bile composition. Cholesterol gallstones are often associated with female sex, European or Native American ancestry, and increasing age (Heuman et al, 2017).
- c. Black and brown pigment gallstones: Black gallstones occur most often in disorders of hemolysis (e.g., sickle cell anemia), cirrhosis of the liver. Brown pigment gallstones most often occur because of intraductal stasis and chronic colonization of bile with bacteria.

(continues on page 400)

### III. Statistics

a. Morbidity: An estimated 10% to 20% of Americans have gallstones, and as many as one-third of those will develop acute cholecystitis (Bloom, 2017). In 2011, approximately 600,000 Americans developed symptoms or complications of gallstones, requiring cholecystectomy (Goldman, 2011).

b. Mortality: In 2009, it was estimated that there were almost 3000 gallstone-related deaths annually in the United States (Everhart & Ruhl, 2009). In a large, national, 18-year follow-up study, gallstone disease was found to be associated with increased overall mortalities from cardiovascular disease and cancer (Ruhl & Everhart, 2011).

## G L O S S A R Y

**Acalculous cholecystitis:** Inflammation of the gallbladder in the absence of gallstones. *Note:* Acute calculous cholecystitis can rapidly progress to gangrene and perforation; therefore early recognition and intervention are required (Bloom, 2017).

**Amulla of Vater:** The anatomical site where the fused common bile duct and pancreatic duct enters the duodenum.

**Biliary colic:** Typically constant and slowly progressive pain that is usually located in the epigastrium or right upper quadrant; most common presenting symptom in cholelithiasis.

**CBD:** Common bile duct.

**Cholangitis:** Inflammation of the common bile duct due to an impacted stone obstructing bile drainage, which can lead to bacteremia and septicemia.

**Cholecystitis:** Inflammation of the gallbladder.

**Cholelithiasis:** Stones in the gallbladder.

**Clay-colored stool:** Reflects absence of bile in stool due to infection of liver or blockage of bile flow out of the liver.

**Colicky pain or colic:** Form of **pain** that starts and stops abruptly. It occurs due to muscular contractions of a

hollow tube (colon, ureter, gall bladder, etc.) in an attempt to relieve an obstruction by forcing content out.

**Dyspepsia:** Feeling of fullness and bloating after eating; also involves belching, heartburn, nausea, and sometimes vomiting.

**Eructation:** Belching.

**Gallstones:** Generally the result of cholesterol precipitating out of bile (cholesterol stones) or of free bilirubin combining with calcium to create bile pigment stones.

**Jaundice:** Yellow tinge to skin and sclera in eyes due to bile absorption into circulatory system.

**Lithotripsy:** Use of high-energy shock waves to fragment and disintegrate gallstones. *Note:* The procedure, which is now rarely performed, has been used for people who have long-term (chronic) **cholecystitis** and who are not strong enough for surgery. It is not appropriate in treating acute cholecystitis (Healthwise Staff, 2015).

**Murphy's sign:** Inability to take in a breath due to pain when examiner's hand is pressing on gallbladder.

**Steatorrhea:** Fatty (oily appearing) foul-smelling stools.

## CARE SETTING

Severe acute attacks may require brief hospitalization on a medical unit. This plan of care deals with the acutely ill, hospitalized client. Surgery is usually performed after symptoms have subsided, but during the hospitalization, for acute illness. (Refer to CP: Cholecystectomy.)

## RELATED CONCERNs

Cholecystectomy, page 407

Fluid and electrolyte imbalances, see DavisPlus

Pancreatitis, page 511

Psychosocial aspects of care, page 835

Surgical intervention, page 873

Total nutritional support: parenteral/enteral feeding, page 525

## CLIENT ASSESSMENT DATABASE

### DIAGNOSTIC DIVISION MAY REPORT

#### CIRCULATION

#### ELIMINATION

- Change in color of urine and stools

### MAY EXHIBIT

- Tachycardia
- Diaphoresis
- Hypotension, if septic

- Abdominal distention
- Palpable mass in right upper quadrant (RUQ)
- Dark, concentrated urine
- Clay-colored stool, or steatorrhea

**MAY REPORT (continued)****MAY EXHIBIT (continued)****FOOD/FLUID**

- Anorexia, nausea, and vomiting
- Obesity (risk for gallbladder disease)
- History of recent rapid weight loss diet
- Intolerance of fatty foods
- Recurrent regurgitation, heartburn, indigestion, belching

**PAIN/DISCOMFORT**

- Sudden, severe epigastric and right upper abdominal pain lasting more than 30 minutes
- May radiate to midback, right shoulder and scapula, or front of chest
- Pain increases with movement
- Midepigastric colicky pain associated with eating, especially after meals rich in fats
- Episodes of severe or ongoing pain starting suddenly, sometimes at night, with episodes of constant pain typically lasting 1 to 5 hours
- Recurring episodes of similar pain

**RESPIRATION**

- Normal to hypoactive bowel sounds
- Rebound tenderness, muscle guarding, or abdominal rigidity when RUQ is palpated
- Positive Murphy's sign

**SAFETY**

- Bleeding tendencies

- Increased respiratory rate
- Splinted respiration marked by short, shallow breathing

**TEACHING/LEARNING**

- Familial tendency for gallstones
- Recent pregnancy and delivery; history of diabetes mellitus (DM), inflammatory bowel disease (IBD), blood dyscrasias

- Low-grade fever
- High fever and chills indicating septic complications
- Jaundice with dry, itching skin (pruritus)

**DISCHARGE PLAN CONSIDERATIONS**

- May require support with dietary changes and weight reduction
- ▶ Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****TEST****WHY IT IS DONE****WHAT IT TELLS ME****DIAGNOSTIC STUDIES**

- **Abdominal/biliary system ultrasound:** Most common screening test, also identifies abnormalities of surrounding tissues.
- **Focused bedside ultrasonography (BUS):** A point-of-care ultrasonography focused on area of concern, performed and interpreted at the bedside.

Right upper abdominal ultrasound is 90% to 95% sensitive for cholelithiasis and 98% sensitive and specific for simple cholelithiasis (Bloom, 2017). BUS can rapidly and accurately diagnose biliary pathology, help definitively diagnose gallstones, and assess degree of obstruction in the setting of choledocholithiasis (one or more gallstones in the acute common bile duct [CBD]) (Jang & Basrai, 2015; Marin & Lewiss, 2015).

(continues on page 402)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li><b>Endoscopic ultrasonography (EUS):</b> Medical procedure in which <b>endoscopy</b> is combined with <b>ultrasound</b> to obtain images of the walls of the gastrointestinal tract and nearby organs near such as the liver, gall bladder, bile duct, and pancreas.</li><li><b>HIDA (hepatobiliary iminodiacetic acid) scan:</b> Nuclear imaging test used to examine the gallbladder and the ducts leading into and out of the gallbladder.</li><li><b>Abdominal radiographs (multipositional):</b> X-rays of the abdomen.</li></ul>	EUS accurately identifies gallstones in the distal CBD. <i>Note:</i> This modality may also be used as a treatment intervention (i.e., EUS-guided biliary [gallbladder and bile ducts] drainage) (Law & Baron, 2016). HIDA scan has been found to be up to 95% accurate in diagnosing acute cholecystitis, although scanning can miss stones due to loops of bowel obstructing view (Bloom, 2017).
<ul style="list-style-type: none"><li><b>Computed tomography (CT) scan:</b> X-ray procedure that uses a computer to produce a detailed picture of a cross section of the body. May be done with or without contrast.</li></ul>	An abdominal x-ray is obtained primarily to exclude other diagnoses. Gallstones may be visualized on noncontrast radiography in 10% to 15% of cases. This finding only indicates cholelithiasis, with or without active cholecystitis (Bloom, 2017). In acute cholecystitis CT scan (with contrast), findings can include enlargement of the gallbladder (if it visualizes); stones in the gallbladder, the cystic duct, or both; thickening of the gallbladder wall; biliary sludge; and gallbladder mucosal sloughing (Khan et al, 2015).
<ul style="list-style-type: none"><li><b>Magnetic resonance imaging (MRI) and/or cholangiopancreatography (MRCP):</b> An MRI scan uses a strong magnetic field and radio waves to create pictures, on a computer, of tissues, organs, and other structures inside the body. A MRCP is an application of magnetic resonance imaging of the hepatobiliary and pancreatic system.</li><li><b>Endoscopic retrograde cholangiopancreatography (ERCP):</b> Endoscopic procedure that allows direct visualization of the biliary anatomy and may be used therapeutically to remove stones.</li></ul>	MRI may depict the same pathological features as CT scanning does. The MRCP is a less invasive alternative to endoscopic retrograde cholangiopancreatography (ERCP) to evaluate the liver, bile ducts, gallbladder, and pancreas for gallstones, infection, or inflammation.
<b>ASSOCIATED TESTS</b> <ul style="list-style-type: none"><li><b>Complete blood count (CBC):</b> Assesses relationship of red blood cells to fluid volume or viscosity and may indicate risk factors, such as anemia, blood loss, or hypercoagulability.</li><li><b>Alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP):</b> Enzymes present in many tissues (but primarily found in the liver) and may be elevated in many diseases (e.g., liver, gallbladder, bone, kidney).</li><li><b>Bilirubin:</b> A yellowish pigment produced from the breakdown of hemoglobin (Hgb) and RBCs.</li><li><b>Amylase:</b> An enzyme produced in the pancreas.</li><li><b>Prothrombin levels:</b> Evaluates the ability of the blood to clot properly.</li></ul>	Visualizes biliary tree by cannulation of the common bile duct through the duodenum. Allows endoscopic removal of 90% of stones. Allows stenting of common bile ducts that are damaged, inflamed, or strictured.

## NURSING PRIORITIES

1. Relieve pain and promote rest.
2. Maintain fluid and electrolyte balance.
3. Prevent complications.
4. Provide information about disease process, prognosis, and treatment needs.

## DISCHARGE GOALS

1. Pain relieved.
2. Homeostasis achieved.
3. Complications prevented and minimized.
4. Disease process, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS:** **acute Pain****May Be Related To**

Biological injury agents—obstruction or ductal spasm, inflammatory process, tissue ischemia

**Possibly Evidenced By**

Self-report of intensity and characteristics of pain

Guarding and expressive behavior; self-focus; narrowed focus

Changes in physiological parameters (e.g., blood pressure [BP], pulse, respirations)

**Desired Outcomes/Evaluation Criteria—Client Will****Pain Self-Control NOC**

Report pain is relieved or controlled.

Demonstrate use of relaxation skills and diversional activities as indicated for individual situation.

**ACTIONS/INTERVENTIONS****RATIONALE****Pain Management: Acute NIC****Independent**

Observe and document location, severity (0 to 10 [or similar scale]), and characteristics of pain. Perform pain assessment each time pain recurs. Accept client's description of pain.

Assists in differentiating cause of pain, provides information about disease progression or resolution, development of complications, and effectiveness of interventions. Note: Pain associated with gallstones depends on its cause and the degree of associated inflammation or infection. For example:

**Biliary colic:** Pain is often sudden and increases rapidly in the upper abdomen, under right side of ribs, and can spread to the right shoulder blade. It typically lasts from 1 to 5 hours, but it could last for just a few minutes.

**Acute cholecystitis:** The pain is severe and steady, lasting longer than biliary colic. It occurs in the right abdominal area and can spread toward the right shoulder. Pain is made worse by moving or coughing.

**Cholangitis:** Upper right abdominal discomfort turning into abdominal pain that can be accompanied by fever and chills, itching, and jaundice.

Observe nonverbal cues and pain behaviors (e.g., how client holds body, facial expressions, moaning, crying, stoic).

Pain is expressed in many different ways. Nonverbal cues are helpful in determining the severity of pain and its effects on the client, especially when client is unable to verbalize.

Monitor vital signs (blood pressure, heart/respiratory rate) and skin color and temperature.

These are often altered during acute pain.

Document response to analgesics, and report to physician if pain is not being relieved.

Severe pain not relieved by routine measures may indicate developing complications and the need for further intervention.

Encourage bedrest, if indicated, allowing client to assume position of comfort.

Bedrest in low-Fowler's position reduces intra-abdominal pressure; however, client will naturally assume least painful position.

Provide quiet environment. Encourage use of relaxation techniques such as guided imagery, visualization, and deep-breathing exercises. Provide diversional activities.

Promotes rest, redirects attention, and may enhance coping.

Maintain frequent contact with client, and listen to concerns.

Helpful in alleviating anxiety and refocusing attention, which can moderate pain.

**Collaborative**

Maintain nothing by mouth (NPO) status; insert and maintain nasogastric (NG) suction, as indicated.

Removes gastric secretions that stimulate release of cholecystokinin and gallbladder contractions.

(continues on page 404)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications, as indicated, for example:	
Opioids, such as IV or injected analgesics such as meperidine (Demerol) or oral analgesics such as oxycodone/acetaminophen (Percocet) or oxycodone/acetaminophen (Vicodin)	Promotes rest and relaxation of smooth muscle, relieving pain.
Antibiotics, such as piperacillin/tazobactam (Zosyn), ceftazidime (Fortaz), metronidazole (Flagyl) plus ciprofloxacin (Cipro) or aztreonam (Azactam), ampicillin/sulbactam (Unasyn), and meropenem (Merrem)	Treatment of cholecystitis with gallstones depends on the stage of the disease. In the hospitalized client with acute symptoms, IV antibiotics will be given to treat infectious process, thereby reducing inflammation and the potential for systemic complications. For serious infections, broad-spectrum combination drug treatment is typically advised. These agents target common bacteria associated with cholecystitis (e.g., <i>Escherichia coli</i> , <i>Bacteroides fragilis</i> , <i>Klebsiella</i> , <i>Enterococcus</i> ) (Bloom, 2017).
Prepare for/assist with procedures, such as the following:	
Cholecystectomy	A minimally invasive procedure done to place a drainage tube into a swollen or infected gallbladder (usually performed on person who is too ill to undergo surgery) (Heuman & Mihas, 2017). Once the patient stabilizes and infection is controlled, cholecystectomy can be performed under elective circumstances.
Sphincterotomy plus extraction of stones during endoscopic retrograde cholangiopancreatography (ERCP)	This procedure widens the mouth of the common bile duct where it empties into the duodenum, in order to extract common bile duct stones. Note: This procedure is typically performed to prevent acute gallstone pancreatitis or other complications of choledocholithiasis in a person who is too sick to undergo elective cholecystectomy (Heuman & Mihas, 2017).
Laparoscopic or open surgical intervention.	Laparoscopic cholecystectomy is the standard of care for surgical treatment of cholecystitis (may be indicated because of the size of stones, degree of tissue involvement, or presence of necrosis or sepsis). (Refer to CP: Cholecystectomy.)

## NURSING DIAGNOSIS: risk for deficient Fluid Volume

### Possibly Evidenced By

Active fluid volume loss—vomiting, gastric suction; [altered clotting process]  
 Deviations affecting intake—medically restricted intake  
 Factors influencing fluid needs [e.g., hypermetabolic state]  
 Barrier to accessing fluid: deviations affecting intake—medically restricted intake

### Desired Outcomes/Evaluation Criteria—Client Will

#### Hydration NOC

Demonstrate adequate fluid balance evidenced by stable vital signs, moist mucous membranes, good skin turgor, capillary refill, individually appropriate urinary output, and absence of vomiting.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid/Electrolyte Management NIC</b>	
<i>Independent</i>	
Maintain accurate record of intake and output (I&O), noting output less than intake and increased urine-specific gravity. Assess skin and mucous membranes, peripheral pulses, and capillary refill.	Provides information about fluid status and circulating volume and replacement needs.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor for continued vomiting, possibly accompanied by abdominal cramps, weakness, twitching, seizures, irregular heart rate, paresthesias, hypoactive or absent bowel sounds, and depressed respirations.	Prolonged vomiting, gastric aspiration, and restricted oral intake can lead to deficits in sodium, potassium, and chloride. Such electrolyte imbalances can rapidly result in systemic complications.
Eliminate noxious sights and smells from environment.	Reduces stimulation of vomiting center.
Perform frequent oral hygiene with alcohol-free mouthwash; apply lubricants.	Decreases dryness of oral mucous membranes and reduces risk of oral bleeding.
Assess for unusual bleeding: oozing from injection sites, epistaxis, bleeding gums, ecchymosis, petechiae, hematemesis, and melena.	Prothrombin is reduced and coagulation time could become prolonged when bile flow is obstructed over time, increasing risk of bleeding or hemorrhage in the critically ill client.
<b>Collaborative</b>	
Keep client NPO as necessary.	Decreases gastrointestinal (GI) secretions and hypermotility.
Insert NG tube, connect to suction, and maintain patency, as indicated.	Provides rest for GI tract and relief of vomiting.
Administer antiemetics, such as promethazine (Phenergan), prochlorperazine (Compazine), or ondansetron (Zofran).	Helpful in reducing nausea and vomiting often associated with cholecystitis and, particularly, common bile duct obstruction.
Review laboratory studies such as Hgb/Hct, electrolytes, and bleeding/clotting times (if indicated).	Aids in evaluating circulating volume, identifies deficits, and influences choice of intervention for replacement or correction.
Administer IV fluids and electrolytes, as indicated.	Maintains circulating volume and corrects imbalances.

### NURSING DIAGNOSIS: risk for imbalanced Nutrition: less than body requirements

#### Possibly Evidenced By

Inability to ingest food [e.g., self-imposed or prescribed dietary restrictions, nausea, vomiting, dyspepsia, pain]  
Biological factors: [nutrient deficits in diet associated with obesity]; inability to digest foods [e.g., obstruction of bile flow]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Nutritional Status NOC

Report relief of nausea and vomiting.

Report appetite and able to ingest desired foods.

Demonstrate progression toward desired weight or maintain weight as individually appropriate.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Management NIC</b>	
<i>Independent</i>	
Assess for abdominal distention, frequent belching, guarding, and reluctance to move.	Nonverbal signs of discomfort associated with impaired digestion and pain.
Consult with client about symptoms associated with diet or foods that cause distress.	Client may restrict many foods because of experience with or fear of nausea, vomiting, or pain. Foods that are high in fat and cholesterol are often the cause of onset of a gallbladder attack; however, some clients seem to experience pain with anything they eat, rather than just select food groups. Gallstones are also known to be associated with prolonged fasting, total parenteral nutrition, and rapid weight loss associated with severe caloric and fat restriction (e.g., fasting diet, gastric bypass surgery) (Bloom, 2017).
Encourage client to keep food diary during assessment period, if indicated. Estimate or calculate caloric intake. Weigh, as indicated.	Identifies food intolerances that could be affecting gallbladder, as well as nutritional deficiencies and needs. Note: Even person who is overweight or obese can be malnourished, needing adjustment in the balance of nutrients.

(continues on page 406)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b>	
Consult with dietitian and nutritional support team, as indicated.	Useful in establishing individual nutritional needs and most appropriate route.
Begin low-fat liquid diet after NG tube is removed. Advance diet as tolerated, usually low fat, nonspicy, high fiber. Restrict foods and fluids high in fat such as butter, fried foods, and nuts.	Limiting fat content reduces stimulation of gallbladder and pain associated with incomplete fat digestion and is helpful in preventing recurrence.
Monitor laboratory studies: blood urea nitrogen (BUN), prealbumin, albumin, total protein, and transferrin levels.	Provides information about nutritional deficits and effectiveness of therapy.
Administer parenteral or enteral feedings as indicated.	Alternative feeding may be required depending on severity of gallbladder involvement, client's overall nutritional status, and need for prolonged gastrointestinal rest.

### NURSING DIAGNOSIS: **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

#### May Be Related To

Insufficient information; insufficient knowledge of resources; insufficient interest in learning  
[Information misinterpretation]

#### Possibly Evidenced By

Reports insufficient knowledge  
Inaccurate follow-through of instruction  
Development of preventable complication

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Knowledge: Acute Illness Management NOC

Verbalize understanding of disease process, prognosis, and potential complications.  
Verbalize understanding of therapeutic needs.  
Initiate necessary lifestyle changes and participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b>	
<b>Independent</b>	
Provide explanations of and reasons for test procedures and preparation needed.	Information can decrease anxiety, thereby reducing sympathetic stimulation.
Review disease process and prognosis. Discuss hospitalization and expected treatment as indicated. Encourage questions and expression of concerns.	Provides knowledge base from which client can make informed choices. Effective communication and support at this time can diminish anxiety and promote healing.
Review drug regimen if chemical stone dissolution is chosen or drug is used for prophylaxis.	Some clients with established cholesterol gallstones may be treated with ursodeoxycholic acid (Ursodiol), which results in gradual gallstone dissolution (e.g., over 6 to 18 months). Clients remain at risk for gallstone complications until dissolution is completed. This medication may also be used to prevent gallstones in client undergoing rapid weight loss (e.g., bariatric surgery or very low-calorie diet) (Heuman et al, 2017).
Discuss relationship between obesity and gallbladder disease, if indicated.	Obesity is a risk factor associated with cholecystitis, and weight loss is beneficial in medical management of chronic condition. Note: Paradoxically, studies show that both obesity and rapid weight loss are main causes for the development of gallbladder disease and formation of gallstones (Mohan, 2011; Rodriguez et al, 2016).
Recommend client try to avoid or limit high-fat, high-calorie foods: fried and highly processed foods, whole-milk dairy products, fatty red meats.	May prevent recurrence of and limit severity of gallbladder attacks.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review signs and symptoms requiring medical intervention, such as recurrent fever; persistent nausea and vomiting; pain; jaundice of skin or eyes; itching; dark urine; clay-colored stools; blood in urine, stools, or vomitus; or bleeding from mucous membranes.	Indicative of progression of disease process and development of complications requiring further intervention.

**Collaborative**

Refer to nutritionist, community support group as desired.

Provides information about healthy weight reduction foods (nutritionally balanced) and weight management programs, if indicated.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **acute Pain**—recurrence of obstruction or ductal spasm, inflammation, tissue ischemia

## CHOLECYSTECTOMY

**I. Indications**—for the treatment of symptomatic gallstones, infection of the gallbladder or biliary ducts, calcified gallbladder, or cancer or trauma

**II. Procedures**

- a. Laparoscopic cholecystectomy: Now the preferred procedure for removal of gallstones; performed using video endoscopy, with instruments inserted through small abdominal incisions.
- b. Open cholecystectomy: Procedure may be preferred in client with multiple or large gallstones, certain comorbid medical conditions, history of previous surgeries with scarring, or unsuccessful laparoscopic cholecystectomy.

**III. Statistics**

- a. Morbidity: Each year, in the United States, approximately 500,000 people develop symptoms or complications of gallstones requiring cholecystectomy (period of data gathering unknown) (Heuman et al, 2017). Bile duct injury (BDI) after laparoscopic cholecystectomy (LC) has been a

significant source of morbidity, now greatly improved. For example: A nationwide sample study covering a period of a decade of inpatients having LCs revealed that 11% of LCs were associated with biliary reconstruction in 2001 versus 0.09% in 2011 (Worth et al, 2016).

- b. Mortality: Sources agree that when cholecystectomy is performed as an elective surgery, the mortality rates are low (less than 0.5% and in the elderly, 0.7% to 2%). Emergency cholecystectomy has a much higher mortality rate (e.g., as high as 19% in ill elderly patients) (Simon, 2009). A nationwide sample study of people undergoing laparoscopic (instead of open) cholecystectomy between 2001 and 2011 revealed that laparoscopic procedures numbers increased from 71.1% to 79.0%, while annual mortality decreased from 0.56% to 0.38% (Worth et al, 2016).
- c. Cost: According to Healthcare Bluebook, fair price for a cholecystectomy is \$13,500, which would equal approximately \$8.1 billion in 2017.

### G L O S S A R Y

**Cholecystitis:** Inflammation of the gallbladder.

**Cholelithiasis:** Stones in the gallbladder.

**Gallstones:** Solid masses made of cholesterol or bilirubin that form in the gallbladder or bile ducts; majority of gallstones in clients (in United States) are composed of cholesterol, resulting from cholesterol precipitating out of bile; bile pigment stones are a result of free bilirubin combining with calcium.

**Hematemesis:** Vomiting of blood.

**Jaundice:** Yellow tinge to skin and sclera in eyes due to bile absorption into circulatory system.

**Melena:** Black, tarry feces due to digestion of blood in stool.

**T-tube:** Drain tube inserted into cystic duct at the point of surgical closure and exiting through stab wound in skin to allow bile to drain.

### CARE SETTING

An elective cholecystectomy is usually done on a 1-day or short-stay basis. However, in the presence of suspected complications such as empyema, gangrene, or perforation, an in-patient stay on a surgical unit is indicated.

### RELATED CONCERNS

Cholecystitis with cholelithiasis, page 399

Pancreatitis, page 511

Peritonitis, page 389

Psychosocial aspects of care, page 835

Surgical intervention, page 873

## CLIENT ASSESSMENT DATABASE (PREOPERATIVE)

Refer to CP: Cholecystitis with Cholelithiasis.

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<b>TEACHING/LEARNING</b>	
<b>DISCHARGE PLAN CONSIDERATIONS</b> <ul style="list-style-type: none"><li>• May require assistance with wound care, supplies, and homemaker tasks</li></ul> <p>► Refer to section at end of plan for postdischarge considerations.</p>	

## DIAGNOSTIC STUDIES

Refer to CP: Cholecystitis with Cholelithiasis.

### NURSING PRIORITIES

1. Promote respiratory function.
2. Prevent complications.
3. Provide information about disease, procedure(s), prognosis, and treatment needs.

### DISCHARGE GOALS

1. Ventilation and oxygenation adequate for individual needs.
2. Complications prevented or minimized.
3. Disease process, surgical procedure, prognosis, and therapeutic regimen understood.
4. Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: **ineffective Breathing Pattern**

### May Be Related To

Pain

Neuromuscular impairment [preexisting lung disorders; general anesthesia; postoperative effects of laparoscopic positioning during surgery (body position that inhibits lung expansion) effects of analgesia for pain]

Fatigue [e.g., deconditioning; age]

### Possibly Evidenced By

Alteration in respiratory rate or pattern

Diminished breath sounds; adventitious sounds

Decreased vital capacity

[Altered chest excursion—reluctance to cough]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status: Ventilation NOC

Establish effective respiratory pattern, as evidenced by patent airway, absence of cyanosis with oxygen saturation ( $\text{SaO}_2$ ) within client's acceptable range.

Experience no signs of respiratory compromise or complications.

## ACTIONS/INTERVENTIONS

## RATIONALE

### Respiratory Monitoring

#### Independent

Determine the presence of factors/conditions noted in Related Factors [e.g., preexisting lung disorders; general anesthesia; postoperative effects of laparoscopic positioning during surgery (body position that inhibits lung expansion); effects of analgesia for pain].

These have an impact on postoperative respiratory status and influence choice of interventions (Nguyen & Tanaka, n.d.).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Observe respiratory rate and depth. Note changes (e.g., shallow breathing, rapid breathing, splinting with respirations, difficult breathing, periods of apnea).	These may be the result of hypoventilation and atelectasis associated with perioperative positioning (particularly during laparoscopic procedures) or effects of anesthesia or pain medications. Early intervention may prevent onset of serious respiratory complications.
Auscultate breath sounds.	Areas of decreased or absent breath sounds suggest atelectasis, whereas adventitious sounds reflect congestion.
Evaluate cough effectiveness.	The client must be able to generate a productive cough; otherwise, mucus accumulation will occur, resulting in atelectasis and/or lung infection or pneumonia.
Assist with/remind client to change position and cough and deep-breathe periodically. Instruct in effective breathing techniques.	Promotes ventilation of all lung segments and mobilization and expectoration of secretions.
Assist with/encourage early ambulation. Support abdomen when coughing or ambulating.	Facilitates deeper breathing and lung expansion. Splinting provides incisional support and decreases muscle tension to promote cooperation with respiratory exercises.
<b>Collaborative</b>	
Monitor pulse oximetry readings, ongoing. Obtain ABGs/capnography/other respiratory data, as indicated.	These tests indicate ability of the lungs to obtain sufficient oxygen to sustain organ function and to compensate for factors such as increased postoperative metabolic rate, elevated body temperature, possible infections. Capnography or ABGs will also indicate if respiratory function is adequate to eliminate carbon dioxide/prevent carbon dioxide accumulation.
Administer analgesics regularly or continuously observing for respiratory suppression, as appropriate. Adjust narcotic dosages or change medications as needed.	Pain management facilitates effective coughing and deep breathing, as well as movement and tissue healing.
Administer oxygen by appropriate route, as indicated.	For optimization of circulating oxygen or management of underlying pulmonary conditions.

## NURSING DIAGNOSIS: risk for deficient Fluid Volume

### Possibly Evidenced By

Active fluid volume losses (e.g., vomiting [postanesthesia nausea]; nasogastric [NG] aspiration; bile drainage devices; altered coagulation)

Factors influencing fluid needs [e.g., hypermetabolic state]; deviations affecting intake—medically restricted intake, nausea

### Desired Outcomes/Evaluation Criteria—Client Will

#### Hydration NOC

Display adequate fluid balance as evidenced by stable vital signs, moist mucous membranes, good skin turgor, capillary refill, and individually appropriate urinary output.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid/Electrolyte Management NIC</b>	
<b>Independent</b>	
Monitor intake and output (I&O), including drainage from NG tube, T-tube (when present). Calculate 24-hour I&O balance. Weigh client periodically.	Provides information about fluid replacement needs and organ function. Initially, 200 to 1000 mL of bile drainage per 24 hours may be expected, gradually decreasing as more bile enters the intestine. Note: The clinical benefit of a T-tube for bile drainage has been a subject of study in recent years. A Cochrane Database of Systematic Reviews study concluded that “based on the currently available evidence, there is no justification for the routine use of T-tube drainage after open common bile duct exploration in patients with common bile duct stones” (Gurusamy et al, 2013).

(continues on page 410)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor vital signs. Assess mucous membranes, skin turgor, peripheral pulses, and capillary refill.	Indicators of adequacy of circulating volume and perfusion.
Document and report bleeding, such as frank bleeding or oozing from incisions, drains, and injection sites, or hematemesis, melena.	Risk of bleeding is increased if bile flow has been significantly obstructed because prothrombin is reduced and coagulation time prolonged in that setting.
<b>Collaborative</b>	
Monitor laboratory studies, such as complete blood count (CBC), electrolytes, prothrombin and clotting time, and amylase.	Provides information about circulating volume, electrolyte balance, and adequacy of clotting factors. The hematocrit (Hct) rises when plasma volume is reduced, as in dehydration from vomiting. Falling hemoglobin (Hgb) and Hct and prolonged clotting time may reflect bleeding as a complication of obstructed bile flow, surgical procedure, or preexisting bleeding disorder. Elevated white blood cells (WBCs) can indicate inflammation from surgery, peritonitis, or pancreatitis or other infection. Damage to the pancreas is indicated by elevated levels of amylase.
Administer the following, as indicated:	
Intravenous (IV) fluids, blood products, and vitamin K	Maintains adequate circulating volume and aids in replacement of clotting factors.
Electrolytes (such as potassium, sodium, and chloride)	Imbalances resulting from gastric or surgical fluid losses may require replacement via oral and parenteral routes.

## NURSING DIAGNOSIS: impaired Skin/Tissue Integrity

### May Be Related To

Surgical procedure  
Alteration in fluid volume [including presence of edema]  
Chemical injury agent—bile; excretions or secretions  
Alteration in metabolism; inadequate nutrition/imbalanced nutritional state (obesity); hypermetabolic state

### Possibly Evidenced By

Alteration in skin integrity (e.g., surgical disruption of skin and tissues)  
[Invasion of body structure—T-tube punctures or incision]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Wound Healing: Primary/Secondary Intention NOC

Achieve timely healing without complications.  
Be free of injury.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Wound Care NIC</b>	
<b>Independent</b>	
Monitor abdominal puncture sites (three to five) if laparoscopic procedure is done. Evaluate surgical incision and dressings (if open procedure performed).	These areas may bleed and also have the potential to become infected.
Change dressings often initially, then as needed. Clean the skin with soap and water. Use skin protectant product around the incision, as needed.	Keeps the skin around the incision clean and provides a barrier to protect skin from excoriation from leaking bile.
Observe the color and character of drainage from surgical drains or T-tube.	Initially, drainage may contain blood and blood-stained fluid, normally changing to greenish-brown (bile color) after the first several hours. Reportable changes include drainage that is green, brown, has a foul odor, or is bloody.
Make sure drains are free-flowing.	Correct positioning prevents backup of the bile in the operative area. Note: Sudden cessation of drainage may indicate blockage of tube or a developing complication (bile leak into the abdomen).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Place a disposable ostomy bag over a stab wound drain. Maintain tube(s) in closed collection system.	Prevents skin irritation and reduces risk of contamination. Note: The T-tube may remain in the common bile duct for some time (days to weeks) to allow for reduction of edema and healing.
Place client in low- or semi-Fowler's position, and encourage early ambulation.	Facilitates drainage of bile.
Observe for hiccups, abdominal distention, or other signs of peritonitis such as rigid abdomen, fever, and severe right upper quadrant (RUQ) abdominal pain suggesting pancreatitis.	Dislodgment of the T-tube can result in diaphragmatic irritation or more serious complications if bile drains into abdomen or pancreatic duct is obstructed. Note: Uncontrolled bile leak into the abdominal cavity can be life-threatening if this is not recognized and treated appropriately.
Observe skin for irritation/excoriation, sclera for jaundice, and urine for change in color to dark brown.	May indicate obstruction of bile flow from retained gallstone(s).
Note color and consistency of stools.	Clay-colored stools result when bile is not present in the intestines.
Investigate reports of increased or unrelenting RUQ pain, development of fever and tachycardia, and leakage of bile drainage around tube or from wound.	Signs suggestive of complications such as peritonitis, pancreatitis, or abscess or fistula formation, requiring immediate medical intervention.
<b>Collaborative</b>	
Administer antibiotics, as indicated.	Necessary for treatment of infection from any abdominal source (e.g., peritonitis, abscess).
Prepare for surgical interventions, as indicated.	Reoperation may be required for complications (e.g., bile duct injury will require stenting of duct or surgical repair if stenting not successful).
Monitor laboratory studies, for instance, WBC count.	Leukocytosis reflects inflammatory process, for example, abscess formation or development of peritonitis or pancreatitis.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

**May Be Related To**

Insufficient information; insufficient interest in learning; insufficient knowledge of resources

**Possibly Evidenced By**

Insufficient knowledge  
Inaccurate follow-through of instructions or performance of a procedure  
Development of preventable complications

**Desired Outcomes/Evaluation Criteria—Client Will**

**Knowledge: Acute Illness Management NOC**

Verbalize understanding of disease process, surgical procedure, therapeutic needs, and potential complications.  
Perform necessary procedures correctly and explain reasons for actions.  
Initiate necessary lifestyle changes and participate in therapeutic regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b>	
<b>Independent</b>	
Review disease process, surgical procedure, and prognosis.	Provides knowledge base on which client can make informed choices.
Discuss/reinforce care of incisions and incisional or T-tube drains (where indicated).	Promotes independence in care and reduces risk of complications.

(continues on page 410)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
For client being discharged with T-tube, instruct in:	
Characteristics of normal skin appearance surrounding the tube; characteristics of normal drainage and reportable changes.	Reportable changes include red and irritated or excoriated skin and drainage that is green, brown, has a foul odor, or is bloody.
Periodic drainage of T-tube collection bag and recording of output, if indicated.	Reduces risk of reflux, strain on tube, and appliance seal. Provides information about resolution of ductal edema and return of ductal function for appropriate timing of T-tube removal.
Anchoring drainage tube, allowing sufficient tubing to permit free turning and avoid kinks and twists.	Avoids dislodging tube and potential occlusion of the lumen.
Clamping T-tube per schedule.	Tests the patency of the common bile duct before tube is removed. Also, if tube is left in place for a long time, clamping may be done 1 hour before and after meals, which diverts the bile back to the duodenum to aid digestion (Antipuesto, 2010).
Discuss resumption of normal diet. Advise client to note and avoid foods that seem to cause discomfort or aggravate diarrhea.	Although radical dietary changes are not usually necessary, certain restrictions may be helpful, such as consuming fats in small amounts. After a period of adjustment, client usually will not have problems with most foods.
Inform client that loose stools may occur for several months.	Intestines require time to adjust to stimulus of continuous output of bile.
Discuss use of medication such as dehydrocholic acid (Decholin).	Oral replacement of bile salts may be required in certain clients to facilitate digestion and treat malabsorption of fats.
Discuss avoiding or limiting use of alcoholic beverages.	Minimizes risk of pancreatic involvement.
Identify signs and symptoms requiring notification of healthcare provider, such as dark urine, jaundiced sclera and skin, clay-colored stools, fever, or recurrent abdominal pain and bloating.	Indicators of obstruction of bile flow or altered digestion, requiring further evaluation and intervention.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition, presence of complications, personal resources, and life responsibilities)

- **Diarrhea**—inflammation, irritation, malabsorption
- **risk for Infection**—invasive procedure, broken skin, traumatized tissues

# CHAPTER 6

## Metabolic and Endocrine Disorders

### EATING DISORDERS: ANOREXIA NERVOSA/BULIMIA NERVOSA

**I. Pathophysiology**—Eating disorders encompass a spectrum of psychological problems that involve insufficient or excessive food intake, resulting in significant health problems across the life span. The cause of eating disorders is thought to stem from a mixture of social, psychological, and biological factors. How much each factor contributes to the development of these disorders is a matter of debate.

**a. Physiological factors**

i. Genetic factors

1. Some studies suggest that genetics contribute to about 50% of the variance for eating disorders.
2. Clinical depression also has a genetic risk with anorexia.
3. Genes seem to influence eating regulation, personality, and emotion and may be factors in these disorders.

ii. Neurobiological factors

1. The neurotransmitter serotonin has a correlation with mood, sleep, emesis, sexuality, and appetite.
2. Anorexia may be linked to a disturbed serotonin system.
3. Cause and effect are not easily separated, as other factors, such as starvation, may be involved.
4. After recovery, personality characteristics, anxiety, and perfectionism remain, suggesting that they may be causal factors.

iii. Nutritional factors

1. Zinc deficiency is known to cause a decrease in appetite and has been recommended for the treatment of anorexia.
2. Other nutrients, such as tyrosine and tryptophan, as well as vitamin B<sub>1</sub>, may also be deficient and contribute to malnutrition.

**b. Psychological factors**

i. Biases in thinking and perception are believed to maintain and contribute to developing anorexia.

ii. Feelings of fatness and unattractiveness are overestimated, perceived, and evaluated by the affected persons as being true, regardless of reality of their body, food, and eating.

iii. A “transdiagnostic model” (Fairburn et al, 2009) proposes that all major eating disorders (with the

exception of obesity) share some core types of psychopathology that help maintain the eating disorder behavior. These core psychopathologies include clinical perfectionism, chronic low self-esteem, mood intolerance, and interpersonal difficulties.

**c. Social and environmental factors**

- i. The media, which have promoted the concept of thinness as the ideal female form, are believed to contribute to the development of eating disorders.
- ii. Those in professions where there is pressure to be thin (e.g., models, dancers, and athletes) may develop anorexia.
- iii. Below-median annual household income was associated with increased prevalence rates from 1998 to 2008 in binge eating, extreme dieting, and purging (Mitchison et al, 2014).
- iv. Environmental eating disorder triggers (e.g., fad dieting, excessive exercise, or medical illness) are examples of negative energy states that can bring about behavioral changes (e.g., restricting food intake, binging), triggering preexisting genetic drivers for eating disorders (Lutter & Ramsay, 2017).

v. **P** A subset of adolescents who are temperamentally incapable of dealing with age-appropriate challenges without extreme reward-seeking behavior (thinness) may be susceptible to anorexia nervosa (AN) (Bernstein, 2017).

vi. Child sexual abuse is noted in people with anorexia, and while it is not a specific risk factor, it is for mental illness in general.

vii. The Internet has become a source of contact and communication for those with eating disorders and may or may not be helpful for them (Gibson, 2017).

**II. Characteristics**—Note: The fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) separates anorexia nervosa and bulimia nervosa as two separate disorders, and there continues to be consideration that these two disorders may be part of a unified eating disorder (Bernstein, 2017).

**a. Anorexia nervosa (AN)**

- i. Serious, chronic illness of starvation associated with a severe disturbance of body image and a morbid fear of obesity

(continues on page 414)

- ii. **P** Disorder is primarily a phenomenon of puberty and early adulthood, but has been observed in both the very young and very old (Swanson et al, 2011). Increasing numbers of women over age 30 (with 13% of American women over age 50) experiencing some form of eating disorder (Trace et al, 2013).
  - iii. Constellation of factors involved include an individual's genetic makeup, personality, and psychological and emotional challenges.
  - iv. Predisposing factors include female sex, family history of eating disorders, perfectionistic personality, low self-esteem, difficulty communicating negative emotions and resolving conflicts. **P** Maternal issues (e.g., negative expressed emotions, maternal encouragement or insistence of weight loss) are risk factors for childhood onset.
  - v. May be divided into stages or may be viewed as a continuum of self-starvation, malnutrition, severe weight loss, and extreme weight loss
  - vi. Divided into two subtypes (Bernstein, 2017)
    - a) Restricting (AN-R): Severe limitation of food as primary means to weight loss. **P** Recent research suggests that youths with AN-R followed a more regular eating pattern but consumed insufficient amounts of food during meals (Bernstein, 2017).
    - b) Binge eating/purging (AN-BE/P): Periods of food intake compensated by self-induced vomiting, laxative or diuretic abuse, and/or excessive exercise. **P** Research also suggests youths with AN-BE/P tended to have more irregular eating patterns than those with AN-R (Bernstein, 2017).
  - b. Bulimia nervosa (BN)
    - i. Chronic cycle involving binge eating and purging
    - ii. Characterized by binges of overeating, which may be extreme, followed by self-induced vomiting, purging, and misuse of laxatives, diuretics, or enemas; may also involve nonpurging behaviors such as excessive exercise and fasting
    - iii. Fear of gaining weight motivates purging or compensatory behaviors.
    - iv. Often seen in persons of normal weight but may be seen in overweight clients
    - v. More common among persons whose occupations, vocations, or hobbies require rapidly gaining and/or losing weight (e.g., wrestlers, body builders; jockeys, runners, gymnasts, actors, models)
    - vi. Does not occur specifically with episodes of AN, although up to 60% of persons with BN report prior histories of AN (Randhawa et al, 2016)
    - vii. Severity of conditions is characterized by frequency of inappropriate behaviors, from mild (average of 1–3 episodes/week) to extreme (14 or more episodes/week).
    - viii. Often present with co-concurring conditions, such as self-injury (cutting and other forms of self-harm without suicidal intent), substance abuse, and impulsivity (e.g., risky sexual behaviors, shoplifting) (National Eating Disorders Association [NEDA], 2016).
    - ix. More than half of persons with bulimia suffer from anxiety disorders (Ulfvebrand et al, 2015).
    - x. Often not diagnosed for months or years after onset because of person's secretiveness, usually associated with shame.
  - c. Binge eating disorder (BED)
    - i. Most common eating disorder overall with lifetime prevalence of 2.8% and most common eating disorder in men (2%) (Randhawa et al, 2016)
    - ii. Characterized by binge eating (gorging behavior) without inappropriate compensatory behaviors such as purging or fasting
    - iii. Ingestion of a large amount of food (in a discrete period of time [e.g., 2 hours]) with a sense of loss of control; frequent dieting without weight loss
    - iv. Binge eating may be as high as 25% in postbariatric surgical persons (Berkman et al, 2015).
- III. Etiology**
- a. The hypothalamus, which regulates appetite by signaling hunger and satiety, may not release balanced amounts of neurotransmitters, such as serotonin or pancreatic polypeptides.
  - b. Occurs in people of any age, gender, race, sexual orientation, religion, or social stratum. A study of college students suggests transgender and nontransgender lesbian, gay, and bisexual students appear to be at the highest risk for eating disorders (Diemer et al, 2015) while a common profile of an individual with an eating disorder is a female between the ages of 30 and 40 (Trace et al, 2013).
  - c. Both AN and BN can be present in the same individual.
  - d. Risk factors
    - i. Personal characteristics: low self-esteem and feelings of helplessness
    - ii. Social factors: popular cultural preferences, media images, peer pressure, occupational expectations, for example, model, dancer, athlete
    - iii. Family structure: Theory suggests that girls who live in families that highly value perfection are at a greater risk for developing an eating disorder.
    - iv. Presence of psychiatric comorbidities: anxiety, depression, addictive behavior, or impulse control disorders
    - v. Genetics: Family and twin studies reveal that addictive genetic factors account for approximately 40% to 60% of liability to anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED) (Trace et al, 2013). A newer study supports previous findings that the risk of developing an eating disorder may have a 50% to 80% genetic component (supporting data, Castellini et al, 2017).
- IV. Statistics**
- a. All disorders
    - i. Morbidity: At least up to 30 million Americans suffer from an eating disorder during their lifetime; 1 in 10 individuals with an eating disorder receives treatment (Anorexia Nervosa and Associated Disorders [ANAD], 2017).
    - ii. Mortality: Eating disorders have the highest mortality rate of any mental illness with approximately one in five deaths being suicide (ANAD, 2017).
    - iii. Cost: Inpatient treatment can range anywhere from \$500 to \$2000 a day, and the average cost for a 30-day stay in a treatment facility is \$30,000. Patients often need from 3 to 6 months of inpatient care. Outpatient care, including medical monitoring and continuing therapy, can reach upward of \$100,000 (PsychGuides.com, 2017).

**b. AN**

- i. Morbidity: More common in girls and women, with a female-to-male ratio of 10 to 20:1 in developed countries (Bernstein, 2017); only about 50% of those affected will recover (Bernstein, 2017). Recovery also depends on the patient's body mass index (BMI) and his or her weight loss at presentation, as well as the duration of symptoms, duration of inpatient care, and state of family relationships (Kaplan et al, 2009).
- ii. Mortality: AN has the highest mortality rate among all psychological disorders with 20% of deaths attributed to suicide. Analysis of 36 quantitative studies published in 2011 reported that the standard mortality ratio (SMR) for AN is 5.86 (see Glossary) (ANAD, 2017; Arcelus et al, 2011). A recent study found that mortality was higher if psychiatric comorbidities were present (Kask et al, 2016). Cardiac complications are the most common physiological cause of death (about 10%) (Bernstein, 2017).

**c. BN**

- i. Morbidity: Recent studies suggest a female-to-male ratio of 10:1. In some populations (e.g., active duty military), body dissatisfaction and subclinical eating disorder rates among males have been reported to be in excess of 20% (Randhawa et al, 2016). A national study concluded that the lifetime comorbidity of BN with any psychiatric disorder (e.g., affective and anxiety disorders, substance abuse; impulse control disorders) is 94.5% (reported in Randhawa et al, 2016, with 14 accompanying relevant citations).
- ii. Mortality: Up to 3% eventually die of complications from the disease. The leading cause of death is suicide, which is more common in persons with BN than those with AN. SMR for BN is 1.93 (ANAD, 2017).

**d. BED**

- i. Morbidity: Most common eating disorder in the United States; 30% to 40% of those seeking weight loss treatments can be clinically diagnosed with binge eating disorder (Binge Eating Disorder Association [BEDA], 2016).

**G L O S S A R Y**

**Abnormal involuntary movement scale (AIMS):** System used to assess abnormal involuntary movements, such as hand tremors or rhythmic movements of the tongue and jaw, which may result from the long-term administration of psychotropic drugs.

**Electroconvulsive therapy (ECT):** Use of an electric shock to produce convulsions and thereby treat drug-resistant psychiatric disorders, such as some cases of major depression, bipolar disorder, suicidal ideation, and schizophrenia.

**Family therapy:** Focuses on the interdependent relationships within the family as a whole.

**Obsessive-compulsive disorder (OCD):** Chronic anxiety disorder most commonly characterized by obsessive, distressing, intrusive thoughts and related compulsions.

**Osteopenia:** Reduced bone mass of lesser severity than osteoporosis.

**Recovery environment:** The individual in treatment and the supportive family members work together to create an

environment in which all feel safe to express their feelings without judgment, criticism, or guilt.

**Refeeding syndrome (RFS):** Severe electrolyte imbalances (principally potassium, magnesium, and phosphate) and metabolic abnormalities in undernourished individuals undergoing refeeding therapy, whether orally, enterally, or parenterally. RFS reflects the change from catabolic to anabolic metabolism (Crook, 2014).

**Standard mortality ratio (SMR):** The ratio of observed deaths in the study group to expected deaths in the general population. Example: SMR for anorexia nervosa (AN) in 2011 was 5.86, where death occurred almost 60% more often in the study population with AN than the reference population without AN (Arcelus et al, 2011).

**Total parenteral nutrition (TPN):** Nutritional therapy specifically designed to prevent or correct protein-calorie malnutrition, which is administered via an enteral or parenteral route.

**CARE SETTING**

Acute care is provided through inpatient stay on a medical or behavioral unit and for correction of severe nutritional deficits and electrolyte imbalances or initial psychiatric stabilization. Individuals who are medically stable may begin therapy in a residential program. Long-term care is provided in an outpatient or day treatment program (partial hospitalization) or in the community.

**RELATED CONCERNS**

Dysrhythmias, page 85

Fluid and electrolyte imbalances (see DavisPlus)

Metabolic alkalosis—primary base bicarbonate excess (see DavisPlus)

Psychosocial aspects of care, page 835

Total nutritional support: parenteral/enteral feeding, page 525

**ACTIVITY/REST**

- Disturbed sleep patterns—early morning insomnia, fatigue
- Feeling “hyper” or anxious
- Increased activity, avid exerciser, participation in high-energy sports
- Employment in positions or professions that emphasize and require strict weight control, such as gymnasts, bodybuilders, and other athletes, jockeys, models, dancers, skaters, actors, wrestlers, flight attendants, and others for whom thinness is emphasized and overly rewarded

**CIRCULATION**

- Feeling cold even when room is warm
- Dizziness, lightheadedness (BN)

- Periods of hyperactivity, constant vigorous exercising (AN)
- Psychomotor retardation (slowing of physical movement due to a slowing of brain activity [late-stage AN])
- Generalized muscle weakness (most common neurologic symptom in AN) (Bernstein, 2017)

**EGO INTEGRITY**

- Lack of control over eating, for example, cannot stop eating or cannot control what or how much is eaten (BN)
- Feeling disgusted with self, depressed, or very guilty because of overeating
- Suppression of angry feelings
- Distorted or unrealistic body image; reports self as fat regardless of weight (denial) and sees thin body as fat
- Persistent overconcern with body shape and weight
- Unrealistic pleasure in weight loss, while denying oneself pleasure in other areas
- High self-expectations
- Stress factors—family move, divorce, onset of puberty

- Low blood pressure (BP), orthostatic changes in BP or heart rate
- Cold hands and feet (acrocyanosis)
- Tachycardia, bradycardia, dysrhythmias
- Resting heart rate often 30 to 40 bpm (severe AN) (Bernstein, 2017)

**ELIMINATION**

- Diarrhea or constipation
- Laxative and diuretic abuse

- Emotional states of depression, withdrawal, anger, anxiety, pessimistic outlook
- Flat affect
- Psychiatric conditions, such as depression, anxiety, bipolar disorder, OCD

**FOOD/FLUID**

- Constant hunger or denial of hunger; normal or exaggerated appetite that rarely vanishes until late in the disorder (AN)
- Intense fear of gaining weight (females); may have prior history of being overweight (particularly males)
- Preoccupation with food, such as calorie counting, gourmet cooking
- Recurrent episodes of binge eating, a feeling of lack of control over behavior during eating binges, a minimum average of two binge-eating episodes a week for at least 3 months (BN)
- Sore throat (BN)
- Regularly engages in self-induced vomiting either independently or as a complication of anorexia, or strict dieting or fasting

- Weight loss and maintenance of body weight 15% or more below that expected; refusal to maintain body weight over minimal norm for age and height (AN)
- No medical illness evident to account for weight loss
- Cachectic appearance, skin may be dry, yellowish, pale, with poor turgor (AN)
- Loss of muscle mass (AN)
- Peripheral edema (AN, BN)
- Preoccupation with food—calorie counting, hiding food, cutting food into small pieces, rearranging food on plate
- Irrational thinking about eating, food, and weight
- Weight may be normal or slightly above or below normal (BN)
- Swollen salivary glands; sore, inflamed buccal cavity; swollen parotid and submandibular glands (AN, BN)
- Vomiting, bloody vomitus (BN) (may indicate esophageal tearing—Mallory-Weiss syndrome)
- Diminished intestinal motility

**MAY REPORT (continued)****MAY EXHIBIT (continued)****HYGIENE**

- Increased hair growth on body (lanugo), hair thinning or loss (axillary, pubic), hair is dull, not shiny
- Brittle nails
- Erosion of tooth enamel, gums in poor condition, ulcerations of mucosa
- Enlarged salivary glands; dry mouth; reddened, dry, cracked lips

**NEUROSENSORY**

- Appropriate affect (except in regard to body and eating) or depressive affect
- Hysterical or obsessive personality style; absence of other psychiatric illness or thought disorder—although a significant number may show evidence of an affective disorder
- ***Mental changes:*** Apathy, confusion, memory impairment brought on by malnutrition or starvation

**PAIN/DISCOMFORT**

- Headaches
- Sore throat or mouth
- Vague abdominal pain and distress (more common in those who self-induce vomiting)
- Bloating

**SAFETY**

- Body temperature below normal
- Skin abrasions or scars (e.g., cutting, burning); other self-induced trauma
- Eczema and other skin rashes; calluses on back of hands from sticking finger down throat to induce vomiting (BN)
- Recurrent infectious processes (indicative of depressed immune system)

**SEXUALITY**

- Absence of at least three consecutive menstrual cycles due to decreased levels of estrogen in response to malnutrition (AN)
- Promiscuity or loss of sexual interest
- History of sexual abuse
- Heterosexual or member of LGBT community

- Amenorrhea occurs in up to 50% of women with BN (Randhawa et al, 2016)
- Irregular periods; scanty periods
- Breast atrophy

**SOCIAL INTERACTION**

- Middle-class or upper-class family background but increasingly noted in lower-income families
- History of being a quiet, cooperative child/individual
- Problems of control issues in relationships, difficult communications with others, especially authority figures
- Poor communication within family of origin
- Engagement in power struggles
- An emotional crisis of some sort, such as divorce/separation, menopause, the onset of puberty, or an unwanted family move
- Altered relationships or problems with relationships, withdrawal from friends and social contacts
- Abusive family relationships
- Sense of helplessness
- History of legal difficulties—shoplifting, drug use

- Passive father, dominant mother
- Family members closely fused
- Togetherness prized
- Personal boundaries not respected

(continues on page 418)

## CLIENT ASSESSMENT DATABASE (contd.)

### MAY REPORT (continued)

### MAY EXHIBIT (continued)

#### TEACHING/LEARNING

- Family history of higher than normal incidence of depression
- Other family members with eating disorders (genetic predisposition)
- Health beliefs and practice—certain foods have “too many” calories, use of “health” foods, and so forth
- Substance abuse
- Use of herbal or over-the-counter (OTC) preparations to control weight gain, such as bitter orange, green tea extract, guarana, rhodiola, laxatives (bisacodyl, cascara, senna), high-fiber supplements
- Use of prescription diet medications—Meridia, phenteramine, Xenical (often obtained without prescription via Internet)

#### DISCHARGE PLAN CONSIDERATIONS

- Assistance with maintenance of treatment plan

► Refer to section at end of plan for postdischarge considerations.

#### DIAGNOSTIC STUDIES

##### TEST WHY IT IS DONE

##### WHAT IT TELLS ME

#### BLOOD TESTS

- **Complete blood count (CBC):** Battery of screening tests that typically include hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; white blood cell (WBC) count and differential.
- **Basic metabolic profile (BMP):** Provides baseline data and can be used to evaluate and monitor fluid and electrolyte balance.
- **Erythrocyte sedimentation rate (ESR):** Helps exclude unrecognized chronic medical conditions.
- **Amylase:** Digestive enzyme primarily located in pancreas and salivary glands.
- **Aspartate aminotransferase/alanine aminotransferase (AST/ALT), aluminum phosphide (ALP), total bilirubin, and direct bilirubin:** Liver function tests to determine associated impairment or damage and gallbladder involvement.

Determines presence of anemia (not due to blood loss). WBCs are reduced (leukopenia) due to margination; lymphocytes are increased (lymphocytosis). Platelets show significantly less than normal activity (thrombocytopenia). Hgb may be elevated in extreme dehydration.

Electrolyte imbalances are secondary to vomiting and potassium is most often affected. Other imbalances include disturbances of sodium, chloride, calcium, magnesium, and phosphorus (AN). Hypokalemia and hypochloremic metabolic alkalosis are observed with vomiting; metabolic acidosis is possible in cases of laxative abuse (BN). Hyponatremia may be a result of excess water intake (AN). May show elevated bicarbonate levels. In AN, hypoglycemia is often present because of lack of carbohydrates in the diet or low glycogen levels in the liver. Blood urea nitrogen (BUN) and creatinine (Cr) may be normal or low. BUN may be elevated (AN) or if severe dehydration is present.

ESR is normal in AN; therefore, elevations may indicate anorexia associated with an organic condition (e.g., steroid-induced anorexia nervosa in adolescent with systemic lupus erythematosus [SLE]) (Bernstein, 2017).

Elevated in up to 30% of clients in presence of significant vomiting; reflects hypersecretion of the salivary glands (Randhawa et al, 2016).

Liver function studies may be minimally elevated (AN). In severe starvation states, AST/ALT levels are elevated. In BN, liver function tests are usually normal, although amylase may be elevated because of vomiting (Randhawa et al, 2016).

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
• <b>Cholesterol, high-density lipoprotein (HDL), low-density lipoprotein (LDL), and triglycerides:</b> Types of lipids.	Dramatic elevations in cholesterol are observed in cases of AN starvation. This elevation may be secondary to (1) decrease in triiodothyronine ( $T_3$ ) levels, (2) low cholesterol-binding globulin, and (3) leakage of intrahepatic cholesterol.
• <b><math>T_3</math>, thyroxine (<math>T_4</math>), and reverse <math>T_3</math>:</b> Thyroid function tests.	$T_4$ and $T_3$ levels may be low; reverse $T_3$ increased, in AN, reflecting euthyroid sick syndrome.
• <b>Pituitary function:</b> Propranolol-glucagon stimulation test studies the response of human growth hormone (hGH).	Depressed in AN. Gonadotropin hypofunction is noted.
• <b>Estrogen and luteinizing hormone (LH) secretions test:</b> Produced by the anterior lobe of the pituitary gland that stimulates ovulation and the development of the corpus luteum in females and the production of testosterone by the interstitial cells of the testis in males.	Pattern often resembles those of prepubertal girls.

## ASSOCIATED STUDIES

- **Urinalysis**
- **Fecal occult blood:** Identifies associated gastrointestinal (GI) complications.
- **Electrocardiogram (ECG):** Record of the electrical activity of the heart.
  
- **Chest x-ray or computed tomography (CT) scan:** Determine presence of associated complications.
- **Bone density scans, e.g., DEXA (dual-energy x-ray absorptiometry) scan:** Measures bone density and is used to assess risk for fracture.

Ketones in the urine represent starvation. Positive result may indicate esophagitis, gastritis (BN), or repeated colon irritation from laxative use (AN, BN). Abnormal tracing with low-voltage, T-wave inversion, prolonged QT interval, bradycardia, and dysrhythmias may be present, reflecting electrolyte imbalances. Note: In AN (and severe BN), frequency of rhythm disturbances is concerning, especially Q-T interval prolongation that may be an indication for risk of cardiac dysrhythmias and sudden death (Bernstein, 2017). May reveal rib fractures associated with repeated vomiting in presence of hypocalcemia and/or osteopenia. Heart size may be decreased. May reveal osteopenia (see Glossary) associated with lack of/ malabsorption of nutrients, vitamins, minerals.

## NURSING PRIORITIES

1. Obtain client's cooperation for treatment.
2. Reestablish adequate, appropriate nutritional intake.
3. Correct fluid and electrolyte imbalance.
4. Assist client to develop realistic body image and improve self-esteem.
5. Provide support and involve significant other (SO), if available, in treatment program.
6. Coordinate total treatment program with other disciplines.
7. Provide information about disease, prognosis, and treatment to client and SO.

\*\*\* Because this condition spans a wide age range from children to the elderly, interventions presented here need to be adjusted for age-appropriateness.

## DISCHARGE GOALS

1. Adequate nutrition and fluid intake maintained.
2. Maladaptive coping behaviors and stressors that precipitate anxiety recognized.
3. Adaptive coping strategies and techniques for anxiety reduction and self-control implemented.
4. Self-esteem increased.
5. Disease process, prognosis, and treatment regimen understood.
6. Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: ineffective child/adolescent Eating Dynamics

### May Be Related To

Disordered eating habits; eating in isolation; eating disorder  
Ineffective coping strategies; anxious/insecure parent-child relationship; abuse  
Changes to self-esteem upon entering puberty

(continues on page 420)

**NURSING DIAGNOSIS:** **ineffective child/adolescent Eating Dynamics** (continued)**Possibly Evidenced By**

Poor appetite/under eating; avoids participation in regular mealtimes; food refusal (AN)  
Overeating; frequently eating processed/poor quality food (BN)

**Desired Outcomes/Evaluation Criteria—Client Will****Eating Disorder-Self Control** **NOC**

Eat regularly scheduled meals with family.

**Knowledge: Eating Disorder Management** **NOC**

Follow dietary plan.

Acknowledge significance of health status appropriate for age and developmental level.

**ACTIONS/INTERVENTIONS****RATIONALE****Eating Disorders Management** **NIC****Independent**

Establish a minimum weight goal and daily nutritional/metabolic requirements.

Provides comparative baseline for effectiveness of therapy.  
Note: Malnutrition is a mood-altering condition, leading to depression and affecting cognitive function and decision making. Improved nutritional status enhances thinking ability, allowing initiation of psychological work.

Implement structured meal plans and schedule times for eating. Involve child in menu planning.

Like medication, nutrition prescriptions include a minimum of three meals and two to three snacks per day. Sets clear expectations parent and child while encouraging child to participate in decision-making process (Ekern, 2012).

Provide food choices within reason (e.g., apple with peanut butter, cheese and crackers).

Provides some sense of control for the child while still meeting nutrition needs.

Review parents' eating and exercise habits and provide nutritional education as indicated.

Parents need to set good example with healthy eating and exercise patterns.

**Collaborative**

Collaborate with registered dietitian to create a focused nutritional prescription and educational plan for client/family.

Useful in developing medical nutritional therapeutic plan with goal of stabilizing medical condition and promoting self-management training (Ekern, 2012). (Refer to ND, imbalanced Nutrition: less than body requirements following.)

Provide dietary supplements or tube feedings as indicated during acute/intensive treatment programs.

Child's refusal to eat solids necessitates liquid supplement diet while refusal of food and supplements requires NG tube feedings (Ekern, 2014).

Engage in family-based therapy (FBT).

Family-based interventions are most effective in younger children with parents taking charge of nutrition decisions and gaining skills in meal support, management of food avoidant behaviors, and anxiety (Ekern, 2014). FBT also empowers parents to renegotiate the relationship with their child, focusing on issues other than food and assisting the child to resume normal adolescent development (Lock et al, 2005).

**NURSING DIAGNOSIS:** **imbalanced Nutrition: less than body requirements****May Be Related To**

Insufficient dietary intake; inability to digest food or absorb nutrients (self-induced vomiting)

Psychological disorder (distorted view of body—see's self as fat [AN/BN], fear of gaining weight; deceptive behaviors relating to food; frequent trips to bathroom after eating [BN])

**Possibly Evidenced By**

Food intake less than recommended daily allowance; food aversion; insufficient interest in food; satiety immediately upon ingesting food (AN)

**NURSING DIAGNOSIS:** **imbalanced Nutrition: less than body requirements** (continued)

Body weight 20% or more below ideal weight range (AN); [fluctuations in weight] (BN)  
 Capillary fragility; pale mucous membranes, insufficient muscle tone; excessive hair loss (AN)  
 Sore buccal cavity (BN)  
 Diarrhea (AN/BN)

**Desired Outcomes/Evaluation Criteria—Client Will****Eating Disorder-Self Control** NOC

Verbalize understanding of nutritional needs.  
 Establish a dietary pattern with caloric intake adequate to regain or maintain appropriate weight.  
 Demonstrate weight gain toward individually expected range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Eating Disorders Management</b> NIC <i>Independent</i>	
Establish a minimum weight goal and daily nutritional/metabolic requirements.	Provides comparative baseline for effectiveness of therapy. Note: Malnutrition is a mood-altering condition, leading to depression and affecting cognitive function and decision making. Improved nutritional status enhances thinking ability, allowing initiation of psychological work.
Contract with client regarding commitment to therapeutic program and meeting specific dietary needs and goals.	Individual success is enhanced when client commits to a contract.
Use a consistent approach. Sit with client while eating; present and remove food without persuasion or comment. Promote pleasant environment and record intake.	Client detects urgency and may react to pressure. Any comment that might be seen as coercion provides focus on food. When staff responds in a consistent manner, client can begin to trust staff responses. The single area in which client has exercised power and control is food and eating, and she or he may experience guilt or rebellion if forced to eat. Structuring meals and decreasing discussions about food will decrease power struggles with client and avoid manipulative games.
Provide small, frequent, and nutritionally dense meals and supplemental snacks, as appropriate. Attempt to increase daily caloric intake slowly by 200 to 300 kcal every 3 to 5 days.	Gastric dilation may occur if refeeding is too rapid following a period of starvation dieting. Client may feel bloated for weeks while body adjusts to increased food intake. Note: Client is at risk for developing refeeding syndrome (RFS). Research suggests that introducing more calories more quickly with a goal of weight gain 2 to 3 lb/wk has better results (Krans, 2013; MacCormick, 2013; Redgrave et al, 2015).
Make selective menu available, and allow client to control choices as much as possible.	Client who gains confidence in self and feels in control of environment is more likely to eat preferred foods.
Be alert to choices of low-calorie foods and beverages, hoarding food, and disposing of food in various places, such as pockets or wastebaskets.	Client will try to avoid taking in what is viewed as excessive calories and may go to great lengths to avoid eating.
Maintain a regular weighing schedule, such as Monday and Friday before breakfast in same attire, and graph results.	Provides accurate ongoing record of weight loss or gain. Also diminishes obsessing about changes in weight.
Weigh with back to scale, depending on program protocols.	Although some programs prefer that client does not see the results of the weighing, this can force the issue of trust in client who usually does not trust others.
Avoid room checks and other control devices whenever possible.	External control reinforces feelings of powerlessness and therefore is usually not helpful.
Provide one-to-one supervision and have client with bulimia remain in the day room area or in sight with no bathroom privileges for a specified period, such as 2 to 3 hours, following eating if contracting is unsuccessful.	Prevents vomiting during or immediately after eating. Client may desire food and eating but uses a binge-purge syndrome to control weight. Note: Some clients purge for the first time in response to establishment of a weight-gain program.

(continues on page 422)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor exercise program and set limits on physical activities. Chart activity and level of work—pacing and so on.	Moderate exercise helps in maintaining muscle tone and combating depression; however, client may exercise excessively to burn calories.
Maintain matter-of-fact, nonjudgmental attitude if giving tube feedings, parenteral fluids, and so on.	Perception of punishment is counterproductive to client's self-confidence and faith in own ability to control destiny.
Be alert to possibility of client disconnecting feeding tube and emptying enteral or parenteral fluids if used. Check measurements and tape tubing snugly.	Sabotage behavior is common in attempt to prevent weight gain.
Monitor for signs of refeeding syndrome reflecting fluid and electrolyte disorders, increased cardiac workload, and oxygen consumption.	Refeeding syndrome and congestive heart failure can occur because of too rapid an increase in oral intake. Heart size diminishes because of malnutrition and may have a difficult time compensating for an increase in circulating volume (Redgrave et al, 2015).
<b>Collaborative</b>	
Perform a comprehensive nutritional assessment at the earliest possible time after emergency conditions are resolved.	Assessing nutritional intake for all patients (even those with "normal" body weight BMI) is important because weight per se does not always correlate with appropriate nutritional intake or normal body composition.
Provide nutritional therapy within a hospital treatment program, as indicated when condition is life-threatening.	Cure of the underlying problem cannot happen without improved nutritional status. Hospitalization provides a controlled environment in which food intake, vomiting, elimination, medications, and activities can be monitored. It also separates client from SO, who may be a contributing factor, and provides exposure to others with the same problem, creating an atmosphere for sharing.
Involve client in setting up and carrying out program of behavior modification. Provide reward for weight gain as individually determined; ignore loss.	Provides structured eating situation while allowing client some control in choices. Behavior modification may be effective in mild cases or for short-term weight gain.
Administer nutritional diet by prescribed means—regular food with supplements, high-calorie liquid diet, or tube feedings if needed.	When caloric intake is insufficient to sustain metabolic needs, nutritional support can be used to prevent malnutrition and death while therapy is continuing. Tube feeding is most often initiated on an inpatient basis when the person with anorexia's weight is at or less than 85% of expected weight and/or less than the third percentile for BMI (Bernstein, 2017).
Blenderize anything left on the tray after a given period of time and tube-feed, if indicated.	This method of feeding may be used as part of a behavior modification program to provide total intake of needed calories.
Administer enteral or parenteral nutrition, as appropriate.	TPN, or hyperalimentation, may be required for life-threatening situations; however, enteral feedings are preferred because they preserve GI function and reduce atrophy of the gut.
Avoid giving laxatives.	Use is counterproductive because they may be used by client to rid body of food or calories.
Administer medication, as indicated, for example:	
Vitamins, minerals, electrolytes	In AN, medication is usually limited to use in managing medical complications, such as calcium and vitamin D for osteopenia (which can be severe), potassium, magnesium, and phosphorus. Restoring electrolytes before refeeding reduces the risk of refeeding syndrome (Bernstein, 2017).
Serotonin and histamine antagonist, such as cyproheptadine (Periactin)	While there are no drugs formulated to treat anorexia (Krans, 2013), some drugs may be used for client with severe anorexia without binging and purging. A serotonin and histamine antagonist may be used in high doses to stimulate the appetite, decrease preoccupation with food, and combat depression. Does not appear to have serious side effects, although decreased mental alertness may occur.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Selective serotonin reuptake inhibitors (SSRIs), such as fluoxetine (Prozac) and other antidepressants, such as tricyclics, for example, amitriptyline (Elavil) and imipramine (Tofranil); dopamine reuptake blocker, such as bupropion (Wellbutrin); 5-HT2 blocker, such as trazadone (Desryel)	Various antidepressants may be used to lift depression, stimulate appetite, and stabilize AN. Many of these same drugs are also found to be useful in reducing binge-purge cycles in BN.
Monoamine oxidase inhibitors (MAOIs), such as phenelzine (Nardil) and tranylcypromine sulfate (Parnate)	May be used to treat depression when other drug therapy is ineffective; decreases urge to binge in BN.
Antipsychotic drugs, such as risperidone (Risperdal), olanzapine (Zyprexa), chlorpromazine (Thorazine), and lithium (Eskalith, Lithane, Lithobid)	Newer antipsychotic drugs, such as Risperdal or Zyprexa, are being used to manage eating disorders, especially in the presence of dual disorder, such as with bulimia and bipolar disorder. These drugs can reduce tension, anxiety, and nervousness and increase cooperation with psychotherapeutic program. However, some antipsychotic drugs are used only when absolutely necessary for severely delusional, overactive, hospitalized client as a last resort (e.g., Thorazine). Possibility of extrapyramidal side effects is a concern.
Monitor electrolytes, as indicated.	Refeeding syndrome may develop with rapid decrease in potassium, magnesium, and phosphate levels.
Prepare for or assist with electroconvulsive therapy (ECT), if indicated. Discuss reasons for use and help client understand this is not punishment.	In rare and difficult cases in which malnutrition is severe or life-threatening, a short-term ECT series may enable client to begin eating and become accessible to psychotherapy.

### NURSING DIAGNOSIS: risk for deficient Fluid Volume

#### Possibly Evidenced By

Insufficient intake; insufficient knowledge about fluid needs  
Extremes of weight  
Excessive fluid loss through normal route (vomiting)

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Hydration NOC

Maintain fluid balance at a functional level, as evidenced by adequate urine output, stable vital signs, moist mucous membranes, and good skin turgor.

##### Risk Control NOC

Verbalize understanding of causative factors and behaviors necessary to maintain or correct fluid balance.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid/Electrolyte Management NIC</b>	
<b>Independent</b>	
Monitor vital signs, capillary refill, status of mucous membranes, and skin turgor.	Indicators of adequacy of circulating volume. Orthostatic hypotension may occur with risk of falls and injury following sudden changes in position.
Monitor amount and types of fluid intake. Measure urine output accurately.	Client may abstain from all intake, with resulting dehydration, or substitute fluids for caloric intake, disturbing electrolyte balance.
Discuss strategies to stop vomiting and laxative or diuretic use.	Helping client deal with the feelings that lead to vomiting and laxative or diuretic use will prevent continued fluid loss. Note: Client with bulimia has learned that vomiting provides a release of anxiety.
Identify actions necessary to regain or maintain optimal fluid balance, such as specific fluid intake schedule.	Involving client in plan to correct fluid imbalances improves chances for success.

(continues on page 424)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Review electrolyte and renal function test results.	Fluid and electrolyte shifts or depressed renal function can adversely affect cerebral function and client's recovery, requiring correction before therapeutic interventions can begin.
Administer intravenous (IV) fluids and electrolytes, as indicated.	Used to correct fluid and electrolyte imbalances and prevent cardiac dysrhythmias.

## NURSING DIAGNOSIS: disturbed Body Image

### May Be Related To

Alteration in self-perception (morbid fear of obesity)  
 Alteration in cognitive functioning (perceived loss of control in some aspect of life)  
 Impaired psychosocial functioning  
 Cultural incongruence

### Possibly Evidenced By

Behavior of monitoring one's body; refusal to acknowledge change  
 Alteration in view of one's body; negative feeling about body  
 Change in social involvement; fear of rejection by others

### Desired Outcomes/Evaluation Criteria—Client Will

#### Body Image NOC

Establish a more realistic internal picture of self.  
 Engage in strategies to enhance appearance.  
 Verbalize acceptance of positive feedback about self.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Body Image Enhancement NIC</b>	
<b>Independent</b>	
Have client draw picture of self.	Provides opportunity to discuss client's perception of self and body image, and realities of individual situation.
Listen to but avoid challenging irrational or illogical thinking. Present reality concisely and briefly.	It is difficult to respond logically when thinking ability is physiologically impaired. Client needs to hear reality, but challenging client leads to distrust and frustration. Note: Even though client may gain weight, she or he may continue to struggle with attitudes and behaviors typical of eating disorders, major depression, and substance dependence.
Involve in personal development program, preferably in a group setting. Provide information about proper application of makeup and grooming.	Learning about methods to enhance personal appearance may be helpful to long-range sense of self-esteem and image. Feedback from others can promote feelings of self-worth.
Recommend consultation with an image consultant.	Positive image enhances sense of self-esteem.
Suggest disposing of "thin" clothes as weight gain occurs.	Provides incentive to at least maintain and not lose weight. Not seeing "thin" clothes removes visual reminder of thinner self.
<b>P</b> Assist client to confront changes associated with puberty and sexual fears. Provide sex education as necessary.	Major physical and psychological changes in adolescence can contribute to development of eating disorders. Feelings of powerlessness and loss of control of feelings, in particular sexual sensations, can lead to an unconscious desire to desexualize self. Client often believes that these fears can be overcome by taking control of bodily appearance, development, and function.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Note athletic activities, as well as excessive/compulsive exercise. Discuss menstrual problems (e.g., amenorrhea).	There is a similar risk for eating disorders in athletes as in nonathletes (Greenleaf et al, 2010; Petrie et al, 2007), but there is a higher level of menstrual dysfunction in athletes (Coelho et al, 2014; Sundgot-Borgen & Torstveit, 2010).
Note body image concerns in men such as muscle dysmorphia, drive for masculinity, low testosterone, and bone loss. Encourage client to take control of activities, avoid overtraining/excessive exercise.	Males may be preoccupied with increased muscle mass, be dissatisfied with body, and need to learn to focus on a healthy body image without the need to be muscle-bound or a super-athlete (Ekern, 2016).
<b>P</b> Encourage age-appropriate responsibilities and social behaviors for adolescent males.	Assists client in developing age-appropriate autonomy and transitioning from boyhood to adulthood in ways other than focusing on food (Ekern, 2016).
<b>Collaborative</b> Encourage participation in directed activities such as group hiking, bicycle tours, and wilderness adventures, such as the Outward Bound program.	Although exercise is often used negatively by these clients, participation in directed activities provides an opportunity to learn self-reliance, enhance self-concept, and realize that food is the fuel required by the body to do its work. Athletes, especially, may need to moderate their exercise in order to maintain their training levels, while avoiding overtraining.
Refer to therapist trained in dealing with sexuality, as indicated.	May need professional assistance to deal with sexuality issues and accept self as a sexual individual.

### NURSING DIAGNOSIS: chronic low Self-Esteem

#### May Be Related To

Inadequate group membership/belonging; receiving insufficient respect/approval from others  
 Cultural incongruence  
 Repeated negative reinforcement  
 Psychiatric disorder; depression

#### Possibly Evidenced By

Dependent on others' opinions  
 Exaggerates negative feedback about self; rejection of positive feedback  
 Indecisive behavior; overly conforming; passivity  
 Guilt, shame

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Self-Esteem NOC

Acknowledge self as an individual.  
 Accept responsibility for own actions.  
 Verbalize positive feelings about own self-worth.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Esteem Enhancement NIC</b>	
<b>Independent</b>	
Establish a therapeutic nurse-client relationship.	Within a helping relationship, client can begin to trust and try out new thinking and behaviors.
Listen with regard when client speaks.	Sets an example and provides a sense of competence and self-worth in that client has been heard and attended to.
Be aware of client's distorted thinking ability.	Allows care providers to have more realistic expectations of client and provide appropriate information and support.
Promote self-concept without moral judgment.	Client sees self as weak-willed even though part of person may feel sense of power and control, for example, through dieting and weight loss.

(continues on page 426)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
State rules clearly regarding weighing schedule, remaining in sight during medication and eating times, and consequences of not following the rules. Involve client in establishing rules and consequences.	Consistency is important in establishing trust. Client is invested in decisions and as part of the behavior modification program, knows risks involved in not following established rules (e.g., decrease in privileges). Failure to follow rules is viewed as client's choice and accepted by staff in matter-of-fact manner so as not to provide reinforcement for the undesirable behavior.
Without undue comment, be consistent in carrying out rules.	Client may be denying the psychological aspects of own situation and is often expressing a sense of inadequacy and depression.
Confront denial and respond with reality when client makes unrealistic statements such as "I'm gaining weight, so there's nothing really wrong with me."	Feelings of disgust, hostility, and infuriation are not uncommon when caring for these clients. Prognosis often remains poor even with a gain in weight because other problems may remain. Many clients continue to see themselves as fat, and there is also a high incidence of affective disorders, social phobias, obsessive-compulsive symptoms, drug abuse, and psychosexual dysfunction. Nurse needs to deal with own feelings so they do not interfere with care of client.
Be aware of own reaction to client's behavior. Avoid arguing.	Feelings of personal ineffectiveness, low self-esteem, and perfectionism are often part of the problem. Client feels helpless to change and requires assistance to problem-solve methods of control in life situations.
Assist client to assume control in areas other than dieting and weight loss, such as management of own daily activities and work and leisure choices.	Client needs to recognize ability to control other areas in life and may need to learn problem-solving skills to achieve this control. Setting realistic goals fosters success.
Help client formulate goals for self not related to eating and create a manageable plan for reaching those goals, one at a time, progressing from simple to more complex.	May have feelings of isolation and fear of rejection and judgment by others.
Note client's withdrawal from or discomfort in social settings.	Avoidance of social situations and contact with others can compound feelings of worthlessness.
Encourage client to take charge of own life in a more healthful way by making own decisions and accepting self as she or he is at this moment.	Client often does not know what she or he may want for self. <b>P</b> Parents, generally mother, often make decisions for client. Client may also believe she or he has to be the best in everything and holds self responsible for being perfect.
<b>P</b> Let client know that it is acceptable to be different from family, particularly mother.	Developing a sense of identity separate from family and maintaining sense of control in other ways besides dieting and weight loss is a desirable goal of therapy and program.
Encourage client to express anger and acknowledge when it is verbalized.	Important to know that anger is part of self and as such is acceptable. Expressing anger may need to be taught to client because anger is generally considered unacceptable in the family, and therefore client does not express it.
Assist client to learn strategies other than eating for dealing with feelings. Have client keep a diary of feelings, particularly when thinking about food.	Feelings are the underlying issue, and client often uses food instead of dealing with feelings appropriately. Client needs to learn to recognize feelings and how to express them clearly.
Assess feelings of helplessness and hopelessness.	Lack of control is a common and underlying problem for this client and may be accompanied by more serious emotional disorders.
Be alert to suicidal ideation and behavior.	Intense anxiety and panic about weight gain, depression, and hopeless feelings may lead to suicidal attempts, particularly if client is impulsive.
<b>Collaborative</b>	Although both therapies have similar results, cognitive-behavioral seems to work more quickly. Interaction between individuals is more helpful for client to discover feelings, impulses, and needs from within own self. Client has not learned this internal control as a child and may not be able to interpret or attach meaning to behavior.
Use cognitive-behavioral or interpersonal psychotherapy approach rather than interpretive therapy.	

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Involve in group therapy.	Provides an opportunity to talk about feelings and try out new behaviors. Also helpful to hear what other participants say about their problems in dealing with illness.
Refer to occupational and recreational therapy, including animal/equine activities.	Can develop interest and skills to fill time that has been occupied by obsession with eating. Involvement in recreational activities encourages social interactions with others and promotes fun and relaxation. Animal therapy assists client to develop self-awareness, better relationships, and improve nonverbal communication skills.
Engage in eye movement desensitization and reprocessing (EMDR) therapy as appropriate.	Some clients have a history of traumatic event/abuse and controlling eating behavior has become an unhealthy coping mechanism. Recovery can be delayed or unsuccessful if underlying trauma not addressed. EMDR was originally developed to treat posttraumatic stress disorder (PTSD) but has also been found to be effective in the treatment of anxiety disorders, depression, and addictive behavior problems (Ekern, 2016).
Refer to therapist trained in dealing with sexuality, as indicated.	Adult may need help to address life changes (e.g., divorce, menopause), <b>P</b> and adolescent may need professional assistance to deal with sexuality issues and accept self as a sexual adult.

### NURSING DIAGNOSIS: readiness for enhanced family Coping

#### Possibly Evidenced By

- Expresses desire to acknowledge growth impact of crisis
- Expresses desire to enhance health promotion
- Expresses desire to choose experiences that optimize wellness

#### Desired Outcomes/Evaluation Criteria—Family Will

##### Family Coping NOC

- Demonstrate individual involvement in problem-solving process directed at encouraging client well-being.
- Express feelings and emotions appropriately among members.
- Demonstrate acceptance and loving toward client.

##### Family Support During Treatment NOC

- Collaborate with client in determining care/health goals.
- Use available resources appropriately.
- Report feelings of self-confidence and satisfaction with plan developed.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Family Therapy NIC</b> <i>Independent</i>	
Observe communication among family members/with SO and identify patterns of interaction. Encourage each family member to speak for self, preventing two members discussing a third without that member's participation.	Provides clues to difficulties that individuals may have in expressing themselves effectively. Note: In the enmeshed, overinvolved family members often speak for each other and need to learn to be responsible for their own words and actions.
Listen to expression of hope, planning, and effect on relationships and life.	Beginning to plan for future with hope promotes changes in relationships that can support growth.
Identify cultural or religious practices/health beliefs and expectations that may impact family members' interactions with client and dealing with condition.	Preconceived biases may interfere with treatment efforts toward positive growth and resolution of condition.

(continues on page 428)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discourage members from asking for approval from each other. Be alert to verbal or nonverbal checking with others for approval. Acknowledge competent actions of client and family members/SO.	Each individual needs to develop own internal sense of self-esteem. Client often is living up to others' (family's/SO's) expectations rather than making own choices. Acknowledgment provides recognition of self in positive ways.
Communicate message of separation—that it is acceptable for family members to be different from each other.	Individuation needs reinforcement. Such a message confronts rigidity and opens options for different behaviors.
Encourage and allow expression of feelings, such as crying or anger by individuals.	Often these families have not allowed free expression of feelings and need help and permission to learn and accept this. In adult clients, this provides the SO/partner opportunity to express how condition is affecting their relationship and begin healing process.
<b>P</b> Reinforce importance of parents as a couple who have rights of their own.	The focus on the child with anorexia is very intense and often is the only area around which the couple interacts. The couple needs to explore their own relationship and restore the balance within relationship to help prevent its disintegration.
<b>P</b> Prevent client from intervening in conflicts between parents. Assist parents in identifying and solving their issues.	Triangulation occurs in which a parent-child coalition exists. Sometimes the child is openly pressed to ally self with one parent against the other. The symptom (anorexia) is the regulator in the family system, and the parents deny their own conflicts.
Be aware and confront sabotage behavior on the part of family members/SO.	Feelings of blame, shame, and helplessness may lead to unconscious behavior designed to maintain the status quo.
<b>Collaborative</b>	
Refer to community resources, such as:	
Age-appropriate family therapy (e.g., family-based therapy [FBT], Uniting Couples Against Anorexia Nervosa] [UCAN]) (Trace et al, 2013)	Eating disorders are not caused by families but are a family problem. Family therapy such as FBT for adolescents or UCAN for adults focuses on developing a recovery environment in which family members work together to create a safe, growth-promoting environment.
Parents' groups, parent effectiveness classes	May help reduce overprotectiveness, and support and facilitate the process of dealing with unresolved conflicts and change.
Family therapy groups, as indicated	Provide a forum for families to talk about their concerns and misconceptions, learning from others. As family members gain knowledge, they can use it to learn new skills of communication and encouragement, instead of using emotion.

## NURSING DIAGNOSIS: risk for impaired Skin Integrity

### Possibly Evidenced By

Inadequate nutrition [e.g., emaciation; obesity]; alteration in fluid volume [including presence of edema]; alteration in metabolism

Alteration in skin turgor; impaired circulation; pressure over bony prominences  
[Immunological factors]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Risk Control NOC

Verbalize understanding of causative factors and absence of itching.  
Identify and demonstrate behaviors to maintain soft, supple, intact skin.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Skin Surveillance NIC</b>	
<i>Independent</i>	
Observe for reddened, blanched, and excoriated areas.	Indicators of increased risk of breakdown, requiring more intensive treatment.
Encourage bathing every other day instead of daily if this is an area of concern.	Frequent baths contribute to dryness of the skin.
Use skin cream twice a day and after bathing.	Lubricates skin and decreases itching.
Massage skin gently.	Improves circulation to the skin and enhances skin tone.
Discuss importance of frequent position changes and need for remaining active.	Enhances circulation and perfusion to skin by preventing prolonged pressure on tissues.
Emphasize importance of adequate nutrition and fluid intake. (Refer to ND: imbalanced Nutrition: less than body requirements.)	Improved nutrition and hydration will improve skin condition.

### NURSING DIAGNOSIS: **ineffective Health Management**

#### May Be Related To

Decisional conflict; powerlessness; family conflict  
Difficulty managing complex treatment regimen  
Insufficient knowledge; perceived seriousness of condition/benefits

#### Possibly Evidenced By

Failure to include treatment regimen in daily living  
Ineffective choices in daily living for meeting health goals  
[Absence of interest in improving health behaviors]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Knowledge: **Eating Disorder Management NOC**

Verbalize plan for lifestyle changes to maintain healthy weight.  
Identify relationship of signs and symptoms, such as weight loss and tooth decay, to behaviors of not eating or binging-purging.  
Identify strategies to prevent relapse.  
Establish realistic exercise/activity program.  
Assume responsibility for own learning.  
Seek out sources and resources to assist with making identified changes.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Learning Facilitation NIC</b>	
<i>Independent</i>	
Determine level of knowledge and readiness to learn.	Learning is easier when it begins where the learner is.
Note blocks to learning, including physical, intellectual, and emotional issues.	Malnutrition, family problems, drug abuse, affective disorders, and obsessive-compulsive symptoms can be blocks to learning requiring resolution before effective learning can occur.
<b>Teaching: Disease Process NIC</b>	
Discuss familial tendencies and genetic risk for eating disorder.	Recent research supports the findings suggesting that anorexia and bulimia are disorders that occur in families; for example, this client is more likely to have an immediate family member or even a more distant relative with either disorder. The disease may be inheritable with single or multiple genes combined with environmental factors and traits such as perfectionism, maturity fears, and low self-esteem (Balik et al, 2017).
Provide written information for client and SOs.	Helpful as reminder of and reinforcement for learning.

(continues on page 430)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss consequences of behavior and potential for recovery and relapse.	Sudden death can occur because of electrolyte imbalances and suppression of the immune system. Liver damage may result from protein deficiency, or gastric rupture may follow binge eating and vomiting.
Review dietary needs, answering questions as indicated. Encourage inclusion of high-fiber foods and adequate fluid intake.	Client and family may need assistance with planning for new way of eating. Constipation may occur when laxative use is curtailed.
Encourage the use of relaxation and other stress management techniques, such as visualization, guided imagery, and biofeedback.	New ways of coping with feelings of anxiety and fear help client manage these feelings in more effective ways, assisting in giving up maladaptive behaviors of not eating or binging-purging.
Assist with establishing a sensible exercise program. Caution regarding overexercise. Modify sports workouts if necessary and use coach-athletic relationship.	Exercise can assist with developing a positive body image and combats depression—release of endorphins in the brain enhances sense of well-being. However, client may use excessive exercise as a way to control weight. Note: It may not be helpful to remove from sports, especially if there is a positive coach-athlete relationship. Sports might be individual's identity and can be maintained unless client is noncompliant with treatment regimen.
Discuss need for information about sex and sexuality.	Because avoidance of own sexuality is an issue for this client, realistic information can be helpful in beginning to deal with self as a sexual being.
Refer to National Association of Anorexia Nervosa and Associated Disorders, Overeaters Anonymous, and other local resources, as appropriate.	May be a helpful source of support and information for client and SO.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **risk for imbalanced Nutrition: less than body requirements**—psychological factors (dysfunctional eating patterns)
- **ineffective Health Management**—complexity of therapeutic regimen, perceived seriousness/benefits, excessive demands made on individual, family conflict

## OBESITY

### I. Pathophysiology

- a. A chronic accumulation of excess body fat, at least 20% over average desired weight for age, sex, and height, or a body mass index (BMI) greater than 30 for persons of either sex
- b. Negatively impacts all body systems and increases risk of multiple physical and psychological pathologies, including hypertension, heart disease, stroke, diabetes, chronic kidney disease, cancers, arthritis, sleep apnea, depression and anxiety disorders, difficulty maintaining personal relationships, prejudice and discrimination, and limited access to public conveniences
- c. Considered a chronic relapsing progressive disease process by the World Obesity Federation (2017), emphasizing need for immediate action for prevention and control of the global epidemic

### II. Etiology

- a. Causes are multiple, complex, and cannot be attributed simply to a disorder of willpower or the result of insufficient exercise

- i. Variations in metabolism, body fat distribution, and appetite regulation can be attributed to genetic factors
- b. Physiological factors
  - 1. Lesions in the hypothalamus—appetite and satiety centers
  - 2. Hypothyroidism—may interfere with basal metabolism
  - 3. Diabetes mellitus—decreased insulin production or utilization
  - 4. Cushing's disease—increased cortisone production
- c. Environmental influences, behavioral and societal issues: includes availability of high-fat, calorie-dense convenience foods, large portions, incessant and unavoidable media advertisements influencing desire to eat; marketing of unhealthy foods and drinks; and sedentary lifestyle
- d. Psychosocial influences: possibility of unresolved dependency needs with individual fixed in the oral stage of psychosexual development, with food believed

- to be a coping mechanism for dealing with life's problems
- e. Medications: Certain medications in each of these classes can cause weight gain: antidepressants, antihistamines, antipsychotics, beta blockers, corticosteroids, diabetes medications, antileptics, mood stabilizers (Anderson, 2014; Budd & Peterson, 2015).
  - f. Societal distribution: Obesity disproportionately affects racial and ethnic minorities as well as people at lower income and educational levels, although it is prevalent among men and women of every segment of society (Mitchell et al, 2011).
  - g. Physical distribution: Accumulating data suggest that regional fat distribution (e.g., abdominal, visceral, subcutaneous) substantially affects the incidence of comorbidities associated with obesity (Wijga et al, 2010).
- III. Classifications**—Although several classifications and definitions for degrees of obesity are accepted, the two most widely accepted classifications are those from the World Health Organization (WHO, 2017c) and surgical practice (Hamdy et al, 2017):
- a. Grade 1 overweight (commonly called **overweight**)—BMI of 25 or greater
  - b. Grade 2 overweight (commonly called **obesity**)—BMI of 30 or greater
  - c. Obesity subcategories
    - a. Class 1 BMI of 30 to <35
    - b. Class 2: BMI of 35 to <40
    - c. Class 3 BMI of 40 or higher (sometimes called “extreme, severe, or morbid obesity”) (CDC, 2016a)

- d. Surgical literature often uses a different classification to recognize particularly severe obesity (Hamdy et al, 2017):
    - i. Severe obesity—BMI greater than 40 kg/m<sup>2</sup>
    - ii. Morbid obesity—BMI of 40 to 50 kg/m<sup>2</sup>
    - iii. Super obese—BMI greater than 50 kg/m<sup>2</sup>
  - e. Most likely influenced by multiple factors as demonstrated by the transactional model of stress/adaptation (Townsend, 2015).
- IV. Statistics**
- a. Morbidity: According to the Centers for Disease Control and Prevention (CDC) for the statistical collection years of 2000 to 2014, 38% of adults over 20 were obese and 71% overweight in the United States.  In children (ages 2–5), the obesity rate decreased during 2000 to 2014 to 8.9% and remained stable in children ages 6 to 11 (at 17.5%) and in children ages 12 to 19 (at 20.5%) (CDC/NCHS, 2015). In 2015, worldwide prevalence of obesity was estimated to be 603.7 million adults and 107.7 million children (The GBD 2015 Obesity Collaborators, 2017).
  - b. Mortality: Many methodological and conceptual difficulties arise in attempting to estimate the number of deaths in the United States that are attributable to obesity. In a study published in 2013 (from data covering 1986–2006), the estimated percentage of adult deaths associated with overweight and obesity was 5.0% overall, with 15.6% for black and white men and 26.8% and 21.7% for black and white women, respectively (Masters et al, 2013).
  - c. Cost: In 2008, more than \$190 billion was spent to manage obesity in the United States (Cawley & Meyerhoefer, 2012).

## G L O S S A R Y

- Anthropometric measurements:** Body measurements, including height, weight, body mass index (BMI), waist-to-hip ratio, and percentage of body fat.
- Appetstat:** Control mechanism in the brain that signals either hunger or fullness.
- Body mass index (BMI):** Number calculated from an individual's weight and height, measured in kilograms divided by height in square meters, correlating to direct measures of body fat.
- Circadian rhythm:** Internal body clock that regulates the 24-hour cycle of biological processes, including sleep, wakefulness, and hunger.
- Cushing's syndrome:** Endocrine (hormonal) disorder resulting from excessive exposure to or production of the hormone cortisol.
- Endomorphic body type:** Descriptive of a type of body that is soft and round or pear-shaped with disposition of fat predominantly in the abdomen, hips, thighs, and buttocks.
- Energy balance:** Weight is balanced by the amount of energy calories obtained from food equating to the energy the body uses.
- Hyperlipidemia:** Elevated high levels of total cholesterol and triglycerides, normal or elevated low-density lipoprotein (LDL, “bad cholesterol”), and low high-density lipoprotein (HDL, “good cholesterol”).
- Obesity:** Having a high amount of extra body fat, with BMI greater than 30.
- Overweight:** Having extra body weight from muscle, bone, fat, and/or water, with BMI between 25 and 29.9.
- Pickwickian syndrome:** Extreme obesity along with shallow breathing, sleep apnea, excessive sleepiness, and heart failure.
- Polycythemia:** Excess number of red blood cells in circulating blood, which can contribute to blood clots.
- Sarcopenic obesity:** Process characterized by loss of lean muscle and concomitant increase in body fat as a person ages. It is often seen in the sedentary individual, whether or not the person is overweight.
- Transactional model of stress/adaptation:** Begins with the precipitating event, leading to predisposing factors, cognitive appraisal, primary and secondary responses, and quality of individual's response, resulting in adaptive (effective) or maladaptive (refusal to eat and other ineffective behaviors).
- Yo-yo dieting:** Repeatedly losing weight by dieting and subsequently regaining it.

## CARE SETTING

Community level unless morbid obesity requires brief inpatient stay.

## RELATED CONCERNS

- Cerebrovascular accident (CVA)/stroke, page 247
- Cholecystitis with cholelithiasis, page 399
- Cirrhosis of the liver, page 494
- Diabetes mellitus/diabetic ketoacidosis, page 454
- Heart failure: chronic, page 38
- Hypertension: severe, page 26
- Myocardial infarction, page 72
- Bariatric surgery, page 442
- Psychosocial aspects of care, page 835
- Venous thromboembolism (VTE) disease including deep vein thrombosis (DVT) and pulmonary embolism (PE), page 120

## CLIENT ASSESSMENT DATABASE

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- Fatigue, constant drowsiness
- Dyspnea with exertion
- Inability or lack of desire to be active or engage in regular exercise, sedentary lifestyle
- Work schedules that leave little time for exercise
- Environmental problems such as lack of sidewalks, safe places to walk

- Increased heart rate or respirations with activity

#### CIRCULATION

- Hypertension
- Edema

#### EGO INTEGRITY

- Cultural and lifestyle factors affecting food choices
- Weight may or may not be perceived as a problem
- Eating relieves unpleasant feelings—loneliness, frustration, boredom
- Perception of body image as undesirable
- Significant other's (SO's) resistance to weight loss (may sabotage client's efforts)

- Reluctant to engage in social activities

#### FOOD/FLUID

- Normal and excessive ingestion of food
- Experimentation with numerous types of diets (yo-yo dieting) with varied or short-lived results
- History of recurrent weight loss and gain

- Weight disproportionate to height
- Endomorphic body type
- Failure to adjust food intake to diminishing requirements—change in lifestyle from active to sedentary, aging

#### PAIN/DISCOMFORT

- Pain or discomfort on weight-bearing joints or spine

- Difficulty with movement, negotiating stairs, long walks

#### RESPIRATION

- Dyspnea

- Cyanosis, respiratory distress if Pickwickian syndrome is present

#### SEXUALITY

- Menstrual disturbances, amenorrhea
- Pregnancy(ies)

- Hormone regulation problems

**MAY REPORT (continued)****MAY EXHIBIT (continued)**

- Menopause
- Problems with relationships

**TEACHING/LEARNING**

- Problem may be lifelong or related to life event
- Family history of obesity
- Concomitant health problems may include hypertension, diabetes, gallbladder and cardiovascular disease, hypothyroidism
- **P** Pediatric comorbidities are common

**DISCHARGE PLAN CONSIDERATIONS**

- May require support with therapeutic regimen; home modifications, assistive devices and equipment

♦ Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****TEST****WHY IT IS DONE****WHAT IT TELLS ME****BLOOD TESTS (MAY INCLUDE, NOT LIMITED TO, THE FOLLOWING)**

- **Lipid profile:** Total cholesterol, triglycerides, and HDL and LDL: fats circulating in the blood.
- **Endocrine function (thyroid, pituitary, growth hormone, pancreas, etc.):** Determines which gland(s) are involved and may determine the cause of obesity. May involve measuring hormone levels and their metabolites in the blood and urine.

Obesity is often associated with hyperlipidemia, which is defined as high total cholesterol, elevated triglycerides, normal or elevated LDL, and low HDL. HDL cholesterol <40 mg/dL in men or <50 mg/dL and/or triglycerides ≥150 mg/dL has been shown to be associated with metabolic syndrome and increased risk of cardiovascular disease (American Heart Association [AHA], 2012).

The goal of testing is to identify the hormone(s) that are being under- or overproduced, which may be negatively affecting client's weight. Examples of conditions may include hypothyroidism, hypopituitarism, hypogonadism, hyperglycemia and hyperinsulinemia, and elevated cortisol.

**OTHER DIAGNOSTIC TESTS**

- **Anthropometric measurements (including and not limited to the following):**
- **Body mass index (BMI):** Measures relative body fat. Typically calculated as weight (kg) ÷ height (m<sup>2</sup>).

Body mass index (BMI) calculation, waist circumference, and waist/hip ratio are the common measures of the degree of body fat used in routine clinical practice (Hamdy et al, 2017).

BMI is a weight-for-height index commonly used to classify overweight and obesity in adults. **P** For children and teens, BMI is age and gender specific and weight to stature specific (ages 2–20 years), expressed in percentiles (CDC, 2017b). In a study, the authors concluded that "there were more than five times as many deaths among participants in the highest obesity categories (BMI of 35.0 to 39.9 and 40.0 to 49.9) than in previous studies because severe obesity had become more common" (Aune et al, 2016). **P** Note: Childhood BMI has been found to be an indicator for adult hypertension (University of Surrey, 2017).

(continues on page 434)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li>• <b>Waist-to-hip ratio (WHR):</b> Based on waist and hip measurements.</li><li>• <b>Waist circumference (WC):</b> Used to assess abdominal (visceral) fat.</li><li>• <b>Standard skin thicknesses (i.e., subscapular, triceps, biceps, suprailiac)</b></li></ul>	<p>A WHR &gt;1.0 in men and &gt;0.85 in women indicates abdominal fat accumulation and is considered the strongest anthropometric measure associated with myocardial infarction risk and is a better predictor than BMI alone.</p> <p>Considered a better measure of visceral fat than the WHR. Increased WC is associated with risk of type 2 diabetes, hypertension, dyslipidemia, and cardiovascular disease across all categories of overweight and obesity. Cardiovascular risk is considered high in men with WC greater than 37 inches and in women with WC greater than 31 inches (Hamdy et al, 2017).</p> <p>Skinfold measurements are the least accurate means by which to assess obesity but can be used to estimate the degree and distribution of obesity (Hamdy et al, 2017).</p>

## NURSING PRIORITIES

1. Assist client to identify a workable method of weight control, incorporating healthful foods and activity.
2. Promote improved self-concept, including body image and self-esteem.
3. Encourage healthy practices to provide for weight control throughout life.

## DISCHARGE GOALS

1. Healthy patterns for eating and weight control identified.
2. Weight loss toward desired goal established.
3. Positive perception of self-verbalized.
4. Plans developed for future weight control.
5. Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: Obesity

### May Be Related To

Energy expenditure below energy intake based on standard assessment; average daily physical activity is less than recommended for gender and age; sedentary behavior occurring for 2 or more hr/d  
Frequent snacking; portion sizes larger than recommended; disordered eating behaviors  
Economically disadvantaged

### Possibly Evidenced By

Adult: BMI of  $>30 \text{ kg/m}^2$ ; child 2 to 18 years: BMI of  $>30 \text{ kg/m}^2$  or  $>95\text{th}$  percentile for age and gender

### Desired Outcomes/Evaluation Criteria—Client Will

#### Eating Disorder Self-Control NOC

Identify inappropriate behaviors and consequences associated with overeating or weight gain.  
Demonstrate appropriate change in lifestyle and behaviors, including eating patterns and food quantity and quality, and exercise program.

#### Nutritional Status NOC

Display weight loss with optimal maintenance of health.

## ACTIONS/INTERVENTIONS

## RATIONALE

### Weight-Reduction Assistance NIC

#### Independent

Review individual cause for obesity (e.g., excess intake vs metabolic or disease condition).

Identifies and influences choice of some interventions.

Ascertain previous dieting history. Determine which diets and strategies have been used, results, and individual frustrations and factors interfering with success.

Client may have tried multiple diets, with little lasting change in body weight and feel negatively about embarking on another plan.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Implement and review daily food diary, for example, total caloric intake, types and amounts of food, and eating habits and associated feelings.	Provides the opportunity for the individual to focus on a realistic picture of the amount of food ingested and corresponding eating habits and feelings. Identifies patterns requiring change and a base on which to tailor the dietary program.
Encourage client to use technology (e.g., smartphone, computer) applications for tracking, if available.	Helpful applications are those that contain a large database of foods with nutritional information for various serving sizes; a calorie tracker, nutrient tracker (e.g., carbs, protein, fats).
Determine client's motivation for weight loss, for instance, health issues, own satisfaction, or to gain approval from others.	Helps to clarify client's motivation and potential for success in weight reduction.
Discuss client's and SO's view of self, including familial and cultural influences.	Client's family and cultural practices greatly influence client's self-view regarding food and body image.
Notice occurrence of negative feedback from SO(s).	Feedback from family may reveal control issues impacting motivation for change.
Formulate an eating plan with the client, using knowledge of individual's height, body build, age, gender, and individual patterns of eating, as well as energy and nutrient requirements.	An important factor in the success of any weight-loss program is adherence to a sound nutritional plan. Although there is little basis for recommending one commercial diet plan over another, a good reducing diet should contain foods from all basic food groups, with a focus on low-fat intake and adequate protein intake to prevent loss of lean muscle mass. It is helpful to keep the plan as similar to client's usual eating pattern as possible. A plan developed with and agreed to by the client is more likely to be successful.
Emphasize the importance of avoiding fad diets.	Elimination of needed components can lead to metabolic imbalances; for example, excessive reduction of carbohydrates can lead to fatigue, headache, instability, weakness, and metabolic acidosis (ketosis), thus interfering with effectiveness of weight-loss program.
Discuss need to give self permission to include desired or craved food items in dietary plan.	Denying self by always excluding favorite foods results in a sense of deprivation and feelings of guilt and failure when individual "succumbs to temptation." These feelings can sabotage weight loss.
Be alert to binge eating and develop strategies for dealing with these episodes, such as substituting other actions for eating.	The client who binges experiences guilt about it, which is also counterproductive because negative feelings may sabotage further weight-loss efforts.
Identify realistic incremental goals for weekly weight loss.	Reasonable weight loss of 1 to 2 lb/wk results in longer-lasting effects. Excessive or rapid loss may result in fatigue and irritability and ultimately lead to failure in meeting goals for weight loss. Motivation is more easily sustained by meeting "stair-step" goals.
Weigh periodically as individually indicated, and obtain appropriate body measurements.	Provides information about effectiveness of therapeutic regimen and visual evidence of success of client's efforts. During hospitalization for controlled fasting, daily weighing may be required. Weekly weighing is more appropriate after discharge.
Determine current physical activity level. Discuss implementation of long-term exercise program.	Physical activity promotes weight loss by reducing appetite and burning fat, while improving lean muscle mass and strength.
Promote whole family strategies (e.g., discuss implementation of "5-2-1-0 Every Day" plan to prevent/fight obesity).	The Foundation for Healthy Communities (FHC) promotes "5 (or more) vegetables and fruits; 2 (or fewer) hours of recreational screen time (TV, computer); 1 (or more) hours of physical activity; and 0 sugary drinks every day" (FHC Staff, 2007). These are helpful guidelines in promoting a healthy lifestyle.

(continues on page 436)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Develop an appetite reeducation plan with client (e.g., avoiding sugary snacks, increasing protein foods, drinking water throughout day, brushing teeth or using mouthwash, eating something that takes up a lot of room in stomach but has few calories, such as soup).	Appetite is both a psychological and physical phenomenon, requiring thoughtful attention and preparedness.
Limit high-calorie, fatty, or sugary foods available in the home; keep a large variety of cut-up fruits and vegetables in refrigerator.	Promotes healthy snacking habits in both adults and children.
Emphasize the importance of avoiding tension at mealtimes and not eating too quickly.	Reducing tension provides a more relaxed eating atmosphere and encourages leisurely eating patterns. This is important because a period of time is required for the appetstat mechanism to know the stomach is full.
Encourage client to eat only at a designated eating place (e.g., kitchen, dining room) and to avoid standing while eating.	Techniques that modify eating behaviors may be helpful in avoiding diet failure. Supports a more relaxed/leisurely mealtime.
Discuss restriction of salt intake and diuretic drugs if used.	Water retention may be a problem because of increased fluid intake and fat metabolism.
Reassess caloric requirements every 2 to 4 weeks; provide additional support when plateaus occur.	Changes in weight and exercise necessitate changes in plan. As weight is lost, changes in metabolism occur, resulting in plateaus when weight remains stable for periods of time. This can create distrust and lead to accusations of "cheating" on caloric intake, which are not helpful. Client may need additional support at this time.
<b>Collaborative</b>	
Perform comprehensive nutritional assessment to determine calorie, nutrient, and vitamin and supplement requirements for individual.	Intake can be calculated by several different formulas, but weight reduction is based on the basal caloric requirement for 24 hours depending on client's sex, age, current or desired weight, and length of time estimated to achieve desired weight. Note: Standard tables are subject to error when applied to individual situations, and circadian rhythms and lifestyle patterns need to be considered.
Provide medications, as indicated:	Currently, there are three major groups of drugs used to manage obesity: (1) centrally acting medications that impair dietary intake (such as appetite suppressants), (2) medications that act peripherally to impair dietary absorption (such as lipase inhibitors), and (3) medications that increase energy expenditure (such as caffeine and other stimulants) (Hamdy et al, 2017). <b>P</b> Note: It is currently recommended that the use of weight-loss medications during childhood and adolescence be restricted to clinical trials (Styne et al, 2017).
Appetite-suppressant drugs, such as: Bupropion (Wellbutrin) and naltrexone (Contrave, Revia)	May be used with caution and supervision at the beginning of a weight-loss program to reduce appetite and increase energy expenditure. They are effective for only a few weeks and may cause problems of dependence in some people.
Lipase inhibitors, such as orlistat (Xenical, Alli)	These drugs induce weight loss by inhibiting fat absorption. Note: Use of lipase inhibitors may reduce absorption of some fat-soluble vitamins (A, D, E, K) and beta-carotene. Vitamin supplement should be given at least 2 hours before or after Xenical.
CNS stimulants, such as phenteramine/topiramate (Qsymia), phentermine (Lomaira), and phendimetrazine (Bontril, PDM)	Adrenergic agonists that release tissue stores of epinephrine, causing subsequent alpha- and/or beta-adrenergic stimulation, have provided benefits to individuals with severe obesity who are under physician-supervised weight-loss programs. They are approved for short-term use (8–12 weeks) in adults.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Hospitalize for fasting regimen or stabilization of medical problems, when indicated.	Aggressive therapy and support may be necessary to initiate weight loss, although fasting is not generally a treatment of choice. Client can be monitored more effectively in a controlled setting to minimize complications such as orthostatic hypotension, anemia, and cardiac irregularities.
Prepare for bariatric surgical interventions, such as gastric banding or bypass, as indicated.	These interventions may be necessary to help the client lose weight when obesity is life-threatening. (Refer to CP: Bariatric Surgery.)

### NURSING DIAGNOSIS: sedentary Lifestyle

#### May Be Related To

Insufficient interest, motivation, or resources [e.g., time, money, companionship, facilities] for physical activities  
Insufficient knowledge of health benefits associated with physical exercise

#### Possibly Evidenced By

Chooses daily routine lacking physical exercise  
Average daily physical activity is less than recommended for gender and age  
Demonstrates physical deconditioning

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Exercise Participation NOC

Verbalize understanding of importance of regular exercise to weight loss and general well-being.  
Identify necessary precautions and safety concerns and self-monitoring techniques.  
Formulate realistic exercise program with gradual increase in activity.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Exercise Promotion NIC</b> <i>Independent</i> Review necessity for and benefits of regular exercise.	Exercise promotes weight loss by reducing appetite, increasing energy, toning muscles, and enhancing cardiac fitness and sense of well-being and accomplishment. In addition, exercise (even when performed at lower than recommended levels) has been found to influence risk factors associated with obesity (e.g., hypertension, glucose intolerance, insulin resistance, hyperlipidemia and inflammation) (Garber et al, 2011).
Determine current activity level and plan progressive exercise program tailored to the individual's physical condition, goals, and choice.	Commitment on the part of the client enables the setting of more realistic goals and adherence to the plan.
Identify perceived and actual barriers to exercise.	Lack of resources, including proper apparel such as supportive shoes and comfortable clothing, a safe place to walk, or facility membership for water aerobics, reduces the likelihood of individual adhering to specific program. In addition, fear of discrimination or ridicule by others may limit client's willingness to exercise in public.
Discuss appropriate warm-up exercises, cool-down activities, and specific techniques to avoid injury.	Preventing muscle injuries allows client to stay active. Time spent recuperating from exercise-induced injuries may result in relapse to sedentary habits.
Determine optimal exercise heart rate. Demonstrate proper technique to monitor pulse and discuss signs and symptoms requiring modification of activity.	Promotes safety as client exercises to tolerance, not peer pressure.
Identify alternatives to chosen activity program to accommodate weather, travel, and so forth.	Promotes continuation of program by reducing reasons/excuses to refrain from activity.

(continues on page 438)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss use of mechanical devices or equipment for weight reduction.	Fat loss occurs on a generalized overall basis, and there is no evidence that spot reducing or mechanical devices aid in weight loss in specific areas; however, specific types of exercise or equipment may be useful in toning specific body parts.
Recommend keeping a graph of activity as exercise program advances.	Provides visual record of progress and positive reinforcement for efforts.
Suggest client identify an exercise buddy.	Provides support and companionship, increasing likelihood of adherence to program.
Encourage involvement in social activities that are not centered on food—bike ride or nature hike, attending musical event, and group sporting activities.	Provides opportunity for pleasure and relaxation not associated with food as well as additional physical activity.
<b>Collaborative</b> Involve physical therapist or exercise physiologist in developing progressive program.	Facilitates development of an appropriate program of activities that are geared to obese individual and considers impact of client's weight on ability to perform specific activities and safety concerns.

### NURSING DIAGNOSIS: risk for disturbed Body Image

#### Possibly Evidenced By

Alteration in view of one's body; nonverbal response to actual or perceived changes in body  
 Negative feelings about body (e.g., hopelessness, powerlessness); change in social involvement; fear of reaction by other  
 Preoccupation with change—attempts to lose weight

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Body Image NOC

Verbalize a more realistic self-image.  
 Demonstrate some acceptance of self as is rather than an idealized image.

##### Self-Esteem NOC

Seek information and actively pursue appropriate weight loss.  
 Acknowledge self as an individual who has responsibility for self.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Body Image Enhancement NIC</b> <i>Independent</i>	
Determine client's view of being overweight or "fat" and what it does for the individual.	Mental image includes our ideal and is usually not up-to-date. Fat and compulsive eating behaviors may have deep-rooted psychological implications, such as compensation for lack of love and nurturing or a defense against intimacy. In addition, chronically obese client may report long-term discrimination in family, social, and professional settings. She or he may experience mixed feelings of fear and shame or compensate for psychological trauma by developing a strong or "big" personality.
Determine client perception of threat to self.	Client's perception of what problem weight poses is more important than what the threat really is and needs to be dealt with before reality can be addressed.
Identify basic sense of self-worth and image client has of existential, physical, and psychological self. Determine locus of control.	Provides insight into view of self as fat and own ability to control weight. Information necessary to determine individual needs and treatment plan.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Promote open communication, avoiding criticism or judgment about client's behavior.	Supports client's own responsibility for weight loss, enhances sense of control, and promotes willingness to discuss difficulties and setbacks and to problem-solve. Note: Distrust and accusations of "cheating" on caloric intake are not helpful.
Assist client to identify feelings that lead to compulsive eating. Encourage journaling.	People often eat because of depression, anger, and guilt. Awareness of emotions that lead to overeating can be the first step in changing behavior.
Have client recall coping patterns related to food in family of origin and explore how these may affect current situation.	Parents act as role models for the child. Maladaptive coping patterns, such as overeating, are learned within the family system and are supported through positive reinforcement. Food may be substituted by the parent for affection and love, and eating is associated with a feeling of satisfaction, becoming the primary defense.
Develop strategies for doing something besides eating for dealing with dysfunctional eating, such as talking with a friend.	Replacing eating with other activities helps retrain old patterns and establish new ways to deal with feelings.
Identify client's motivation for weight loss and assist with goal setting.	The individual may harbor repressed feeling of hostility, which may be expressed inward on the self. Because of a poor self-concept, the person often has difficulty with relationships. Note: When losing weight to please or attract someone else, the client is less likely to be successful or maintain weight loss.
Outline and clearly state responsibilities of client and nurse.	It is helpful for each individual to understand area of own responsibility in the program so that misunderstandings do not arise.
Graph weight on a weekly basis.	Provides ongoing visual evidence of weight changes, reinforcing reality.
Encourage client to use imagery to visualize self at desired weight and to practice handling of new behaviors.	Mental rehearsal is very useful in helping the client plan for and deal with anticipated change in self-image or occasions that may arise, such as family gatherings or special dinners, where constant decisions about eating many foods will occur.
Suggest client enhance current self through the application of makeup, current hairstyles, and dressing to maximize figure assets.	Enhances feelings of self-esteem and promotes improved body image.
Encourage buying clothes instead of food treats as a reward for weight loss and life successes.	Properly fitting clothes enhance the body image as small losses are made and the individual feels more positive. Waiting until the desired weight loss is reached can become discouraging.
Suggest the client dispose of "fat clothes" as weight loss occurs.	Removes the "safety valve" of having clothes available "in case" the weight is regained. Retaining fat clothes can convey the message that the weight loss will not occur or be maintained.
Be alert to myths the client and SO may have about weight and weight loss.	Beliefs about what an ideal body looks like or unconscious motivations can sabotage efforts to lose weight. Some of these include the feminine thought of "If I become thin, men will view me as a sexual object"; the masculine counterpart, "I don't trust myself to stay in control of my sexual feelings"; as well as issues of strength, power, or the "good cook" image.
Determine relationship history and possibility of sexual abuse.	May contribute to current issues of self-esteem and patterns of coping.
Ensure availability of properly sized equipment, including gowns and other apparel; blood pressure cuff; wider and strong wheelchair, bed, commode, scales, and transfer devices, when providing inpatient care.	Healthcare providers have a moral and legal obligation to meet the client's needs for dignity, comfort, and safety.

(continues on page 440)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide privacy during care activities. Assist with personal care, as needed.	Individual knows size makes it hard to care for her or him and usually is sensitive and self-conscious about body.
Help staff be aware of and deal with own feelings when caring for client.	Judgmental attitudes, feelings of disgust, anger, and weariness can interfere with care and be transmitted to client, reinforcing negative self-concept and image.
<b>Collaborative</b> Refer to community support and/or therapy group.	Weight-loss groups can provide companionship, enhance motivation, decrease loneliness and social ostracism, and give practical solutions to common problems. Group therapy can be helpful in dealing with underlying psychological concerns.

## NURSING DIAGNOSIS: Social Isolation

### May Be Related To

Inability to engage in satisfying personal relationships; [self-concept disturbance]  
Insufficient personal resources

### Possibly Evidenced By

Desire to be alone; feeling different from others; withdrawn  
History of rejection; insecurity in public; absence of support system

### Desired Outcomes/Evaluation Criteria—Client Will

#### Social Involvement NOC

Verbalize awareness of feelings that lead to poor social interactions.  
Express sense of self-worth.  
Become involved in achieving positive changes in social behaviors and interpersonal relationships.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Socialization Enhancement NIC</b>	
<b>Independent</b>	
Review family patterns of relating and social behaviors.	Social interaction is primarily learned within the family of origin. When inadequate patterns are identified, actions for change can be instituted.
Encourage client to express feelings and perceptions of problems.	Helps identify and clarify reasons for difficulties in interacting with others, such as feeling unloved or unlovable and insecure about sexuality.
Assess client's use of coping skills and defense mechanisms.	May have coping skills that will be useful in the process of weight loss. Defense mechanisms used to protect the individual may contribute to feelings of aloneness or isolation.
Have client list behaviors that cause discomfort.	Identifies specific concerns and suggests actions that can be taken to effect change.
Involve in role-playing new ways to deal with identified behaviors or situations.	Practicing these new behaviors enables the individual to become comfortable with them in a safe situation.
Discuss negative self-concepts and self-talk, such as, "No one wants to be with a fat person," "Who would be interested in talking to me?"	May be impeding positive social interactions.
Encourage use of positive self-talk such as telling oneself "I am OK" or "I can enjoy social activities and do not need to be controlled by what others think or say."	Positive strategies enhance feelings of comfort and support efforts for change.
<b>Collaborative</b>	
Refer for ongoing family or individual therapy, as indicated.	Client benefits from involvement of SO to provide support and encouragement.

## NURSING DIAGNOSIS: Ineffective Health Management

### May Be Related To

Difficulty managing complex treatment regimen; insufficient knowledge of therapeutic regimen  
Decisional conflicts; family pattern of healthcare  
Perceived seriousness of condition/barriers  
Insufficient social support

### Possibly Evidenced By

Difficulty with prescribed regimen  
Ineffective choices in daily living for meeting health goals  
Failure to include treatment regimen in daily living or to take action to reduce risk factors

### Desired Outcomes/Evaluation Criteria—Client Will

#### Knowledge: Eating Disorder Management NOC

Verbalize understanding of need for lifestyle changes to maintain or control weight.  
Establish individual goal and plan for attaining that goal.  
Begin to look for information about nutrition and ways to manage weight.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Prescribed Diet NIC</b>	
<b>Independent</b>	
Determine level of nutritional knowledge and what client believes is most urgent need.	Necessary to know what additional information to provide. When client's views are listened to, trust is enhanced.
Identify individual long-term goals for health, such as lowering blood pressure, controlling serum lipid and glucose levels.	A high relapse rate at 5-year follow-up suggests obesity cannot be reliably reversed. Shifting the focus from initial weight loss and percentage of body fat to overall management of wellness may enhance rehabilitation.
Provide information about ways to maintain satisfactory food intake in settings away from home.	"Smart" eating when dining out or when traveling helps individual manage weight while still enjoying social outlets.
Identify other sources of information—quality Internet sites, books, community classes, and groups.	Using different avenues of accessing information furthers client's learning. Involvement with others who are also losing weight can provide support.
<b>Teaching: Individual NIC</b>	
Emphasize necessity of continued follow-up care or counseling, especially when plateaus occur.	As weight is lost, changes in metabolism occur, interfering with further loss by creating a plateau as the body activates a survival mechanism, attempting to prevent "starvation." This requires new strategies and aggressive support to continue weight loss and to maintain reduced weight. Note: The National Weight Control Registry (NWCR) members must have maintained at least a 30-pound weight loss for 1 year or longer. Most report continuing to maintain a low-calorie, low-fat diet and doing high levels of activity (e.g., 90% exercise, on average, about 1 hour per day) (NWCR, n.d.). <b>P</b> Note: Because pediatric comorbidities are common, long-term health complications (e.g., prediabetes, arterial damage) often result and both client and parents need age-appropriate information and ongoing support (Styne et al, 2017; University of Surrey, 2017).
Discuss use of medications; advise client to discuss with physician and pharmacist any additions to regimen such as over-the-counter (OTC) medications, antibiotics, and herbal supplements.	Obesity can alter the pharmacokinetic properties of medications. Changes in dosages may be needed based on the degree to which drugs are absorbed, resulting in subtherapeutic or toxic drug levels or dangerous side effects and interactions that might occur.

(continues on page 442)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct client about risk of deep vein thrombosis (DVT) and self-care including ankle exercises, walking to limit of ability, and reporting any unusual discomfort in legs.	The very obese client is at higher risk for DVT and pulmonary embolism than the general population because of immobility, stasis, and polycythemia related to chronic respiratory insufficiency.
Discuss necessity of good skin care, especially in skinfolds, such as pendulous abdomen, breasts, groin, perineal areas, during hot weather and times of immobility or following exercise.	Client is at risk for developing pressure injuries/ulcers and can be prone to yeast infections. Frequent skin care such as cleansing and drying the tissues and using antifungal creams in skinfolds, as appropriate, can prevent skin breakdown.
Identify alternative ways to “reward” self and family for accomplishments or to provide solace.	Reduces likelihood of relying on food to deal with feelings (emotional eating).

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities in addition to above nursing diagnoses)

- **Ineffective Health Management**—complexity of therapeutic regimen, perceived seriousness and benefits, excessive demands made on individual; family conflict
- **Other nursing diagnoses associated with comorbidities/complications of condition**

## BARIATRIC SURGERY

### I. Indications

- a. Weight and health of extremely obese persons can be favorably changed by bariatric surgery.
- b. Benefits are being reported in improvement in comorbid conditions associated with morbid obesity such as hypertension, hyperlipidemia, back pain, and sleep apnea. Studies are supporting that bariatric surgery is effective in remitting type 2 diabetes in 50% to 85% of individuals (Dixon et al, 2009).
- c. Surgery recommended for clients with type 2 diabetes and BMI  $\geq 40 \text{ kg/m}^2$  regardless of glycemic control and for clients with BMI 30 to  $34.9 \text{ kg/m}^2$  who have inadequately controlled hyperglycemia despite optimal medical management. Note: BMI thresholds should be reduced by  $2.5 \text{ kg/m}^2$  for clients of Asian descent (Cohen et al, 2016).

### II. Procedures

- a. Laparoscopy is the most common surgical approach used, preferred because of improved recovery and lower morbidity (Lim, 2016). Note: Although the procedure can be limited by patient size, as well as instrument and trocar length, even extremely large patients have been successfully completed laparoscopically (Lim, 2016).
- b. Those with previous abdominal surgery or complicating medical problems may require an open-abdomen approach.
- c. Basic concepts for bariatric surgery (Saber & El-Ghazaly, 2017)

#### i. Restriction

Restrictive procedures limit caloric intake by reducing the stomach's reservoir capacity by means of resection, bypass, or creation of a proximal gastric outlet.

Most common procedure:

Adjustable gastric banding (AGB, also may be called “the band” or Lap-Band): This laparoscopic

procedure is reversible and adjustable. The gastric band can be adjusted, resulting in an increased degree of restriction. Digestion is slowed by allowing smaller-than-normal amounts of food through to the remainder of the gastrointestinal tract. The absorption function of the small intestine is intact, resulting in the lowest risk for vitamin and mineral deficiencies. Weight loss is slower and less immediate than with other procedures but over 2 years is about 50% to 60% of excess body weight (Saber & El-Ghazaly, 2017). Because of its many advantages, AGB has replaced the vertical banded gastroplasty (VGB) as the main restrictive procedure (Lim, 2016).

#### ii. Combined restriction and malabsorption

Most common procedures:

Laparoscopic sleeve gastrectomy (SG): This restrictive, irreversible procedure, usually performed laparoscopically, removes 80% to 90% of the stomach, leaving only a gastric “sleeve.” This operation is believed to be safer than the RYGB procedure, due to the fact that the natural anatomy of the gastrointestinal tract is not changed and therefore has no true malabsorptive component (Lim, 2016; Saber & El-Gahazly, 2017). Note: In 2015, SG was the most commonly performed bariatric procedure in the world and in the United States (American Society for Metabolic and Bariatric Surgery [ASMBS], 2016).

Roux-en-Y gastric bypass (RYGB): Involves creating a small stomach pouch and attaching it directly to the small intestine using a Y-shaped limb of the small bowel; the larger stomach portion and the duodenum are bypassed. The procedure is irreversible, is usually performed by laparoscopy, and works both

by restricting intake and by slowing the digestion and absorption. Weight loss usually exceeds 100 lb or about 65% to 75% of excess body weight (Saber & El-Ghazaly, 2017). Note: An updated Cochrane review from 2014 stated that RYGB and sleeve gastrectomy had comparable outcomes, and both had better outcomes than adjustable gastric banding (Colquitt et al., 2014).

### iii. *Primarily malabsorptive procedures with some restriction*

Biliopancreatic diversion with duodenal switch (BPD-DS): Considered for individuals with severe obesity, this procedure is performed at only a few centers in the United States (Lim, 2016). The surgery involves removing 65% to 70% of the stomach, leaving the pyloric valve intact. The remaining portion of the stomach is then connected to the proximal portion of the ileum, and a large portion of the small intestine is bypassed. Early weight loss is from restriction and malabsorption and later is mostly from malabsorption (Saber & El-Ghazaly, 2017). The surgery reduces fat absorption by over 70% and causes favorable changes in gut hormones to reduce appetite and improve satiety (ASMBS, n.d.); however, it has a greater potential to cause long-term protein, vitamin, and mineral deficiencies. Most people lose 75% to 85% of their excess weight and stay at their new weight (Colquitt et al., 2014).

## III. Complications

- Complications of bariatric surgery are specific to the performed procedure.

- b. Early complications of gastric bypass can include bleeding (0.5% to 2%) and anastomotic leaks (1% to 3%) (Saber & El-Ghazaly, 2017).
- c. Late complications: Cholelithiasis (occurs in about 38% of *gastric bypass* patients [Ellsmere, 2017]); stomal stenosis, gastric remnant distention, ulceration at margins, hernias (all relatively uncommon). Note: Common late complications of *gastric banding* include gastroesophageal reflux disease, port problems, and band slippage (Kodner & Hartman, 2014).
- d. Wound infections: Open-abdomen procedures have been associated with higher risk of infection (10% to 16%) than laparoscopic procedures (3% to 4%) (Chopra et al., 2010).
- e. Nutritional side effects: Malabsorptive effects include risk for deficiencies (e.g., iron, calcium, thiamine, folate, and vitamin B<sub>12</sub>); deficiencies can occur early or late and are long term.

## IV. Statistics

- a. Morbidity: Recent numbers of bariatric surgeries vary, but the American Society for Metabolic and Bariatric Surgery (ASMBS) reports a figure of 196,000 for all procedures for 2015 (ASMBS, 2017).
- b. Mortality: Rates vary somewhat by procedures but are generally low. Data involving nearly 60,000 bariatric patients show that the risk of death within the 30 days following bariatric surgery averages 0.13%, or approximately one out of 1000 patients (ASMBS, 2017).
- c. Cost: According to Obesity Coverage, the average costs in 2015 were \$25,600 for gastric bypass surgery, \$14,500 for Lap-Band surgery, and \$14,900 for gastric sleeve (Obesity Coverage, 2017).

## G L O S S A R Y

**Bariatric surgery:** Term is synonymous with “obesity surgery” or “weight-loss surgery.”

**Body mass index (BMI):** Uses individual’s weight in kilograms divided by height in meters squared to produce a unit of measure for classifying body composition.

**Comorbidities:** In the context of obesity, means medical conditions that a client may have that are either caused or exacerbated by obesity. Examples include diabetes type 2, hypertension, cardiopulmonary disease, sleep apnea, gastroesophageal reflux disease (GERD), and musculoskeletal problems.

**Dumping syndrome:** A group of symptoms that result from the quick “dumping” of food into the small intestine. The most typical forms may occur after gastric bypass, although not all individuals develop dumping syndrome. Early dumping occurs shortly after a meal and consists of any combination of lightheadedness, flushing, diarrhea, and extreme weakness. Delayed dumping may occur an hour or later after a meal and is believed to be a result of hypoglycemia.

**Intertriginous dermatitis (ITD):** An inflammatory condition of opposing skin surfaces caused by moisture. People with more skinfolds, especially the obese, often have ITD under the abdominal or pubic panniculi. Following weight-loss surgery, surplus skin remains and is also a site for the development of ITD.

**Laparoscopic surgery:** A way of performing various bariatric surgical procedures through multiple small holes or incisions in the abdomen.

**Malabsorptive surgery:** A type of bariatric surgery that causes weight loss by bypassing a portion of the small intestine, where almost all of the absorption of nutrients takes place.

**Panniculus:** Term used to describe an excess fold or layer (apron) of skin and tissue that hangs dependently. Abdominal panniculi can grow over and beyond the abdomen, eventually covering the genitals and potentially extending even further, passing the knees. This can cause considerable discomfort and disability. Other areas of the body that may develop panniculi include the neck, upper back, flank, upper-medial thigh, posterior legs and ankles.

**Restrictive surgery:** A type of bariatric surgery that induces weight loss by making only a small portion of the stomach (the pouch or, in the case of sleeve gastrectomy, a tube) available to receive food from the esophagus.

**Skinfolds:** Areas where one skin layer rests on or against another. These folds tend to be dark, moist, and warm, making them an ideal breeding ground for organisms like bacteria and fungi. Individuals can develop severe skin infections and may experience large ulcerations and lesions from unchecked growth of microorganisms.

## CARE SETTING

Care is provided in an inpatient acute surgical unit.

## RELATED CONCERNS

- Obesity, page 430
- Peritonitis, page 389
- Psychosocial aspects of care, page 835
- Surgical intervention, page 873
- Venous thromboembolism (VTE) disease including deep vein thrombosis (DVT) and pulmonary embolism (PE), page 120

## CLIENT ASSESSMENT DATABASE

\*\*\*\*Refer to Metabolic and Endocrine Disorders: Obesity Database for additional assessment information.

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<b>ACTIVITY/REST</b> <ul style="list-style-type: none"><li>• Exertional discomfort, inability to participate in desired activity or sports</li><li>• Difficulty sleeping</li></ul>	<ul style="list-style-type: none"><li>• Exertional dyspnea</li><li>• Slow to move, inability to participate in desired activity</li></ul>
<b>EGO INTEGRITY</b> <ul style="list-style-type: none"><li>• Motivated to lose weight for oneself (or for gratification of others)</li><li>• Embarrassment that they've been unable to lose weight by other means</li><li>• Worry that even after surgery will fail to lose weight</li><li>• Fear or anxiety about procedure and ability to deal with postoperative adjustments</li><li>• Feels lonely, isolated, disconnected from others</li><li>• History of psychiatric illness or treatment</li></ul>	<ul style="list-style-type: none"><li>• Anxiety, depression</li></ul>
<b>ELIMINATION</b> <ul style="list-style-type: none"><li>• Urinary stress incontinence</li></ul>	
<b>FOOD/FLUID</b> <ul style="list-style-type: none"><li>• History of yo-yo dieting, years of failed dieting; weight fluctuations; dysfunctional eating patterns</li></ul>	<ul style="list-style-type: none"><li>• Weight exceeding ideal body weight by 100 lb, or BMI more than 40 (morbid obesity) or BMI of 25 to 40 with comorbid conditions, such as diabetes, sleep apnea, or heart disease</li></ul>
<b>HYGIENE</b> <ul style="list-style-type: none"><li>• Difficulty with dressing, bathing, toileting, perineal care, or other self-care activities</li></ul>	<ul style="list-style-type: none"><li>• Poor general hygiene, or constant attention to hygiene practices</li></ul>
<b>PAIN/DISCOMFORT</b> <ul style="list-style-type: none"><li>• Incisional pain</li></ul>	<ul style="list-style-type: none"><li>• Guarding behavior</li><li>• Positioning to avoid pain</li><li>• Restlessness, moaning, irritability</li><li>• Facial mask, grimacing</li></ul>
<b>RESPIRATION</b> <ul style="list-style-type: none"><li>• History of chronic respiratory diseases; use of respiratory aids (including oxygen, medications)</li><li>• Heavy snoring, daytime sleepiness, morning headaches</li><li>• Sleep apnea (may use continuous positive airway pressure [CPAP])</li><li>• History of/current smoking</li></ul>	<ul style="list-style-type: none"><li>• Shortness of breath with activity or rest</li><li>• Breath sounds may be distant (chest depth and shallow respirations)</li><li>• Obesity hypoventilation syndrome (OHS)</li><li>• Nighttime hypoventilation, sleep-disordered breathing, and daytime hypercapnia and hypoxemia</li></ul>

**MAY REPORT (continued)****MAY EXHIBIT (continued)****SAFETY**

- History of falls/other accidental injuries due to unstable gait, arthritis, joint problems
- Use of ambulatory or other assistive devices for transportation (e.g., walker, cane, wheelchair)
- Skin injuries, dermatitis, and other skin problems associated with skinfolds and hanging fat and tissue deposits (panniculi)

**SEXUALITY/SOCIAL INTERACTIONS**

- Problems with menstruation, fertility, and/or childbearing
- Problems with relationships that client perceives is related to condition
- History of bullying, discrimination, and abuse

**TEACHING/LEARNING**

- Presence of chronic conditions—hypertension, diabetes, heart failure, arthritis, sleep apnea, Pickwickian syndrome, infertility
- Learning about lifelong healthy eating and physical activity habits, medical follow-up, and vitamin and mineral supplementation

**DISCHARGE PLAN CONSIDERATIONS**

- May require support with therapeutic regimen and weight loss, assistance with self-care, homemaker and maintenance tasks

► Refer to section at end of plan for postdischarge considerations.

- Areas of skin breakdown, including breast, abdominal, and other body skinfolds
- Intertriginous dermatitis, pressure ulcers, candidiasis, incontinence-associated dermatitis, lower leg ulcers (Blackett et al, 2011)

- May or may not have support people present

**DIAGNOSTIC STUDIES**

Studies depend on individual situation and are used to rule out underlying disease and provide a preoperative workup, including psychiatric evaluation.

**NURSING PRIORITIES**

1. Support respiratory function.
2. Prevent or minimize complications.
3. Provide appropriate nutritional intake.
4. Provide information regarding surgical procedure, postoperative expectations, and treatment needs.

**DISCHARGE GOALS**

1. Ventilation and oxygenation adequate for individual needs.
2. Complications prevented or controlled.
3. Nutritional intake modified for specific procedure.
4. Procedure, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS: *ineffective Breathing Pattern*****May Be Related To**

Obesity; body position that inhibits lung expansion  
Pain, anxiety  
Fatigue

(continues on page 446)

**NURSING DIAGNOSIS:** **Ineffective Breathing Pattern** (continued)**Possibly Evidenced By**

Feeling breathless; dyspnea  
Tachypnea, alteration in depth of breathing; decreased vital capacity

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Ventilation NOC**

Maintain adequate ventilation.  
Experience no cyanosis or other signs of hypoxia, with ABGs within acceptable range.

**ACTIONS/INTERVENTIONS****RATIONALE****Ventilation Assistance NIC****Independent**

Be aware of presurgical history of respiratory conditions (e.g., obstructive sleep apnea, use of nighttime CPAP).

Continuous positive airway pressure (CPAP) may be used postoperatively to maintain adequate tidal volumes, to clear anesthesia, and to maintain a wakeful state.

Monitor respiratory rate and depth. Auscultate breath sounds. Investigate presence of pallor and cyanosis, increased restlessness, or confusion.

Respirations may be shallow because of incisional pain, analgesia, immobility, and obesity itself, causing hypoventilation and potentiating risk of atelectasis and hypoxia.

Elevate head of bed 30 to 45 degrees.

Encourages optimal diaphragmatic excursion and lung expansion and minimizes pressure of abdominal contents on the thoracic cavity. Note: When kept recumbent, obese clients are at high risk for severe hypoventilation (Dambbaugh & Eckland, 2016).

Encourage deep-breathing exercises. Assist with coughing and splint incision.

Promotes maximal lung expansion and aids in clearing airways, thus reducing risk of atelectasis and pneumonia.

Turn periodically and ambulate as early as possible.

Promotes aeration of all segments of the lung, mobilizing and aiding movement of secretions. Note: If client was a good candidate for bariatric surgery, she or he was probably relatively healthy before operation and is usually able to turn self, walk, and transfer to chair within 8 hours of surgery.

Pad side rails and teach client to use them as armrests.

Using the side rail as an armrest allows for greater chest expansion.

Use small pillow under head, when indicated.

Many obese clients have large, thick necks, and use of large, fluffy pillows may obstruct the airway.

**Collaborative**

Administer supplemental oxygen as indicated.

Maximizes available O<sub>2</sub> for exchange and reduces work of breathing. Note: Some clients may require noninvasive mechanical ventilation, which necessitates a proper-fitting interface (Dambbaugh & Eckland, 2016).

Assist in use of blow bottle or incentive spirometer, as indicated.

Enhances lung expansion; reduces potential for atelectasis.

Monitor continuous pulse oximetry, or ABGs, as indicated.

Reflects ventilation, oxygenation, and acid-base status. Used as a basis for evaluating need for and effectiveness of respiratory therapies.

Monitor patient-controlled analgesia (PCA) and administer analgesics, as appropriate.

Maintenance of comfort enhances participation in respiratory therapy and promotes increased lung expansion. Note: For the first 48 hours after the procedure, intravenous (IV) PCA is the method of choice. (Refer to CP: Surgical Intervention, ND acute Pain for pain control interventions.)

**NURSING DIAGNOSIS:** risk for ineffective Tissue Perfusion [specify]**Possibly Evidenced By**

Insufficient knowledge of disease process, risk factors, or aggravating factors (e.g., obesity, smoking sedentary lifestyle, immobility)  
 Hypertension; diabetes mellitus  
 Sedentary lifestyle

**Desired Outcomes/Evaluation Criteria—Client Will****Circulation Status NOC**

Maintain perfusion as individually appropriate—skin warm and dry, peripheral pulses present and strong, and vital signs within acceptable range.

**Risk Control NOC**

Identify causative or risk factors.  
 Demonstrate behaviors to improve or maintain circulation.

**ACTIONS/INTERVENTIONS****RATIONALE****Surveillance NIC****Independent**

Monitor vital signs, palpate peripheral pulses routinely, and evaluate capillary refill and changes in mentation. Note 24-hour fluid balance.

Indicators of circulatory adequacy. (Refer to ND: risk for deficient Fluid Volume, below.)

Encourage frequent range-of-motion (ROM) exercises for legs and ankles. Maintain schedule of sequential compression devices (SCD) on lower extremities when used.

Stimulates circulation in the lower extremities, reduces high-risk complications associated with venous stasis, such as DVT and pulmonary embolus (PE).

Assess for redness, edema, and discomfort in calf.

Indicators of thrombus formation, but warning signs may not always be present in obese individuals.

Encourage early ambulation; discourage sitting and dangling legs at the bedside.

Sitting constricts venous flow, whereas walking encourages venous return. Note: Feelings of dyspnea may result in decreased exercise tolerance and decreased mobility (Dambbaugh & Eckland, 2016).

Evaluate for complications, such as rigid abdomen, nonincisional abdominal pain, fever, tachycardia, and low blood pressure.

Although rare, client can develop abdominal complications, such as abdominal compartment syndrome, sepsis, or septic shock secondary to anastomotic leak or wound infection, requiring intensive interventions or return to surgery.

**Collaborative**

Administer heparin therapy, as indicated.

May be used prophylactically to reduce risk of thrombus formation or to treat thromboemboli.

Monitor hemoglobin (Hgb), hematocrit (Hct), and coagulation studies, such as prothrombin time (PT) and international normalized ratio (INR).

Provides information about circulatory volume and alterations in coagulation and indicates therapy needs and effectiveness.

**NURSING DIAGNOSIS:** risk for deficient Fluid Volume**Possibly Evidenced By**

Extremes of weight  
 Active fluid volume loss [e.g., hemorrhage, nasogastric suction, diarrhea]  
 Deviations affecting intake—limited oral intake

**Desired Outcomes/Evaluation Criteria—Client Will****Hydration NOC**

Maintain adequate fluid volume with balanced intake and output (I&O) and be free of signs reflecting dehydration.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid/Electrolyte Management</b> <b>NIC</b>	
<b>Independent</b>	
Assess vital signs, noting changes in blood pressure (BP), such as orthostatic hypotension, tachycardia, and fever.	Indicators of dehydration and hypovolemia and adequacy of current fluid replacement. Note: Adequately sized cuff must be used to ensure factual measurement of BP. If cuff is too small, reading will be falsely elevated.
Assess skin turgor, capillary refill, and moisture of mucous membranes.	
Monitor I&O, including nasogastric (NG) suction losses.	Changes in gastric capacity and intestinal motility and nausea greatly influence intake and fluid needs, increasing risk of dehydration.
Establish individual needs and replacement schedule.	Determined by amount of measured losses and estimated insensible losses and dependent on gastric capacity.
Encourage increased oral intake when able, beginning with clear liquids and advancing to full liquids. Encourage frequent small sips of fluids.	Intake capacity is drastically reduced (to as little as 15 to 30 mL), so client may need IV fluid support for a while, but once oral fluids are resumed, client must drink frequently in order to be hydrated. Small sips will reduce nausea.
<b>Collaborative</b>	
Administer IV fluids, as indicated.	Replaces fluid losses and restores fluid balance in immediate postoperative phase until client is able to take sufficient oral fluids.
Monitor electrolyte levels and replace, as indicated.	Use of NG tube and changes in GI function can deplete electrolytes, affecting organ function.

### NURSING DIAGNOSIS: **risk for imbalanced Nutrition: less than body requirements**

#### Risk Factors May Include

Inability to ingest food—restricted intake, early satiety

Inability to absorb nutrients—malabsorption of nutrients and impaired absorption of vitamins

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Eating Disorder Self-Control

**NOC**  
Identify individual nutritional needs.

Display behaviors to maintain adequate nutritional intake.

Demonstrate appropriate weight loss with normalization of laboratory values.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Diet Staging: Weight-Loss Surgery</b> <b>NIC</b>	
<b>Independent</b>	
Determine client's type of bariatric procedure and early postoperative dietary plan.	The diet after surgery is based on the type of bariatric procedure and client's comorbid conditions (e.g., diabetes) and is a staged approach (e.g., clear liquid to full liquids, to pureed foods, to healthy solid foods). Dietary advancement is based on nutritional needs and increasing tolerance for dietary texture (Kushner et al, 2017).
Establish hourly intake schedule. Measure and provide food and fluids in amount specified.	After gastric restriction procedures, stomach capacity is reduced to approximately 30 to 50 mL, necessitating frequent, small feedings.
Instruct in how to eat slowly. Take small bites, using a baby spoon. Chew food thoroughly. Take 30 to 60 minutes to eat meal, then refrain from eating until next scheduled mealtime.	Increases satiety and reduces risk of overeating. Note: Chewing food to mush-like consistency prevents complications (such as blocking the new opening from the stomach into the intestine [gastric bypass] or putting too much strain on gastric band [Lap-Band]). Blockages prevent food from leaving the stomach, causing vomiting, nausea, and abdominal pain.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Avoid taking fluids with meals and for 30 minutes before or 45 minutes after meals. Encourage almost constant sipping of fluids between scheduled eating times.	Although fluids are a necessary part of the client's intake, the stomach is too small to hold food and fluids at the same time.
Avoid high-calorie fluids—milkshakes, sodas, and alcoholic beverages.	These can sabotage weight loss.
Emphasize importance of recognizing satiety and stopping intake.	Overeating may cause nausea and vomiting, as well as having the potential to damage surgical anastomosis.
Require that client sit up to drink and eat.	Reduces possibility of aspiration.
Determine foods that are gas forming and eliminate them from diet.	May cause nausea and bloating, interfering with digestion and causing client to restrict nutritional intake.
Discuss food preferences with client and include those foods in puréed diet when possible.	May enhance intake and promote sense of participation and control.
Weigh on regular schedule.	Monitors losses and aids in assessing nutritional needs and effectiveness of therapy.
<b>Collaborative</b>	
Refer to dietitian or multidisciplinary team.	Provides assistance in planning a diet specifically geared toward client's type of bariatric surgery (e.g., gastric bypass, Lap-Band) that meets client's nutritional needs as well as offering individualized treatment and support. Note: Because quantity is strictly limited, foods should be nutrient dense, low in fat and sugars, and high in protein.
Administer vitamin supplements (may use chewable vitamins) and vitamin B <sub>12</sub> injections, folate, and calcium, as indicated.	When absorption is impaired, supplements will be needed for life to prevent complications associated with vitamin deficiencies. Increased intestinal motility following bypass procedure lowers calcium level and increases absorption of oxalates, which can lead to urinary stone formation.

## NURSING DIAGNOSIS: impaired Skin/Tissue Integrity

### May Be Related To

Mechanical factors (e.g., shearing forces, pressure, surgical procedure)  
Impaired circulation  
Imbalanced nutritional state—obesity

### Possibly Evidenced By

Alteration in skin integrity [i.e., disruption of skin surface/skin layers; invasion of body structures]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Wound Healing: Primary Intention NOC

Display timely wound healing without complications.

#### Tissue Integrity: Skin and Mucous Membranes NOC

Display intact skin free of signs of pressure or breakdown.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Incision Site Care NIC</b>	
<i>Independent</i>	
Observe incisions periodically, noting approximation of wound edges, hematoma formation and resolution, and presence of redness, bleeding, and drainage.	Verifies status of healing, provides for early detection of developing complications requiring prompt evaluation and influencing choice of interventions.
Provide routine incisional care, being careful to keep dressing dry and sterile. Assess and maintain patency of drains (if used).	Promotes healing. Accumulation of serosanguineous drainage in subcutaneous layers increases tension on suture line, may delay wound healing, and serves as a medium for bacterial growth.

(continues on page 450)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct client/provide incisional support when turning, coughing, deep breathing, and ambulating.	Reduces possibility of dehiscence and incisional hernia.
<b>Pressure Ulcer Prevention NIC</b> Encourage/assist with frequent positional change. Inspect pressure points, and massage gently, as indicated. Apply transparent skin barrier to elbows and heels, if indicated.	Reduces pressure on skin, promoting peripheral circulation and reducing risk of skin breakdown. Skin barrier reduces risk of shearing injury. Note: Obese clients may be unable/have difficulty repositioning themselves (Dambbaugh & Eckland, 2016).
Skinfold management:  Inspect all skin surfaces, paying particular attention to multiple skinfolds (e.g., under breasts, abdomen, perineal and gluteal folds, posterior neck, lumbar and midback areas) common in the obese client.	Client may have intertriginous dermatitis (ITD), thought to arise from skin-on-skin friction that initially leads to mild erythema and may progress to more intense inflammation with erosion, oozing, exudation, maceration, and crusting. Moisture or excoriation enhances growth of yeast and bacteria that can lead to chronic skin infections and raise the risk of postoperative wound infection from local contamination (Black et al, 2011; Dambbaugh & Eckland, 2016).
Bathe/cleanse skin carefully, using a mild skin cleanser instead of ordinary soap.	Gentle mechanical actions should be used when cleansing the skin, and scrubbing should be avoided. The cleanser should be free of perfumes or potential irritants, and its pH should be similar to that of normal skin. One option is pH-balanced disposable cleansing cloths or soft baby washcloths, since regular washcloths can be abrasive. Note: The pH of ordinary soap is usually due to alkaline, which may increase skin irritation.
Apply skin moisturizers, as indicated.	May be needed to keep skin supple if at risk for cracking or fissuring from excessive dryness.
Use absorptive fabric/padding and loose-fitting clothing, as indicated.	Obese clients tend to sweat profusely. The combination of increased perspiration and larger skinfolds increases the risk for maceration and for friction damage. Use of absorptive materials in skinfolds helps keep them dry and reduces risk of skin rashes and breakdown. Client should be encouraged to wear loose-fitting, lightweight clothing made from natural fibers to absorb moisture from skinfolds. Other options include athletic clothing specifically designed to draw moisture away from the skin.
Utilize draw sheets to form sling to lift or shift large tissue areas (e.g., abdominal panniculus) when moving client in bed.	Reduces risk of friction and shear injuries and pain.
<b>Collaborative</b> Provide foam, water, or air mattress, as indicated. Refer to skin/wound specialist nurse if indicated.	Reduces skin pressure and enhances circulation. May be desired/needed in client with severe skin and/or tissue conditions. Management strategies must focus on elimination of skin-to-skin contact without causing harm to friable tissue, as well as education of client/SO in skin care.

## NURSING DIAGNOSIS: risk for Infection

### Possibly Evidenced By

Inadequate primary defenses—broken skin, traumatized tissues, decreased ciliary action, stasis of body fluids [Invasive procedures; malnutrition associated with obesity]

### Desired Outcomes/Evaluation Criteria—Client Will

### Infection Severity NOC

Be free of healthcare-acquired infection.

Achieve timely wound healing free of signs of local or generalized infectious process.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<b>Independent</b>	
Recognize client's risks for postoperative infections (e.g., obesity with possible preoperative malnutrition, as well as the increased need for protein and micronutrients for normal surgical wound healing in setting of restricted intake and possible malabsorption issues).	The nature of gastric bypass surgery leaves clients in a state of "deliberate malnutrition," possibly exacerbating the altered metabolic response and nutritional deficiencies already present in the obese client. In addition, it is known that obesity is often associated with preoperative malnutrition. Nutritional deficits and stress of surgery can affect early wound healing in current situation, as well as increase the risk of other complications (Pierpont et al, 2014).
Emphasize and model proper handwashing technique.	Prevents spread of bacteria and cross-contamination.
Maintain aseptic technique in dressing changes and invasive procedures.	Reduces risk of healthcare-associated infection.
Inspect surgical incisions and invasive line sites for erythema and purulent drainage.	Early detection of developing infection provides for prevention of more serious complications.
Encourage frequent position changes, deep breathing, coughing, and use of respiratory adjuncts, such as incentive spirometer.	Promotes mobilization of secretions, reducing risk of pneumonia associated with hypoventilation and atelectasis.
Provide routine catheter care (when used) and provide or assist with good perineal care. Remove catheter as early as possible.	Prevents ascending bladder infections.
Encourage client to drink acid-ash juices, such as cranberry.	Maintains urine acidity and prevents bacteria from adhering to the bladder wall to retard bacterial growth.
Observe for reports of abdominal pain, especially after third postoperative day; elevated temperature; and increased white blood cell (WBC) count.	Suggests possibility of anastomotic leak, developing peritonitis.
<b>Collaborative</b>	
Administer IV antibiotics, as indicated.	A prophylactic antibiotic regimen is usually standard in these clients to reduce risk of perioperative contamination and peritonitis.
Obtain specimen of purulent drainage or sputum for culture and sensitivity.	Identifies infectious agent; aids in choice of appropriate therapy.

### NURSING DIAGNOSIS: Diarrhea

#### May Be Related To

Treatment regimen: inflammation; irritation; malabsorption

#### Possibly Evidenced By

Loose, liquid stools

Hyperactive bowel sounds; bowel urgency, cramping

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Knowledge: Treatment Regimen NOC

Verbalize understanding of causative factors and rationale of treatment regimen.

Follow through with treatment recommendations.

#### Gastrointestinal Function NOC

Regain near-normal bowel function.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Diarrhea Management NIC</b>	
<b>Independent</b>	
Discuss potential for diarrhea as indicated (e.g., after gastric bypass). Observe and record stool frequency, characteristics, and accompanying symptoms.	Gastric bypass surgery may cause “dumping syndrome” where food moves too quickly from the stomach to the small intestine. Symptoms include nausea, weakness, sweating, fainting, and, occasionally, diarrhea after eating. This condition is usually self-limiting but can cause discomfort and social difficulties when persistent.
Encourage diet high in fiber and bulk within dietary limitations, with moderate fluid intake as diet resumes.	Increases consistency of the effluent. Although fluid is necessary for optimal body function, excessive amounts contribute to diarrhea.
Restrict fat intake, as indicated.	Low-fat diet reduces risk of steatorrhea and limits laxative effect of decreased fat absorption.
<b>Collaborative</b>	
Administer medications such as diphenoxylate with atropine (Lomotil), if indicated.	Antidiarrheals may be desired to control frequency of stools; however, drug absorption issues may prevent their use.
Monitor serum electrolytes.	Large gastric losses potentiate the risk of electrolyte imbalance, which can lead to more serious or life-threatening complications.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

**May Be Related To**

Insufficient information; insufficient knowledge of resources  
Misinformation presented by others

**Possibly Evidenced By**

Insufficient knowledge  
Inaccurate follow-through of instructions; development of preventable complications

**Desired Outcomes/Evaluation Criteria—Client Will**

**Knowledge: Disease Process NOC**

Verbalize understanding of surgical procedure, potential complications, and postoperative expectations.

**Knowledge: Treatment Regimen NOC**

Verbalize understanding of therapeutic needs and rationale for actions.  
Initiate necessary lifestyle changes and participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Individual NIC</b>	
<b>Independent</b>	
Review specific surgical procedure and postoperative expectations.	Provides knowledge base from which informed choices can be made and goals formulated. Initial weight loss is rapid, with client often losing half of the total weight loss during the first 6 months. Weight loss then gradually stabilizes over a 2-year period.
Address concerns about altered body size and image.	Anticipation of problems can be helpful in dealing with situations that arise. (Refer to CP: Obesity; ND: disturbed Body Image.)
Review medication regimen, dosage, and side effects.	Knowledge may enhance client's involvement with therapeutic regimen. Note: As client loses weight, the dosages of many medications may need to be recalculated because body fat alters the pharmacokinetics of many medications.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Recommend avoidance of alcohol.	High caloric count contributes to slowed weight loss as well as liver and pancreatic dysfunction. Note: Recent studies found that the Roux-en-Y and sleeve gastrectomy procedures more than doubled the association to alcohol problems. It is believed alcohol is metabolized differently after these procedures, which may lead to loss of sensitivity to the effects of alcohol at the time of drinking and thus increase risk of overuse and abuse (King et al, 2012).
Discuss responsibility for self-care with client and significant other (SO).	Full involvement in weight-loss program is important for successful outcome after procedure.
Emphasize importance of regular medical follow-up, including laboratory studies, and discuss possible health problems.	Periodic assessment and evaluation, for example, over 3 to 12 months, promotes early recognition of such complications as liver dysfunction, malnutrition, electrolyte imbalances, and kidney stones, which may develop following bypass procedure.
<b>Diet Staging: Weight Loss Surgery NIC</b>	
Encourage progressive exercise and activity program balanced with adequate rest periods.	Promotes weight loss, enhances muscle tone, and minimizes postoperative complications while preventing undue fatigue.
Review proper eating habits; for example, eat small amounts of food slowly and chew well; sit at table in calm, relaxed environment; eat only at prescribed times; avoid between-meal snacking; and do not “make up” skipped feedings.	Focuses attention on eating, increasing awareness of intake and feelings of satiety.
Identify signs of hypokalemia, for example, diarrhea, muscle cramps, weakness of lower extremities, weak or irregular pulse, and dizziness with position changes.	Increasing dietary intake of potassium (e.g., milk, coffee, potatoes, carrots, bananas, oranges) may correct deficit, preventing serious respiratory or cardiac complications.
Discuss symptoms that may indicate dumping syndrome: weakness, profuse perspiration, nausea, vomiting, faintness, flushing, and epigastric discomfort or palpitations occurring during or immediately following meals. Problem-solve solutions.	Generally occurring in early postoperative period (1 to 3 weeks), syndrome is usually self-limiting but may become chronic and require medical intervention.
Review symptoms requiring medical evaluation, including persistent nausea or vomiting, abdominal distention or tenderness, change in pattern of bowel elimination, fever, purulent wound drainage, excessive weight loss, plateauing, or weight gain.	Early recognition of developing complications allows for prompt intervention, preventing serious outcome.
<b>Collaborative</b>	
Refer to bariatric postoperative program or community support groups.	Involvement with others who have dealt with same problems enhances coping; may promote cooperation with therapeutic regimen and long-term positive recovery.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **risk for imbalanced Nutrition: less than body requirements**—inability to ingest food—restricted intake, early satiety; inability to absorb nutrients—malabsorption of nutrients and impaired absorption of vitamins
- **risk for delayed Surgical Recovery**—obesity; pain; excessive surgical procedure
- **risk for ineffective Health Management**—complexity of therapeutic regimen; family patterns of healthcare; perceived benefit/barriers; social support deficit
- **risk for [recurrent] Overweight**—disordered eating behavior, frequent snacking, consumption of sugar-sweetened beverages, average daily physical activity less than recommended

\*\*\*Refer to Potential Considerations in Surgical Intervention plan of care.

# DIABETES MELLITUS AND DIABETIC KETOACIDOSIS

## I. Pathology

- a. Diabetes mellitus (DM, also called diabetes) is a chronic metabolic disorder characterized by high blood glucose levels, in which the body cannot metabolize carbohydrates, fats, and proteins because of a lack of, or ineffective use of, the hormone insulin.
- b. Diabetes is the leading cause of kidney failure, nontraumatic lower-limb amputations, and new cases of blindness as well as a major cause of heart disease and stroke among adults in the United States (American Diabetes Association [ADA], 2017).
- b. Diabetic ketoacidosis (DKA) is a life-threatening emergency caused by a relative or absolute deficiency of insulin. DKA is a complex disturbed metabolic state, characterized by hyperglycemia, ketoacidosis, and ketonuria. Although DKA occurs mainly in type 1 diabetes mellitus (T1DM), it can occur in people with type 2 DM (T2DM) (Hamdy, 2014).

## II. Classifications of Diabetes Mellitus

- a. The ADA classifies diabetes into four main categories, based on underlying mechanisms (ADA, 2017; Tashko, 2017).
  - i. Type 1 diabetes mellitus (T1DM)—formerly called *juvenile-onset* or *insulin-dependent diabetes* is due to autoimmune beta-cell destruction in the pancreas, resulting in an absolute insulin deficiency.
  - ii. Type 2 diabetes mellitus (T2DM)—formerly known as *adult onset* or *non-insulin-dependent diabetes* is due to a progressive loss of beta-cell insulin secretion and mounting insulin resistance.
  - iii. Gestational diabetes (GD) applies to women in whom glucose intolerance develops or is first discovered during pregnancy. GD develops in 2% to 18% of all pregnant women, typically develops in the second or third trimester, but disappears after delivery (ADA, 2017; Tashko, 2017). However, up to 10% of women with GD go on to develop T2DM, anywhere from weeks after delivery to months (or even years) later (Dansinger, 2017).
  - iv. Other cause diabetes: Less commonly known forms include disease of the exocrine pancreas (such as occurs with cystic fibrosis), drug- or chemical-induced diabetes (such as occurs with glucocorticoid use or after organ transplantation), ketosis-prone diabetes (KPD), and latent autoimmune diabetes in adults (LADA) (Giese, 2016; Tashko, 2017).

## III. Etiology of Diabetes

### a. Type 1 Diabetes

- i. An autoimmune disease possibly triggered by genetic and environmental factors
  1. Destroys beta-cells in the pancreas
  2. When 80% to 90% of the beta-cells are destroyed, overt symptoms occur.
  3. Abrupt onset of signs and symptoms of hyperglycemia
  4. Totally insulin deficient; clients require exogenous insulin to survive.
- ii. Other characteristics
  1. Five percent of people with diabetes have this type (ADA, 2017).

2. Usually occurs before 30 years of age, with peak onset during puberty, but can occur at any age.  
*Note:* A Swedish study in 2008 reported that 25% of T1DM cases are diagnosed as adults (Thunander et al, 2008).
3. Common complications: ketoacidosis, kidney disease, heart disease, neuropathy, foot problems, eye disease (retinopathy); skin infections, gum disease (Dansinger, 2017).

### b. Type 2 Diabetes

- i. Involves a decreased ability to use the insulin produced in the pancreas
  1. Decreased insulin secretion in response to glucose levels
  2. Insulin resistance blocking cells from absorbing glucose
  3. Excess production of glucose because of defective insulin secretory response
- ii. Other characteristics
  1. Accounts for approximately 90% of all diabetes in the United States (Centers for Disease Control and Prevention [CDC], 2014).
  2. Usually occurs after 30 years of age but is now occurring in children and adolescents. P *Note:* T2DM now represents 8% to 45% of all new cases of diabetes reported among children and adolescents, primarily in minority populations (Dabelea et al, 2007; Morales Pozzo, 2017).
  3. Increased prevalence in some ethnic groups—African Americans (13.2% of all African Americans age 20 or older have diagnosed diabetes) (ADA, 2014), Hispanic/Latino, Native Americans, Asian Americans, and Pacific Islanders
  4. Strong genetic predisposition
  5. Frequently associated with obesity
  6. Common complications: **Short term:** hypoglycemia, HHNS (see Glossary). **Long term:** microvascular complications affecting eyes (cataracts and/or retinopathy); kidneys (nephropathy with impaired kidney function or failure); nerves (peripheral neuropathy is the most common form, often affecting the feet and hands). Macrovascular complications can affect the large blood vessels over time, causing heart attack, stroke, and peripheral vascular disease (Leontis & Hess-Fischl, 2017). *Note:* Person with T2DM is not typically prone to ketoacidosis.

## IV. Etiology of DKA (Hamdy, 2014)

- i. Previously undiagnosed or newly diagnosed type 1 diabetes
- ii. Brittle diabetes
- iii. Underlying infection (40%)
- iv. Missed or disrupted insulin treatments; acute insulin deficiency (25%)
- v. Stress associated with illness, infection, trauma, or emotional distress
- vi. Biochemical changes, including blood glucose greater than 250 mg/dL (usually much higher) with acidity demonstrated by increased serum ketones, and arterial pH <7

- vii. DKA is much more common in young children and adolescents than it is in adults. However, it may occur in patients with diabetes at any age.
- viii. Cerebral edema is the most severe complication of DKA. It occurs in 0.5% to 1% of all DKA cases (Lawrence et al, 2005) and carries a mortality rate of 21% to 24%. Survivors are at risk of residual neurologic problems (Wolfsdorf et al, 2007).

#### V. Statistics

- a. Morbidity: In 2015, an estimated 30.3 million Americans had diabetes, with approximately 1.25 million children and adults having type 1. *Note:* These figures include both diagnosed and undiagnosed diabetes (which includes persons who were unaware of or did not report having diabetes). Both fasting glucose and hemoglobin A1C (A1C) levels were used to derive estimates for undiagnosed diabetes and prediabetes (ADA, 2017; CDC, 2017a).

**P** In 2015, approximately 193,000 American children and

adolescents (under the age of 20) were estimated to have diagnosed diabetes, with most of those being T1DM (ADA, 2017; CDC, 2017a). **P** Research shows that the initial presentation of T1DM is ketoacidosis in about one-third of children (Klingensmith et al, 2013).

- b. Mortality: In 2016, diabetes was reported to be the seventh leading cause of death. This ranking is based on 76,488 death certificates in 2014, in which diabetes was the underlying cause of death (CDC, 2016b). **P** Children aged 1 to 4 years are particularly at risk and may die due to diabetic ketoacidosis (DKA) at the time of diagnosis. **P** Most deaths in adolescents result from delayed diagnosis or neglected treatment and subsequent cerebral edema during treatment for DKA, although untreated hypoglycemia also causes some deaths (Lamb, 2017).
- c. Cost: Estimated direct medical care costs of \$176 billion annually with an additional \$69 billion of indirect costs (CDC, 2016b).

#### G L O S S A R Y

**A1C test:** (also known as HbA1c, glycated hemoglobin, or glycosylated hemoglobin) is a blood test that correlates with a person's average blood glucose level over a span of a few months.

**Acetone:** Chemical formed in the blood when the body uses fat instead of glucose for energy. Acetone passes through the body into the urine. Someone with high levels of acetone can have breath that smells fruity and is called “acetone breath.”

**Beta-cells:** Cells that make insulin found in areas of the pancreas called the islets of Langerhans.

**Blood glucose:** The main sugar that the body makes from food. Glucose is carried through the bloodstream to provide energy to all of the body's living cells.

**Counterregulatory hormone:** A hormone that opposes the action of another or others. For example, the action of **insulin** is counterregulated by hormones **glucagon**, **epinephrine (adrenaline)**, **norepinephrine (noradrenaline)**, **cortisol**, and **growth hormone**.

**Dawn phenomenon:** An abrupt increase in fasting levels of serum glucose concentrations between the hours of 5 a.m. and 9 a.m., without preceding hypoglycemia, especially in diabetic patients receiving insulin therapy.

**Diabetic ketoacidosis (DKA):** A life-threatening complication of T1DM in which very high blood sugar levels (along with a very low level of insulin) result in a dangerous accumulation of ketones (acids) in the blood and urine. Coma or death can result if condition is not treated. *Note:* Although persons with DKA typically have a history of diabetes, 27% to 37% are newly diagnosed with diabetes (especially young children), and it is the most common cause of mortality in people under 40 with T1DM. DKA is more common in young people and in certain groups of people (e.g., those with eating disorders or mental disorders) (Mills & Stamper, 2014; Westerberg, 2013).

**Diabetic neuropathy:** Family of nerve disorders caused by diabetes, causing numbness, pain, and weakness in the

hands, arms, feet, and legs. About half of all diabetics have some form of neuropathy.

**Hyperglycemia:** High blood glucose.

**Hypersmolar hyperglycemic nonketotic syndrome**

(HHNS): A rare complication of diabetes (**most commonly, T2DM**), where diabetes is uncontrolled (e.g., blood glucose level is very high, often greater than 600). HHNS is most likely to occur in conjunction with an illness, and elderly people are most likely to develop it. When blood glucose level starts to climb, the body will try to get rid of the excess glucose through frequent urination, resulting in dehydration. If HHNS continues, the severe dehydration will lead to seizures, coma, and eventually death.

**Hypoglycemia:** Low blood glucose.

**Impaired fasting glucose:** Person has elevated fasting blood glucose because the liver is resistant to the action of insulin, allowing it to release too much glucose into the bloodstream. Also, the early burst of insulin (that normally occurs within 30 minutes of a meal) is absent. The late insulin response after the meal is normal, so blood glucose returns to its usual (but elevated) level 2 hours after the meal.

**Impaired glucose tolerance:** Some people have trouble producing late-phase insulin. Glucose level is normal after fasting overnight and between meals but rises progressively after meals or after eating carbs and remains elevated 2 hours.

**Insulin:** Hormone produced by the pancreas that helps the body use blood glucose for energy. A person lacking this hormone is dependent on supplemental, outside (exogenous) sources.

**Insulin analogue:** An altered form of insulin, different from any occurring in nature, but still available to the human body for performing the same action as human insulin in terms of glycemic control.

**Insulin release:** Following a meal, insulin is released in **two phases:** (1) an early burst that occurs 30 minutes after

(continues on page 456)

## G L O S S A R Y (continued)

- eating and a (2) late phase that happens a half hour to 2 hours after a meal.
- Insulin resistance:** Body is unable to use the insulin that it makes because of cell-receptor defect resulting in inability of cells to absorb glucose.
- Ketones:** Chemical substances produced when the body breaks down fat for energy. When ketones build up in the body over a long period of time, serious illness or coma can result.
- Kussmaul respirations:** Abnormal respiratory pattern characterized by rapid, deep breathing, often seen in client with metabolic acidosis.
- Lactic acidosis:** The buildup of lactic acid in the body. Cells make lactic acid when they use glucose for energy. If too much lactic acid stays in the body, the balance tips and the person begins to feel ill. Lactic acidosis may be caused by DKA or liver or kidney disease.
- Metabolic acidosis:** A pH imbalance in which the body has accumulated too much acid and does not have enough bicarbonate to effectively neutralize the effects of the acid. It can be brought on by a lack of insulin, a starvation diet, a gastrointestinal (GI) disorder, or a major organ dysfunction. For a person with diabetes, this can lead to diabetic ketoacidosis.

## CARE SETTINGS

Diabetes is managed throughout life in the community setting.

Diabetic ketoacidosis (DKA) may be encountered in any setting, with mild DKA managed at the community level; however, severe metabolic imbalance requires inpatient acute care on a medical unit.

\*\*\*The hospitalized client with DKA is the focus of this care plan.

## RELATED CONCERNS

- Fluid and electrolyte imbalances (see *DavisPlus*)  
Metabolic acidosis—primary base bicarbonate deficiency (see *DavisPlus*)  
Pediatric considerations, page 993  
Psychosocial aspects of care, page 835

## CLIENT ASSESSMENT DATABASE (DKA)

\*\*\*\*Data depend on the severity and duration of metabolic imbalance, length and stage of diabetic process, and effects on other organ function.

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<b>ACTIVITY/REST</b> <ul style="list-style-type: none"><li>• Sleep and rest disturbances</li><li>• Weakness, fatigue, difficulty walking and moving</li><li>• Muscle cramps, decreased muscle strength</li></ul>	<ul style="list-style-type: none"><li>• Tachycardia and tachypnea at rest or with activity</li><li>• Lethargy, disorientation, coma</li><li>• Decreased muscle strength and tone</li></ul>
<b>CIRCULATION</b> <ul style="list-style-type: none"><li>• History of hypertension; acute myocardial infarction (MI)</li><li>• Leg ulcers, slow healing</li></ul>	<ul style="list-style-type: none"><li>• Confusion, disorientation (hypoglycemia); coma (in severe DKA)</li><li>• Tachycardia; dysrhythmias</li><li>• Postural blood pressure (BP) changes; hypertension</li><li>• Crackles; jugular vein distention (JVD)—if heart failure present</li><li>• Decreased or absent pulses</li></ul>
<b>EGO INTEGRITY</b> <ul style="list-style-type: none"><li>• Life stressors, including financial concerns related to condition</li></ul>	<ul style="list-style-type: none"><li>• Anxiety, irritability</li></ul>
<b>ELIMINATION</b> <ul style="list-style-type: none"><li>• Change in usual voiding pattern</li><li>• Excessive urination (polyuria)</li><li>• Nocturia</li><li>• Pain and burning, difficulty voiding (infection neurogenic bladder)</li></ul>	<ul style="list-style-type: none"><li>• Pale, yellow, dilute urine</li><li>• Polyuria may progress to oliguria and anuria if severe hypovolemia occurs</li><li>• Glycosuria</li><li>• Cloudy, odorous urine (infection)</li></ul>

MAY REPORT (continued)	MAY EXHIBIT (continued)
<ul style="list-style-type: none"> <li>Recent and recurrent urinary tract infections (UTIs) (often a precipitator of DKA)</li> <li>Abdominal tenderness, bloating, diarrhea</li> </ul>	<ul style="list-style-type: none"> <li>Abdominal rigidity and distention</li> <li>Bowel sounds diminished or hyperactive (diarrhea)</li> </ul>
<b>FOOD/FLUID</b>	
<ul style="list-style-type: none"> <li>Not following prescribed diet if diabetic (e.g., increased intake of glucose and carbohydrates)</li> <li>No diet followed (e.g., unknown diabetes)</li> <li>Loss of appetite, nausea, and vomiting</li> <li>Unexplained or rapid weight loss over a period of days or weeks</li> <li>Overweight or obesity (common in adults and <b>P</b> strongly associated with children and adolescents with T2DM)</li> <li>Thirst; abnormally great thirst</li> <li>Use of medications exacerbating dehydration, such as diuretics</li> </ul>	<ul style="list-style-type: none"> <li>Halitosis and sweet, fruity breath odor</li> <li>Hot, dry, flushed skin (if fever present)</li> <li>Dry and cracked skin, poor skin turgor; sunken eyeballs—if dehydration is severe in DKA</li> </ul>
<b>NEUROSENSORY</b>	
<ul style="list-style-type: none"> <li>Fainting spells, dizziness</li> <li>Headaches</li> <li>Visual disturbances</li> <li>Tingling, numbness, weakness in muscles</li> </ul>	<ul style="list-style-type: none"> <li>Confusion, disorientation</li> <li>Drowsiness, lethargy, stupor, and coma (later stages DKA or hypoglycemia)</li> <li>Seizure activity (late stages of DKA or hypoglycemia)</li> <li>Deep tendon reflexes (DTRs) may be decreased</li> </ul>
<b>PAIN/DISCOMFORT</b>	
<ul style="list-style-type: none"> <li>Abdominal bloating and pain</li> </ul>	<ul style="list-style-type: none"> <li>Facial grimacing with abdominal palpation, guarding</li> </ul>
<b>RESPIRATION</b>	
<ul style="list-style-type: none"> <li>Air hunger (late stages of DKA)</li> <li>Cough, with and without purulent sputum (infection)</li> </ul>	<ul style="list-style-type: none"> <li>Tachypnea</li> <li>Kussmaul's respiration (metabolic acidosis)</li> <li>Rhonchi, wheezes</li> <li>Yellow or green sputum (infection)</li> </ul>
<b>SAFETY</b>	
<ul style="list-style-type: none"> <li>Dry, itching skin, skin ulcerations</li> <li>Paresthesia (diabetic neuropathy)</li> </ul>	<ul style="list-style-type: none"> <li>Skin breakdown, lesions, and ulcerations</li> <li>Weakness and paralysis of muscles, including respiratory musculature—if potassium levels are markedly decreased</li> <li>Decreased general strength and range of motion (ROM)</li> <li>Fever, diaphoresis, other signs of infection <b>P</b> (especially in children presenting in DKA as an initial presentation of T1DM)</li> </ul>
<b>SEXUALITY</b>	
<ul style="list-style-type: none"> <li>Vaginal discharge (prone to infection)</li> <li>Problems with impotence (men), orgasmic difficulty (women)</li> </ul>	
<b>TEACHING/LEARNING</b>	
<ul style="list-style-type: none"> <li>Familial risk factors, such as diabetes mellitus, heart disease, stroke, hypertension</li> <li>Slow and delayed healing</li> <li>History of failure to comply with insulin or oral diabetes medications prescriptions</li> <li>Use of drugs, such as steroids, thiazide diuretics, phenytoin (Dilantin), and phenobarbital (can increase glucose levels)</li> </ul>	
<b>DISCHARGE PLAN CONSIDERATIONS</b>	
<ul style="list-style-type: none"> <li>May need assistance with dietary regimen, glucose monitoring, medication administration, supplies, and self-care</li> </ul> <p>► Refer to section at end of plan for postdischarge considerations.</p>	

## DIAGNOSTIC STUDIES

### TEST

### WHY IT IS DONE

### WHAT IT TELLS ME

#### BLOOD TESTS

- **Glucose:** The gold standard for diagnosing diabetes is an elevated plasma glucose level after an overnight fast.

**Diabetes diagnosis (type 1):** This person typically presents with symptoms of uncontrolled hyperglycemia (e.g., polyuria, polydipsia, polyphagia). In such cases, the diagnosis of DM can be confirmed with a random (nonfasting) plasma glucose concentration of 200 mg/dL or a fasting plasma glucose concentration of 126 mg/dL or higher (Khaderi, 2017).

**P Note:** A1C is not typically measured when person presents with overt symptoms of uncontrolled hyperglycemia, as often occurs in children (Vehik et al, 2012).

**Diabetes diagnosis (type 2):** A fasting plasma glucose (FPG) value above 126 mg/dL, a 2-hour plasma glucose above 200 mg/dL after an oral glucose challenge, or A1C greater than 6.5% establishes a diagnosis of diabetes. **Note:** Use of the A1C test is recommended for persons with T2DM. **P Since more children/youth are now being diagnosed with T2DM, this test may be used as a screening tool in children.**

**DKA diagnosis:** Is defined as glucose greater than 250 mg/dL in association with an arterial pH of less than 7.30, or serum bicarbonate of less than 15 mEq/L, and ketonemia (serum ketones) and ketonuria (abnormally large amounts of ketones in urine) (Hamdy, 2014).

When insulin levels are too low or there is not enough glucose to use for energy, the body burns fat for energy. The body then makes ketone bodies (waste products) that cause the acid level in the blood to become too high. Ketones may also be present in the urine as levels reach threshold and “spill” over into the urine.

Osmolality increases with dehydration and decreases with overhydration. In DKA, osmolality is elevated.

Elevated level is associated with conditions that produce (1) actual hypoglycemia; (2) relative lack of glucose, such as trauma or infection; or (3) lack of insulin. Therefore, glucagon may be elevated with severe DKA despite hyperglycemia.

May be decreased or absent (type 1) or normal to high (type 2), indicating absolute or relative deficiency of body's insulin (endogenous), or improper use of insulin preparations (exogenous).

These tests may be helpful in diagnosing autoimmune diabetes such as latent autoimmune diabetes (LADA) or slowly progressing T1DM (Kawasaki et al, 2010).

Sodium may be low, normal, or high (with total body depletion). Initial potassium level may be high, normal, or low (total body depletion). Potassium may be falsely elevated, reflecting cellular shifts, then markedly decrease with treatment of the DKA. Phosphate may be normal or low; chloride may be high. Levels are determined by amount of solute and water loss, which is not always equal.

Usually reflect low pH and decreased  $\text{HCO}_3^-$  (metabolic acidosis) with compensatory respiratory alkalosis.

#### BLOOD TESTS

- **Hemoglobin A1c test, also called A1C, or HbA1c, or glycated hemoglobin test:** Levels provide an estimate of plasma glucose levels during the preceding 1 to 3 months. The normal range is between 4% and 5.6%. Target level for diabetics is <7%.

- **Total serum ketones:** Types of naturally occurring and synthetic lipid compounds.

- **Serum osmolality:** Measures the concentration of particles found in the fluid part of blood to help evaluate the body's water balance. Normal calculated values range from 280 to 303 mOsm/K.

- **Glucagon:** Hormone that raises the blood glucose level.

- **Serum insulin:** Peptide hormone that enables the body to metabolize and use glucose.

- **Islet cell autoantibodies:** Partial listing may include such tests as islet cell cytoplasmic autoantibodies (ICAs), glutamic acid decarboxylase-65 autoantibody (GAD-65A), insulioma-assoicated-2 autoantibody (IA-2A), and insulin autoantibodies (IAAs).

- **Electrolytes:** Substances that dissociate into ions in solution and acquire the capacity to conduct electricity. Common electrolytes include sodium, potassium, chloride, calcium, and phosphate.

- **Arterial blood gases (ABGs):** Assessment of ABG levels of oxygen ( $\text{PaO}_2$ ), carbon dioxide ( $\text{PaCO}_2$ ), bicarbonate ( $\text{HCO}_3^-$ ), and pH.

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li><b>Complete blood count (CBC):</b> Battery of screening tests, which typically includes Hgb; hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; white blood cell (WBC) count and differential.</li> </ul>	Hct may be elevated, reflecting dehydration; increased WBCs or leukocytosis suggests hemoconcentration, response to stress, or infection.

## OTHER DIAGNOSTIC STUDIES

- Urine:** Urine glucose correlates poorly with blood glucose, being dependent on renal glucose threshold (150 to 300 mg/dL) and should be used only if measuring of blood glucose is not possible or as a confirmatory test. Ketones should be self-monitored during febrile illness or when DKA symptoms are present.
- Cultures and sensitivities:** Specimens may include urine, sputum, or wound drainage.
- CT scan or MRI of head**

In DKA, urine tests are positive for glucose and ketones. Specific gravity and osmolality may be elevated if dehydration is present.

May reveal source of infection and identify effective antimicrobial agent. These imaging studies can detect early cerebral edema and may be used in children with altered mental status and DKA (Hamdy, 2014).

## NURSING PRIORITIES

- Restore fluid, electrolyte, and acid-base balance.
- Correct or reverse metabolic abnormalities.
- Identify and assist with management of underlying cause or disease process.
- Prevent complications.
- Provide information about disease process, prognosis, self-care, and treatment needs.

## DISCHARGE GOALS

- Homeostasis achieved.
- Causative and precipitating factors corrected or controlled.
- Complications prevented or minimized.
- Disease process, prognosis, self-care needs, and therapeutic regimen understood.
- Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: deficient Fluid Volume [specify]

### May Be Related To

Active fluid losses—diarrhea, vomiting, osmotic diuresis  
Barrier to accessing fluid; insufficient fluid intake—nausea, vomiting, anorexia, mental status changes  
Factors influencing fluid needs [e.g., hypermetabolic state; compromised regulatory mechanisms]

### Possibly Evidenced By

Increased urine output (hyperglycemia); decreased urine output, increased urine concentration (dehydration)  
Weakness, thirst, sudden weight loss  
Dry skin and mucous membranes, poor skin turgor  
Decreased blood pressure, increased pulse rate, decreased pulse pressure  
Alteration in mental status

### Desired Outcomes/Evaluation Criteria—Client Will

#### Fluid Balance NOC

Demonstrate adequate hydration as evidenced by stable vital signs, palpable peripheral pulses, good skin turgor and capillary refill, individually appropriate urinary output, and electrolyte levels within normal range.

## ACTIONS/INTERVENTIONS

## RATIONALE

### Fluid/Electrolyte Management NIC

#### Independent

Obtain history from client and significant other (SO) related to duration and intensity of symptoms, such as vomiting and excessive urination.

Helps estimate total volume depletion. Symptoms may have been present for varying amounts of time—hours to days. Presence of infectious process results in fever and hypermetabolic state, increasing insensible fluid losses.

(continues on page 460)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor vital signs:	
Note orthostatic BP changes.	Hypovolemia may be manifested by hypotension and tachycardia. Estimates of severity of hypovolemia may be made when client's systolic BP drops more than 10 mm Hg from a recumbent to a sitting or standing position.
Respiratory pattern, such as Kussmaul's respirations, acetone breath	Lungs remove carbonic acid through respirations, producing a compensatory respiratory alkalosis or ketoacidosis. Acetone breath is due to breakdown of acetoacetic acid and should diminish as ketosis is corrected.
Respiratory rate and quality; use of accessory muscles, periods of apnea, and appearance of cyanosis	Correction of hyperglycemia and acidosis will cause the respiratory rate and pattern to approach normal. In contrast, increased work of breathing—shallow, rapid respirations—and presence of cyanosis may indicate respiratory fatigue and that client is losing ability to compensate for acidosis.
Temperature, skin color, and moisture	Although fever, chills, and diaphoresis are common with infectious process, fever with flushed, dry skin may reflect dehydration. Note: Although infection is a common precipitating factor for DKA, client may be normothermic, feverish, or hypothermic (because of peripheral vasodilation).
Assess peripheral pulses, capillary refill, skin turgor, and mucous membranes.	Indicators of level of hydration and adequacy of circulating volume.
Monitor intake and output (I&O); note urine-specific gravity.	Provides ongoing estimate of volume replacement needs, kidney function, and effectiveness of therapy.
Weigh daily.	Provides the best assessment of current fluid status and adequacy of fluid replacement.
Promote comfortable environment. Cover client with light sheets.	Avoids overheating, which could promote further fluid loss.
Investigate changes in mentation and sensorium.	Changes in mentation can be due to abnormally high or low glucose, electrolyte abnormalities, acidosis, decreased cerebral perfusion, or developing hypoxia. Regardless of the cause, impaired consciousness can predispose client to aspiration.
<b>Collaborative</b>	
Administer fluids, as indicated such as:	Intravenous solutions replace extravascular and intravascular fluids and replenish electrolyte losses. They also dilute both the levels of glucose and circulating counterregulatory hormones (see Glossary) (Hamdy, 2014).
Isotonic (0.9%) or lactated Ringer's solution without additives. (Type of solution may be changed after initial stabilization according to physician orders or DKA protocol.)	Type and amount of fluid depends on degree of deficit and individual client response. Note: Client with DKA is often severely dehydrated due to active fluid losses and fluid shifts within the body, because of metabolic influences. Recent fluid replacement recommendations include 1 to 3 liters (L) of isotonic saline or lactated Ringer's during the first hour of treatment, followed by 1 L during the second hour, 1 L during the following 2 hours, and then 1 L every 4 hours (Hamdy, 2014).  The International Society for Pediatric and Adolescent Diabetes (ISPAD) Clinical Practice Consensus Guidelines suggest that initial fluid replacement in pediatric patients should be 10 to 20 mL/kg of 0.9% saline during the first 1 to 2 hours (Wolfsdorf et al, 2007).
Albumin, plasma, dextran	Plasma expanders may occasionally be needed if the deficit is life-threatening and BP does not normalize with rehydration efforts.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Insert and maintain indwelling urinary catheter, if indicated.	Provides for accurate and ongoing measurement of urinary output, especially if autonomic neuropathies result in neurogenic bladder with urinary retention and overflow incontinence. May be removed when client is stable to reduce risk of infection.
Monitor laboratory studies, such as:	
Hct	Assesses level of hydration; Hct is often elevated because of hemoconcentration associated with osmotic diuresis.
Blood urea nitrogen (BUN)/creatinine (Cr)	Elevated values may reflect cellular breakdown from dehydration or signal the onset of renal failure.
Serum osmolality	Elevated because of hyperglycemia and dehydration.
Sodium	May be decreased, reflecting shift of fluids from the intracellular compartment as with osmotic diuresis. High sodium values reflect severe fluid loss and dehydration or sodium reabsorption in response to aldosterone secretion.
Potassium	Initially, hyperkalemia occurs in response to metabolic acidosis, but as this potassium is lost in the urine, the absolute potassium level in the body is depleted. As insulin is replaced and acidosis is corrected, serum potassium deficit becomes apparent.
Administer potassium and other electrolytes intravenously (IV) or by oral route, as indicated.	Potassium should be added to the IV as soon as urinary flow is adequate, to prevent hypokalemia. Note: Potassium phosphate may be drug of choice when IV fluids contain sodium chloride in order to prevent chloride overload. Phosphate concentrations tend to decrease with insulin therapy.
Administer bicarbonate, if indicated, for example, if pH is less than 7.1.	Not routinely necessary and given with caution to help correct acidosis in the presence of hypotension or shock, lactic acidosis, or severe hyperkalemia.
Insert nasogastric (NG) tube and attach to suction, as indicated.	Decompresses stomach and may relieve vomiting.

### NURSING DIAGNOSIS: **unstable Blood Glucose Level**

#### May Be Related To

Insufficient diabetes management or adherence to diabetes management plan; inadequate blood glucose monitoring or ineffective medication management

Insufficient dietary intake; excessive weight gain or loss; rapid growth period; pregnancy

Compromised physical health status; excessive stress; [infectious process]

#### Possibly Evidenced By

Inadequate/inappropriate food intake, lack of interest in food

Weakness, fatigue, poor muscle tone

Altered level of consciousness (LOC)

Increased urinary output, dilute urine

#### Desired Outcomes/Evaluation Criteria—Client Will

##### **Blood Glucose Level NOC**

Achieve and maintain glucose in satisfactory range.

##### **Self-Management: Diabetes NOC**

Acknowledge factors that lead to unstable glucose and DKA.

Verbalize understanding of body and energy needs.

Verbalize plan for modifying factors to prevent or minimize complications.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hyperglycemia Management NIC</b> <i>Independent</i>	
Determine individual factors that may have contributed to current situation. Note client's age, developmental level, and awareness of needs.	Occasionally, client with "no known diabetes" will present with DKA, especially a young person with some type of precipitating infection. However, many times DKA is precipitated by failure of diabetes management, possibly related to dietary factors, activity, or medications. <b>P</b> Because DKA presents more frequently in the young client with known T1DM, there has been a failure to account for developmental changes, such as a growth spurt or adolescent pregnancy.
Perform blood glucose testing. Ascertain whether client and SO(s) are adept at blood glucose monitoring and are testing according to plan.	All available glucose monitors will provide satisfactory readings if properly used and maintained and routinely calibrated. Note: Unstable blood glucose is often associated with failure to perform testing on a regular schedule. Frequent glucose monitoring at home makes DKA less likely, as it allows client/caregiver to promptly search for reasons for unexpectedly high glucose levels before condition progresses to DKA (Bradley & Tobias, 2008).
For client on oral diabetes medications, review medications and ask about client's adherence to treatment plan.	A client presenting in DKA may not have been on either oral drugs or insulin prior to this incident, client may not have followed therapeutic regimen, or glucose may not be well controlled on current meds. (For additional information about oral diabetes medication refer to ND; ineffective Health Maintenance, end of this care plan.)
For client receiving insulin:	Physiologic insulin replacement is the standard of care in persons with advanced insulin deficiency. <b>P</b> Note: Children with diabetes usually have type 1 and thus a lifetime dependence on exogenous insulin. Most young children require two or more injections of insulin daily, with doses adjusted on the basis of intermittent monitoring of blood glucose levels. Typically, they receive around 50% of the basal requirement in the morning; the remainder is given as food-related boluses. Older children and adolescents may receive insulin via a programmable pump, over time, and in two ways: (1) a steady measured and continuous dose ("basal" insulin) and (2) a surge ("bolus") dose, at client's direction, around mealtime (ADA, 2015; Lamb, 2017).
Review type(s) of insulin used, such as ultra-short acting (e.g., lispro, aspart), short acting (e.g., regular), intermediate (e.g., NPH), and long acting (e.g., glargine, ultralente). Note delivery method—inhaled, subcutaneous injections, premixed pen injector, insulin infuser, or pump. Note times when short-acting, intermediate-acting, and long-acting insulins are administered, duration, and when they peak.	These factors affect timing of effects and provide clues to potential timing of glucose instability. Insulin products have differing onset, peak, and duration of action, ranging from ultra-short acting to ultra-long acting. The use of longer-acting insulin preparations and the continuous delivery of insulin via pump can produce near-normal glycemia (Meneghini, 2016).
Check injection sites.	Insulin absorption can vary from day to day in healthy sites and is even less absorbable in lypohypertrophic (lumpy) tissues.
Review client's dietary program and usual pattern; compare with recent intake.	Identifies deficits and deviations from therapeutic plan, which may precipitate unstable glucose and uncontrolled hyperglycemia.
Weigh daily or as indicated.	Assesses adequacy of nutritional intake—both absorption and utilization. <b>P</b> Note: Eating disorders are a contributing factor in 20% of recurrent DKA in young clients (Polin, 2015).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Auscultate bowel sounds. Note reports of abdominal pain and bloating, nausea, or vomiting. Maintain nothing by mouth (NPO) status, as indicated.	Hyperglycemia and fluid and electrolyte disturbances decrease gastric motility and function resulting in gastroparesis, affecting choice of interventions. Note: Long-term difficulties with gastroparesis and poor intestinal motility suggest autonomic neuropathies affecting the GI tract and requiring symptomatic treatment.
Provide liquids containing nutrients and electrolytes as soon as client can tolerate oral fluids; progress to more solid food as tolerated.	Oral route is preferred when client is alert and bowel function is restored.
Identify food preferences, including ethnic and cultural needs.	Incorporating as many of the client's food preferences into the meal plan as possible increases cooperation with dietary guidelines after discharge.
Include SO in meal planning, as indicated.	Promotes sense of involvement; provides information for SO to understand nutritional needs of client. Note: Various methods available for dietary planning include carbohydrate counting, exchange list, point system, or preselected menus.
Observe for signs of hypoglycemia—changes in LOC, cool and clammy skin, rapid pulse, hunger, irritability, anxiety, headache, lightheadedness, and shakiness.	Once carbohydrate metabolism resumes, blood glucose level will fall, and as insulin is being adjusted, hypoglycemia may occur. Unless client is comatose, hypoglycemia can occur without notable change in LOC. This potentially life-threatening emergency should be assessed and treated quickly per protocol. Note: Type 1 diabetics of long standing may not display usual signs of hypoglycemia because normal response to low blood sugar may be diminished.
<b>Collaborative</b>	
Monitor laboratory studies, such as serum glucose, acetone, pH, and $\text{HCO}_3^-$ .	Blood glucose will decrease slowly with controlled fluid replacement and insulin therapy. With the administration of optimal insulin dosages, glucose can then enter the cells and be used for energy. When this happens, acetone levels decrease and acidosis is corrected.
Collaborate in treatment of hyperglycemia in DKA:	Treatment is focused on correction of metabolic imbalances and includes (1) correction of fluid loss with intravenous fluids; (2) correction of hyperglycemia with insulin; (3) correction of electrolyte disturbances, particularly potassium loss; (4) correction of acid-base balance; and (5) treatment of concurrent infection, if present (Hamdy, 2014).
Administer rapid (short)-acting insulin, such as regular (Humulin R), lispro (Humalog), or aspart (Novolog) by intermittent or continuous IV method, for example, IV bolus followed by a continuous drip via pump of approximately 5 to 10 units/hr so that glucose is reduced by 50 to 75 mg/dL/hr.	Rapid-acting insulin is used in hyperglycemic crisis. The IV route is the initial route of choice because absorption from subcutaneous tissues may be erratic. Many believe the continuous method is the optimal way to facilitate transition to carbohydrate metabolism and reduce incidence of hypoglycemia. Note: Intermediate insulin, such as NPH, Humulin N, Lente, and long-acting insulin, such as Ultralente, protamine zinc insulin (PZI), and glargin (Lantus), may be part of the client's usual or added insulins but are not part of crisis hyperglycemic treatment.
Administer glucose solutions, for example, 5% dextrose and half-normal saline.	Glucose solutions may be added after insulin and fluids have brought the blood glucose to approximately 180 mg/dL (Hamdy, 2014). As carbohydrate metabolism approaches normal, care must be taken to avoid hypoglycemia.
Consult with nutritionist or dietitian for resumption of oral intake.	Useful in calculating and adjusting diet to meet client's specific needs; answer questions and assist client and SO in developing meal plans.

(continues on page 464)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide diet of approximately 60% carbohydrates, 20% proteins, and 20% fats in designated number of meals and snacks.	Complex carbohydrates help to maintain more stable glucose levels, reduce serum cholesterol levels, and promote satiation. Food intake is scheduled according to specific insulin characteristics, such as peak effect and individual client response. Note: A snack of complex carbohydrates at bedtime is especially important if insulin is given in divided doses to prevent hypoglycemia during sleep and potential Somogyi response.

## NURSING DIAGNOSIS: risk for Infection

### Possibly Evidenced By

Chronic disease—diabetes mellitus [hyperglycemia, metabolic disorder; poor tissue perfusion]

Alteration in skin integrity; invasive procedures/devices

Leukopenia; decrease in ciliary action

Increased environmental exposure to pathogens; [preexisting respiratory or urinary tract infection]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Risk Control: Infectious Process NOC

Be free of infection(s).

Identify interventions to prevent or reduce risk of infection.

Demonstrate techniques and lifestyle changes to prevent development of infection.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Prevention NIC</b>	
<i>Independent</i>	
Observe for signs of infection and inflammation—fever, flushed appearance, wound drainage, purulent sputum, and cloudy urine.	Client may be admitted with infection, which could have precipitated the ketoacidotic state, or can develop a hospital-acquired infection.
Model and promote good handwashing by staff and client.	Reduces risk of cross-contamination.
Maintain aseptic technique for IV insertion procedure, administration of medications, and providing site care. Rotate IV sites, as indicated.	High glucose in the blood creates an excellent medium for bacterial growth.
Provide catheter and perineal care, where indicated. Teach the female client to clean from front to back after elimination.	Minimizes risk of UTI. Comatose client may be at particular risk if urinary retention occurred before hospitalization. Note: Elderly female diabetic clients are especially prone to UTIs and vaginal yeast infections. Many UTIs are asymptomatic, possibly related to neurogenic bladder.
Provide conscientious skin care, keep the skin dry, and keep linens dry and wrinkle-free.	Peripheral circulation may be impaired, placing client at increased risk for skin irritation and breakdown and infection.
Inspect client's feet, noting presence of ulcers, infected ingrown toenails, or other problems requiring medical or nursing intervention.	Foot injuries, sensory neuropathy, and impaired circulation are associated with many complications in diabetics, including skin and soft tissue infections (cellulitis) with potential for amputations. These infections can affect any skin surface but most commonly involve the feet (Khordori, 2015). Note: Cellulitis can precipitate DKA.
Auscultate breath sounds.	Rhonchi indicate accumulation of secretions possibly related to pneumonia or bronchitis that may have precipitated the DKA.
Place in semi-Fowler's position.	Facilitates lung expansion and reduces risk of aspiration.
Reposition and encourage coughing and deep breathing if client is alert and cooperative. Otherwise, suction airway, using sterile technique, as needed.	Aids in ventilating all lung areas and mobilizing secretions. Prevents stasis of secretions with increased risk of infection.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide tissues and trash bag in a convenient location for sputum and other secretions. Instruct client in proper handling of secretions.	Minimizes spread of infection.
Encourage and assist with oral hygiene.	Reduces risk of oral and gum disease.
Encourage adequate dietary and fluid intake (at least 2500 mL/d if not contraindicated by cardiac or renal dysfunction), including 8 oz of cranberry juice per day, as appropriate.	Decreases susceptibility to infection. Increased urinary flow prevents stasis and aids in maintaining urine acidity, reducing bacteria growth and flushing organisms out of system. Note: Use of cranberry juice can help prevent bacteria from adhering to the bladder wall, reducing the risk of recurrent UTI.
<b>Collaborative</b>	
Obtain specimens for culture and sensitivities, as indicated.	Identifies organism(s) so that most appropriate drug therapy can be instituted.
Administer antibiotics, as appropriate.	Early treatment may help prevent sepsis.

### NURSING DIAGNOSIS: [risk for disturbed Sensory Perception, (specify)]

#### Possibly Evidenced By

[Biochemical imbalance (e.g., glucose, insulin, electrolyte; insulin resistance, dehydration)]

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Neurological Status NOC

Regain/maintain usual level of mentation.

Recognize and compensate for existing sensory impairments.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Neurologic Monitoring NIC</b>	
<i>Independent</i>	
Monitor vital signs and mental status.	Provides a baseline from which to compare abnormal findings; for instance, fever may affect mentation.
Address client by name; reorient as needed to place, person, time, and situation. Give short explanations, speaking slowly and enunciating clearly.	Decreases confusion and helps maintain contact with reality.
Schedule nursing activities to provide for uninterrupted rest periods.	Promotes restful sleep, reduces fatigue, and may improve cognition.
Keep client's routine as consistent as possible. Encourage participation in activities of daily living (ADLs) as able.	Helps keep client in touch with reality and maintain orientation to the environment.
Protect client from injury—avoid or limit use of restraints as able, place bed in low position when cognition is impaired or seizures occur. Pad bed rails if client is prone to seizures.	Disoriented client is prone to injury, especially at night, and precautions need to be taken as indicated. Seizure precautions reduce risk of physical injury.
Evaluate visual acuity, as indicated.	Retinal edema or detachment, hemorrhage, presence of cataracts, or temporary paralysis of extraocular muscles may impair vision, requiring corrective therapy or supportive care. Note: Retinopathy is a very common microvascular complication associated with diabetes and is the cause of approximately 8000 new cases of blindness annually (Bhavasar et al, 2017).
Investigate reports of hyperesthesia, pain, or sensory loss in the feet and legs. Determine issue client may have with walking. Ascertain if client has (or needs) mobility aids.	Peripheral neuropathies may result in severe discomfort and absent or distorted tactile sensation, potentiating risk of impaired balance.
Keep hands and feet warm, avoiding exposure to cool drafts, hot water, or heating pad.	Reduces discomfort and potential for dermal injury. Note: Sudden development of cold hands and feet may reflect hypoglycemia, suggesting need to evaluate serum glucose level.

(continues on page 466)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assist with ambulation or position changes.	Promotes client safety, especially when sense of balance is affected.
<b>Collaborative</b> Carry out prescribed regimen for correcting DKA, as indicated.	Alteration in thought processes and potential for seizure activity is usually alleviated once hyperosmolar state is corrected.
Monitor laboratory values, such as blood glucose, serum osmolality, Hgb/Hct, and BUN/Cr.	Imbalances can impair mentation. Note: If fluid is replaced too quickly, water intoxication can occur—sodium concentration falls, water enters brain cells, and confusion, disorientation, or coma may develop.

## NURSING DIAGNOSIS: **ineffective Coping**

### May Be Related To

Situational or maturational crisis [long-term, progressive illness that is not curable]; inadequate opportunity to prepare for stressor

High degree of threat; inaccurate threat appraisal

Inadequate confidence in ability to deal with situation; inadequate level of perception of control

### Possibly Evidenced By

Inability to deal with situation or ask for help

Insufficient goal-directed behavior, problem-solving, or problem resolution

Ineffective coping strategies; risk-taking behavior

### Desired Outcomes/Evaluation Criteria—Client Will

#### Health Beliefs: Perceived Control NOC

Assess the current situation accurately; identify ineffective coping behaviors and consequences.

Verbalize awareness of own coping abilities and sense of control.

Meet psychological needs as evidenced by appropriate expression of feels, identification of options, and use of resources.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Coping Enhancement NIC</b>	
<b>Independent</b>	
Determine client's developmental level of functioning and client/care provider/significant other (SO) ability to understand events.	A client and/or family experiencing a new diagnosis of diabetes, a first-time DKA, or failure of diabetes management can be vulnerable and upset. <b>P</b> Because the onset of T1DM is typically in childhood or adolescence, developmental issues are certainly in play.
Determine individual stressors (e.g., family issues, school, work, and social issues; finances).	A new diagnosis of diabetes or a crisis of diabetes management frequently adds more stressors than the client or family feels able to deal with.
Determine (if possible) changes that may occur (or have occurred) as a result of diabetes (e.g., in relationship or role with SO; client is involved in risk-taking behavior [e.g., alcohol/other drug use, child's eating disorder is escalating, or client is refusing to take diabetes meds]).	The client and SOs may have significant distress and turmoil in their lives. Complications and setbacks occur, people act out, and changes occur that affect the lives of everyone involved. Even those who are highly motivated to adhere to treatment may struggle adapting to a lifelong condition and need external supports.
Explain disease process, current procedures, and expectations in a simple, concise manner.	May help client/SO to express emotions, grasp the situation, and feel more in control.
Encourage client and SO to express feelings about current crisis/hospitalization and diabetes in general.	Identifies concerns and facilitates problem-solving.
Active-listen to concerns. Acknowledge normality of feelings.	Recognition that these reactions are normal can help client problem-solve and seek help as needed. Diabetic control is a full-time job that serves as a constant reminder of both presence of condition and threat to client's health and life.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess how client has handled problems in the past; identify locus of control.	Knowledge of individual's style helps determine needs for treatment goals. Client whose locus of control is internal usually looks at ways to gain control over own treatment program. Client who operates with an external locus of control wants to be cared for by others and may project blame for circumstances onto external factors.
Provide opportunity for SO to express concerns and discuss ways in which he or she can be helpful to client.	Enhances sense of being involved and gives SO a chance to problem-solve solutions to help client prevent recurrence.
Ascertain expectations and goals of client and SO.	Unrealistic expectations and pressure from others or self may result in feelings of frustration or loss of control and may impair coping abilities.
Support participation in self-care and give positive feedback for efforts. Provide for gradual implementation and continuation of necessary behaviors and lifestyle changes.	Promotes feeling of control over situation and can enhance commitment to plan.
<b>Collaborative</b> Collaborate in management of underlying condition(s).	As diabetes control is reestablished and other contributing conditions are treated, client's/SO's sense of optimism and coping abilities may be restored/enhanced.
Refer to diabetes educator, nutrition team, medical equipment, home-care providers, other outside resources, and/or professional therapy as indicated.	Education and support (people and other resources) are important in assisting the client/SO to understand that they can live life in a normal way but within their given limitations.

### NURSING DIAGNOSIS: **ineffective Health Management**

#### May Be Related To

Insufficient knowledge of and complexity of healthcare regimen  
 Decisional conflicts; family conflict; family pattern of healthcare; insufficient social support  
 Perceived seriousness of condition, susceptibility, benefit or barrier  
 Economically disadvantaged

#### Possibly Evidenced By

Difficulty with prescribed regimen  
 Ineffective choices in daily living for meeting health goals  
 Failure to include treatment regimen in daily living or take actions to reduce risk factors  
 Unexpected acceleration of illness symptoms

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Knowledge: Diabetes Management NOC

Verbalize understanding of disease process and potential complications.  
 Identify relationship of signs and symptoms to the disease process and correlate symptoms with causative factors.

##### Self-Management: Diabetes NOC

Verbalize acceptance of need and desire to change actions to achieve agreed-upon health goals.  
 Correctly perform necessary procedures and explain reasons for the actions.  
 Initiate necessary lifestyle changes and participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Learning Facilitation NIC</b> <i>Independent</i> Create an environment of trust by listening to concerns and being available.	Rapport and respect need to be established before client will be willing to take part in the learning process.
Work with client in setting mutual goals for learning.	Participation in the planning promotes enthusiasm and cooperation with the principles learned.

(continues on page 468)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Select a variety of teaching strategies, such as demonstrating needed skills and having client do return demonstration, incorporating new skills into the hospital routine.	Use of different means of accessing information promotes information retention.
<b>Teaching: Disease Process NIC</b>	
Discuss essential elements, such as the following:	
Explain the normal blood glucose range and how it compares with client's level, the type of diabetes the client has, and the relationship between insulin deficiency and a high glucose level.	Provides knowledge base from which client can make informed lifestyle choices.
Reasons for the DKA (or other diabetes crisis) episode.	Knowledge of the precipitating factors may help avoid recurrences.
Acute and chronic complications of the disease, including visual disturbances, neurosensory and cardiovascular changes, renal impairment, and hypertension.	Awareness helps client be more consistent with care and may prevent or delay onset of complications.
Demonstrate client's glucose self-monitoring system, including fingerstick testing. Have client and SO return demonstration of obtaining sample and operating glucose meter until proficient.	Frequent (up to six to eight times daily) self-monitoring of blood glucose (SMBG) is the foundation of intensive T1DM management. There are many different blood glucose monitors available. The client/SO may desire recommendations for a meter that best meets the client's needs (e.g., large numbers on the screen because of poor eyesight or client needs a simple meter rather than one that is complex). Note: A just-released study suggests that blood glucose testing does not offer a significant advantage in blood sugar control for people with T2DM who are not treated with insulin (Young et al, 2017).
Ascertain that client/caregiver know client's desired glucose range and appropriate insulin coverage.	Desired blood glucose ranges are based on each individual's needs, but frequent testing promotes tighter control of serum levels.
Review client's particular dietary plan. In general, plan should include avoiding sugar and limiting intake of fat, salt, and alcohol; eating complex carbohydrates, especially those high in fiber such as fruits, vegetables, and whole grains.	Medical nutrition therapy for diabetes encourages client to make meal choices based on unique needs and preferences. Awareness of importance of dietary control aids client in planning meals and sticking to regimen. Fiber can slow glucose absorption, decreasing fluctuations in serum levels but may cause GI discomfort, increase flatus, and affect vitamin and mineral absorption.
Review medication regimen (e.g., oral medication or insulin):	
Determine type of agent(s) the client with T2DM may be using (e.g., (1) <b>sulfonylureas</b> such as chlorpropamide [Diabinese], empagliflozin [Jardiance], and glipizide [Glucotrol]; (2) <b>biguanides</b> such as metformin [Glucophage, Glumetza]; (3) <b>meglitinides</b> such as repaglinide [Prandin] and nateglinide [Starlix]; (4) <b>thiazolidinediones</b> , such as rosiglitazone [Avandia] and pioglitazone [Actos]; (5) <b>alpha-glucosidase inhibitors</b> , such as acarbose [Precose] and miglitol [Glyset]; (6) <b>DPP-IV inhibitors</b> , such as sitagliptin [Januvia], linagliptin [Tradjenta], and exenatide [Byetta]; (7) <b>SGLT2 inhibitors</b> , such as dapagliflozin [Farxiga] and canagliflozin (Invokana); and (8) <b>combination agents</b> such as alogliptin and metformin [Kazano], rosiglitazone and glimepiride [Avandaryl]). Ascertain client's compliance with therapy.	Drugs for type 2 diabetes work in different ways to bring blood sugar levels back to normal. They include (1) drugs that increase insulin production (e.g., Diabinese, Prandin), (2) drugs that improve body's use of insulin (e.g., Actos, Avandia), (3) drugs that reduce sugar absorption in the intestines (e.g., Precose, Glyset), (4) drugs that decrease sugar production by the liver and improve insulin resistance (e.g., metformin), (5) drugs that increase insulin production by the pancreas and reduce sugar production by the liver (e.g., Januvia, Byetta), and (6) drugs that block reabsorption of glucose by the kidneys and increase glucose excretion (e.g., Farxiga, Invokana). Combination drugs contain more than one type of diabetes medication such as one to block reabsorption of glucose by the kidneys while also helping the pancreas produce more insulin and the liver to produce less glucose (Dansinger, 2016; Grams et al, 2015).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review type and timing of client's insulin(s), as indicated: both (1) <b>basal</b> (for long-term coverage) such as detemir (Levemir) and glargine (Lantus) and (2) <b>bolus</b> (for rapid-action coverage) such as aspart (NovoLog), glulisine (Apidra), lispro (Humalog), and human insulin inhaled powder (Afrezza).	Long-acting <b>basal</b> insulins work to provide around-the-clock blood sugar control for both types of diabetes (and is likely the first type of insulin given for T2DM). Fast-acting <b>bolus</b> insulin(s) (injected or inhaled) may be given near mealtimes in both types of diabetes. Mixed insulins are available in either a vial or insulin pen. If multiple daily injections are required, combinations of types (e.g., rapid-acting plus short-acting, intermediate, and long-acting insulin) are used. If the pump method is used, only rapid-acting insulin is used, and client programs own basal and bolus settings (Vallerand et al, 2017). Note: DKA is rare among pump users who perform SMBG adequately but can develop quickly because of the short half-life of rapid-acting insulin analogues commonly used in pumps.
Review and obtain return demonstration of self-administration of insulin, either injection or pump, and care of equipment. Have client demonstrate procedure: drawing up and injecting insulin, insulin pen technique, or use of continuous pump.	Confirms that client is proficient in skills or will require assistance or full care in managing procedures and equipment.
Emphasize importance of maintaining diary of glucose testing, medication dose and time, dietary intake, activity, feelings, sensations, and life events.	Aids in creating overall picture of client situation to achieve better disease control and promotes self-care and independence.
Discuss factors that play a part in diabetic control such as aerobic versus isometric exercise, stress, surgery, and illness. Review "sick day" rules.	This information promotes diabetic control and can greatly reduce the occurrence of ketoacidosis. Note: Aerobic exercise such as walking and swimming promotes effective use of insulin, lowering glucose levels, and strengthens the cardiovascular system. A "sick day" management plan helps maintain equilibrium during illness, minor surgery, severe emotional stress, exogenous steroids (as with spinal or joint injections or any oral treatment for asthma and arthritis), or any condition that might send glucose spiraling upward.
Review effects of smoking. Encourage cessation of smoking.	Nicotine constricts the small blood vessels, and insulin absorption is delayed for as long as these vessels remain constricted.
Establish regular exercise or activity schedule and identify corresponding insulin concerns.	Exercise times should not coincide with the peak action of insulin. A snack should be ingested before or during exercise as needed, and rotation of injection sites should avoid the muscle group that will be used in the activity (e.g., abdominal site is preferred over thigh or arm before jogging or swimming) to prevent accelerated uptake of insulin.
Identify the symptoms of hypoglycemia—weakness, dizziness, lethargy, hunger, irritability, diaphoresis, pallor, tachycardia, tremors, headache, and changes in mentation—and explain causes.	Client/caregiver must be made aware of the signs and symptoms of hypoglycemia and educated about ways to manage it. It has been shown that hypoglycemia is often the result of diabetes management errors (i.e., incorrect dosing or timing of insulin, failure to eat when needed, failure to keep blood glucose as close to normal levels as possible). Early detection and treatment of hypoglycemia can limit its effects and help prevent recurrence.
Instruct SO in emergency use of glucagon.	Given for treatment of severe hypoglycemia when client is unable to take oral carbohydrates. Prompt intervention may prevent more serious complications.
Emphasize importance of using medical alert ID bracelet or necklace.	Can promote quick entry into the health system and appropriate care with fewer resultant complications in the event of an emergency.

(continues on page 470)

**ACTIONS/INTERVENTIONS (continued)**

Instruct in importance of routine daily examination of the feet and proper foot care. Demonstrate ways to examine feet, inspect shoes for fit, and care for toenails, calluses, and corns. Encourage use of natural-fiber stockings and refraining from going barefoot.

Emphasize importance of seeking medical attention promptly if foot injuries occur or ulcerations develop.

Emphasize importance of regular eye examinations, especially for clients who have had T1DM for 5 years or more.

Arrange for vision aids when needed, such as magnifying sleeve for insulin syringe, prefilled insulin pens, large-print instructions, and one-touch or talking glucose meters.

Discuss sexual functioning and answer questions client and SO may have.

Recommend reading product labels and avoidance of over-the-counter (OTC) drugs without prior discussion with healthcare provider.

Discuss importance of follow-up care.

Review signs and symptoms requiring medical evaluation—fever, cold, or flu symptoms; cloudy, odorous urine; painful urination; delayed healing of cuts or sores; sensory changes with pain or tingling of lower extremities; changes in blood sugar level; and presence of ketones in urine.

Identify community resources such as the American Diabetes Association, Internet resources, and online diabetes bulletin boards, visiting nurse, weight-loss or smoking cessation clinics, contact person, or diabetic instructor.

**RATIONALE (continued)**

Prevents or delays complications associated with peripheral neuropathies and circulatory impairment, especially cellulitis, gangrene, and amputation. Studies show that diabetic foot ulcers are responsible for more hospitalizations than any other complication of diabetes (Rice et al, 2014) and are associated with reduced quality of life and higher risk for early mortality (Hingorani et al, 2016). Also, diabetes is the leading cause of nontraumatic lower extremity amputations in the United States. In fact, every year, approximately 5% of diabetics develop foot ulcers and 1% of those require amputation (Rowe, 2017). Prevention and early treatment of diabetic foot injuries/ulcers are therefore critical. Note: High-risk individuals such as those with significant neuropathy, foot deformities, or previous amputations may benefit from custom therapeutic footwear (Hingorani et al, 2016).

Clients with plantar foot ulcers may require off-loading with use of a contact cast or irremovable fixed ankle walking boot. Individuals with nonplantar wounds or healed ulcers may benefit from specific types of pressure-relieving footwear such as surgical sandal or a heel relief shoe (Hingorani et al, 2016).

Changes in vision may be gradual and are more pronounced in persons with poorly controlled DM and BP. Problems include changes in visual acuity and may progress to retinopathy and blindness. Note: Retinopathy is the most frequent cause of new blindness among adults 20 to 74 years of age (National Eye Institute [NEI], 2012).

Adaptive aids have been developed in recent years to help the visually impaired manage their own DM more effectively.

Impotence may be first symptom of onset of DM. Note: Counseling and use of penile prosthesis may be of benefit.

These products may contain sugars and interact with prescribed medications.

Helps maintain tighter control of disease process and may prevent exacerbations of DM, retarding development of systemic complications.

Prompt intervention may prevent development of more serious or life-threatening complications.

Continued support is usually necessary to sustain lifestyle changes and promote well-being.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **risk for unstable Blood Glucose Level**—lack of acceptance of diagnosis, inadequate blood glucose monitoring, average daily activity less than recommended, excessive stress
- **ineffective Health Management**—complexity of therapeutic regimen, economically disadvantaged, perceived susceptibility (recurrence of problem)
- **risk for Trauma**—alteration in sensation; insufficient vision
- **risk for Sexual Dysfunction**—altered body function (disease process)

## HYPERTHYROIDISM, THYROTOXICOSIS, AND THYROID STORM

**I. Pathophysiology**—Hyperthyroidism is the result of inappropriately elevated thyroid function. The term *thyrotoxicosis* refers to an excessive amount of circulating thyroid hormones from any source. Thyroid storm (also referred to as thyrotoxic crisis) occurs when a large amount of thyroid hormone is released in a short period of time. A diagnosis of thyroid storm is based on the presence of severe and life-threatening symptoms (high fever, cardiovascular dysfunction, and altered mentation) in the setting of biochemical evidence of hyperthyroidism. Approximately 1% to 2% of patients with hyperthyroidism progress to thyroid storm (Ross, 2017).

**II. Etiology**

- a. Metabolic imbalance resulting from overproduction of the thyroid hormones triiodothyronine ( $T_3$ ) and thyroxine ( $T_4$ ), creating a life-threatening emergency.
- b. Thyroid storm is extreme thyrotoxicosis, which can occur with or without preexisting hyperthyroidism (Leung, 2016), but is usually associated with untreated (or inadequately treated) hyperthyroidism.
- c. Genetic factors appear to influence the incidence of thyroid disorders. For example, Hashimoto's hypothyroidism and Graves' disease often occur in multiple members of the same family.
- d. Varied causation of hyperthyroidism:
  - i. Toxic diffuse goiter (also called Graves' disease) is the most common form of hyperthyroidism, accounting for 80% of hyperthyroidism diagnoses; it predominantly affects those aged 20 to 40 years (Lee & Ananthakrishnan, 2017; Schraga, 2017).
  - ii. Chronic, subacute, and “silent” thyroiditis (Hashimoto's thyroiditis). *Note:* Although subacute thyroiditis is the primary cause of hypothyroidism, it can initially present (in 15%–20% of cases) with thyrotoxicosis (Lee & Ananthakrishnan, 2017; Schraga, 2017).
  - iii. Toxic nodular goiter (TNG): TNG is a spectrum of the disease ranging from a single hyperfunctioning nodule (toxic adenoma) within a multinodular thyroid to one gland with multiple areas of hyperfunction. Toxic multinodular goiter (TMG) accounts for 15% to 20% of thyrotoxicosis but primarily in world regions of iodine deficiency. Toxic adenoma is the cause of 3% to 5% of thyrotoxicosis (Lee & Ananthakrishnan, 2017; Orlander et al, 2016).

iv. Pituitary tumors (e.g., thyroid-stimulating hormone-secreting [TSH] tumors) can cause thyroid to make too much thyroxine. Although this type of tumor is rare, it can cause hyperthyroidism (Toft, n.d.).

v. Thyroid cancers: Graves' disease appears to be linked with larger, multifocal, and potentially more aggressive thyroid cancers when compared with single or multinodular toxic goiter. In one study, thyroid cancers were found in 22.2% of patients with thyroid nodules in Graves' goiters compared with 2.9% of patients with diffuse toxic goiter with no nodules (Vole, 2016).

vi. Pregnancy: Hyperthyroidism affects 0.1% to 0.4% of pregnancies (Ogunyemi, 2016). The most common cause of hyperthyroidism in women of childbearing age is autoimmune Grave's disease (GD) occurring before pregnancy in 0.4% to 1.0% of women and in approximately 0.2% during pregnancy. These women are at higher risk of preeclampsia, early labor, and thyroid storm (Alexander et al, 2017; Ogunyemi, 2016).

vii. Antineoplastic agents may cause thyroid dysfunction in 20% to 50% of patients (Schraga, 2017).

**e. Triggers for thyroid storm:**

- i. Surgery: thyroid (or other) surgery
- ii. Infections
- iii. Trauma
- iv. Exposure to excess iodine (e.g., iodinated contrast medium for radiographic scan)
- v. Cardiovascular events; diabetic ketoacidosis or hyperosmolar coma; insulin-induced hypoglycemia
- vi. Toxemia of pregnancy

**III. Statistics:**

- a. Morbidity: The overall incidence of hyperthyroidism in the United States is estimated between 0.05% and 1.2% (Endocrine Society, 2017; Leung, 2016). Hyperthyroidism from toxic multinodular goiter and toxic adenoma is permanent. Thyrotoxicosis has been associated with dilated cardiomyopathy, right heart failure with pulmonary hypertension, and diastolic dysfunction and atrial fibrillation (A-fib) (Dahl et al, 2008).
- b. Mortality: Adult mortality rate from thyroid storm is variable (according to multiple sources, including the United States, Japan, and Malaysia) and ranged from 8%, 10%, and 25% (respectively) in hospitalized patients (Ross, 2017).

## G L O S S A R Y

**Ablation:** Removal of thyroid gland usually carried out surgically but may be done chemically with radioactive iodine.

**Endocrine gland:** Gland that releases a chemical messenger, known as a hormone, directly into the bloodstream, which will affect other parts of the body. The thyroid is an endocrine gland.

**Euthyroid:** Situation where thyroid-stimulating hormone (TSH) test values are in the normal range and the thyroid is neither hyperthyroid nor hypothyroid.

**Exophthalmos:** Abnormal bulging of the eyeball, often with resulting difficulty or inability to close eyelid. Most often caused by thyroid-related eye disease.

**Goiter:** Enlargement of the thyroid gland.

**Graves' disease:** A condition caused by excessive production of thyroid hormone and characterized by an enlarged thyroid gland, protrusion of the eyeballs, a rapid heart-beat, and nervous excitability. Also called toxic goiter or exophthalmic goiter.

**Nodule:** A small, solid collection of tissue that is palpable.

**Pretibial myxedema:** A skin condition associated with Graves' disease characterized by swollen, itchy patches of skin on the front of the lower legs or shins.

**Radioactive iodine (RAI):** An isotope of the chemical element iodine that is radioactive. Used in diagnostic tests as well as in radiotherapy of a hyperactive thyroid gland, most often due to Graves' disease.

**Subclinical hyperthyroidism:** Mild form of hyperthyroidism, characterized by low TSH and normal  $T_3$  and  $T_4$ . The client may have no symptoms at all or mild symptoms (e.g., weight loss, anxiety) and possibly experience heart and bone problems.

**Thyroidectomy:** Surgical removal of all or a portion of the gland (amount varies). In a subtotal thyroidectomy, a lobe or portion of thyroid tissue remains to produce thyroid hormone.

**Thyroid storm (severe thyrotoxicosis):** A state of thyroid hormone excess, arising from either overproduction from the thyroid gland (hyperthyroidism) or exogenous sources (e.g., oral thyroid replacement drugs).

## CARE SETTING

Most people with classic hyperthyroidism rarely need hospitalization. Critically ill clients and those with extreme manifestations of thyrotoxicosis, plus a significant concurrent illness, require inpatient acute care on a medical unit.

## CLIENT ASSESSMENT DATABASE

Data depend on the severity and duration of hormone imbalance and involvement of other organs.

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Extreme fatigue
- Nervousness, irritability
- Insomnia
- Muscle weakness
- Incoordination

#### CIRCULATION

- Palpitations
- Chest pain (angina)

#### ELIMINATION

- Urinating in large amounts
- Stool changes; diarrhea

### MAY EXHIBIT

- Dysrhythmias—atrial fibrillation, gallop rhythm
- Murmurs
- Tachycardia out of proportion to fever, e.g., exceeding 140 bpm (thyroid storm)
- High systolic blood pressure, low diastolic blood pressure (widened pulse pressure)
- Congestive heart failure; circulatory collapse, shock (thyroid storm)
- Diaphoresis (may be profuse with thyroid storm)

**MAY REPORT (continued)****MAY EXHIBIT (continued)****EGO INTEGRITY**

- Recent stressful experience—emotional and physical

**FOOD/FLUID**

- Recent and sudden weight loss
- Nausea and vomiting
- Thirst

**NEUROSENSORY**

- Emotional lability—mild euphoria to delirium
- Anxiety and depression

- Dehydration (due to GI losses and diaphoresis)
- Nonpitting edema, especially in front of the shinbone

- Mental status and behavior alterations—confusion, disorientation, nervousness, irritability, delirium, frank psychosis, stupor, coma
- Hyperactive deep tendon reflexes (DTRs)
- Fine tremor in hands; purposeless, quick, jerky movements of body parts
- Rapid and hoarse speech
- Paralysis (thyrotoxic hypokalemia)

**PAIN/DISCOMFORT**

- Eye pain, sensitivity to light
- Chest pain (often occurs in the absence of cardiovascular disease)

**RESPIRATION**

- Difficulty breathing

- Increased respiratory rate, tachypnea
- Breath sounds: crackles, wheezes
- Pulmonary edema (thyrotoxic crisis)

**SAFETY**

- Heat intolerance, excessive sweating
- Itching skin
- Visual disturbance; dry eye; problems closing eyes
- Allergy to iodine (may be used in testing or potentially in treatment)

- Elevated temperature
- Fever (104°F to 106°F [40–44°C] common in thyroid storm)
- Skin smooth, warm, and flushed (fever)
- Puritic, erythematous lesions—often in pretibial area—that become brawny
- Exophthalmos, lid retraction, conjunctival irritation, tearing; stare

**SEXUALITY**

- Menstrual irregularity; hypomenorrhea, amenorrhea (long-term hyperthyroidism)
- Toxemia of pregnancy
- Decreased libido
- Impotence

**TEACHING/LEARNING**

- Family history of thyroid problems
- History of hypothyroidism, thyroid hormone replacement therapy or antithyroid therapy, premature withdrawal of antithyroid drugs, recent partial thyroidectomy
- History of insulin-induced hypoglycemia, cardiac disorders or surgery, recent illness (e.g., pneumonia), trauma, x-ray contrast studies

**DISCHARGE PLAN CONSIDERATIONS**

- May require assistance with treatment regimen, self-care activities, homemaker and maintenance tasks

► Refer to section at end of plan for postdischarge considerations.

## DIAGNOSTIC STUDIES

### TEST

### WHY IT IS DONE

### WHAT IT TELLS ME

## BLOOD TESTS

### • *Thyroid function tests:*

- **TSH:** Measures the amount of TSH in the blood; it is done first to evaluate thyroid function.
- **Thyroxine ( $T_4$ ):** Produced by the thyroid gland when the pituitary gland releases TSH. Free  $T_4$  can be measured directly (FT $_4$ ) or calculated by index (FTI). Total  $T_4$  measures both bound and free  $T_4$ . Free  $T_4$  affects tissue function, whereas bound  $T_4$  does not.
- **Triiodothyronine ( $T_3$ ):** Small amount produced directly by thyroid gland. Most  $T_3$  is made by other tissues that convert  $T_4$  into  $T_3$ ;  $T_4$  has a greater effect on metabolism than  $T_3$  even though  $T_3$  is normally present in lower amounts than  $T_4$ . Total  $T_3$  measures both bound and free  $T_3$  (FT $_3$ ).
- **Triiodothyronine uptake ( $T_3U$ ):** An indirect measurement of the amount of the protein thyroxine-binding globulin (TBG) that can bind  $T_3$  and  $T_4$ .
- **Thyroid antibodies:** May include antithyroid peroxidase (anti-TPO) antibody, thyroid-stimulating antibody (TSAb) (also known as thyroid-stimulating immunoglobulin [TSI]), long-acting thyroid stimulator (LATS), or TSH-receptor antibody (TRAb)

*Note:* Thyroid function studies do not distinguish thyrotoxicosis from thyroid storm (that diagnosis is made on basis of clinical evaluation).

TSH is suppressed in hyperthyroidism and suppressed to unmeasurable levels in thyrotoxicosis (except when etiology is a TSH-secreting pituitary tumor or pituitary resistant to thyroid hormone).

Total  $T_4$ , FT $_4$ , and FTI are elevated in hyperthyroidism.

Both  $T_3$  and  $T_4$  are increased in hyperthyroidism; however,  $T_3$  appears to be the more accurate diagnostic indicator of hyperthyroidism than  $T_4$ .  $T_3$  becomes abnormal earlier than  $T_4$  and returns to normal later than  $T_4$  in hyperthyroidism.

A high  $T_4$  value combined with a high  $T_3U$  value usually confirms the presence of hyperthyroidism.

Autoantibody titers in hyperthyroidism are as follows: (1) Graves' disease—significantly elevated anti-TPO, elevated TSAb; (2) toxic multinodular goiter—low or absent anti-TPO and TSAb; and (3) toxic adenoma—low or absent anti-TPO and TSAb (Lee & Ananthakrishnan, 2017).

## OTHER DIAGNOSTIC STUDIES

- **Thyroid ultrasound:** Uses high-frequency sound waves to obtain an image of the thyroid gland, obtain accurate measurements, and identify nodules.
- **CT or radioactive iodine uptake (RAIU) thyroid scan:** During this procedure, the amount of iodine “taken up” by the thyroid is measured and images are taken. A gamma camera scan views the entire thyroid gland at once. A computerized rectilinear thyroid (CRT) scan uses computer technology to enhance thyroid nodules.

Differentiates a “solid” nodule from a fluid-filled cyst; however, it does not differentiate as to whether a nodule is benign or malignant. Determines if a nodule is getting smaller or is growing larger during treatment. Also aids in performing thyroid needle biopsy by improving accuracy if the nodule cannot be felt easily on examination.

Measures both thyroid function and thyroid size. A CT scan may be done with or without contrast for screening, often followed by RAIU scan. Uptake of radioactive iodine occurs in Graves' disease toxic multinodular goiter and toxic adenoma (the more common forms of hyperthyroidism and thyrotoxicosis).

## NURSING PRIORITIES

1. Reduce metabolic demands and support cardiovascular function.
2. Provide psychological support.
3. Prevent complications.
4. Provide information about disease process, prognosis, and therapy needs.

## DISCHARGE GOALS

1. Homeostasis achieved.
2. Current situation being dealt with effectively.
3. Complications prevented and minimized.
4. Disease process, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS:** risk for decreased Cardiac Output**Possibly Evidenced By**

- Altered preload [e.g., decreased venous return]
- Altered afterload [e.g., systemic vascular resistance]
- Alteration in heart rate or rhythm
- [Hypermetabolic state]

**Desired Outcomes/Evaluation Criteria—Client Will****Circulation Status NOC**

Maintain adequate cardiac output for tissue needs as evidenced by stable vital signs, palpable peripheral pulses, good capillary refill, usual mentation, and absence of dysrhythmias.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hemodynamic Regulation NIC</b>	
<i>Independent</i>	<i>Note: Intensive care admission is recommended for management of thyroid storm.</i>
Monitor BP lying, sitting, and standing, if able. Note widened pulse pressure.	General and orthostatic hypotension may occur as a result of excessive peripheral vasodilation and decreased circulating volume. Widened pulse pressure reflects compensatory increase in stroke volume and decreased systemic vascular resistance (SVR).
Monitor central venous pressure (CVP), or other hemodynamic pressures, if available.	Provides more direct measure of circulating volume and cardiac function.
Investigate reports of chest pain.	May reflect increased myocardial oxygen demands and ischemia.
Assess pulse and heart rate while client is sleeping.	Provides a more accurate assessment of tachycardia.
Auscultate heart sounds, noting extra heart sounds and development of gallops and systolic murmurs.	Prominent S <sub>1</sub> and murmurs are associated with forceful cardiac output of hypermetabolic state. Development of S <sub>3</sub> may warn of impending cardiac failure.
Monitor ECG, noting rate and rhythm. Document dysrhythmias.	Tachycardia (greater than normally expected, with fever) and increased circulatory demand may reflect direct myocardial stimulation by thyroid hormone. Dysrhythmias (especially A-Fib) often occur and may compromise cardiac function and output.
Auscultate breath sounds, noting adventitious sounds such as crackles.	Early sign of pulmonary congestion, reflecting developing cardiac failure.
Monitor temperature, provide cool environment, limit bed linens and clothes, and administer tepid sponge baths.	Fever, which may exceed 104°F (40.0°C), can occur as a result of excessive hormone levels increasing diuresis and dehydration, causing increased peripheral vasodilation, venous pooling, and hypotension.
Observe for dry mucous membranes, weak and thready pulse, poor capillary refill, decreased urinary output, and hypotension.	Rapid dehydration can occur with thyroid storm often due to gastrointestinal losses and excessive diaphoresis, which reduces circulating volume and compromises cardiac output.
Record intake and output (I&O). Note urine-specific gravity.	Significant fluid losses through vomiting, diarrhea, diuresis, or diaphoresis can lead to profound dehydration, concentrated urine, and weight loss.
Weigh daily. Encourage chair rest and bedrest; limit nonessential activity.	Activity increases metabolic and circulatory demands, which may potentiate cardiac failure.
Note history of asthma and bronchoconstrictive disease, sinus bradycardia and heart blocks, advanced heart failure (HF), or current pregnancy.	Presence and potential recurrence of these conditions affects choice of therapy; for example, use of beta-adrenergic blocking agents may be contraindicated.
<i>Collaborative</i>	
Administer intravenous (IV) fluids, as indicated.	Rapid fluid replacement may be necessary to improve circulating volume but must be balanced against signs of cardiac failure and need for inotropic support.

(continues on page 476)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications, as indicated, such as:	Generally, drugs used to treat thyroid storm are those used for uncomplicated hyperthyroidism (at higher doses and more frequently) with additional drugs such as glucocorticoids and iodine solution (Leung, 2016; Ross, 2017).
Beta blockers, for example, propranolol (Inderal), atenolol (Tenormin), nadolol (Corgard), and pindolol (Visken)	Beta blockers are for relief of neurologic and cardiovascular symptoms. However, their onset is slow and benefit is limited in reducing $T_3$ , so they are typically given along with a thioamide (Leung, 2016; Ross, 2017; Schraga, 2017).
Thioamides (also called thyroid hormone antagonists), for example, methimazole (Tapazole) and propylthiouracil (PTU)	These drugs block thyroid hormone synthesis and inhibit conversion of $T_4$ to $T_3$ and are used both for long-term control of hyperthyroidism and for thyroid storm (at higher doses). PTU is often now reserved for acute and rapid treatment of thyroid storm (i.e., given every 4 hours in monitored patient in ICU). Tapazole is more potent and longer acting than PTU. IV tapazole may be preferred for thyroid storm, as well as severe (but not life-threatening) hyperthyroidism because of its longer duration of action. Caution: The U.S. Food and Drug Administration (FDA) has added a black box warning regarding potential liver injury with PTU (Leung, 2016; Ross, 2017; Schraga, 2017). Note: Thyroid storm has been reported in patients with Graves' disease after discontinuation of thioamides because of liver failure. In such patients who require urgent treatment of hyperthyroidism, thyroidectomy is the treatment of choice (Kandil et al, 2011; Ross, 2017; Schraga, 2017).
Oral iodide-iodine solution (Lugol's solution) or super-saturated potassium iodide (SSKI, PIMA)	Used to rapidly block the release of $T_4$ and $T_3$ thyroid hormone in thyroid storm and/or short-term use in hyperthyroidism (e.g., preoperative preparation for thyroidectomy in Graves' disease) (Lee & Ananthakrishnan, 2017). Note: Should be started 1 to 3 hours after initiation of antithyroid drug therapy to minimize hormone formation from the iodine (Leung, 2016; Ross, 2017; Schraga, 2017).
Corticosteroids, for example, dexamethasone (Decadron)	Provides glucocortical support, decreases hyperthermia, relieves relative adrenal insufficiency, inhibits calcium absorption, and reduces peripheral conversion of $T_4$ to $T_3$ .
Digoxin (Lanoxin)	May be required in clients with HF before beta-adrenergic blocking therapy can be considered and safely initiated.
Furosemide (Lasix)	Diuresis may be necessary if HF occurs. Note: It also may be effective in reducing calcium level if neuromuscular function is impaired.
Potassium (KCl, K-Lyte)	Increased losses of $K^+$ through intestinal and renal routes may result in dysrhythmias if not corrected.
Acetaminophen (Tylenol)	Drug of choice to reduce temperature and associated metabolic demands. Aspirin is contraindicated because it actually increases level of circulating thyroid hormones by blocking binding of $T_3$ and $T_4$ with thyroid-binding proteins.
Monitor laboratory and diagnostic studies, as indicated:	
Serum potassium	Hypokalemia resulting from intestinal losses, altered intake, or diuretic therapy may cause dysrhythmias and compromise cardiac function and output.
Serum calcium	Elevation may alter cardiac contractility.
Sputum culture	Pulmonary infection is most frequent precipitating factor of crisis.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Obtain serial ECGs and other cardiac diagnostic studies (e.g., echocardiogram, myocardial perfusion studies), if indicated after thyroid storm is abated.	May demonstrate effects of electrolyte imbalance and/or ischemic changes reflecting inadequate myocardial oxygen supply in the presence of increased metabolic demands or dysrhythmias. Note: Studies have associated subclinical hyperthyroidism with a higher prevalence of atrial fibrillation (AF) in older clients, confirmed by ECG, than those with normal serum TSH (Ross, 2017).
Chest x-rays	Cardiac enlargement may occur in response to increased circulatory demands. Pulmonary congestion may be noted with cardiac decompensation.
Provide supplemental oxygen ( $O_2$ ), as indicated.	May be necessary to support increased metabolic demands and $O_2$ consumption.
Provide hypothermia blanket, as indicated.	Occasionally used to lower uncontrolled hyperthermia (104°F [40.0°C] and higher) to reduce metabolic demands, $O_2$ consumption, and cardiac workload.
Prepare for radioactive iodine ablation (RAI) or surgical intervention.	RAI is often the treatment of choice for hyperthyroidism, with the purpose of reversing the overactivity. This is referred to as radioactive iodine ablation, or chemical ablation. Peak results take 6 to 12 weeks, and occasionally a second treatment may be necessary; however, a single dose controls hyperthyroidism in about 90% of clients. Note: This therapy is contraindicated during pregnancy and breastfeeding (Ross, 2017). In patients with Graves' disease, definitive therapy with radioactive iodine or thyroidectomy is important to prevent a recurrence of severe thyrotoxicosis. Thyroidectomy may be performed once euthyroid state is achieved in individuals who are intolerant of antithyroid medications or who refuse RAI therapy (Schraga, 2017).

## NURSING DIAGNOSIS: Fatigue

### May Be Related To

Illness (e.g., hyperthyroidism)  
Altered body chemistry—hypermetabolic state, medications  
Stressors; anxiety; sleep deprivation

### Possibly Evidenced By

Insufficient energy, impaired ability to maintain usual routine or physical activity  
Tiredness; nonrestorative sleep pattern  
Alteration in concentration

### Desired Outcomes/Evaluation Criteria—Client Will

#### Fatigue: Disruptive Effects NOC

Report improved sense of energy.  
Display improved ability to participate in desired activities.  
Identify basis of fatigue and individual areas of control.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Energy Management NIC</b>	
<b>Independent</b>	
Monitor vital signs, noting pulse rate at rest and when active.	Pulse is typically elevated, and even at rest tachycardia may be noted.
Note presence of/development of tachypnea, dyspnea, pallor, and cyanosis.	$O_2$ demand and consumption are increased in hypermetabolic state, potentiating risk of hypoxia with activity.
Provide quiet environment, cool room, decreased sensory stimuli, soothing colors, and quiet music.	Reduces stimuli that may aggravate agitation, hyperactivity, and insomnia.

(continues on page 478)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage client to restrict activity and rest in bed as much as possible.	Helps counteract effects of increased metabolism.
Provide comfort measures—judicious touch and massage and cool showers.	May decrease nervous energy, promoting relaxation.
Provide for calming diversional activities (e.g., reading, computer games, television).	Allows for use of nervous energy in a constructive manner, serves as a distraction, and may reduce anxiety.
Avoid topics that irritate or upset client. Discuss ways to respond to these feelings.	Increased irritability of the CNS may cause client to be easily excited, agitated, and prone to emotional outbursts.
Discuss with SO reasons for fatigue and emotional lability.	Understanding that fatigue and emotional lability is caused by the hyperthyroid state may enhance client's/SO's coping with situation.

**Collaborative**

Administer medications, as indicated, such as sedatives and antianxiety agents.

May be prescribed to help combat nervousness, hyperactivity, and insomnia.

**NURSING DIAGNOSIS:** **risk for imbalanced Nutrition: less than body requirements**

**Possibly Evidenced By**

Biological factors—metabolic demands; fever  
Insufficient dietary intake or inability to absorb nutrients (nausea, vomiting, diarrhea)

**Desired Outcomes/Evaluation Criteria—Client Will**

**Nutritional Status** **NOC**

Demonstrate stable weight with normal laboratory values and be free of signs of malnutrition.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Therapy</b> <b>NIC</b>	
<i>Independent</i>	
Monitor daily food intake once client resumes eating. Weigh daily and report losses.	Continued weight loss in face of adequate caloric intake may indicate failure of antithyroid therapy.
Encourage client to eat and increase number of meals and snacks, using high-calorie foods that are easily digested.	Aids in keeping caloric intake high enough to keep up with rapid expenditure of calories caused by hypermetabolic state.
Avoid foods that increase peristalsis, such as tea, coffee, fibrous and highly seasoned foods, and fluids that cause diarrhea—apple and prune juice.	Increased motility of gastrointestinal (GI) tract may result in diarrhea and impair absorption of needed nutrients.
<i>Collaborative</i>	
Consult with dietitian to provide diet high in calories, protein, carbohydrates, and vitamins.	May need assistance to ensure adequate intake of nutrients, identify appropriate supplements.
Administer medications, as indicated, such as glucose and vitamin B complex.	Given to meet energy requirements and prevent or correct hypoglycemia associated with hypermetabolic state in thyrotoxicosis.

**NURSING DIAGNOSIS:** **Anxiety [specify level]**

**May Be Related To**

Stressors; situational crisis (e.g., stimulation, pseudo-catecholamine effect of thyroid hormones); change in health status

**Possibly Evidenced By**

Apprehensive; jittery; shakiness; distressed  
Difficulty concentrating  
Focus on self; restlessness; tremors  
Sleep disturbance

**NURSING DIAGNOSIS: Anxiety [specify level] (continued)****Desired Outcomes/Evaluation Criteria—Client Will****Anxiety Level NOC**

Appear relaxed.

Report anxiety reduced to a manageable level.

**Anxiety Self-Control NOC**

Recognize changes in thinking and behavior and causative factors.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction NIC</b>	
<i>Independent</i>	
Monitor changes in behavior. Note behavior indicative of level of anxiety.	May be hypervigilant, restless, extremely sensitive, or crying, or may develop frank psychosis. Mild anxiety may be displayed by irritability and insomnia. Severe anxiety progressing to panic state may produce feelings of impending doom, terror, inability to speak or move, shouting, and swearing. Note: It has been reported that pseudo-psychiatric symptoms were a first sign of hyperthyroidism in 2% to 12% of cases (Formica, 2011).
Assess thinking processes, such as memory; attention span; and orientation to person, place, time, and situation.	Determines extent of interference with sensory processing.
Monitor physical responses, noting palpitations, repetitive movements, hyperventilation, and insomnia.	Increased number of beta-adrenergic receptor sites, coupled with effects of excess thyroid hormones, produces clinical manifestations of catecholamine excess even when normal levels of norepinephrine and epinephrine exist.
Stay with client, maintaining calm manner. Acknowledge feelings and allow client's behavior to belong to client.	Affirms to client and SO that although client feels out of control, environment is safe. Avoiding personal responses to inappropriate remarks or actions prevents conflicts and overreaction to stressful situation and client behavior.
Describe and explain procedures, surrounding environment, or sounds that may be heard by client. Present reality concisely and briefly without challenging illogical thinking.	Provides accurate information, which reduces distortions and misinterpretations that can contribute to anxiety and fear reactions. Avoiding challenging of distorted thinking limits defensive reaction.
Speak in brief statements, using simple words.	Attention span may be shortened and concentration reduced, limiting ability to assimilate information.
Reduce external stimuli. Place in quiet, cool room; provide soft, soothing music; reduce bright lights; limit procedures and reduce number of persons interacting with client.	Creates a therapeutic environment, shows recognition that unit activity and personnel may increase client's anxiety. May decrease hyperactivity and CNS irritability.
Provide safety measures, such as padded side rails, close supervision, or use of soft restraints as last resort, as necessary.	Prevents injury to client who may be hallucinating and disoriented.
Discuss with client and SO reasons for emotional lability or psychotic reaction.	Understanding that behavior is physically based enhances acceptance of situation and encourages different responses and approaches.
Reinforce expectation that emotional control should return as drug therapy progresses.	Provides information and reassures client that the situation is temporary and will improve with treatment.
<i>Collaborative</i>	
Administer medications as indicated (e.g., antianxiety agents or sedatives), and monitor effects.	May be used in conjunction with medical regimen to reduce effects of hyperthyroid secretion. Promotes relaxation and reduces CNS hyperactivity and agitation, enhancing thinking ability and sense of control.
Refer to support systems, as needed, including counseling, social services, and pastoral care.	Ongoing therapy support may be desired and required by client and SO if crisis precipitates lifestyle alterations. Note: When psychiatric symptoms remain after restoration of euthyroidism, specific treatment with psychotropic drugs may be indicated.

## NURSING DIAGNOSIS: risk for Dry Eye

### Possibly Evidenced By

Autoimmune disease: (Grave's disease/hyperthyroidism-related symptoms, i.e., lack of moisture, inflammation and irritation; bulging of eyeball due to tissue swelling, lid retraction)  
Altered protective mechanisms of eye—reduced ability to blink, eye dryness  
Periorbital edema

### Desired Outcomes/Evaluation Criteria—Client Will

#### Dry Eye Severity NOC

Maintain moist eye membranes, free of ulcerations, corneal scarring, and eroded vision.

#### Risk Control: Dry Eye NOC

Identify measures to provide protection for eyes and prevent complications.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Dry Eye Prevention NIC</b> <i>Independent</i> Note presence of thyroid condition(s) that can cause and/or worsen dry eye symptoms in current situation, and determine severity of symptoms.	Thyroid eye disease (TED) may or may not be a factor in the care of client with thyroid storm. However, its presence impacts client needs and influences nursing interventions during facility care. Although 50% of patients with Graves' disease have TED, only 5% develop severe ophthalmopathy (e.g., diplopia, visual-field deficits, or blurred vision) (Bahn Chair et al, 2011). Milder symptoms include light sensitivity (photophobia), constant eye irritation, or blurred vision associated with eye drops or gels to reduce dryness. In severe Graves' disease, the eyes may be protruding, the eyelids may not close all of the way during sleep or normal blinking, causing corneal irritation and (rarely) increased ocular pressure (glaucoma).
Keep head of bed raised when client is sleeping.	A great deal of swelling can accompany TED (e.g., demonstrated by bags under the eyes, bulging of the eyes, swelling of the tissue coating the eyes). Sleeping with head raised can allow fluid to settle out of face.
Encourage use of wrap-around dark glasses when awake and goggles or taping of eyelids shut during sleep as needed.	Protects exposed cornea if client is unable to close eyelids completely and helps to maintain eye moisture.
Provide opportunity for client to discuss feelings about altered appearance and measures to enhance self-image.	Protruding eyes may be viewed as unattractive. Appearance can be enhanced with proper use of makeup, overall grooming, and use of shaded glasses.
<b>Collaborative</b> Collaborate in treatment of underlying thyroid condition (ongoing) as well as interventions to manage thyroid eye disease (TED), such as:	Treatment during the active phase of the TED focuses on preserving sight and the integrity of the cornea, as well as promoting client's comfort (e.g., reducing congestion, redness, pain, and eyeball exposure).
Administer medications, as indicated, for example:  Eye drops, ointments, and artificial tears or corticosteroids, along with antithyroid drugs	To minimize eye irritation, artificial tears may be used several times per day and gel ointments may be applied at night to prevent the eyes from drying out. Cyclosporine (Restasis) and lifitegrast (Xiidra) are the only prescription medications currently approved by the U.S. Food and Drug Administration for treating dry eye (National Eye Institute [NEI], 2017). Corticosteroid eye drops also may be prescribed short term to reduce eye inflammation (Lee & Ananthakrishnan, 2017; Douglas, n.d.).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Prepare for surgery, as indicated.	Surgical treatment of TED will not be considered during acute thyrotoxic crisis but in stable client can be done over time in several procedures. Surgery can release pressure on the optic nerve (to improve vision), reduce exposure of the surface of the eye, improve eyelid closing, reduce bulging appearance, and reduce pressure pain.

NURSING DIAGNOSIS:	<b>deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs</b>
<b>May Be Related To</b>	Insufficient information; insufficient knowledge of resources Misinformation presented by others
<b>Possibly Evidenced By</b>	Insufficient knowledge Inaccurate follow-through of instructions
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Knowledge: Acute Illness Care NOC</b>	Verbalize understanding of disease process and potential complications. Identify relationship of signs and symptoms to the disease process and correlate symptoms with causative factors. Verbalize understanding of therapeutic needs. Participate in treatment regimen. Initiate necessary lifestyle changes.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i>	
Review disease process and future expectations.	Provides knowledge base from which client can make informed choices.
Provide information appropriate to individual situation.	Severity of condition, cause, age, and concurrent complications determine course of treatment.
Identify stressors and discuss precipitators to thyroid crises—personal, social, and job concerns; infection; failure of antithyroid drugs or failure to take medications; and pregnancy.	Psychogenic factors are often of prime importance in the occurrence and exacerbation of this disease.
Discuss drug therapy, including need for adhering to regimen and expected therapeutic and side effects.	Antithyroid medication, either as primary therapy or in preparation for thyroidectomy, requires adherence to a medical regimen over an extended period to inhibit hormone production.
Identify signs and symptoms requiring medical evaluation, such as fever, sore throat, and skin eruptions.	Early identification of toxic reactions (thiourea therapy) and prompt intervention are important in preventing development of agranulocytosis.
Explain need to check with physician and pharmacist before taking other prescribed or over-the-counter (OTC) drugs.	Antithyroid medications can affect or be affected by numerous other medications, requiring monitoring of medication levels, side effects, and interactions.
Emphasize importance of planned rest periods.	Prevents undue fatigue and reduces metabolic demands. As euthyroid state is achieved, stamina and activity level will improve.
Review need for nutritious diet and periodic review of nutrient needs; avoid caffeine, red and yellow food dyes, and artificial preservatives.	Provides adequate nutrients to support hypermetabolic state. As hormonal imbalance is corrected, diet will need to be readjusted to prevent excessive weight gain. Irritants and stimulants should be limited to avoid cumulative systemic effects.
Emphasize necessity of continued medical follow-up.	Required to monitor effectiveness of therapy and for prevention of potentially fatal complications.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **risk for ineffective Health Management**—perceived susceptibility/seriousness of condition; perceived barrier; difficulty managing complex treatment regimen
- **risk for Overweight**—decrease in metabolic rate [if hypothyroidism occurs after thyrotoxic crisis or in overmedication with antithyroid agents)], excessive intake in relation to metabolic needs

## HEPATITIS

### I. Pathophysiology

- a. Hepatitis (inflammation of the liver) can damage liver cells (hepatocytes) and impair liver function either directly (from the inflammation) or indirectly (from an autoimmune response).
- b. May be acute or chronic:
  - i. Acute: Swelling of hepatocytes reduces ability to detoxify drugs; produce clotting factors, plasma proteins, bile, and glycogen; and store fat-soluble vitamins. Adults with acute hepatitis A or B are usually asymptomatic. Persons with acute hepatitis C may or may not have symptoms.
  - ii. Chronic: Inflammation of the liver of more than 6 months' duration. Not all viral infections progress from acute to chronic; however, some do. For example, chronic hepatitis C infection develops in 75% to 85% of infected persons (Chen & Morgan, 2006). Chronic hepatitis B (CHB) has been characterized into four phases, reflecting the relationship between viral replication and the host immune response (e.g., phases are from mild liver to fibrosis). These phases are of variable duration, and not every person infected with CHB will go through all phases (Terrault et al, 2016).

### II. Etiology

- a. Infectious causes: viral, bacterial, fungal, or other
  - i. Viruses are primarily designated by letters (e.g., A, B, C, D, E), with terms used interchangeably, for example, hepatitis B is also known as HBV or HepB.
  - ii. In the United States, viral hepatitis is most commonly caused by HAV, HBV, and HCV (Samji et al, 2017).
  - iii. HAV is spread primarily through the fecal-oral route, either through exposure to contaminated food or water (poor sanitation and hygiene) or from person to person (e.g., living with/sexual partner of infected person; anal-oral sexual contact) (Westbrook & Dusheiko, 2014; World Health Organization [WHO], 2017a). HAV causes only acute infection and typically gets better without treatment after a few weeks. Hepatitis A infection does not cause chronic liver disease, but it can (rarely) cause debilitating symptoms and fulminant hepatitis (acute liver failure), which is often fatal.
  - iv. HBV is transmitted by exposure to body fluids (saliva, serum, semen) of an infected person (e.g., birth to infected mother; sexual contact with infected person; injection drug use with shared needles; shared equipment such as glucose monitor) (Centers for Disease Control and Prevention [CDC], 2016c; Weinbaum et al, 2008).

- v. HCV is transmitted by injection drug use with shared needles, receiving blood transfusion or organ transplant before 1992, and (less frequently) through poor infection control practices during healthcare procedures or outbreaks in healthcare facilities (CDC, 2016c). Sexual transmission occurs, but rarely, although the likelihood of sexual transmission rises with number of sex partners (CDC, 2010).
- vi. HDV is transmitted percutaneously (through the skin) through contact with infected blood or blood products. The HepD virus cannot replicate without the HepB virus; therefore, it does not occur in the absence of HBV. Prevalence is low in North America (WHO, 2017b).
- vii. HEV is transmitted primarily through the fecal-oral route, with contaminated water being the most common means. Person-to-person transmission is rare. The disease is common in countries with limited access to essential water, sanitation, hygiene, and health services (WHO, 2017b).
- viii. Other viruses: Cytomegalovirus (CMV), Epstein-Barr virus (EBV), *Mycobacterium avium* complex (MAC), herpes simplex, varicella-zoster, toxoplasmosis, and histoplasmosis may also cause inflammation of the liver, but they do not target the liver.

- b. Noninfectious causes: physical or toxic chemical agents, autoimmune
  - i. Toxic agents: carbon tetrachloride, vinyl chloride; alcohol, cocaine, acetaminophen, isoniazid, anabolic steroids, methyldopa, erythromycin; poisonous mushrooms
  - ii. Autoimmune: no identifiable etiology; several types, with type 1 most common form in North America more often affecting (70%) and associated with other autoimmune diseases. Type 2 occurs most often in children, generally affects girls age 2 to 14 (American Liver Foundation, 2017; National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2014).

### III. Statistics

- a. Morbidity
  - i. Between 2000 and 2015, the reported incidence of HepA and HepB declined significantly by 88% and 64%, respectively. By contrast, HepC has increased by 75% since 2010 (Dan et al, 2015). The CDC reported 1390 new cases of acute HAV in 2015 and estimated that the number of new infections in the United States would be around 2800 in that year (CDC, 2015).
  - ii. After adjusting for underascertainment and underreporting, the estimated number of new HBV infections in 2015 was 21,900. Using most recent national

- prevalence data, the CDC estimates that approximately 850,000 persons are living with HBV in the United States, although other studies have estimated this number to be much higher (CDC, 2017d).
- iii. Approximately 8% to 20% of patients with chronic hepatitis B and 15% to 30% with hepatitis C eventually develop cirrhosis, as evidenced by the histologic changes of severe fibrosis and nodular regeneration (Samji et al., 2017).
  - iv. After adjusting for underascertainment and under-reporting, the CDC estimated that 33,900 new HCV infections occurred in 2015 and further estimates that approximately 3.5 million persons are currently living with HCV (CDC, 2017d).

- b. Mortality: Total deaths reported by National Vital Statistics to be directly related to hepatitis (per mortality/death certificates) for the year 2014 were 8081 (CDC, 2017e), although it is believed that HCV deaths are underreported. Chronic HCV infection is the leading cause of liver-related death and hepatocellular cancer in the Western world (Westbrook & Dusheiko, 2014).
- c. Cost: According to estimates published by the National Viral Hepatitis Roundtable (NVHR), HBV infections result in an estimated \$658 million in medical costs and lost wages annually, while the projected direct and indirect costs of the current HCV epidemic, if left unchecked, will be over \$85 billion for the years 2010 through 2019 (NVHR, 2016).

## G L O S S A R Y

**Acute hepatitis:** Often self-limiting, although approximately 5% to 10% of clients with HBV and 80% to 85% of clients with HCV progress to a chronic state (Samji et al., 2017).

**Anorexia:** Loss of appetite as result of disease.

**Ascites:** Buildup of fluid in the abdomen due to a number of conditions, including severe liver disease.

**Autoimmune:** Persistent inflammation and necrosis with hypergammaglobulinemia and autoantibodies without other common causes of hepatitis.

**Chronic hepatitis:** Persistent inflammation and necrosis lasting more than 6 months, commonly due to hepatitis B, C, or D virus.

**Fulminant hepatitis:** Occurs suddenly and with great intensity or severity, progressing to encephalopathy within

8 weeks of onset and death if liver transplant is not performed.

**Hepatic encephalopathy:** Brain dysfunction directly due to the liver dysfunction most often seen in advanced cirrhosis. Encephalopathy may cause disturbances of consciousness and progress to coma.

**Hepatocyte:** Parenchymal liver cell.

**Jaundice:** Yellow staining of the skin and sclera (and sometimes other tissues and body fluids) by abnormally high blood levels of the bile pigment bilirubin.

**Pruritus:** Severe itching of the skin.

**Right upper quadrant (RUQ):** Anatomic location of the liver.

**Toxic hepatitis:** Liver inflammation often due to common drugs used to treat disease or chemicals found in the workplace.

## CARE SETTING

Care is most often provided in the outpatient setting or at the community level. In states of acute hepatic inflammation, inpatient acute care on a medical unit may be required to monitor and treat hepatic failure or hepatic encephalopathy.

\*\*\*\*NOTE: This care plan focuses on care of the client with viral hepatitis.

## RELATED CONCERNS

Alcohol: acute withdrawal, page 919

Cirrhosis of the liver, page 494

Psychosocial aspects of care, page 835

Renal dialysis—general considerations, page 623

Substance use disorders, page 929

## CLIENT ASSESSMENT DATABASE

Data depend on the cause (type of hepatitis) and severity of liver involvement and damage.

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Fatigue
- Weakness, general malaise, muscle aches

#### CIRCULATION

### MAY EXHIBIT

- Bradycardia—in severe hyperbilirubinemia
- Jaundiced sclera, skin, mucous membranes

(continues on page 484)

**CLIENT ASSESSMENT DATABASE (contd.)****MAY REPORT (continued)****MAY EXHIBIT (continued)****ELIMINATION**

- Dark urine, clay-colored stools
- Diarrhea, constipation

**FOOD/FLUID**

- Nausea, vomiting
- Loss of appetite, weight loss
- Weight gain—edema, ascites
- Abdominal distention due to liver enlargement
- Ascites

**NEUROSENSORY**

- Irritability, drowsiness, lethargy

**PAIN/DISCOMFORT**

- Abdominal cramping, RUQ tenderness
- Headache
- Joint pain
- Muscle guarding, restlessness

**SAFETY**

- Itching (pruritus)
- Skin rashes
- Tattoos, piercings (possible equipment source)
- History of blood transfusions or organ transplant received prior to viral screening tests

- Fever—usually low grade (viral)
- Urticaria, maculopapular lesions, irregular patches of erythema

**SEXUALITY**

- Lifestyle or behaviors increasing risk of exposure—unprotected sexual intercourse with infected person

**TEACHING/LEARNING**

- History of known or possible exposure to virus, bacteria, or toxins—from contaminated food, water, needles, surgical equipment, or blood; hepatitis virus carriers (symptomatic or asymptomatic); exposure to toxic chemicals, such as carbon tetrachloride, vinyl chloride
- History of known or possible exposure to hepatotoxic prescription, such as sulfonamides, phenothiazines, isoniazid, or over-the-counter (OTC) drug use, such as acetaminophen
- Use of herbal supplements associated with hepatotoxicity, such as chaparral, Jin Bu Huan, germander, comfrey, mistletoe, skullcap, margosa oil, pennyroyal
- Use of street injection drugs or alcohol
- Travel to or immigration from Central and East Asia, North Africa, the Middle East, India, Malaysia, Japan (HCV)
- Concurrent diabetes, heart failure (HF), malignancy, or renal disease

**DISCHARGE PLAN CONSIDERATIONS**

- May require assistance with homemaking, maintenance tasks, shopping, transportation

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****TEST  
WHY IT IS DONE****WHAT IT TELLS ME****BLOOD TESTS**

- **Acute viral hepatitis panel:** Used to help detect and/or diagnose an acute liver infection due to one of the three most common hepatitis viruses: hepatitis A virus (HAV), hepatitis B virus (HBV), or hepatitis C virus (HCV).
- **Liver enzymes/isoenzymes:** Of limited value in differentiating viral from nonviral hepatitis.
- **Alanine aminotransferase (ALT):** Considered best liver enzyme test for detecting hepatitis.
- **Complete blood count (CBC):** Battery of screening tests that typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; white blood cell (WBC) count and differential—the percentage of each of the five types of mature WBCs: neutrophils, lymphocytes (B cells and T cells), monocytes, eosinophils, and basophils.
- **Serum albumin:** Measures the main body protein manufactured by the liver.
- **Prothrombin time (PT):** One of several clotting factors that is produced by the liver. Evaluates the body's ability to produce a clot in a reasonable amount of time.
- **Serum bilirubin:** Yellow-red substance that results from the breakdown of Hgb, a normal process of the liver, then excreted via the intestines.

**ASSOCIATED TESTS**

- **Liver biopsy:** Considered if diagnosis is uncertain or if clinical course is atypical or unduly prolonged.
- **Urinalysis:** Checks the urine for bilirubin in the nonjaundiced client with suspected viral hepatitis.

These tests are used to determine if symptoms are due to a current infection with a virus and to identify which virus in particular is causing the disease. These tests may also help determine if someone has been exposed to one of the viruses even before symptoms develop. An acute hepatitis panel typically consists of the following tests (Van Leeuwen & Bladh, 2015):

- Hepatitis A antibody, IgM—body produces antibodies early after exposure so positive hepatitis A IgM test is usually considered diagnostic for acute hepatitis A.
  - Hepatitis B core antibody, IgM—the first antibody produced in response to a hepatitis B infection and, when detected, may indicate an acute infection. It may also be present in people with chronic hepatitis B when flares occur.
  - Hepatitis B surface Ag—earliest indicator of acute infection but may also be present in blood of person chronically infected.
  - Hepatitis C antibody—test detects antibodies produced in response to HCV infection. It cannot distinguish between an active and a previous infection. If positive, it is typically followed up with other tests to determine if the infection is a current one.
- Abnormal—may be 4 to 10 times normal values.

Elevation usually occurs before other symptoms, such as jaundice, are noted.

RBCs are decreased because of shortened life span of RBCs—liver enzyme alterations or hemorrhage. WBCs may be abnormally low (leukopenia) or high (leukocytosis); monocytes may be increased (monocytosis), and lymphocytes may be increased and atypical in appearance.

Level is decreased.

May be prolonged—liver dysfunction.

High level indicates the liver is incapable of adequately removing bilirubin in a timely manner due to blockage of bile ducts or liver disease, such as acute hepatitis. Accumulation of bilirubin is responsible for jaundice of the skin and mucous membranes.

Provides initial assessment of disease severity in client with chronic HBV or chronic HVC.

Elevated bilirubin levels and proteinuria and hematuria may occur.

**NURSING PRIORITIES**

1. Reduce demands on liver while promoting physical well-being.
2. Prevent complications.
3. Enhance self-concept and acceptance of situation.
4. Provide information about disease process, prognosis, and treatment needs.

**DISCHARGE GOALS**

1. Homeostasis achieved.
2. Complications prevented or minimized.
3. Dealing with reality of current situation.
4. Disease process, prognosis, transmission, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: impaired Liver Function

### May Be Related To

Viral infection (e.g., viruses A, B, C, D), Epstein-Barr  
HIV coinfection  
Hepatotoxic medications (e.g., acetaminophen, statins)  
Substance abuse (e.g., alcohol, cocaine)

### Possibly Evidenced By

Presence of virus or antibodies, abnormal liver function tests  
Presence of jaundice, hepatic enlargement

### Desired Outcomes/Evaluation Criteria—Client Will

#### Knowledge: Acute Illness Management NOC

Demonstrate behaviors or lifestyle changes to limit effects of condition.

#### Liver Function NOC

Be free of signs of liver failure as evidenced by liver function studies within acceptable range and absence of jaundice, hepatic enlargement, or altered mental status.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Control NIC</b>	
<i>Independent</i>	
Determine presence of condition(s), as listed above. Note whether problem is acute—viral hepatitis or acetaminophen overdose—or chronic—longstanding alcoholic or viral hepatitis.	Influences choice of interventions.
Review usual and/or occasional use medications—sulfonamides, phenothiazines, isoniazid—for hepatotoxic drugs or OTC drug use such as acetaminophen.	May require changes in usual medication regimen and client education about hepatic effects of OTC drugs.
Ascertain if client works in high-risk occupation; for example, performs tasks that involve contact with blood, blood-contaminated body fluids, other body fluids, or sharps or needles.	Helps in identifying source of infection—occupational high risk for exposure to HBV and HCV.
Assess for exposure to contaminated food or untreated drinking water or for evidence of poor sanitation practices by food service workers if source is known.	Helps in identifying source of infection—risk for exposure to enteric viruses, such as HAV and HEV.
<i>Collaborative</i>	
Review results of laboratory tests, such as hepatitis viral titers, liver function, and other diagnostic studies.	Identifies cause of hepatitis, influences choice of interventions, and monitors response to therapies.
Assist with treatment of underlying condition.	Supports organ function and minimizes liver damage and risk of organ failure. For chronic HBV and HCV infections, in particular, the goals of therapy are to reduce liver inflammation and fibrosis and to prevent progression to cirrhosis and the associated complications
Administer medications, as indicated, for example:	The goal of antiviral therapy (in general) is to decrease viral replication, thus preventing progression of the disease; reduce the prevalence of cirrhosis; and treat distressing symptoms (e.g., fatigue, vomiting, joint pain). The particular or combination of medication used depends on the type and chronicity of the infection, as well as the status of liver function. Because treatment regimens for hepatitis are being actively researched, medication recommendations, indications, and dosages are all subject to change.
Antivirals, such as ribavirin (Rebetol, Virazole), boceprevir (Victrelis), famciclovir (Famvir), and entecavir (Baraclude)	Treatment of hepatitis depends on its type and the client's liver function and general health. For HBV and HCV, drugs with general antiviral properties are used to inhibit viral reproduction. They are sometimes used in conjunction with interferons or NRTIs to improve their effectiveness (Samji et al, 2017).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Nucleoside reverse transcriptase inhibitors (NRTIs), such as entecavir (Baraclude), lamivudine (Epivir-HBV), adefovir (Hespera), telbivudine (Tyzeka), and tenofovir (Viread)	NRTIs may be used to help reduce HBV viral load and treat chronic, active hepatitis B. These drugs are often used in combinations and usually require a long-term (e.g., a year or more) treatment regimen. NRTIs may be an alternative choice for individuals unable or unwilling to use interferons, or in the presence of impaired immune function such as coinfection with HIV.
Interferons such as IFN alpha-2a (Roferon A) and IFN alpha-2b (Intron A)	Interferons lead to temporary improvement in liver function in chronic HVB and HCV infections (Dhawan, 2016).
Pegylated interferons, such as PEG-IFN alpha-2a (Pegasys) and PEG-IFN alpha-2b (Peg-Intron)	These agents have largely replaced standard interferons in the treatment of HCV and may be used in combination therapy with antivirals such as ribavirin (Rebetol), boceprevir (Victrelis), and protease inhibitor such as TVR (Incivek) (Yee et al, 2012).
Newer direct anti-antiviral agents (e.g., daclatasvir [Daklinza], elbasvir and grazoprevir [Zepatier], glecaprevir and pibrentasvir [Myvyret], simeprevir [Olysio], sofosbuvir [Solvadi], sofosbuvir-velpatasvir [Epclusa])	These drugs (not a complete listing) are proving highly useful in weakening the HepC virus. Note: There is no one-size-fits-all treatment option for HepC, because to date, 6 different types or genotypes of HCV and more than 50 subtypes have been identified. The goal of treatment is complete viral clearance (Rantini, 2017).
Steroid therapy, such as prednisone (Deltasone), alone or in combination with azathioprine (Imuran)	Steroids may be contraindicated because they can increase risk of relapse or development of chronic hepatitis in clients with viral hepatitis; however, anti-inflammatory effect may be useful in chronic active hepatitis to reduce nausea and vomiting and to enable client to retain food and fluids. Steroids may decrease serum aminotransferase and bilirubin levels, but they do not affect liver necrosis or regeneration. Combination therapy has fewer steroid-related side effects.
Refer to specialist or liver treatment center for consideration of other treatment options, for example, transplantation, as indicated.	Liver transplants may be deemed necessary for liver failure associated with viral (B, C, and D) and autoimmune hepatitis. Currently, almost one-half of all liver transplants in the United States are performed for end-stage HCV. However, HCV reinfection posttransplant is nearly universal and if left untreated negatively affects patient and graft survival (Taylor et al, 2016).

### NURSING DIAGNOSIS: Fatigue

#### May Be Related To

Illness, anemia, malnutrition, physical deconditioning  
Stressors, depression, sleep deprivation

#### Possibly Evidenced By

Insufficient energy; tiredness; nonrestorative sleep pattern  
Impaired ability to maintain usual physical activity/routines; ineffective role performance  
Increase in physical complaints

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Fatigue: Disruptive Effect NOC

Report improved sense of energy.  
Perform activities of daily living (ADLs) and participate in desired activities at level of ability.  
Participate in recommended treatment program.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Energy Management NIC</b>	
<b>Independent</b>	
Determine if client is experiencing fatigue and ascertain client's belief about what is causing the fatigue and its impact on quality of life.	Fatigue is a common problem for client with hepatitis, whether it is brought on directly by liver disease, insomnia, depression, nutritional deficits, or side effect of treatments (e.g., interferon). Studies have found that 61% to 82% of people with HepC report some level of fatigue, often being a debilitating factor in daily life (Blahd, 2016; Daniel, 2017; Zalai et al, 2015).
Encourage bedrest and chair (recliner) rest during toxic state and frequent rest periods during recovery.	Available energy can be used for healing.
Provide quiet environment and limit visitors as needed.	Allows for extended periods of uninterrupted rest.
Encourage client to note daily energy patterns (i.e., peaks and valleys) and to plan activities accordingly.	Because fatigue may be profound at times over a long period of time with chronic hepatitis, client may need to learn to pace self. This may be accomplished by doing essential activities first and then other tasks as energy level allows.
Identify energy-conserving techniques, such as sitting to shower and brush teeth, planning steps of activity so that all needed materials are at hand, and scheduling rest periods.	Helps minimize fatigue, allowing client to accomplish more and feel better about self.
Progress activity as tolerated. Demonstrate and perform range-of-motion (ROM) exercises if unable to participate in other activities. Encourage daily exercise as time goes by.	Prolonged disease process can be debilitating and body is further weakened by inactivity. This can be offset by limited activity alternating with rest periods, progressing to short walks and beyond. Daily exercise (no matter how limited) can improve energy and mood.
Encourage and instruct in stress management techniques, such as progressive relaxation, visualization, and guided imagery, as desired. Discuss appropriate diversional activities, such as music, Internet surfing and/or games, TV, and reading.	Promotes relaxation and conserves energy, redirects attention, and may enhance coping.
Recommend avoidance of alcohol/other drugs.	Alcohol/other drugs are not only dangerous for the liver but also can exacerbate fatigue.
Recommend small, more frequent meals of nutritious foods.	While anorexia is common, eating small amounts frequently may improve energy.
<b>Collaborative</b>	
Collaborate in treatment of hepatitis infection and other underlying conditions (e.g., anemia, thyroid disease).	Fatigue will usually lessen significantly if client can achieve a sustained virologic response (SVR) defined as "no evidence of the particular hepatitis virus in the blood after receiving hepatitis treatment" (Daniel, 2017). Also managing other common conditions associated with fatigue can improve client's energy and coping abilities.
Refer to physical therapist, as indicated.	May be helpful in providing or instructing in mobility and strengthening exercises, as well as energy-saving techniques.
Administer medications, as indicated, for example, sedatives and antianxiety agents.	May be given to assist in managing insomnia and promoting required rest. Note: Because the liver is responsible for breaking down drugs in the body, any benefit from medication must be weighed against possible risks of damaging the liver.
Refer to community resources, as indicated (e.g., obtaining mobility aids, handicapped parking, Meals on Wheels, homemaker and housekeeper services).	Promotes problem-solving of most pressing needs of individual and family.

**NURSING DIAGNOSIS:** **imbalanced Nutrition: less than body requirements****May Be Related To**

Inability to ingest food—anorexia, nausea, vomiting  
Inability to digest food/absorb nutrients—reduced peristalsis, bile stasis  
[Increased caloric demands]

**Possibly Evidenced By**

Food aversion; insufficient interest in food; food intake less than recommended daily allowance; alteration in taste sensation  
Abdominal pain/cramping  
Loss of weight, insufficient muscle tone

**Desired Outcomes/Evaluation Criteria—Client Will****Weight Maintenance Behavior NOC**

Initiate behaviors and lifestyle changes to regain or maintain appropriate weight.

**Nutritional Status NOC**

Demonstrate progressive weight gain toward goal with normalization of laboratory values and no signs of malnutrition.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Weight Gain Assistance NIC</b>	
<i>Independent</i>	
Note reports of/presence of anorexia, nausea and vomiting, diarrhea.	May be present because of the underlying disease or from side effects of certain treatments.
Monitor dietary intake and calorie count, if indicated.	May be required if client is severely anorexic, to assess deficits and needs.
Provide meals in several small feedings and offer largest meal at breakfast.	Large meals are difficult to manage when client is anorexic. Anorexia may also worsen during the day, making intake of food difficult later in the day.
Offer and make available snacks and calorie-dense fluids between meals and whenever client feels some appetite.	Improves total daily intake of nutrients, especially if client has access to foods that do not require cooking (e.g., liquid food supplements, single-package foods, snacks that don't require refrigeration).
Encourage intake of plenty of fluids throughout the day (e.g., glass of water at beginning and end of day, ice chips or water bottle handy at all times).	Some treatments (e.g., ribavirin) cause dehydration, dry mouth, and thick saliva, which can interfere with food intake.
Limit fluids at mealtime and/or carbonated sugar-containing beverages.	These can fill the stomach rapidly and interfere with appetite for food.
Provide bland foods and foods and fluids high in soluble fiber and electrolytes, as indicated.	These may be helpful if client has diarrhea associated with disease process or treatments.
Encourage mouth care before meals and after-dinner mints, chewing gum, etc.	Rinsing mouth with saline or soda water, tea, ginger ale before eating can help clear taste buds and eliminate unpleasant taste associated with disease condition or treatments. Lemon drops, zinc lozenges, mints, or gum can help get rid of bad or “off” tastes that linger after eating.
Recommend eating in upright position.	Reduces sensation of abdominal fullness and may enhance intake.
Encourage intake of fruit juices or smoothies, milk shakes, iced tea, other noncarbonated beverages; saltines or animal crackers; hard candy throughout the day.	These supply extra calories and may be more easily digested and tolerated than other fluids and foods.

(continues on page 490)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Consult with dietitian or nutritional support team to provide diet according to client's needs, with fat and protein intake as tolerated.	Useful in formulating dietary program to meet individual needs. Fat metabolism varies according to bile production and excretion and may necessitate restriction of fat intake if diarrhea develops. If tolerated, a normal or increased protein intake helps with liver regeneration. Protein restriction may be indicated in severe disease, such as fulminating hepatitis, because the accumulation of the end products of protein metabolism can potentiate hepatic encephalopathy (Daniel, 2017).
Monitor serum glucose, as indicated.	Hyperglycemia or hypoglycemia may develop in chronic hepatitis, either as a direct result of liver dysfunction or as a side effect of certain medications.
Administer medications, as indicated, for example:	
Antiemetics (e.g., ondansetron [Zofran], metoclopramide [Reglan])	Given before meals, these drugs may reduce nausea and increase food tolerance.
Antilulcer agents and antacids, such as lansoprazole (Prevacid), esomeprazole (Nexium), and magnesium hydroxide/aluminum hydroxide (Maalox, Mylanta), as indicated	Counteracts gastric acidity, reducing irritation and risk of bleeding.
Vitamins, such as B complex, C, and other dietary supplements, as indicated	Corrects deficiencies and aids in the healing process.
Provide supplemental feedings, enteral or parenteral nutrition if needed.	May be necessary to meet nutrient requirements if marked deficits are present and intestinal symptoms are prolonged.

## NURSING DIAGNOSIS: risk for deficient Fluid Volume/Bleeding

### Possibly Evidenced By

Excessive losses through normal routes—vomiting, diarrhea  
Failure of regulatory mechanisms—third-space shift  
Active fluid loss—altered clotting process

### Desired Outcomes/Evaluation Criteria—Client Will

#### Fluid Balance NOC

Maintain adequate hydration, as evidenced by stable vital signs, good skin turgor, timely capillary refill, strong peripheral pulses, and individually appropriate urinary output.

#### Blood Coagulation NOC

Be free of signs of hemorrhage with clotting times within normal limits (WNL).

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid/Electrolyte Management NIC</b> <i>Independent</i> Monitor intake and output (I&O) and compare periodic weights. Note enteric losses, such as vomiting and diarrhea.	Provides information about replacement needs and effects of therapy. Note: Diarrhea may be due to transient fullike response to acute viral infection or may represent a more serious problem in chronic hepatitis with damaged liver, causing vascular congestion in the gastrointestinal (GI) tract. Or, it may be the intended result of medication use, such as neomycin or lactulose, to decrease serum ammonia levels in the presence of hepatic encephalopathy.
Assess vital signs, peripheral pulses, capillary refill, skin turgor, and mucous membranes.	Indicators of circulating volume and perfusion.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Bleeding Precautions <b>NIC</b> Check for ascites and edema formation. Measure abdominal girth, as indicated.	Useful in monitoring progression and resolution of fluid shifts associated with edema and ascites.
Use small-gauge needles for injections, applying pressure for longer than usual after venipuncture.	Reduces possibility of bleeding into tissues.
Have client use cotton or sponge swabs and alcohol-free mouthwash instead of toothbrush.	Avoids trauma and bleeding of the gums. Note: Alcohol-based mouthwash may be irritating to dry mucosa.
Observe for signs of bleeding—hematuria and melena, ecchymosis, and oozing from gums or puncture sites.	Prothrombin levels are reduced and coagulation times prolonged when vitamin K absorption is altered in GI tract, and synthesis of prothrombin is decreased in affected liver.
<b>Fluid/Electrolyte Management NIC</b> <b>Collaborative</b>	
Monitor periodic laboratory values, such as Hgb/Hct, sodium, albumin, and clotting times.	Reflects hydration status and identifies sodium retention and protein deficits, which may lead to edema formation. Deficits in clotting potentiate risk of bleeding.
Administer antidiarrheal agents, such as diphenoxylate with atropine (Lomotil).	Reduces fluid and electrolyte loss from GI tract.
Provide intravenous (IV) fluids (usually glucose) and electrolytes.	Provides fluid and electrolyte replacement in acute toxic state.
<b>Bleeding Precautions NIC</b>	
Administer medications, as indicated, for example:	
Vitamin K	Because absorption is altered, supplementation may prevent coagulation problems, which may occur if clotting factors are decreased.
Antacids or H <sub>2</sub> -receptor antagonists, such as lansoprazole (Prevacid) and cimetidine (Tagamet)	Neutralizes or reduces gastric secretions to lower risk of gastric irritation and bleeding.
Infuse fresh-frozen plasma (FFP), as indicated.	May be required to replace clotting factors in the presence of coagulation defects.

<b>NURSING DIAGNOSIS:</b> risk for situational low Self-Esteem	
<b>Possibly Evidenced By</b>	
Physical illness	
Alteration in body image	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Self-Esteem NOC</b>	
Verbalize feelings.	
Identify methods for coping with negative perception of self.	
Verbalize acceptance of self in situation, including length of recovery and need for isolation.	
Acknowledge self as worthwhile; be responsible for self.	

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Esteem Enhancement NIC</b> <b>Independent</b>	
Contract with client regarding time for listening. Encourage discussion of feelings and concerns.	Establishing time enhances trusting relationship. Providing opportunity to express feelings allows client to feel more in control of the situation. Verbalization can decrease anxiety and depression and facilitate positive coping behaviors. Client may need to express feelings about being ill, length and cost of illness, possibility of infecting others, and (in severe illness) fear of death. May have concerns regarding the stigma of the disease.

(continues on page 492)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Avoid making moral judgments regarding lifestyle, such as alcohol use, drug abuse, and sexual practices.	Client may already feel upset or angry and condemn self; judgments from others will further damage self-esteem.
Discuss recovery expectations.	Recovery period may be prolonged (months), potentiating family and situational stress and necessitating need for planning, support, and follow-up.
Assess effect of illness on economic factors of client and significant other (SO).	Financial problems may exist because of loss of client's role functioning in the family and prolonged recovery.
Offer diversional activities based on energy level.	Enables client to use time and energy in constructive ways that enhance self-esteem and minimize anxiety and depression.
Suggest client wear bright reds or blues and blacks instead of yellows or greens.	Enhances appearance because yellow skin tones are intensified by yellow and green colors. Note: Jaundice usually peaks within 1 to 2 weeks, then gradually resolves over 2 to 4 weeks.
<b>Collaborative</b>	
Make appropriate referrals for help as needed, such as community case manager, social services, and other community agencies.	Can facilitate problem-solving and help involved individuals cope more effectively with situation.
Refer to counseling, support group, as indicated.	May need additional assistance to deal with emotional issues of illness and effect on own life and family to prevent progression to chronic self-esteem issues.

### NURSING DIAGNOSIS: risk for Infection [secondary/spread]

#### Possibly Evidenced By

Leukopenia, suppressed inflammatory response, immunosuppression  
Malnutrition

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Risk Control: Infectious Process NOC

Verbalize understanding of individual causative and risk factor(s).  
Demonstrate techniques and initiate lifestyle changes to avoid reinfection and transmission to others.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Control NIC</b>	
<i>Independent</i>	
<b>For client in healthcare facility:</b> Establish isolation techniques if indicated according to facility infection guidelines and policy for handling body fluids and wastes, as well as contaminated objects. Model and emphasize need for effective hand hygiene, including handwashing and use of alcohol-based hand sanitizers.	Healthcare-associated HAV occurs infrequently. HAV is spread by the fecal-oral route, and transmission to healthcare personnel usually occurs when the source client has unrecognized hepatitis and is fecally incontinent or has diarrhea. Types A, B, C, and D are transmitted by contaminated blood or blood products, needle punctures, open wounds, and contact with saliva, urine, stool, and semen. Incidence of both HBV and HCV has increased among healthcare providers (primarily through contaminated needles/other sharp instruments). Note: Toxic and alcoholic types of hepatitis are not communicable and do not require special measures or isolation.
Emphasize need to monitor and restrict visitors, as indicated.	Client exposure to infectious processes, especially respiratory, potentiates risk of secondary complications.
Explain isolation procedures to client and SO.	Understanding reasons for safeguarding themselves and others can lessen feelings of isolation and stigmatization. Isolation may last 2 to 3 weeks from onset of illness, depending on type and duration of symptoms.
<b>Collaborative</b>	
Administer anti-infective medications, as appropriate.	Used to treat or limit secondary infections.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**
**May Be Related To**

Insufficient information; insufficient interest in learning; misinformation presented by others

**Possibly Evidenced By**

Insufficient knowledge

Inaccurate follow-through of instructions

**Desired Outcomes/Evaluation Criteria—Client Will****Knowledge: Chronic Illness Care NOC**

Verbalize understanding of disease process, prognosis, and potential complications.

Identify relationship of signs and symptoms to the disease and correlate symptoms with causative factors.

Verbalize understanding of therapeutic needs.

Initiate necessary lifestyle changes and participate in treatment regimen.

**ACTIONS/INTERVENTIONS****RATIONALE****Teaching: Disease Process NIC***Independent*

Assess level of understanding of the disease process, prognosis, and possible treatment options.

Identifies areas of lack of knowledge or misinformation and provides opportunity to give additional information as necessary.

Discuss the importance of participating in entire treatment regimen (e.g., take medications every day, exactly as prescribed; don't skip doses; get blood tests done on time; attend all follow-up visits with healthcare providers).

It is known that sustained remission is rare in the absence of/or completion of treatment. Much of the time, treatment is 12 weeks long (but may be as short as 8 weeks or as long as over a year), which can become a burden to some clients, raising the risk that they fail to complete treatment and relapse.

Provide specific information regarding prevention and transmission of disease: for example, contacts may require gamma globulin, personal items should not be shared, and observe strict handwashing and sanitizing of clothes, dishes, and toilet facilities while liver enzymes are elevated. Avoid intimate contact, such as kissing and sexual contact, and exposure to infections, especially respiratory infections.

Needs vary with type of hepatitis, causative agent, and individual situation.

Plan resumption of activity, as tolerated, with adequate periods of rest.

It is not necessary to wait until serum bilirubin levels or viral loads return to normal to resume activity. However, client needs to understand the importance of continued adequate rest in preventing relapse or recurrence.

Help client identify appropriate diversional activities.

Enjoyable activities promote rest and help client avoid focusing on prolonged convalescence.

Encourage continuation of balanced diet.

Promotes general well-being and enhances energy for healing process and tissue regeneration.

Identify ways to maintain usual bowel function, such as adequate intake of fluids and dietary roughage and moderate exercise to tolerance.

Decreased level of activity, changes in food and fluid intake, and slowed bowel motility may result in constipation.

Discuss the side effects and dangers of taking OTC and certain prescribed drugs that are known to have adverse effects on the liver. Advise client to notify pharmacists and all future healthcare providers of diagnosis.

Some drugs are toxic to the liver; many others are metabolized by the liver and should be avoided in severe liver diseases because they may cause cumulative toxic effects or chronic hepatitis.

Discuss restrictions on donating blood.

Most state laws prevent accepting as donors those who have a history of any type of hepatitis.

Emphasize importance of follow-up physical examination and laboratory evaluation.

Disease process may take several months to resolve. If symptoms persist longer than 6 months, liver biopsy may be required to verify presence of chronic hepatitis.

(continues on page 494)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss need for immunizations.	Recovery from hepatitis A and B results in protective antibodies in the client, so he or she will not get those strains again. There is currently no vaccine available against HCV. However, people should be vaccinated against HAV and HBV. Guidelines include immunizing everyone under the age of 18 years, individuals exposed to blood and body fluids or sharing a household with an infected person, screening all pregnant women for HBsAg, and providing immunoprophylaxis to infants of HBV-infected women, people traveling to areas where infection rates are known to be high, men who have sex with men, illicit injection drug users, and persons receiving hemodialysis or who have clotting disorders or liver disease (CDC, 2018).
Give information regarding availability of gamma globulin, immune serum globulin (ISG), hepatitis immune globulin (H-BIG), HBV vaccine (Recombivax HB, Engerix-B) through health department or family physician.	Immune globulins may be effective in preventing viral hepatitis in those who have been exposed, depending on type of hepatitis and period of incubation.
Review necessity of avoidance of alcohol, illicit drugs, and tobacco.	These substances increase hepatic irritation and interfere with recovery.
<b>Collaborative</b> Refer to community resources and drug and alcohol treatment program, as indicated.	May need additional assistance to withdraw from substance and maintain abstinence to avoid further liver damage.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Fatigue**—altered body chemistry, malnutrition, stress, depression
- **impaired Home Maintenance**—illness, insufficient finances, inadequate support systems, unfamiliarity with neighborhood resources
- **imbalanced Nutrition: less than body requirements**—inability to ingest/digest food (anorexia, nausea, vomiting); inability to absorb nutrients; [increased metabolic demands]
- **risk for Infection**—inadequate secondary defenses; malnutrition
- **risk for impaired Liver Function**—viral infection, coinfections, substance abuse
- **risk for ineffective Health Management**—complexity of therapeutic regimen, economic difficulties, family patterns of healthcare, perceived barriers, social support deficit

## CIRRHOSIS OF THE LIVER

### I. Pathophysiology

- a. All chronic liver diseases that progress to cirrhosis have in common the histologic features of hepatic fibrosis and nodular regeneration. However, signs and symptoms may vary, depending on the underlying etiology of the disease. For example, a person with end-stage liver disease caused by hepatitis C may develop profound muscle wasting, marked ascites, and severe hepatic encephalopathy, with only mild jaundice. In contrast, a person with end-stage primary biliary cirrhosis may be deeply jaundiced, with no evidence of muscle wasting or portal hypertension.
- b. Altered liver structure and degenerative changes are the result of the buildup of diffuse bands of fibrotic connective

tissue causing widespread destruction of hepatic cells, impairing liver function, and impeding blood flow through the liver.

- c. Compensated cirrhosis: Liver function may continue for some time, even with significant scarring, but metabolic abnormalities can occur, such as coagulation defects and malnutrition.
- d. Decompensated cirrhosis: Progression of failure with significant complications, such as portal hypertension with bleeding varices, spontaneous bacterial infections (SPBs), ascites, hepatorenal syndrome, and encephalopathy.

### II. Etiology

- a. Rate of progression of fibrosis to cirrhosis varies for unknown reasons.

- b. Multiple causation (Fagerstrom & Frisman, 2017; Wolf, 2017)
  - i. Hepatitis C (26%)
  - ii. Alcoholic liver disease (21%); HepC plus alcoholic liver disease (15%)
  - iii. HepB, along with HepD (15%)
  - iv. Cryptogenic causes (no readily identifiable cause) (18%): including nonalcoholic fatty liver disease (NAFLD). *Note:* The development of NAFLD is closely associated with obesity and metabolic syndrome, a proinflammatory state that perpetuates metabolic abnormalities and fatty deposits in the liver (Dietrich & Hellerbrand, 2014; Wisocky & Paul, 2017).
  - v. Miscellaneous liver disorders (about 5%) include autoimmune hepatitis, Wilson's disease, alpha<sub>1</sub>-antitrypsin deficiency, drug-induced liver disease (e.g., NSAIDs, acetaminophen; aminoglycoside antibiotics, methotrexate; statins, phenytoin; methamphetamine [not a complete list]) (Lee, 2016), chronic right-sided heart failure, hemochromatosis, and toxins (e.g., arsenic, environmental toxins).

### III. Treatment

- a. Goals are to (1) slow the progression of the disease (if the cause can be treated) and manage developing complica-

tions (e.g., esophageal varices, hepatic encephalopathy, hepatocellular carcinoma [HCC]) and (2) alleviate distressing symptoms (e.g., anorexia, anemia, ascites, pruritus, pain).

- b. Liver transplantation is currently the only life-saving procedure for end-stage disease.

### IV. Statistics

- a. Morbidity: According to a study published in 2015, the prevalence of cirrhosis in the United States was approximately 0.27%, corresponding to 633,323 adults (Scaglione et al, 2015). As of December 2015, approximately 14,046 individuals were listed on the waiting list for liver transplant (Kim et al, 2015).
- b. Mortality: In 2014, cirrhosis (and other liver disorders) were listed as the 12th leading cause of death in the United States (approximately 38,000 a year) (Centers for Disease Control and Prevention [CDC], 2016b).
- c. According to a study published in 2011, the national cost for treatment of cirrhosis in 2008 ranged from \$14 million to \$2 billion, depending on disease etiology. *Note:* This burden is expected to rise over the next 20 years, given that the percentage of patients with HCV-related cirrhosis is predicted to almost double (Neff et al, 2011).

## G L O S S A R Y

**Ascites:** Buildup of excessive fluid within the peritoneal cavity, can be a complication of either hepatic or nonhepatic disease. The four most common causes of ascites in North America and Europe are cirrhosis, neoplasm, congestive heart failure, and tuberculous peritonitis (Wolf, 2017).

**Asterixis:** Involuntary jerking movements of hands and feet associated with hepatic encephalopathy.

**Echymosis:** Skin discoloration consisting of a large, irregularly formed hemorrhagic area with colors changing from blue-black to greenish-brown or yellow; commonly referred to as a bruise.

**Fetor hepaticus:** Particularly foul-smelling breath, which frequently precedes hepatic coma.

**Hematemesis:** Bloody vomitus.

**Hepatic encephalopathy:** Brain dysfunction directly due to liver dysfunction seen in advanced cirrhosis, resulting in disturbances of consciousness and progressing to coma.

**Hepatomegaly:** Enlarged liver.

**Hepatorenal syndrome:** Represents a continuum of kidney dysfunction observed in individuals with cirrhosis caused by the vasoconstriction of large and small renal arteries.

**Jaundice:** Yellow staining of the skin and sclera (and sometimes other tissues and body fluids) because of abnormally high blood levels of bilirubin.

**Melena:** Bloody stools.

**Palmar erythema:** Redness of the palms of the hands caused by dilation and congestion of capillaries.

**Peritoneovenous shunt:** Surgically implanted device for continuous draining of ascitic fluid into the venous system. Fluid is removed via a pressure-sensitive one-way valve. It is connected to a tube under the subcutaneous tissue of the chest wall to the neck, where it enters the internal jugular vein and terminates in the superior vena cava.

**Petechiae:** Tiny red dots on the skin caused by minute hemorrhage, indicating low platelet count or other blood disorder.

**Spider angiomas:** Abnormal collection of blood vessels near the surface of the skin; can occur anywhere but are most common on the face and trunk.

**Splenomegaly:** Enlarged spleen.

**Steatorrhea:** Pale, bulky, and malodorous stools as a result of fat malabsorption.

**Telangiectasia:** Visibly dilated blood vessel on the skin or mucosal surface.

**Venous thromboembolism (VTE):** A venous thrombus is a blood clot that forms within a vein. A common type of venous thrombosis is a deep vein thrombosis (DVT), a blood clot in the deep veins of the leg. If the thrombus breaks off and flows toward the lungs, it can become a pulmonary embolism (PE), a blood clot in the lungs.

## CARE SETTING

Client may be hospitalized on a medical unit during initial or recurrent acute episodes with potentially life-threatening complications. Otherwise, this condition is managed at the community, outpatient level.

## RELATED CONCERNS

- Acute renal injury (acute renal failure), page 595
- Alcohol: acute withdrawal, page 919
- Fluid and electrolyte imbalances (see *DavisPlus*)
- Peritonitis, page 389
- Psychosocial aspects of care, page 835
- Renal dialysis—general considerations, page 623
- Substance use disorders, page 929
- Total nutritional support: parenteral/enteral feeding, page 525
- Upper gastrointestinal bleeding, page 340
- Venous thromboembolism (VTE) disease including deep vein thrombosis (DVT) and pulmonary embolism (PE), page 120

## CLIENT ASSESSMENT DATABASE

Data depend on underlying cause of the condition.

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Weakness
- Fatigue, exhaustion

#### CIRCULATION

- History of or recent onset of hepatitis, heart failure (HF), pericarditis, rheumatic heart disease, or cancer, causing liver impairment leading to failure
- Easy bruising, nosebleeds, bleeding gums

#### ELIMINATION

- Gradual abdominal enlargement
- Diarrhea or constipation

#### FOOD/FLUID

- Anorexia
- Food intolerance, ingestion
- Nausea, vomiting

#### NEUROSENSORY

- Significant other (SO)/family may report personality changes, depressed mentation

### MAY EXHIBIT

- Decreased muscle mass and tone
- Lethargy, malaise

- Hypertension or hypotension (fluid shifts)
- Dysrhythmias, extra heart sounds—S<sub>3</sub>, S<sub>4</sub>
- Jugular vein distention (JVD), distended abdominal veins, spider angiomas, collateral circulation
- Ecchymosis, petechiae

- Abdominal distention (hepatomegaly, splenomegaly, ascites)
- Hemorrhoidal or esophageal varices
- Decreased or absent bowel sounds
- Clay-colored stools, melena
- Dark, concentrated urine; oliguria (hepatorenal syndrome, failure)

- Weight loss (actual) or gain (fluid)
- Tissue wasting
- Hematemesis
- Halitosis or fetor hepaticus, bleeding gums
- Dry skin, poor turgor
- Edema generalized in tissues

- Changes in mentation, confusion
- Slowed, slurred speech
- Hallucinations
- Confusion progressing to delirium and coma (hepatic encephalopathy)
- Asterixis

MAY REPORT (continued)	MAY EXHIBIT (continued)
<b>PAIN/DISCOMFORT</b>	
<ul style="list-style-type: none"> <li>Abdominal tenderness and right upper quadrant (RUQ) pain</li> <li>Pins-and-needles sensation, burning pain in extremities (peripheral neuropathy)</li> </ul>	<ul style="list-style-type: none"> <li>Guarding or distraction behaviors</li> <li>Self-focus</li> </ul>
<b>RESPIRATION</b>	
<ul style="list-style-type: none"> <li>Shortness of breath</li> </ul>	<ul style="list-style-type: none"> <li>Tachypnea, dyspnea, shallow respiration, adventitious breath sounds</li> <li>Hypoxia</li> <li>Limited thoracic expansion because of ascites</li> </ul>
<b>SAFETY</b>	
<ul style="list-style-type: none"> <li>Itching, dryness of the skin (pruritus)</li> </ul>	<ul style="list-style-type: none"> <li>Fever—more common in alcoholic cirrhosis</li> <li>Jaundiced skin and sclera</li> <li>Spider angiomas, telangiectasias</li> <li>Palmar erythema</li> <li>Delayed wound healing</li> <li>Unsteady or shaky, jerking movements (risk for falls)</li> </ul>
<b>SEXUALITY</b>	
<ul style="list-style-type: none"> <li>Menstrual disorders (women)</li> <li>Impotence (men)</li> </ul>	Testicular atrophy, gynecomastia, loss of hair—chest, underarm, pubic
<b>TEACHING/LEARNING</b>	
<ul style="list-style-type: none"> <li>History of long-term alcohol or injection drug use, alcoholic liver disease, use of drugs affecting liver function</li> <li>History of biliary system disease, hepatitis, exposure to toxins, liver trauma</li> </ul>	
<b>DISCHARGE PLAN CONSIDERATIONS</b>	
<ul style="list-style-type: none"> <li>May need assistance with self-care and other activities of daily living (ADLs), homemaking and maintenance tasks, or placement in care facility</li> </ul> <p>► Refer to section at end of plan for postdischarge considerations.</p>	

<b>DIAGNOSTIC STUDIES</b>	
TEST	WHY IT IS DONE
<b>BLOOD TESTS</b>	
<ul style="list-style-type: none"> <li><b>Liver enzymes such as alanine aminotransferase (ALT), aspartate aminotransferase (AST), lactate dehydrogenase (LDH), alkaline phosphatase (ALP):</b> Assess liver functioning and detect liver damage.</li> <li><b>Serum bilirubin (total and indirect unconjugated):</b> Bilirubin results from the breakdown of hemoglobin.</li> <li><b>Serum albumin:</b> Protein of the highest concentration in plasma. Transports substances, such as bilirubin, calcium, progesterone, and drugs, and regulates osmotic pressure of blood, keeping fluid from leaking out into the tissues.</li> </ul>	<p>Liver enzyme levels are elevated because of cellular damage and release of enzymes. Which enzymes are elevated and how much they are elevated varies depending on the cause(s) for liver disease.</p> <p>Elevated because of cellular disruption or biliary obstruction, causing jaundice.</p> <p>Because albumin is made by the liver, decreased serum albumin may result from liver disease and affect bleeding/clotting and nutrition.</p>

(continues on page 498)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li><b>Immunoglobulin (Ig) A, G, and M:</b> Proteins found in blood or other bodily fluids used by the immune system to identify and neutralize foreign objects, such as bacteria and viruses.</li><li><b>Complete blood count (CBC):</b> Battery of screening tests, which typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; white blood cell (WBC) count and differential.</li><li><b>Bleeding studies</b> (e.g., platelets, coagulation factors [Factor II, V, VII, X, or XII deficiencies]; prothrombin time, fibrinogen, vitamin K [not a complete list])</li><li><b>Clotting studies</b> (e.g., protein C, antithrombin, aPTT, anti-Xa, INR [not a complete list])</li><li><b>Blood urea nitrogen (BUN):</b> Urea is the end product of protein metabolism formed in the liver from amino acids and from ammonia compounds.</li><li><b>Serum ammonia:</b> Product of breakdown of protein, which is normally converted to urea and excreted.</li><li><b>Serum glucose:</b> One of the simple sugars in the blood, which serves as primary energy source for cells.</li><li><b>Electrolytes:</b> Substances that dissociate into ions in solution and acquire the capacity to conduct electricity. Common electrolytes include sodium, potassium, chloride, calcium, and phosphate.</li></ul>	Levels are increased.  Hb, Hct, and RBCs may be decreased because of bleeding and RBC destruction. Anemia is seen with hypersplenism and iron deficiency. Leukopenia may be present as a result of hypersplenism.  In severe liver disease, there is both a risk for bleeding and risk for clotting, which may be concurrent.
	Elevation indicates breakdown of blood proteins and possible kidney dysfunction because of diuretic use in treatment of ascites.  Elevated because of inability to convert ammonia to urea. Elevated levels will cause hepatic encephalopathy. Low blood glucose (hypoglycemia) suggests impaired synthesis of glycogen from glucose (glycogenesis). Low potassium (hypokalemia) may reflect increased aldosterone, although various imbalances may occur. Low calcium (hypocalcemia) may occur because of impaired absorption of vitamin D.
	May be first assessment performed in individual with suspected liver disease to detect ascites and enlarged liver and spleen. In advanced disease, the liver appears small and multinodular, ascites may be detected, and Doppler flow can be significantly decreased in the portal circulation.  Definitive test for cirrhosis, revealing hepatic tissue destruction and fibrosis.

## OTHER DIAGNOSTIC STUDIES

- Abdominal ultrasonography with Doppler:** Diagnostic technique that uses sound waves to produce an image of internal body structures.
- Liver biopsy:** Biopsy can be performed via percutaneous, transjugular, laparoscopic, open operative, or computed tomography (CT)-guided fine-needle approaches. Samples are obtained for microscopic evaluation.

## NURSING PRIORITIES

- Maintain adequate nutrition.
- Prevent complications.
- Enhance self-concept and acceptance of situation.
- Provide information about disease process, prognosis, potential complications, and treatment needs.

## DISCHARGE GOALS

- Nutritional intake adequate for individual needs.
- Complications prevented or minimized.
- Deals effectively with current reality.
- Disease process, prognosis, potential complications, and therapeutic regimen understood.
- Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: imbalanced Nutrition: less than body requirements

### May Be Related To

Inability to ingest food (e.g., anorexia, nausea, vomiting, indigestion)  
Inability to digest food  
Abdominal cramping

**NURSING DIAGNOSIS:** **imbalanced Nutrition: less than body requirements** (continued)**Possibly Evidenced By**

Body weight 20% or more below ideal weight range [recent weight loss; decreased subcutaneous fat or muscle mass]; poor muscle tone  
 Insufficient interest in food; food aversion; food intake less than recommended daily allowances; satiety immediately after ingesting food  
 Hyperactive bowel sounds; diarrhea, steatorrhea  
 Abnormal laboratory studies (e.g., decreased albumin)

**Desired Outcomes/Evaluation Criteria—Client Will****Nutritional Status** **NOC**

Demonstrate progressive weight gain toward goal.  
 Experience no further signs of malnutrition.

**Nutritional Status: Biochemical Measures** **NOC**

Display appropriate normalization of laboratory values.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Therapy</b> <b>NIC</b> <i>Independent</i> Note client reports of inability to eat. Assess for presence of conditions that can interfere with food intake.	Client with cirrhosis may have been sick for quite a while with nausea and/or vomiting and have no appetite or may have abdominal ascites, which causes early satiety.
Evaluate client's risk for malnutrition, noting such things as emaciated appearance, muscle wasting, obvious lack of interest in food, expressed aversion to eating, etc.	Malnutrition, weight loss, and muscle wasting occur in more than 50% of persons with cirrhosis (Cheung et al, 2012). Client may have malabsorption syndrome due to inability to process or digest nutrients, anorexia, nausea or vomiting, indigestion, or early satiety associated with ascites. Deficiencies in water-soluble vitamins are common in alcoholic cirrhosis, while deficiencies in fat-soluble vitamins are more common in cholestatic liver disease. In more advanced stages, both fat-soluble and water-soluble vitamin deficiencies occur (O'Brien & Williams, 2008).
Determine ability to chew, swallow, and taste. Discuss usual eating habits, including food preferences, intolerances, or aversions.	Factors that affect ingestion and digestion of nutrients.
Evaluate total daily food intake, using food diary if needed.	Provides information about intake, needs, and deficiencies. <i>Note:</i> Dietary protein restriction is not advised for the management of mild hepatic encephalopathy since loss of skeletal muscle, which metabolizes ammonia, can lead to worsening hepatic encephalopathy (Cordoba et al, 2004; Liou, 2017).
Weigh, as indicated. Consider fluid status and recent weight history.	It may not be reasonable to use weight as a direct indicator of nutritional status in view of edema and ascites.
Assist or encourage client to eat; explain reasons for the types of diet. Feed client if tiring easily, or have SO assist client. Consider preferences in food choices.	Improved nutrition is vital to recovery. Client may eat better if family is involved and preferred foods are included as much as possible. Client and family must understand protein intake limitations and how best to meet needs and desires within limitations.
Recommend or provide small, frequent meals.	Poor tolerance to larger meals may be due to increased intra-abdominal pressure or ascites.
Offer and make available snack and calorie-dense foods between meals and whenever client feels some appetite.	Improves total daily intake of nutrients especially if client has access to foods that do not require cooking (e.g., liquid supplements, single-package low-salt foods, snacks that don't require refrigeration).
Recommend sitting in upright position to eat.	Reduces discomfort from abdominal distention and may enhance intake.

(continues on page 500)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage intake of plenty of fluids throughout the day (e.g., glass of water at beginning and end of day, ice chips or water bottle handy at all times).	Helps in hydrating for metabolic functions but also can counteract effects of some treatments (e.g., ribavirin, diuretics used for ascites/edema), which can cause dehydration, dry mouth, and thick saliva interfering with food intake.
Limit fluids at mealtime and/or carbonated sugar-containing beverages.	These can fill stomach rapidly and interfere with appetite for foods.
Limit such high-salt foods as canned soups and vegetables, processed meats, and condiments. Provide salt substitutes if allowed, avoiding those containing ammonia.	Salt limitations can help manage fluid complications in cirrhosis, including ascites or tissue edema. Salt substitutes enhance the flavor of food and aid in increasing appetite; ammonia potentiates risk of encephalopathy.
Encourage or provide frequent mouth care, especially before meals.	Client is prone to sore and bleeding gums and bad taste in mouth, which contributes to anorexia.
Provide assistance with activities as needed. Promote undisturbed rest periods, especially before meals.	Conserving energy reduces metabolic demands on the liver and promotes cellular regeneration.
<b>Collaborative</b> Monitor laboratory studies (e.g., glucose, prealbumin or albumin, total proteins, and ammonia).	Glucose may be decreased because of impaired glycogenesis, depleted glycogen stores, or inadequate intake. Protein may be low because of impaired metabolism, decreased hepatic synthesis, or loss into peritoneal cavity (ascites). Elevation of ammonia level may require restriction of protein intake to prevent serious complications in person with severe cirrhosis.
Maintain nothing by mouth (NPO) status, when indicated.	Gastrointestinal (GI) rest may be required in acutely ill clients to reduce demands on the liver and production of ammonia and urea in the GI tract. When this is the case, nutrition must be supplied by another method—enteral or parenteral feedings.
Collaborate with nutritional team to provide diet individualized to client's needs.	The client needs and food tolerance vary greatly from day to day, because they are dependent on multiple factors, such as the status of client's gastrointestinal system, but also response to treatments and cognitive and emotional state.
Provide enteral tube feedings or total parenteral nutrition (TPN), if indicated.	May be required to supplement diet or to provide nutrients when client is too nauseated or anorexic to eat or when esophageal varices interfere with oral intake. (Refer to CP: Total Nutritional Support: Parenteral/Enteral Feedings.)
Administer medications, as indicated, for example:	
Vitamin supplements (especially fat-soluble vitamins A, D, E, K) and B vitamins (thiamine, iron, folic acid)	Replacement required because of the inability of the liver to process or store vitamins.
Antiemetics, such as ondansetron (Zofran) and promethazine (Phenergan)	Used to reduce nausea and vomiting or to enhance oral intake (when taken before meals).

## NURSING DIAGNOSIS: risk for excess Fluid Volume

### Possibly Evidenced By

Compromised regulatory mechanism—decreased plasma proteins  
Excess sodium and fluid intake

### Desired Outcomes/Evaluation Criteria—Client Will

#### Fluid Balance NOC

Demonstrate stabilized fluid volume, with balanced intake and output (I&O), stable weight, vital signs within client's normal range, and free of edema.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid/Electrolyte Management NIC</b>	
<b>Independent</b>	
Measure I&O, noting positive balance—intake in excess of output. Weigh daily, and note trends.	Reflects circulating volume status, developing or resolving fluid shifts, and response to therapy. Positive fluid balance and weight gain often reflect continuing fluid retention. Note: Decreased circulating volume and fluid shifts can directly affect renal function and urine output, resulting in hepatorenal syndrome.
Weigh daily or as prescribed and document changes, noting both gains and losses.	Monitoring is needed to help direct therapy, as weight may increase, decrease, or fluctuate. For example, steady weight gain may reflect continuing fluid retention (renal impairment) or development of ascites. Or adjustments in dosage may be required in client losing more than a pound a day while on diuretic therapy for ascites.
Monitor BP and CVP, if available. Note JVD and abdominal vein distention.	BP elevations are usually associated with fluid volume excess but may not occur because of fluid shifts out of the vascular space. JVD and presence of distended abdominal veins are associated with vascular congestion.
Assess respiratory status, noting increased respiratory rate and dyspnea.	Indicative of pulmonary congestion or edema.
Auscultate lungs, noting diminished or absent breath sounds and developing adventitious sounds—crackles.	Increasing pulmonary congestion may result in consolidation, impaired gas exchange, and complications, such as pulmonary edema.
Monitor for cardiac dysrhythmias. Auscultate heart sounds, noting development of S <sub>3</sub> /S <sub>4</sub> gallop rhythm.	May be caused by HF, decreased coronary arterial perfusion, or electrolyte imbalance.
Assess degree of peripheral and dependent edema.	Fluids shift into tissues as a result of sodium and water retention, decreased albumin, and increased antidiuretic hormone (ADH).
Measure abdominal girth.	Reflects accumulation of fluid or ascites resulting from loss of plasma proteins and fluid into peritoneal space. Note: Ascites is one of the most frequent complications of late-stage cirrhosis (60%–75%) (Cesario et al, 2013; Shah & Fields, 2016).
Provide frequent mouth care and occasional ice chips, particularly if NPO; schedule fluid intake around the clock.	Decreases sensation of thirst, especially when fluid intake is restricted.
<b>Collaborative</b>	
Monitor serum albumin and electrolytes, particularly potassium and sodium.	Decreased serum albumin affects plasma colloid osmotic pressure, resulting in edema formation. Reduced renal blood flow, accompanied by elevated ADH and aldosterone levels and the use of diuretics to reduce total body water, may cause various electrolyte shifts and imbalances.
Monitor serial chest x-rays.	Vascular congestion, pulmonary edema, and pleural effusions frequently occur.
Restrict sodium and fluids, as indicated.	Sodium may be restricted to minimize fluid retention in extravascular spaces. Fluid restriction may be necessary to correct dilutional hyponatremia.
Administer salt-free albumin and plasma expanders, as indicated.	Albumin may be given to increase the colloid osmotic pressure in the vascular compartment, thereby increasing effective circulating volume and decreasing formation of ascites. Note: In client with tense ascites in whom other complications are absent or have been resolved, a total paracentesis (i.e., removal of the maximal amount of ascites) may be an initial treatment for ascites along with albumin infusion followed by the administration of diuretics (Shah & Fields, 2016).

(continues on page 502)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications, as indicated, for example:	
Diuretics, such as spironolactone (Aldactone) given alone or in combination with furosemide (Lasix)	Spironolactone is the diuretic of choice to control edema and ascites, block effect of aldosterone, and increase water excretion while sparing potassium. Diuretics given in conjunction with albumin may enhance fluid removal.
Potassium	Serum and cellular potassium are usually depleted because of liver disease and urinary losses.
Positive inotropic drugs and arterial vasodilators	Given to increase cardiac output and improve renal blood flow and function, thereby reducing excess fluid.
Prepare for/assist with procedures as indicated in client with ascites unresponsive to medical therapies, for example:	
Paracentesis, either single or serial	Therapeutic paracentesis may be performed in client who requires rapid symptomatic relief for refractory ascites. The removal of 5 L of fluid or more is considered large-volume paracentesis (LVP) (Shah & Fields, 2016).
Peritoneovenous shunting (PVS)	This surgically placed shunt creates a passage between the peritoneum and the jugular vein to return ascitic fluid to the central venous system. The procedure is an alternative to LVP and may be used in client with diuretic-resistant ascites, who is not a candidate for transplant or other shunting procedures (Shah & Fields, 2016).
Transjugular intrahepatic portosystemic shunt (TIPS)	This procedure places a stent between the right jugular vein and the hepatic vein, creating a connection between the portal and systemic circulations. TIPS is gradually becoming the standard of care in patients with diuretic-refractory ascites (Shah & Fields, 2016).

## NURSING DIAGNOSIS: risk for Infection

### Possibly Evidenced By

Stasis of body fluid  
Chronic illness; immunosuppression; invasive procedure  
Malnutrition

### Desired Outcomes/Evaluation Criteria—Client Will

#### Infection Severity NOC

Be free of fever and abdominal pain.

#### Risk Control: Infectious Process NOC

Acknowledge individual risk factors for infection.  
Engage in actions to reduce risk of infection.  
Be free of preventable complications.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<i>Independent</i>	
Identify client at risk (i.e., presence of cirrhosis and ascites, immunocompromised state, malnutrition, invasive lines and procedures).	This client is at risk for any healthcare-related infection (e.g., pneumonia, urinary tract infection, skin/wound infections) and especially blood-borne infections resulting in sepsis. Hospitalized client with cirrhosis plus ascites is at significant risk (10% to 30%) for spontaneous bacterial peritonitis (SBP) (Bonnel et al, 2011).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Note client reports of new-onset abdominal pain or change in usual level of abdominal discomfort. Determine intensity using 0 to 10 or similar coded scale.	Client with chronic cirrhosis does not always have abdominal pain and may characterize it as discomfort, depending on presence/degree of ascites. Thus, if client is reporting new-onset or unusual abdominal pain, interventions should be geared toward finding the cause, not just relieving pain.
Monitor vital signs, noting onset of fever.	Fever usually accompanies bacterial infections but is not always present in immunocompromised client.
Evaluate body systems (e.g., respiratory, skin, urinary tract for signs of infection).	Infection may be anywhere in the body. If not found in most likely places, client must be evaluated for more unusual infectious causes.
Promote safe healthcare environment:	First-line defense against healthcare-associated infections.
Emphasize and practice proper handwashing before and after direct contact. Wear gloves when appropriate.	This is important for staff, clients, and visitors to reduce the cross-contamination, especially for immunocompromised clients.
Maintain sterile technique for all invasive procedures (e.g., IV, urinary catheter, pulmonary suctioning).	Reduces risk of device-related infections.
Change surgical or other wound dressings, as indicated, using proper technique for changing/disposing of contaminated materials.	Dressing changes maintain dry, clean wound area to promote healing. Proper disposal of contaminated material reduces risk of spread of infection to others.
Encourage deep breathing and coughing, position changes, and early ambulation.	To limit complications associated with stasis of respiratory secretions and shallow breathing.
Maintain adequate hydration; encourage regular voiding or maintain urinary catheter as indicated. Provide/assist with pericare.	Prevents infections associated with urinary stasis and/or presence of catheter, which can be associated with ascending urinary tract infections.
<b>Collaborative</b>	
Prepare for/assist with medical procedures (e.g., paracentesis).	May be performed to obtain specimen of ascitic fluid for analysis.
Review laboratory test results (e.g., WBCs with differential, urinalysis, ascitic fluid and/or blood cultures).	Helps reveal source of infection. Additional tests may be done on ascites fluid (e.g., total protein, LDH, glucose) to help differentiate secondary bacterial peritonitis from spontaneous bacterial peritonitis when other sources of infection (e.g., pneumonia, perforated gut, or abdominal abscess) have been ruled out (Roy Lu et al, 2017).
Administer antibiotics, as indicated.	Therapy will be determined by the site and type of infection found. Broad-spectrum therapy is used in client with suspected ascitic fluid infection until the results of susceptibility testing are available. Cefotaxime or a similar third-generation cephalosporin appears to be the treatment of choice for suspected SBP.

### NURSING DIAGNOSIS: risk for impaired Skin Integrity

#### Possibly Evidenced By

Impaired circulation  
Inadequate nutrition; alteration in metabolism  
Chemical injury agents—accumulation of bile salts in skin  
Changes in skin turgor, skeletal prominence, changes in fluid status (e.g., edema, ascites)

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Risk Control NOC

Maintain skin integrity.  
Identify individual risk factors and demonstrate behaviors or techniques to prevent skin breakdown.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Skin Surveillance NOC</b>	
<i>Independent</i>	
Inspect skin surfaces and pressure points routinely. Use emollient lotions and limit use of soap for bathing.	Edematous tissues are more prone to breakdown and to the formation of decubitus ulcers. Ascites may stretch the skin to the point of tearing in severe cirrhosis.
Encourage and assist with repositioning on a regular schedule, while in bed or chair, and active or passive range-of-motion (ROM) exercises, as appropriate.	Repositioning reduces pressure on edematous tissues to improve circulation. Exercises enhance circulation and improve or maintain joint mobility.
Recommend elevating lower extremities.	Enhances venous return and reduces edema formation in extremities, which reduces risk of skin irritation and breakdown.
Keep linens dry and free of wrinkles.	Moisture aggravates pruritus and increases risk of skin breakdown.
Discuss itching with client, addressing areas involved and time of day when client is most uncomfortable.	Approximately 55% to 60% of patients with primary biliary cirrhosis present with pruritus, and almost all develop pruritus at some point during the course of their disease (Butler, 2017; Pyrsopoulos & Reddy, 2016). The itching often worsens during the evening and improves during the day. It typically begins in the palms and soles and then spreads to the rest of the body. Prolonged, repeated scratching can result in excoriations and thickening and darkening of the skin.
Offer comfort measures (e.g., cold applications, colloidal oatmeal or baking soda baths, OTC creams, lotions or ointments for itching).	May be soothing and provide relief of itching.
Suggest clipping fingernails short and provide mittens or gloves, if indicated.	Prevents client from inadvertently injuring the skin, especially while sleeping.
Encourage, or provide, perineal care following urination and bowel movement.	Prevents skin excoriation breakdown from gastrointestinal or urinary excretions or bile salts.
<i>Collaborative</i>	
Use pressure-relieving devices such as alternating-pressure mattress, waterbed, overlays such as egg-crate or foam mattress, or gel-filled pad when up in chair, as indicated.	Reduces dermal pressure, increases circulation, and diminishes risk of tissue ischemia and breakdown.
Administer medications, such as cholestyramine (Questran), rifampin (Rimactane), ondansetron (Zofran), colestipol (Colestid), hydroxyzine (Atarax), and dronabinol (Marinol), if indicated.	Although the cause of pruritus is unknown, it may respond to these treatments (Pyrsopoulos & Reddy, 2016; Butler, 2017).

### NURSING DIAGNOSIS: risk for ineffective Breathing Pattern

#### Possibly Evidenced By

Hypoventilation [ascites with decreased lung expansion]  
Fatigue

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status: Ventilation NOC

Maintain effective respiratory pattern and be free of dyspnea and cyanosis, with arterial blood gases (ABGs) and vital capacity within acceptable range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b>	
<i>Independent</i>	
Monitor respiratory rate, depth, and effort.	Rapid, shallow respirations or dyspnea may be present because of hypoxia or fluid accumulation in abdomen.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Auscultate breath sounds, noting crackles, wheezes, and rhonchi.	Indicates developing complications—presence of adventitious sounds reflects accumulation of fluid while diminished sounds suggest atelectasis—increasing risk of pulmonary infection.
Investigate changes in level of consciousness (LOC).	Changes in mentation may reflect hypoxemia and respiratory failure, which often accompany hepatic coma.
Keep head of bed elevated. Position client on side.	Facilitates breathing by reducing pressure on the diaphragm and minimizes risk of aspiration of secretions.
Encourage frequent repositioning, deep-breathing exercises, and coughing, as appropriate.	Aids in lung expansion and mobilizing secretions.
Monitor temperature. Note presence of chills, increased coughing, and changes in color or character of sputum.	Indicative of onset of infection, such as pneumonia. Note: Severely ill client is immunocompromised and may not be able to mount a febrile response to infection.
<b>Collaborative</b>	
Monitor serial ABGs, pulse oximetry, vital capacity measurements, and chest x-rays.	Reveals changes in respiratory status and developing pulmonary complications.
<b>Ventilation Assistance NIC</b>	
Provide supplemental oxygen ( $O_2$ ) as indicated.	May be necessary to treat or prevent hypoxia. If respirations or oxygenation are inadequate, mechanical ventilation may be required.
Demonstrate and assist with respiratory adjuncts, such as incentive spirometer.	Reduces incidence of atelectasis and enhances mobilization of secretions.
Prepare for/assist with acute care procedures, such as paracentesis.	Occasionally may be done to remove ascites fluid to relieve abdominal pressure when respiratory embarrassment is not corrected by other measures.

### NURSING DIAGNOSIS: risk for Bleeding/Venous Thromboembolism

#### Possibly Evidenced By

Impaired liver function  
Significant medical comorbidity

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Liver Function NOC

Maintain homeostasis with absence of bleeding/venous thromboembolism.

##### Risk Control NOC

Demonstrate behaviors to reduce risk of bleeding and thrombosis.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bleeding Precautions NIC</b>	
<i>Independent</i>	
Be aware of client's risk in current condition, either <b>bleeding</b> (e.g., late-stage cirrhosis with portal hypertension/risk for variceal bleeding) or <b>thromboembolic phenomena</b> .	Although the risk for bleeding has long been associated with liver dysfunction, recent research has enlarged the view of coagulation issues with cirrhosis. The current understanding is that in liver disease, the hemostatic balance remains as in normal individuals but is reset, with equally reduced levels of both coagulant and anticoagulant proteins. Thus, it is fragile and easily disturbed, resulting in either bleeding (e.g., varices) or thrombosis (e.g., peripheral or systemic), depending on the initial stimulus. Recent data of the literature support this hypothesis, as portal vein thrombosis and peripheral thrombosis are frequent features of cirrhosis (Ahmed & Hunt, 2016; Tripodi et al, 2013).

(continues on page 506)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
For bleeding complications:	
Assess for signs and symptoms of GI bleeding; for instance, check all secretions for frank or occult blood. Observe color and consistency of stools, nasogastric (NG) drainage, or vomitus.	The GI tract—especially esophagus and rectum—is the most usual source of bleeding because of its mucosal fragility and alterations in homeostasis associated with cirrhosis.
Observe for presence of petechiae, ecchymosis, and bleeding from one or more sites.	Subacute disseminated intravascular coagulation (DIC) may develop secondary to altered clotting factors.
Monitor pulse, BP, and CVP, if available.	An increased pulse with decreased BP and CVP may indicate loss of circulating blood volume, requiring further evaluation.
Note changes in mentation and LOC.	Changes may indicate decreased cerebral perfusion secondary to hypovolemia or hypoxemia.
Avoid rectal temperature; be gentle with GI tube insertions.	Rectal and esophageal vessels are most vulnerable to rupture.
Encourage use of soft toothbrush and electric razor, avoiding straining for stool, forceful nose blowing, and so forth.	In the presence of clotting factor disturbances, minimal trauma can cause mucosal bleeding.
Use small needles for injections. Apply pressure to small bleeding or venipuncture sites for longer than usual.	Minimizes damage to tissues, reducing risk of bleeding and hematoma.
<b>Embolus Precautions NIC</b>	
Determine presence of factors associated with thrombus or emboli (e.g., inflammatory diseases such as hepatitis; long periods of immobility, dehydration, presence of central venous catheters).	To identify client at higher risk for venous stasis, vessel wall injury, and hypercoagulability.
Assess presence, location, and degree of swelling or edema formation. Measure circumference of extremities, noting difference in size, as indicated.	Can help to identify developing DVT and monitoring course of edema in extremities (but may not be readily apparent in severely emaciated or dehydrated client).
Determine presence and quality of peripheral pulses.	To evaluate distribution and quality of blood flow.
Document and report client's complaints of extremity discomfort or pain, or reports of chest pain accompanied by dyspnea and changes in pulse oximetry.	These symptoms often accompany VTE, especially deep vein thrombosis (DVT) or pulmonary embolus (PE).
Refer to CP: Venous thromboembolism (VTE) disease including deep vein thrombosis (DVT) and pulmonary embolism (PE) for related assessments and interventions.	To provide interventions to promote systemic and peripheral circulation, and limit complications associated with venous stasis.
<b>Collaborative</b>	
Monitor laboratory studies favoring <b>risk for bleeding</b> (e.g., platelets, reduced coagulation factors [e.g., II, V, VII, X, or XII], fibrinogen, vitamin K deficiency [not a complete list]) and studies favoring <b>risk for thrombotic events</b> (e.g., protein C, antithrombin, aPTT, anti-Xa, INR [not a complete list]).	Reduced production of procoagulant factors and platelets is balanced by concomitant decreased levels of anticoagulants, thus placing the client at risk both for bleeding and for venous thromboembolism (VTE). Research is still new in this area but seems to support that some individuals with advanced liver disease have a loss of balance toward the clotting side, and others are clearly more prone to bleeding (Aggarwal et al, 2014; Ha & Regal, 2016; Northup & Caldwell, 2013).
Assist with treatment of underlying condition (cirrhosis and comorbidities) and with supportive measures including fluids, electrolytes, medications, nutrients, and oxygen, as indicated.	To maximize systemic circulation, improve tissue perfusion and organ function.
Administer medications, as indicated, to reduce risk of bleeding, for example:	
Supplemental vitamins, such as vitamins K, D, and C, as indicated	Promotes prothrombin synthesis and coagulation, if liver is functional. Vitamin C deficiencies increase susceptibility of GI system to irritation and bleeding.
Provide gastric lavage with cool saline solution or water, as indicated.	In presence of acute bleeding, evacuation of blood from GI tract may reduce ammonia production and risk of hepatic encephalopathy. (Refer to CP: Upper Gastrointestinal Bleeding.)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Prepare for procedures, such as direct ligation or banding of varices, esophagogastric resection, transjugular intrahepatic portosystemic shunt (TIPS), and splenorenal-portacaval anastomosis.	May be needed to control active hemorrhage or to decrease portal and collateral blood vessel pressure to minimize risk of recurrence of bleeding. TIPS is an interventional radiological procedure involving stent placement from the right jugular vein to the hepatic vein, thereby creating a connection between the portal and systemic circulations to relieve portal hypertension and decompress varices.
Administer anticoagulants, such as low-molecular-weight heparins (e.g., enoxaparin [Lovenox]) and, ardeparin (Ineparin), as indicated.	Thromboprophylaxis against VTE should be considered and implemented (with caution) in the at-risk client.

NURSING DIAGNOSIS:	risk for acute Confusion
<b>Possibly Evidenced By</b>	
Liver impairment [inability to remove toxins]; altered metabolic functioning	
Substance abuse [alcohol/other drugs]; pharmaceutical agent	
Alteration in cognitive functioning	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Cognition NOC</b>	Regain and maintain usual level of mentation and reality orientation.
<b>Alcohol/Drug Abuse Cessation Behavior NOC</b>	Initiate behaviors or lifestyle changes to prevent or minimize recurrence of problem.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Substance Use Treatment: Alcohol/Drug Withdrawal NIC</b>	
<i>Independent</i>	
Identify client at risk for hepatic encephalopathy in current situation.	Client at risk is typically in end-stage liver disease. Among the precipitating factors for hepatic encephalopathy, common categories include (1) increased nitrogen load (e.g., gastrointestinal bleed, infection, excess dietary protein), (2) decreased toxin clearance (e.g., hypovolemia, renal failure, constipation, portosystemic shunt, medication noncompliance, acute-on- chronic liver failure), and (3) altered neurotransmission (e.g., sedating medication, alcohol, hypoxia, hypoglycemia) (Liou, 2017).
Observe for changes in behavior and mentation: lethargy, confusion, drowsiness, slowing or slurring of speech, and irritability. Arouse client at intervals, as indicated.	Ongoing assessment of behavior and mental status is important because of fluctuating nature of hepatic encephalopathy or impending hepatic coma. Note: Subtle signs of hepatic encephalopathy are observed in nearly 70% of patients with cirrhosis (Wolf, 2017).
Review current medication regimen.	Adverse drug reactions or interactions may potentiate or exacerbate confusion.
Evaluate sleep and rest schedule.	Difficulty falling asleep or staying asleep leads to sleep deprivation, exacerbating cognition problems and fatigue.
Note development or presence of asterixis, fetor hepaticus, and seizure activity.	Suggests elevating serum ammonia levels and increased risk of progression to encephalopathy.
Consult with SO about client's usual behavior and mentation.	Provides baseline for comparison of current status.
Have client write name periodically and keep this record for comparison. Report deterioration of ability. Have client do simple arithmetic computations.	Easy test of neurological status and muscle coordination.
Reorient to time, place, person, and situation, as needed.	Assists in maintaining reality orientation, reducing confusion and anxiety.

(continues on page 508)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Maintain a pleasant, quiet environment and approach in a slow, calm manner. Encourage uninterrupted rest periods.	Reduces excessive stimulation and sensory overload, promotes relaxation, and may enhance coping.
Provide continuity of care. If possible, assign same nurse over a period of time.	Familiarity provides reassurance, aids in reducing anxiety, and provides a more accurate documentation of subtle changes.
Reduce provocative stimuli and confrontation. Refrain from forcing activities. Assess potential for violent behavior.	Avoids triggering agitated, violent responses; promotes client safety.
Discuss current situation and future expectations.	Client and SO may be reassured that intellectual as well as emotional function may improve as liver involvement resolves.
Maintain bedrest and assist with self-care activities.	Reduces metabolic demands on liver, prevents fatigue, and promotes healing, lowering risk of ammonia buildup.
Identify and provide for safety needs, such as supervision during smoking, bed in low position, side rails up and padded, if necessary. Provide close supervision.	Reduces risk of injury when confusion, seizures, or violent behavior occurs. Note: Falls and fall-related injuries are common in chronic liver diseases. One study reported a 40% fall incidence in patients with cirrhosis and the cognitive dysfunction associated with hepatic encephalopathy compared to 6% in those without it (Soriano et al, 2012; Yildirim, 2017).
Investigate temperature elevations. Monitor for signs of infection.	This may be due to loss of balance control, longer reaction time, slowed motor function, loss of muscle strength (and other factors) associated with multiple body system disorders.
Recommend avoidance of narcotics or sedatives, antianxiety agents, and limiting or restricting use of medications metabolized by the liver.	Clients with cirrhosis are immunocompromised and susceptible to infections. Also, infection can precipitate hepatic encephalopathy caused by tissue catabolism and release of nitrogen.
<b>Collaborative</b>	
Assist with treatment of underlying condition(s).	Approximately 70% to 80% of patients with overt hepatic encephalopathy improve after correction of precipitating factors (Wolf, 2017).
Monitor laboratory studies, such as ammonia, electrolytes, pH, blood urea nitrogen (BUN), glucose, and CBC with differential.	Elevated ammonia levels, hypokalemia, metabolic alkalosis, hypoglycemia, anemia, and infection can precipitate or potentiate development of hepatic coma.
Eliminate or restrict protein in diet if indicated in severe liver dysfunction. Provide glucose supplements and adequate hydration.	Ammonia is responsible for mental changes in hepatic encephalopathy. Dietary changes may result in constipation, which also increases bacterial action and formation of ammonia. Glucose provides a source of energy, reducing need for protein catabolism.
Administer medications, as indicated, for example:	
Beta-galactosidofructose (Lactulose) orally, via nasogastric tube or enema	Lactulose appears to inhibit intestinal ammonia production and also works as a cathartic, reducing colonic bacterial load. Note: Long-term use of lactulose may be required for clients with hepatic encephalopathy.
Aminoglycoside antibiotics (e.g., neomycin, paromomycin [Humatin]); other broad-spectrum antibiotics (e.g., metronidazole [Flacy]), vancomycin [Vancocin], rifaximin [Rifampin], and oral quinolone ciprofloxacin [Cipro])	Destroys protein-degrading intestinal bacteria and production of ammonia to prevent/limit effects of encephalopathy.
Electrolytes	Corrects imbalances and may improve cerebral function and metabolism of ammonia.
Administer supplemental O <sub>2</sub> .	Mentation is affected by O <sub>2</sub> concentration and utilization in the brain.
Assist with procedures as indicated, such as dialysis, plasmapheresis, or extracorporeal liver perfusion.	May be used to reduce serum ammonia levels if encephalopathy develops or other measures are not successful.

**NURSING DIAGNOSIS:** **disturbed Body Image****May Be Related To**

Alteration in self-perception  
Alteration in body function

**Possibly Evidenced By**

Alteration in view of one's body; negative feeling about body  
Change in social involvement; fear of reaction by others

**Desired Outcomes/Evaluation Criteria—Client Will****Body Image NOC**

Verbalize understanding of changes and acceptance of self in the present situation.  
Identify feelings and methods for coping with negative perception of self.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Body Image Enhancement NIC</b>	
<b>Independent</b>	
Discuss situation and encourage verbalization of fears and concerns. Explain relationship between nature of disease and symptoms.	Client is very sensitive to body changes and may also experience feelings of guilt when cause is related to alcohol or other drug use.
Support and encourage client; provide care with a positive, friendly attitude.	Caregivers sometimes allow judgmental feelings to affect the care of client and need to make every effort to help client feel valued as a person.
Encourage family/SO to verbalize feelings, visit freely, and participate in care.	Family/SO may feel guilty about client's condition and may be fearful of impending death. They need nonjudgmental emotional support and free access to client. Participation in care helps them feel useful and promotes trust between staff, client, and family/SO.
Assist client/SO to cope with change in appearance; suggest clothing that does not emphasize altered appearance, such as use of red, blue, or black clothing.	Client may present unattractive appearance as a result of jaundice, ascites, and ecchymotic areas. Providing support can enhance self-esteem and promote client's sense of control.
<b>Collaborative</b>	
Refer to support services, such as counselors, psychiatric resources, social service, clergy, and alcohol treatment program.	Increased vulnerability and concerns associated with this illness may require services of additional professional resources.

**NURSING DIAGNOSIS:** **ineffective Health Management****May Be Related To**

Complexity of therapeutic regimen; insufficient knowledge  
Perceived seriousness of condition, susceptibility, benefit, or barrier; decisional conflicts  
Excessive demands; insufficient social support  
Economically disadvantaged

**Possibly Evidenced By**

Difficulty with prescribed regimen  
Ineffective choices in daily living for meeting health goals  
Failure to take action to reduce risk factors  
Unexpected acceleration of illness symptoms

**Desired Outcomes/Evaluation Criteria—Client Will****Self-Management: Chronic Disease NOC**

Verbalize understanding of disease process, prognosis, and potential complications.  
Correlate symptoms with causative factors.  
Identify and initiate necessary lifestyle changes.  
Actively participate in care.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Be aware of client's living situation when preparing for postdischarge teaching or community care. Make every effort to provide useful, appropriate teaching and referrals.	The complexities of treating advanced liver disease are often compounded by poverty, limited/absent family and social support systems. For example, a national survey of homeless veterans (2011) revealed that over 20% had been hospitalized (one to three times) in the past year, 76% reported a substance abuse habit, 14% had a diagnosis of hepatitis C, and over 9% of those reported liver disease (Marie Curie Palliative Care Research Unit, 2011; Veterans Affairs [VA], 2011). Whatever the living circumstances, the client may have limited insight into his or her condition and is frequently unwilling to accept services offering treatment. Therefore, attempts to encourage client to seek help must be tempered by respect for personal autonomy and rights of individual choice.
Review disease process and future expectations.	Provides knowledge base from which client can make informed choices.
Emphasize importance of avoiding alcohol and illegal drugs (e.g., heroin, inhalants, performance-enhancing steroids). Give information about medical and community services available to aid in substance use rehabilitation, if indicated.	Alcohol is one of the leading causes for the development of cirrhosis and can be deadly when combined with other substances.
Inform client of altered effects of medications with cirrhosis and the importance of using only drugs prescribed or cleared by a healthcare provider who is familiar with client's history.	Many over-the-counter and prescription drugs are hepatotoxic (may be dose dependent). Examples in this category include acetaminophen (Tylenol), NSAIDs, certain antibiotics, anticonvulsants, cough suppressants (antitussives), analgesic pain relievers, and certain types of muscle relaxants (not a complete list). In addition, the damaged liver has a reduced ability to metabolize all drugs, potentiating cumulative effect and exacerbating liver-related complications.
Assist client with identifying support person(s).	Because of length of recovery, potential for relapses, and slow convalescence, support systems are extremely important in maintaining behavior modifications.
Emphasize the importance of good nutrition. Provide written dietary instructions of diet prescriptions.	Can assist in remission of symptoms and help prevent further liver damage. Written instructions are helpful for client to refer to at home.
Discuss sodium and salt substitute restrictions and necessity of reading labels on food, OTC drugs, and herbal agents, if client has ascites.	Minimizes ascites and edema formation. Overuse of substitutes may result in other electrolyte imbalances. Food, OTC medications, and personal care products, including antacids and some mouthwashes, may contain sodium or alcohol and may be toxic to the liver or be primarily metabolized by the liver.
Encourage scheduling activities with adequate rest periods.	Adequate rest decreases metabolic demands on the body and increases energy available for tissue regeneration.
Promote diversional activities that are enjoyable to client.	Prevents boredom, facilitates rest, and minimizes anxiety and depression.
Recommend avoidance of persons with infections, especially upper respiratory infections.	Decreased resistance, altered nutritional status, and impaired immune responses potentiate risk of infection.
Stress necessity of follow-up care and adherence to therapeutic regimen.	Chronic nature of disease has potential for life-threatening complications. Provides opportunity for evaluation of effectiveness of regimen, including patency of shunt if used.
Instruct client and SO of signs and symptoms that warrant notification of healthcare provider, such as increased abdominal girth, rapid weight loss or gain, increased peripheral edema, increased dyspnea, fever, blood in stool or urine, excess bleeding of any kind, and jaundice.	Prompt reporting of symptoms provides opportunity to treat complications before they become life-threatening. Note: Client may be evaluated for additional medical or surgical interventions, including liver transplantation.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct SO to notify healthcare providers of any confusion, untidiness, night wandering, tremors, or personality change.	Changes reflecting deterioration in mental status may be apparent to SO, although insidious changes may be noted by others with less frequent contact with client.
<b>POTENTIAL CONSIDERATIONS</b> following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)	
<ul style="list-style-type: none"> <li>• <b>Fatigue</b>—disease state, malnutrition, poor physical condition, negative life events, altered body chemistry (e.g., alcohol withdrawal, changes in liver function, effect on target organs)</li> <li>• <b>imbalanced Nutrition: less than body requirements</b>—inability to ingest food (anorexia, nausea and vomiting, indigestion), inability to digest food/absorb nutrients</li> <li>• <b>risk for ineffective Health Management</b>—perceived benefit, social support deficit, complexity of therapeutic regimen, economic difficulties</li> <li>• <b>dysfunctional Family Processes</b>—substance abuse, resistance to treatment, inadequate coping and/or lack of problem-solving skills</li> <li>• <b>risk for caregiver Role Strain</b>—illness severity of care receiver, substance abuse codependency; family dysfunction before caregiving situation; presence of situational stressors that normally affect families (e.g., economic vulnerability)</li> </ul>	

## PANCREATITIS

### I. Pathophysiology

- a. Inflammation of pancreas with premature activation of pancreatic enzymes resulting in localized damage to the pancreas, autodigestion, and fibrosis of the pancreas
- b. Leads to wide range of metabolic consequences and life-threatening complications, such as hypovolemia, shock, acute renal failure, diabetes, acute respiratory distress syndrome (ARDS), and multiorgan failure

### II. Types

- a. Acute pancreatitis (AP)
  - i. Sudden inflammation occurs over a short period of time.
  - ii. Severity ranges from mild abdominal discomfort to a life-threatening illness.
  - iii. Can result in bleeding into the gland, serious tissue damage, infection, and cyst formation
  - iv. Release of enzymes and toxins into bloodstream can damage other vital organs, including the heart, lungs, and kidneys.
  - v. Classified as early or late and mild or severe (Banks et al, 2013; Bell et al, 2014)
    - 1. Severe is further classified as mild, moderate, and severe.
    - 2. Mild acute pancreatitis is the most common form, has no local or systemic complications, and resolves quickly.
    - 3. Moderately severe acute pancreatitis is demonstrated by transient organ (pancreas) dysfunction and local complications.
    - 4. Severe acute pancreatitis: organ failure longer than 48 hours, local complications (e.g., peripancreatic fluid collection, abscess, pseudocyst, necrosis)
- b. Chronic pancreatitis (CP) (Huffman et al, 2016)
  - i. Commonly defined as continuing, chronic, inflammatory process of the pancreas with irreversible structural changes. Chronic inflammation can lead to chronic

abdominal pain and/or impairment of endocrine and exocrine functions of the pancreas.

- ii. Development may be delayed, as in long-term alcohol abuse.

### III. Etiology

- a. Acute
  - i. Biliary tract disease, such as obstruction by gallstones, is most common cause—about 35% to 40% (Vege, 2017)
  - ii. Longstanding alcohol abuse, particularly binge drinking—approximately 30% (Bell et al, 2014; Yang et al, 2008)
  - iii. Trauma: blunt or penetrating
  - iv. Procedures: endoscopic or surgical
  - v. Viral infections: mumps, coxsackievirus, hepatitis A and B, cytomegalovirus, herpes simplex, HIV, mononucleosis, varicella
  - vi. Bacterial infections: *Mycoplasma pneumoniae*, salmonellosis, tuberculosis
  - vii. Drugs: Drug-associated pancreatitis is rare (0.3% to 1.4%) (Spanier et al, 2011), but many drugs may be implicated, including sulfonamides, glucocorticoids, thiazide diuretics, combination cancer chemotherapy drugs (especially asparaginase), 5-amino salicylic acid compounds, nonsteroidal anti-inflammatory drugs (NSAIDs)
  - viii. Very high serum triglycerides (greater than 1000 mg/dL) as may occur in obesity, diabetes mellitus, hypothyroidism, nephrotic syndrome, pregnancy
  - ix. Unknown cause—about 15% to 20% of cases. Note: Biliary sludge (tiny gallstones) is commonly found in 20% to 40% of patients with acute pancreatitis with no obvious cause (Vege, 2017). Also, with the advent of molecular medicine, research is revealing various genetic abnormalities associated with pancreatitis (Tang & Markus, 2017).

(continues on page 512)

- b. Chronic (Huffman et al, 2016)
  - i. Intraductal obstruction: alcohol abuse, stones, or tumors
  - ii. Alcohol abuse—about 60% to 70% of cases
  - iii. Direct toxins and toxic metabolites
  - iv. Recurrent acute pancreatitis that heals with fibrosis
  - v. Ischemia from obstruction and fibrosis exacerbates or perpetuates disease rather than initiates disease.
  - vi. Autoimmune pancreatitis: diffuse enlargement of gland, irregular narrowing of main pancreatic duct, increased circulating levels of gamma globulin, presence of autoantibodies, and a possible association with other autoimmune diseases

#### IV. Statistics

- a. Morbidity: Acute pancreatitis (AP) caused approximately 275,000 hospitalizations in 2009 and was the single

most frequent gastrointestinal cause of hospital admissions in the United States. The annual incidence of AP ranges from 13 to 45/100,000 persons and chronic pancreatitis (CP) from 5 to 12/100,000 (Dhiraj & Lowenfels, 2013).

- b. Mortality: Mild AP has an overall mortality of approximately 0% to 5% (Stevens, 2014). The risk of death increases with age, comorbidities, and the severity of pancreatic disease (e.g., 30% for infected necrotic pancreatitis with persistent organ failure) (Stevens, 2014). Patients with CP have shorter survival times than the general population, but most die from comorbidities (Dhiraj & Lowenfels, 2013).
- c. Cost: In 2009, AP was the most common gastroenterology discharge diagnosis in the United States, with a cost of \$2.6 billion (Peery et al, 2012).

## G L O S S A R Y

**Cullen's sign:** Blue-black bruising around the umbilicus area, indicative of intraperitoneal hemorrhage.

**Endocrine function:** Pertains to hormones and the glands that make and secrete them into the bloodstream where they travel to distant organs. The islets of Langerhans produce and secrete insulin.

**Exocrine function:** Refers to glands that secrete their products into ducts. Pancreatic enzymes are produced in the pancreas, accumulate in the intralobular ducts, and empty into the main pancreatic duct, which drains into the duodenum when needed for digestion.

**Hemorrhagic pancreatitis:** Hemorrhage caused by digestion of vessel walls by pancreatic enzymes.

**Ileus:** Partial or complete blockage of the small and/or large intestine.

**Interstitial edema:** Abnormally large fluid volume in tissues between the body's cells (interstitial spaces).

**Pancreas:** Gland located in the upper, posterior abdomen responsible for insulin production and the manufacture and secretion of digestive enzymes leading to carbohydrate, fat, and protein metabolism.

**Pancreatic pseudocyst:** Collection of tissue, fluid, debris, pancreatic enzymes, and blood. The fluid is usually pancreatic juice that has leaked out of a damaged pancreatic duct.

**Secondary diabetes:** A small minority of diabetes cases (about 2%) arise as the consequence of some other well-defined disease or predisposing factor such as pancreatitis with damage to the exocrine pancreas. Pancreatic diabetes results in loss of both insulin and pancreatic glucagon, but some residual function is often present, which means that diabetic ketoacidosis rarely occurs. Lack of glucagon means that client is extra-sensitive to the action of insulin, and hypoglycemia may be a problem (Diapedia, n.d.)

**Steatorrhea:** Symptom in which fecal matter is frothy or foul-smelling and floats because of a high fat content.

**Systemic inflammatory response syndrome (SIRS):** Inflammation of the whole body (the “system”) without a proven source of infection. It is a medical emergency.

## CARE SETTING

The client is treated in an inpatient acute medical unit or intensive care unit (ICU) for initial incident or exacerbations with serious complications; otherwise, condition is managed at the community level.

## RELATED CONCERNs

Acute renal injury (acute renal failure), page 595

Alcohol: acute withdrawal, page 919

Diabetes mellitus and diabetic ketoacidosis, page 454

Peritonitis, page 389

Psychosocial aspects of care, page 835

Sepsis/septic shock, page 772

Substance use disorders, page 929

Total nutritional support: parenteral/enteral feeding, page 525

Upper gastrointestinal bleeding, page 340

**CLIENT ASSESSMENT DATABASE****DIAGNOSTIC DIVISION  
MAY REPORT****MAY EXHIBIT****ACTIVITY/REST**

- Malaise, fatigue

**CIRCULATION**

- Agitation, restlessness, apprehension
- Hypertension (acute pain)
- Tachycardia (65%)
- Hypotension and tachycardia accompany hypovolemic shock or sepsis or SIRS (see Glossary)
- Generalized edema
- Ascites
- Skin pale, mottled areas
- Flushing may be present in acute stage from systemic inflammation
- Jaundice (28%) (inflammation or obstruction of common duct)
- Bluish discoloration (Cullen's sign) around umbilicus (severe necrotizing pancreatitis)
- Reddish-brown discoloration between upper abdomen and back (flanks) (severe necrotizing pancreatitis)
- **In severe acute pancreatitis:** There may be evidence of systemic organ failure (e.g., systolic blood pressure below 90 mm Hg, arterial partial pressure of oxygen [ $\text{PaO}_2$ ] 60 mm Hg or lower, serum creatinine level 2 mg/dL or higher, and GI bleeding) (Banks et al, 2013).

**ELIMINATION**

- Abdominal bloating
- Absence of bowel movements
- Diarrhea
- Dark and decreased urine

- Bowel sounds may be decreased or absent—reduced peristalsis or ileus
- Diarrhea
- Steatorrhea
- Dark amber or brown, foamy urine (bile)
- Scanty urine (oliguria) progressing to absence of urine (anuria), which may be a compensatory response to hypovolemia

**FOOD/FLUID**

- Nausea and frequent or persistent vomiting; retching, dry heaves
- Food intolerance, loss of appetite
- Weight loss

- Hypoactive bowel sounds

**NEUROSENSORY**

- Confusion, agitation
- Coarse tremors of extremities from hypocalcemia

**PAIN/DISCOMFORT**

- Unrelenting, severe, deep abdominal pain (primary symptom), usually located in the epigastrum and periumbilical regions, but may radiate to the back (acute pancreatitis)
- Onset may be sudden and may follow an episode of heavy drinking or a large meal
- Radiation to chest and back
- May increase in supine position
- Poorly localized, dull, cramping, burning, deep, or aching (long-term or chronic pancreatitis)

- Abdominal tenderness (68%) and guarding (65% in acute pancreatitis) (Tang & Markus, 2017)
- Diffuse abdominal tenderness to palpation
- Abdominal rigidity, distention
- May curl up on left side with both arms over abdomen and knees and hips flexed

(continues on page 514)

**CLIENT ASSESSMENT DATABASE (contd.)****MAY REPORT (continued)****MAY EXHIBIT (continued)****RESPIRATION**

- Difficulty breathing; shortness of breath

- Tachypnea with or without dyspnea
- Decreased depth of respiration with splinting or guarding actions
- Bibasilar crackles—associated with pleural effusion

**SAFETY**

- Fever (76% in acute pancreatitis) (Tang & Markus, 2017)

**SEXUALITY**

- Current pregnancy (third trimester) with shifting of abdominal contents and compression of biliary tract

**TEACHING/LEARNING**

- Family history of pancreatitis
- Signs and symptoms of hyperglycemic crisis
- History of cholelithiasis with partial or complete common bile duct obstruction
- Gastritis, duodenal ulcer, duodenitis, diverticulitis, Crohn's disease
- Recent abdominal surgery (such as procedures on the pancreas, biliary tract, stomach, or duodenum)
- External abdominal trauma
- Binge alcohol intake (90% of cases)
- Use of medications—salicylates, pentamidine, antihypertensives, opiates, thiazides, steroids, some antibiotics, estrogens
- Infectious diseases—mumps, hepatitis B, Coxsackie viral infection

**DISCHARGE PLAN CONSIDERATIONS**

- May require assistance with dietary program and activities of daily living (ADLs) at home

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****TEST****WHY IT IS DONE****WHAT IT TELLS ME****BLOOD TESTS**

- **Serum amylase:** Common biochemical marker for acute pancreatitis.
- **Serum lipase:** More specific to the pancreas than amylase and has a longer half-life.
- **Alanine aminotransferase (ALT):** An enzyme found mainly in the liver but also in smaller amounts in the kidneys, heart, and pancreas.

Increased because of obstruction of normal outflow of pancreatic enzymes. May be five or more times the normal level in acute pancreatitis and then fall back within normal ranges because serum half-life is short. Levels are elevated in chronic pancreatitis, but not as high as in acute phase, and may return to near-normal levels in late stage of chronic disease.

Elevates along with amylase but stays elevated longer. Levels are elevated to a lesser degree in chronic pancreatitis and return to normal levels in late stage of chronic disease.

An increased ALT can be indicative of gallstones, which is commonly associated with pancreatitis.

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li><b>Serum bilirubin:</b> Substance formed when red blood cells (RBCs) break down and are excreted by the liver.</li> <li><b>Alkaline phosphatase:</b> Enzyme concentrated in liver and biliary tract.</li> <li><b>C-reactive protein (CRP):</b> An acute-phase reactant protein produced in the liver.</li> <li><b>Serum albumin:</b> Most abundant plasma protein transports substances such as bilirubin, calcium, progesterone, and drugs and creates oncotic pressure to keep fluid from leaking out into the tissues.</li> <li><b>Serum calcium:</b> Chemical element necessary for the normal function of the heart, nerves, and bones.</li> </ul>	Elevation is common (may be caused by alcoholic liver disease or compression of common bile duct). Excessive bilirubin causes jaundice and may be excreted in urine and stools. Usually elevated if pancreatitis is accompanied by biliary disease.
<ul style="list-style-type: none"> <li><b>Potassium:</b> Electrolyte needed to regulate water balance, levels of acidity, and blood pressure.</li> <li><b>Magnesium:</b> Essential mineral needed for protein, bone, and fatty acid formation, making new cells, activating B vitamins, relaxing muscles, clotting of blood, and producing and using insulin.</li> <li><b>Triglycerides:</b> One of the many fats formed by the union of glycerol and fatty acids and may indicate cause of condition.</li> <li><b>Complete blood count (CBC):</b> Battery of screening tests that typically includes hemoglobin (Hgb); hematocrit (Hct); RBC count, morphology, indices, and distribution width index; platelet count and size; white blood cell (WBC) count and differential.</li> <li><b>Serum glucose:</b> One of the simple sugars in the blood.</li> </ul>	Level greater than 10 mg/dL strongly indicates severe pancreatitis. Higher levels have been shown to correlate with a propensity toward organ failure (Tang & Markus, 2017). May be decreased because of increased capillary permeability and movement of fluid into extracellular space.
<ul style="list-style-type: none"> <li><b>Blood urea nitrogen (BUN)</b></li> </ul>	Hypocalcemia occurs early on because of the release of fatty acids combining with calcium, rendering it unusable to the body. May be decreased because of increased capillary permeability and movement of fluid into extracellular space. Hypoalbuminemia and marked elevations of LDH (lactic dehydrogenase) are associated with an increased mortality rate. Hypokalemia may occur because of gastric losses; hyperkalemia may develop secondary to tissue necrosis, acidosis, and renal insufficiency. Diuretic therapy, chronic alcoholism, cirrhosis, and pancreatitis can all cause excessive magnesium loss, as can losses from the gastrointestinal (GI) tract through nasogastric suctioning, fistula drainage, and diarrhea (Astle, 2005). High triglyceride levels are often indicative of high levels of insulin. Levels may exceed 1700 mg/dL and may be causative agent in acute pancreatitis. WBC count of 10,000 to 25,000 is present in 80% of clients with acute pancreatitis. Hgb may be lower because of bleeding. Hct may be elevated because of hemoconcentration associated with vomiting, hypovolemia, or from effusion of fluid into pancreas or retroperitoneal area. Transient elevations of more than 200 mg/dL are common, especially during initial or acute attacks. Sustained hyperglycemia reflects widespread pancreatic cell damage and necrosis and is a poor prognostic sign.
<h3>OTHER DIAGNOSTIC TESTS</h3> <ul style="list-style-type: none"> <li><b>Ultrasound of abdomen:</b> Technique that uses sound waves to produce an image of internal body structures.</li> <li><b>Endoscopic ultrasound (EUS):</b> Combines endoscopy (to provide direct visualization of digestive tract) and ultrasound (uses high-frequency sound waves to produce images of the organs and structures).</li> <li><b>Computed tomography (CT) scan:</b> X-ray procedure that uses a computer to produce a detailed picture of a cross section of the body to look for complications of pancreatitis and determine treatment options.</li> <li><b>Endoscopic retrograde cholangiopancreatography (ERCP):</b> Test that combines endoscopy with x-rays to provide an accurate view of the pancreatic and bile ducts.</li> </ul>	An elevated BUN has been associated with severe acute pancreatitis, possibly due to hemoconcentration and intravascular depletion (Tang & Markus, 2017).  Most useful initial test to determine etiology of pancreatitis and to identify pancreatic inflammation, abscesses, pseudocysts, or obstruction of biliary tract by gallstones.  Indicated in client with severe acute pancreatitis and is the imaging study of choice for assessing complications, such as fluid around the pancreas, abscess, or pancreatic pseudocyst.  Enables accurate visualization of the pancreatic ductal system and is regarded as the criterion standard for diagnosing chronic pancreatitis (Huffman et al, 2016). Should not be used as a first-line diagnostic tool in acute pancreatitis (Tang & Markus, 2017).

(continues on page 516)

## DIAGNOSTIC STUDIES (contd.)

### WHY IT IS DONE (continued)

- **Magnetic resonance cholangiopancreatography (MRCP):**

Type of MRI that uses computer software to focus on the pancreas, bile ducts, gallbladder, and liver.

### WHAT IT TELLS ME (continued)

Not as sensitive as ERCP but safer and noninvasive. No nuclear contrast medium is required because fluid naturally present in the ducts serves as contrast.

## ASSOCIATED TESTS

- **Fecal tests**

Because malabsorption does not occur until more than 90% of the pancreas has been destroyed, steatorrhea is a manifestation of advanced chronic pancreatitis (Huffman et al, 2016).

## NURSING PRIORITIES

1. Control pain and promote comfort.
2. Prevent and treat fluid and electrolyte imbalance.
3. Reduce pancreatic stimulation while maintaining adequate nutrition.
4. Prevent complications.
5. Provide information about disease process, prognosis, and treatment needs.

## DISCHARGE GOALS

1. Pain relieved or controlled.
2. Hemodynamically stable.
3. Complications prevented or minimized.
4. Disease process, prognosis, potential complications, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: acute Pain

#### May Be Related To

Physical agent—obstruction of pancreatic/biliary ducts

Chemical agent—contamination of peritoneal surfaces by pancreatic exudate, autodigestion of pancreas, extension of inflammation to the retroperitoneal nerve plexus

#### Possibly Evidenced By

Self-report of pain intensity and characteristics

Guarding behavior—positioning to avoid pain

Expressive behavior (e.g., grimacing)

Self-focused

Changes in physiological parameter (e.g., blood pressure, heart rate, respiratory rate)

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Pain Level NOC

Report pain is relieved or controlled.

##### Pain Self-Control NOC

Follow prescribed therapeutic regimen.

Demonstrate use of methods that provide relief.

## ACTIONS/INTERVENTIONS

## RATIONALE

### Pain Management: Acute NIC

#### Independent

Investigate verbal reports of pain, noting specific location and intensity (e.g., 0 to 10 scale). Note factors that aggravate and relieve pain.

Pain is often diffuse, severe, and unrelenting in acute or hemorrhagic pancreatitis. Severe pain is often the major symptom in client with chronic pancreatitis. Isolated pain in the right upper quadrant (RUQ) reflects involvement of the head of the pancreas. Pain in the left upper quadrant (LUQ) suggests involvement of the pancreatic tail. Localized abdominal pain may indicate development of pseudocysts or abscesses.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Maintain bedrest during severe, acute attack and provide quiet, restful environment.	Decreases stimulation of pancreatic secretions, thereby reducing pain.
Promote position of comfort, such as on one side with knees flexed or sitting up and leaning forward.	Reduces abdominal pressure and tension, providing some measure of comfort and pain relief. Note: Supine position often increases pain.
Provide alternative comfort measures, including repositioning and back rub, and quiet diversional activities such as TV or radio. Encourage relaxation techniques, such as guided imagery and visualization.	Promotes relaxation and enables client to refocus attention; may enhance coping.
Keep environment free of food odors.	Sensory stimulation can activate pancreatic enzymes, increasing pain.
Administer intravenous (IV) analgesics in timely manner and in smaller, more frequent doses, during acute episode. Consider use of patient-controlled analgesia (PCA), if appropriate.	Severe or prolonged pain can aggravate shock and is more difficult to relieve, requiring larger doses of medication, which can mask underlying problems and complications and may contribute to respiratory depression.
Maintain meticulous skin care, especially in presence of draining abdominal wall fistulas.	Pancreatic enzymes can digest the skin and tissues of the abdominal wall, creating abscesses and ulceration.
<b>Collaborative</b>	
Administer medication, as indicated, for example:	
Opioid analgesics, such as meperidine (Demerol), morphine sulfate, hydrocodone (Vicodin), and tramadol (Ultram)	Meperidine is usually effective in relieving pain and may be preferred over morphine, which may have a side effect of biliary-pancreatic spasms. Note: Pain in clients who have recurrent or chronic pancreatitis may be more difficult to manage because they can develop tolerance to normal doses of the opioids given for pain control.
Histamine blockers, such as lansoprazole (Prevacid), cimetidine (Tagamet), ranitidine (Zantac), and famotidine (Pepcid)	Decreasing production of hydrochloric acid inhibits pancreatic enzyme activity and associated pain.
Withhold food and fluid, as indicated.	Client should be kept on nothing by mouth (NPO) status until pain and nausea subside to limit or reduce release of pancreatic enzymes and resultant pain.
Maintain gastric suction when used.	Nasogastric (NG) tube may be used for client with ileus or protracted vomiting to prevent accumulation of gastric secretions and pancreatic enzyme activity.
Prepare for surgical intervention, if indicated.	Surgical exploration may be required in presence of intractable pain or complications involving the biliary tract, such as gallstones blocking duct, pancreatic abscess, or pseudocyst. Note: Surgery is not performed during acute stage, unless it would actually cure the problem, such as removing stone causing biliary tract obstruction.

### NURSING DIAGNOSIS: risk for deficient Fluid Volume

#### Possibly Evidenced By

Active fluid volume loss; excessive losses through normal routes—vomiting, gastric suctioning

Fluid loss through abnormal routes: compromised regulatory mechanisms (e.g., third-space fluid transudation, ascites formation, vasodilatation, alteration of clotting process)

#### Fluid Balance NOC

Maintain adequate hydration as evidenced by stable vital signs, good skin turgor, prompt capillary refill, strong peripheral pulses, and individually appropriate urinary output.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid/Electrolyte Management</b> <b>NIC</b>	
<b>Independent</b>	
Auscultate heart sounds; note rate and rhythm. Monitor and document rhythm and changes.	Cardiac changes and dysrhythmias may reflect hypovolemia or electrolyte imbalance, commonly hypokalemia and hypocalcemia. Hyperkalemia may occur related to tissue necrosis, acidosis, and renal insufficiency and may precipitate lethal dysrhythmias if uncorrected. Note: Cardiovascular complications are common in severe pancreatitis and include myocardial infarction (MI), pericarditis, and pericardial effusion with or without tamponade.
Monitor blood pressure (BP), noting trends. Measure central venous pressure (CVP), if available.	Fluid sequestration with shifts into third space, bleeding, and release of vasodilators (kinins) and cardiac depressant factor triggered by pancreatic ischemia may result in profound hypotension. Reduced cardiac output and poor organ perfusion can precipitate widespread systemic complications. Systemic infection (septic shock) is also possible, exacerbating hypovolemic status.
Investigate changes in sensorium: confusion and slowed responses.	Changes may be related to hypovolemia, hypoxia, electrolyte imbalance, or impending delirium tremens (in client with acute pancreatitis secondary to excessive alcohol intake). Severe pancreatic disease may cause toxic psychosis.
Measure intake and output (I&O), including vomiting or gastric aspirate and diarrhea. Calculate 24-hour fluid balance.	Indicators of replacement needs and effectiveness of therapy.
Note decrease in urine output (less than 400 mL/24 hr).	Oliguria may occur, signaling renal impairment or acute tubular necrosis (ATN), related to increase in renal vascular resistance or altered renal blood flow.
Record color and character of gastric drainage, measure pH, and note presence of occult blood.	Risk of gastric hemorrhage is high because of esophageal varices or erosion of other large vessels. (Refer to CP: Upper Gastrointestinal Bleeding, if indicated.)
Weigh, as indicated; correlate with calculated fluid balance.	Weight loss may suggest hypovolemia; however, edema, fluid retention, and ascites or hemorrhage into the peritoneal cavity may be reflected by increased weight or stable weight in the presence of muscle wasting.
Note poor skin turgor, dry skin and mucous membranes, or reports of thirst.	Further physiological indicators of dehydration.
Observe and record peripheral and dependent edema. Measure abdominal girth if ascites present.	Edema and fluid shifts occur as a result of increased vascular permeability, sodium retention, and decreased colloid osmotic pressure in the intravascular compartment.
Inspect skin for petechiae, hematomas, and unusual wound or venipuncture bleeding. Note hematuria, mucous membrane bleeding, and bloody gastric contents.	Disseminated intravascular coagulation (DIC) may be initiated by release of active pancreatic proteases into the circulation. The most frequently affected organs are the kidneys, skin, and lungs.
Observe and report coarse muscle tremors, twitching, and positive Chvostek's sign.	These are symptoms of calcium imbalance. Calcium binds with free fats in the intestine and is lost by excretion in the stool. Note: Chvostek's sign is evaluated by tapping the cheek over the facial nerve and then observing for the development of a lip twitch or facial spasm, which is indicative of muscular irritability.
<b>Collaborative</b>	
Administer fluid replacement, as indicated, such as saline solutions, albumin, blood and blood products, and dextran.	Choice of replacement solution may be less important than rapidity and adequacy of volume restoration. Saline solutions and albumin may be used to promote mobilization of fluid back into vascular space. Low-molecular-weight dextran is sometimes used to reduce risk of renal dysfunction and pulmonary edema associated with pancreatitis.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor laboratory studies—Hgb/Hct, protein, albumin, electrolytes, blood urea nitrogen (BUN), creatinine, urine osmolality, sodium and potassium, and coagulation studies.	Identifies deficits, replacement needs, and developing complications.
Replace electrolytes—sodium, potassium, chloride, and calcium, as indicated.	Decreased oral intake and excessive losses greatly affect electrolyte and acid-base balance, which is necessary to maintain optimal cellular and organ function.
Prepare for and assist with peritoneal lavage or peritoneal dialysis.	While uncommon, peritoneal dialysis is an approach to treat necrotizing acute pancreatitis as it removes dialyzable toxins and rapidly reduces severe metabolic disturbances (Li et al, 2016). (Refer to CP: Peritoneal Dialysis (PD) for related assessments and interventions, as needed.)

### NURSING DIAGNOSIS: imbalanced Nutrition: less than body requirements

#### May Be Related To

Inability to ingest food (e.g., anorexia, nausea, vomiting, indigestion)  
Inability to digest food  
Abdominal cramping [severe pain with food ingestion]

#### Possibly Evidenced By

Insufficient interest in food; food aversion; food intake less than recommended daily allowances; satiety immediately after ingesting food  
Hyperactive bowel sounds; diarrhea, steatorrhea  
Abnormal laboratory studies (e.g., decreased albumin)

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Nutritional Status NOC

Demonstrate stable weight with normalization of laboratory values, including blood glucose.  
Be free of signs of malnutrition and nutritional deficiencies.

##### Knowledge: Prescribed Diet NOC

Demonstrate behaviors or lifestyle changes to avoid causing acute episode of pancreatitis, and maintain appropriate weight.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Management NIC</b> <i>Independent</i> Determine likelihood of serious nutritional issues in client's current situation. Note reason for pancreatitis (e.g., acute incident associated with gallstones or binge drinking, or long-term chronic alcoholic with nutritional deficits and acute-on-chronic pancreatitis).	Nutrition needs and feeding depend on the type and stage of the disease. The severity of malnutrition is correlated with two major factors: (1) malabsorption and depletion of nutrients (e.g., from alcoholism and pain) cause impaired nutritional status, and (2) increased metabolic activity is present (in correlation with disease type and stage). However, in CP, uncontrolled exocrine pancreatic insufficiency (EPI) can have serious ramifications, resulting in nutrient malabsorption, weight loss, bloating, abdominal pain, and even chronic malnutrition, if left untreated (Grant, 2011; Rasmussen et al, 2013).
Perform brief nutrition screening upon admission to care. Refer for in-depth testing as indicated.	Nutrition status is part of the admission assessment and can be evaluated quickly in four basic areas (i.e., recent weight loss, recent food intake, current weight and BMI, and estimate of current disease severity) to predict risk of malnutrition.
Assess abdomen, noting presence and character of bowel sounds, abdominal distention, and reports of nausea.	Gastric distention and intestinal atony are frequently present, resulting in reduced or absent bowel sounds. Return of bowel sounds and relief of symptoms signal readiness for discontinuation of NG tube.

(continues on page 520)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide frequent oral care.	Decreases vomiting stimulus and soothes inflamed, dry mucous membranes associated with dehydration and mouth breathing when NG tube is in place.
Assist client in selecting food and fluids that meet nutritional needs and restrictions when diet is resumed.	Previous dietary habits may be unsatisfactory in meeting current needs for tissue regeneration and healing. Use of gastric stimulants, such as caffeine, alcohol, cigarettes, or gas-producing foods, or ingestion of large meals may result in excessive stimulation of the pancreas and recurrence of symptoms.
Observe color, consistency, and amount of stools. Note frothy consistency and foul odor.	Steatorrhea may develop in chronic pancreatitis from incomplete digestion of fats.
Maintain NPO status and gastric suctioning during acute phase.	Prevents stimulation and release of pancreatic enzymes (secretin) when chyme and hydrochloric acid enter the duodenum.
Resume oral intake as appropriate in frequent small meals (four to eight times a day).	In mild AP, oral feedings can be started immediately if there is no nausea and vomiting, and abdominal pain has resolved. Studies support that initiation of feeding with a low-fat solid diet appears as safe as a clear liquid diet; however, oral feedings given too early in the course of AP may exacerbate symptoms (Tenner et al, 2013). Dietary management in CP includes a diet of lean meat and vegetable proteins, as well as low-fat and nutrient-dense foods. Fried or greasy foods are to be avoided to help prevent pain. Carbohydrate intake might be limited when overt diabetes mellitus is present (Rasmussen et al, 2013).
<b>Collaborative</b>	To help identify needs and influence interventions. For example, dietary recommendations usually begin with total abstinence from alcohol. In addition, an adequate number of calories should be taken. Estimation (or measurement) of resting energy expenditure (REE) is essential to calculate adequate caloric intake. The carbohydrate intake might be limited when overt diabetes mellitus is present. Data on measured REE in CP are very limited but have shown that weight loss is accompanied by hypermetabolism and that between 30% and 50% of patients with CP have increased REE (Rasmussen et al, 2013).
Collaborate in treatment regimen.	Treatment should be multidisciplinary and support that the mainstay of treatment is abstinence from alcohol, pain treatment, dietary modifications, and pancreatic enzyme supplementation (where needed). Note: About 80% of patients can be managed by a combination of analgesics, dietary recommendations, and pancreatic enzyme supplements, while 10% to 15% need oral nutritional supplements, 5% need enteral tube feeding, and around 1% require parenteral nutrition (Meier et al, 2006; Plauth et al, 2009).
Administer enteral or parenteral feedings, as indicated.	Nutritional support can have a significant beneficial impact in a hypermetabolic and hypercatabolic state. Enteral feeding is preferred via nasogastric or jejunostomy tube to stabilize gut bacteria, which can help to limit/prevent infection. However, parenteral nutrition (PN) should be instituted if enteral feedings can't meet nutritional needs or client can't tolerate enteral feeding (Grant, 2011; Krenzer, 2016; Tenner et al, 2013). (Refer to CP: Total Nutritional Support: Parenteral/Enteral Feedings.)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications, as indicated, for example:	
Vitamins, such as A, D, E, and K	Replacement required because fat metabolism is altered, reducing absorption and storage of fat-soluble vitamins. A deficiency in vitamins A, D, E, and K correlates with the severity of steatorrhea in patients with CP but may be caused by several different mechanisms, including (and not limited to) suboptimal dietary intakes, increased nutrient and vitamin losses occurring simultaneously with increased requirements, and impaired binding of nutrients.
Replacement enzymes, such as delayed-release varied enzyme combination drugs (e.g., pancrelipase [Creon, Zenep, Pancrease V, Viokase, Zenpep])	Used in chronic pancreatitis to correct deficiencies and to promote digestion and absorption of nutrients. Note: Use of delayed-release pancreatic enzymes has improved client outcomes for dosage and timing of meals.

### NURSING DIAGNOSIS: risk for unstable Blood Glucose Level

#### Possibly Evidenced By

Dietary intake; [pancreas dysfunction with decreased insulin production, increased glucagon release]

Physical health status, stress

Insufficient knowledge of, or adherence to management plan

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Blood Glucose Level NOC

Maintain glucose in satisfactory range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hyperglycemia Management NIC</b>	
<b>Independent</b>	
Note signs of increased thirst and urination or changes in mentation and visual acuity.	May warn of developing hyperglycemia associated with increased release of glucagon (damage to alpha cells) or decreased release of insulin (damage to beta-cells). Note: When the insulin-producing cells (beta-cells) have been damaged, diabetes may develop. Diabetes as a consequence of pancreatitis is known as secondary diabetes (see Glossary) and may require insulin injections.
Perform and monitor results of bedside fingerstick glucose testing.	Early detection of inadequate glucose utilization may prevent development of hyperglycemic crisis. IV insulin may be required to control serum glucose within normal ranges.
<b>Collaborative</b>	
Monitor serum glucose, as indicated.	Indicator of insulin needs because hyperglycemia is frequently present, although not usually in levels high enough to produce ketoacidosis.
Provide insulin, as appropriate.	Corrects persistent hyperglycemia caused by injury to beta-cells and the increased release of glucocorticoids. Insulin therapy is usually short term unless permanent damage to pancreas occurs.
Advance diet as tolerated and based on specific nutritional needs.	Loss of pancreatic function or reduced insulin production may require initiation of a permanent diabetic diet.

## NURSING DIAGNOSIS: risk for Infection [sepsis]

### Possibly Evidenced By

Stasis of body fluids; alteration in peristalsis; malnutrition  
Chronic illness; alteration in pH of secretions; alteration in tissue integrity; immunosuppression

### Desired Outcomes/Evaluation Criteria—Client Will

#### Infection Status NOC

Be free of signs of infection.  
Be afebrile.

#### Risk Control: Infectious Process NOC

Participate in activities to reduce risk of infection.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<i>Independent</i>	
Use strict aseptic technique when changing surgical dressings or working with IV lines, indwelling catheters, tubes, or drains. Change soiled dressings promptly.	Limits sources of infection, which can lead to sepsis in a compromised client.
Model and emphasize importance of good hand hygiene.	Reduces risk of cross-contamination.
Observe rate and characteristics of respirations and breath sounds. Note occurrence of cough and sputum production.	Potential pulmonary complications of pancreatitis can include atelectasis, pleural effusion, pneumonia, and acute respiratory distress syndrome (ARDS). Fluid accumulation and limited mobility predispose client to respiratory infections and atelectasis. Accumulation of ascites fluid may cause elevated diaphragm and shallow abdominal breathing.
Encourage frequent position changes, deep breathing, and coughing. Assist with ambulation as soon as stable.	Enhances ventilation of all lung segments and promotes mobilization of secretions.
Observe for signs of infection, such as the following:	
Fever and respiratory distress in conjunction with jaundice	Cholestatic jaundice and decreased pulmonary function may be first sign of sepsis or ARDS.
Increased abdominal pain, rigidity and rebound tenderness, diminished or absent bowel sounds	Suggestive of peritonitis.
Increased abdominal pain and tenderness, recurrent fever (higher than 101°F [38.3°C]), leukocytosis, hypotension, tachycardia, and chills	Abscesses can occur 2 weeks or more after the onset of pancreatitis and should be suspected whenever client is deteriorating despite supportive measures.
<i>Collaborative</i>	
Obtain culture specimens, such as blood, wound, urine, sputum, or pancreatic aspirate.	Identifies presence of infection and causative organism.
Administer anti-infective therapies as indicated, such as imipenem/cilastatin (Primaxin), metronidazole (Flagyl), and levofloxacin (Levaquin); cephalosporins, such as ceftriaxone (Rocephin); and aminoglycosides, such as gentamicin (Garamycin) and tobramycin (Nebcin).	Antibiotics are not given routinely for fever, especially early in the disease course, because this symptom is almost universally secondary to the inflammatory response and typically does not reflect an infectious process. However, broad-spectrum anti-infectives are generally recommended for acute pancreatitis sepsis, while long-term therapy will be based on the specific organisms cultured (Tang & Markus, 2017).
Prepare for surgical intervention, as necessary.	Abscesses may be surgically drained with resection of necrotic tissue. Sump tubes may be inserted for antibiotic irrigation and drainage of pancreatic debris. Pseudocysts (persisting for several weeks) may be drained because of the risk and incidence of infection and rupture.

**NURSING DIAGNOSIS:** risk for impaired Gas Exchange**Possibly Evidenced By**

Alveolar-capillary membrane changes—interstitial edema, pulmonary congestion

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status NOC**

Maintain adequate ventilation with respiratory rate and rhythm normal for client, breath sounds clear, and free of dyspnea or shortness of breath.

Display arterial blood gases (ABGs) within client's normal range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b>	
<b>Independent</b>	
Evaluate respiratory rate and depth. Note respiratory effort, for example, presence of dyspnea, use of accessory muscles, and nasal flaring.	Client responses are variable. Rate and effort may be increased by pain, accumulation of secretions, or abdominal distention. Respiratory depression can occur with use of opioid analgesics. Early recognition and treatment of abnormal ventilation may prevent complications.
Auscultate breath sounds. Note areas of diminished or absent breath sounds and presence of adventitious sounds, such as rhonchi or crackles.	Loss of active breath sounds in an area of previous ventilation may reflect atelectasis. Crackles or rhonchi may be indicative of fluid accumulation due to interstitial edema, pulmonary congestion, or infection.
Encourage client participation and responsibility for deep breathing exercises, use of adjuncts, and coughing, as indicated. Reposition frequently.	Stimulates respiratory function and lung expansion. Effective in preventing and resolving pulmonary congestion.
Reinforce splinting of abdomen with pillows during deep breathing or coughing.	May enhance effectiveness of cough effort.
Note increasing restlessness, confusion, and lethargy.	May indicate impaired gas exchange and possible ARDS, requiring prompt evaluation and intervention.
<b>Collaborative</b>	
Monitor and graph serial ABGs and pulse oximetry, and review chest x-ray reports.	Decreasing oxygen level or saturation and increasing PaCO <sub>2</sub> and changes in chest x-rays suggest developing complications requiring further evaluation and treatment.
Administer supplemental oxygen (O <sub>2</sub> ), if indicated.	Increases available O <sub>2</sub> for tissue and organ function. Note: Inability to maintain adequate oxygenation indicates need for more aggressive therapy or mechanical ventilation. (Refer to CP: Respiratory Failure/Ventilatory Assistance.)

**NURSING DIAGNOSIS:** ineffective Health Management**May Be Related To**

Complexity of therapeutic regimen; insufficient knowledge of healthcare regimen

Perceived seriousness of condition, susceptibility, benefit or barriers; decisional conflicts

Economically disadvantaged

Insufficient social support

**Possibly Evidenced By**

Reports difficulty with prescribed regimen

Failure to include treatment regimen in daily living or to take action to reduce risk factors

Ineffective choices in daily living for meeting health goals

Unexpected acceleration of illness symptoms

(continues on page 524)

**NURSING DIAGNOSIS:** **ineffective Health Management** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Knowledge: Acute Illness/Chronic Disease Management NOC**

Verbalize understanding of condition, disease process, and potential complications.  
Verbalize understanding of therapeutic needs.  
Correctly perform necessary procedures and explain reasons for the actions.  
Initiate necessary lifestyle changes and participate in treatment regimen.  
Identify and use available resources.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Review specific cause of current episode and prognosis.	Provides knowledge base on which client can make informed choices.
Discuss other causative and associated factors such as excessive alcohol intake, gallbladder disease, duodenal ulcer, and some drugs—oral contraceptives, thiazide diuretics, glucocorticoids, and sulfonamides.	Client may or may not be able to impact risk, but avoidance of certain substances and drugs may help limit damage and prevent development of a chronic condition.
Explore availability of treatment programs for chemical dependency, if indicated.	Alcohol abuse is currently the most common cause of recurrence of chronic pancreatitis. Usage of other drugs, whether prescribed or illicit, is increasing as a factor. Note: Pain of pancreatitis can be severe and prolonged and may lead to narcotic dependence. Client may benefit from referral to a pain clinic.
Emphasize the importance of follow-up care, and review symptoms that need to be reported immediately to physician, such as recurrence of abdominal pain, persistent fever, nausea and vomiting, abdominal distention, frothy or foul-smelling stools, and general intolerance of food.	Prolonged recovery period requires close monitoring to prevent or limit recurrence and complications, such as infection and pancreatic pseudocysts.
Review importance of initially continuing bland, low-fat diet with frequent small feedings within individual tolerance.	Understanding the purpose of the diet in maximizing the use of available enzymes while avoiding overstimulation of the pancreas may enhance client involvement in self-monitoring of dietary needs and responses to foods.
Instruct in use of pancreatic enzyme replacements as indicated, avoiding concomitant ingestion of hot foods or fluids.	If permanent damage to the pancreas has occurred, exocrine deficiencies will occur, requiring long-term replacement. Hot foods or fluids can inactivate enzymes.
Recommend cessation of smoking. Refer for medical and support interventions, if client desires.	Nicotine stimulates gastric secretions and unnecessary pancreatic activity.
Discuss signs and symptoms of diabetes mellitus: polydipsia, polyuria, weakness, and weight loss.	Damage to the beta-cells may result in a temporary or permanent alteration of insulin production.
Provide information about available resources, such as home healthcare, nutritionist, alcohol treatment program, financial assistance, diabetes care, transplant information, etc.	Client/SO may benefit assistance from multiple community assistance programs. Aid may be possible for many clients if they are assisted in accessing resources.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **imbalanced Nutrition: less than body requirements**—inability to ingest food (prescribed dietary restrictions, persistent nausea and vomiting), inability to digest food/absorb nutrients (imbalances in digestive enzymes)
- **risk for unstable Blood Glucose Level**—lack of acceptance of diagnosis; deficient knowledge of diabetes management; medication management
- **acute/chronic Pain**—chemical agents (e.g., irritation of peritoneal surfaces by pancreatic enzymes, general inflammatory process), physical agent (e.g., spasms of biliary ducts)

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities) (continued)

- **dysfunctional Family Processes**—alcohol abuse, family history of resistance to treatment, inadequate coping, lack of problem-solving skills
- **ineffective Health Management**—complexity of therapeutic regimen, economic difficulties, perceived benefit, social support deficits

## TOTAL NUTRITIONAL SUPPORT: PARENTERAL/ENTERAL FEEDING

- I. **Pathophysiology**—Malnutrition is a disorder of body composition in which nutritional intake is less than required and results in reduced organ function, abnormalities in blood chemistry, reduced body mass, and worsened clinical outcomes.
  - a. According to the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.), malnutrition can be classified as either being illness related (secondary to another disease or injury) or non–illness related (attributable to environmental/behavioral causes) or a combination of the two (Mehta et al, 2013).
  - b. Nutritional status is affected by multiple factors, including eating behaviors, disease states, age, economics, and environment.
  - c. In the acutely or chronically ill client, the impact of malnutrition includes muscle mass loss, progressive weakness, reduced immune competence, increased infectious complications, poor skin integrity and delayed wound healing, a higher rate of systemic complications, and prolonged length of stay.
  - d. When oral intake is inadequate or not possible, specifically designed nutritional therapy can be administered via an enteral or a parenteral route to prevent or correct protein-calorie malnutrition.

### II. Clinical Indication for Feeding

- a. Preexisting nutritional deprivation; unplanned or unexplained loss of 10% in body weight
- b. Anticipated or actual inadequate energy intake by mouth, such as inability to consume food or drink orally for 7 days or more, based on individual nutritional status
- c. Critically ill individuals, because of their increased metabolic demands and limited nutritional reserve, commonly require nutritional support.

### III. Etiology of Malnutrition

- a. Can exist in persons who are underfed or overfed, occurring in both extremely thin and obese individuals
- b. May result from an inadequate or unbalanced diet, digestive difficulties, absorption problems, or other medical conditions
  - i. Acute conditions, such as surgery, severe burns, infections, and trauma, that drastically increase short-term nutritional requirements
  - ii. Chronic diseases associated with nutrient loss, nutrient demand, and malabsorption, such as celiac disease, cystic fibrosis, pancreatic insufficiency, pernicious anemia
  - iii. Conditions and treatments associated with malnutrition through decreased intake, such as depressed appetite,

difficulty swallowing, and nausea associated with both cancer and chemotherapy, as well as with HIV/AIDS and its drug therapies

- c. Certain age groups, such as elderly clients, require fewer calories but continue to require adequate nutritional support because they are often less able to absorb nutrients, due in part to decreased stomach acid production, and are more likely to have one or more chronic ailments that may affect their nutritional status.

### IV. Routes for Feeding

- a. Enteral nutrition
  - i. Gastrointestinal (GI) intubation is preferred for clients with a functional GI tract but who are unable to consume an adequate nutritional intake or for whom oral intake is contraindicated or impossible.
  - ii. Feeding may be done via flexible catheter (such as nasogastric [NG], orogastric tube) or enterostomy (such as gastrostomy, duodenostomy, or jejunostomy) tube.
  - iii. Feeding may be short term for supplementation of oral intake or long term to provide for all of client's nutrition.
  - iv. Formulas can be manufactured to meet certain needs for the body (e.g., *polymeric* is a standard formula, and *elemental* is for those with malabsorptive guts), but also there are special formulas for diabetes, acute and chronic renal failure, immune system enhancement, and hepatic encephalopathy.
- b. Parenteral nutrition
  - i. May be chosen because of altered metabolic states or when mechanical or functional abnormalities of the GI tract prevent enteral feeding
  - ii. Goals are to improve the client's nutritional status, establish and maintain a positive nitrogen balance, improve or maintain muscle strength and mass, promote weight gain, and encourage the healing process through infusion of amino acids, fat, carbohydrates, trace elements, vitamins, and electrolytes, as indicated.
  - iii. The average adult requires approximately 1500 calories per day in order to maintain energy stores before illness is factored in.
  - iv. Parenteral nutrition (PN) is provided via an intravenous (IV) route, either centrally or peripherally.
    1. Central: Formula is concentrated hyperosmolar and must be infused via a large vein in the chest, neck, or arm. Commonly used central lines are peripher-

(continues on page 526)

ally inserted central catheter (PICC) lines and Hickman and Groshong catheters. The nutrition supplied in this manner is called total parenteral nutrition (TPN) because it supplies all the nutrition the client receives.

2. Peripheral PN (also called PPN) formulas are similar to (but less concentrated than) centrally

infused formulas and are infused via a peripheral vein. *Note:* A.S.P.E.N. guidelines suggest that PN with an osmolarity of up to 900 mOsm/L can be safely infused peripherally (Boullata et al, 2014). PPN treatment is typically short term and may be given to supplement other methods of nutrition the client receives.

## G L O S S A R Y

**Basal metabolic rate (BMR):** Number of calories the body burns at rest to maintain normal body functions.

**Cachexia:** Profound and marked state of general ill health and malnutrition.

**Catabolism:** Metabolic breakdown of complex molecules into simpler ones, often resulting in a release of energy.

**Harris-Benedict equation:** Formula that uses BMR and then applies an activity factor to determine total daily energy expenditure (calories).

**Ideal body weight (IBW):** Calculation for men: 106 lbs for first 5 feet plus 6 lbs for each additional inch of height. Women: 100 lbs for first 5 feet plus 5 lbs for each additional inch of height.

**Indirect calorimetry:** Estimation of energy expenditure via the measurement of oxygen consumption and carbon dioxide production.

**Lipids:** Lipids are fat emulsion of 10% to 20%. It contains triglycerides, egg phospholipids, glycerol, and water. If lipids are needed with TPN, they are given intermittently or mixed in with the TPN solution.

**Malabsorption:** Inability of the body to use one or more available nutrients.

**Partial parenteral nutrition (PPN):** Normally prescribed for clients who can tolerate some oral feedings but cannot ingest adequate amounts of food to meet their nutritional

needs. It is usually administered through a peripheral intravenous catheter. A time frame of less than 14 days is recommended. Two types of solutions are commonly used in a number of combinations for PPN: lipid emulsions and amino acid–dextrose solutions.

**Protein calorie malnutrition (PCM), also called protein energy malnutrition (PEM):** Severe deficiency of protein plus inadequate caloric intake to meet energy needs.

**Total energy expenditure (TEE):** Amount of energy spent, on average, in a typical day measured in calories (k/day).

**Total parenteral nutrition (TPN):** IV full nutrition support using a formulation of amino acids, carbohydrates, lipids, electrolytes, multiple vitamins, minerals, and supplemental medications (e.g., insulin or H2 blockers). It is recommended for a minimum of 7 days for improvement in patient outcome to occur.

**TPN IV access:** Central access lines for TPN may include a triple lumen catheter (TLC), a peripherally inserted central line (PICC), tunneled central venous catheters (e.g., Broviac, Groshong, or Hickman), and implanted central venous catheter (e.g., Port-A-Cath). The first two categories are likely to be used in shorter-term parenteral therapy, while the latter two categories may be reserved for long-term and permanent therapy.

## CARE SETTING

Client may be treated in any setting, including acute care (often ICU), community care, or home care.

**\*\*\*NOTE: This plan of care addresses only enteral or parenteral feedings and does not deal with transitional feedings or caring for the client with difficulties chewing and swallowing that may require additional interventions in order to ingest food by mouth.**

## RELATED CONCERNs

Acute lung injury/acute respiratory distress syndrome, page 177

Acquired immunodeficiency syndrome (AIDS), page 800

Anemias, page 541

Bariatric surgery, page 442

Burns: thermal, chemical, and electrical—acute and convalescent phases, page 740

Cancer, page 945

Cerebrovascular accident (CVA)/stroke, page 247

Craniocerebral trauma—acute rehabilitative phase, page 226

Chronic obstructive pulmonary disease (COPD) and asthma, page 132

Cirrhosis of the liver, page 494

Diabetes mellitus and diabetic ketoacidosis, page 454

Eating disorders: anorexia nervosa/bulimia nervosa, page 413

Obesity, page 430

Fluid and electrolyte imbalances (see DavisPlus)

Fractures, page 702

Inflammatory bowel disease, page 352

Multiple sclerosis (MS), page 311

Pancreatitis, page 511

Parkinson's disease (PD), page 330

Psychosocial aspects of care, page 835

Renal failure: chronic, page 607

Respiratory failure/ventilatory assistance, page 187

Surgical intervention, page 873

## CLIENT ASSESSMENT DATABASE

Clinical signs listed here depend on the degree and duration of malnutrition and include observations indicative of vitamin, mineral, protein, and calorie deficiencies.

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<b>ACTIVITY/REST</b>	<ul style="list-style-type: none"> <li>• Fatigue</li> <li>• Decreased activity tolerance</li> <li>• Muscle wasting—temporal, intercostal, gastrocnemius, dorsum of hand</li> <li>• Flaccid muscles</li> <li>• Thin extremities</li> </ul>
<b>CIRCULATION</b>	<ul style="list-style-type: none"> <li>• Tachycardia, bradycardia</li> <li>• Pallor, cyanosis</li> </ul>
<b>ELIMINATION</b>	<ul style="list-style-type: none"> <li>• Diarrhea or constipation, flatulence associated with food intake</li> <li>• Stools may be loose, hard-formed, fatty, or clay-colored</li> <li>• Abdominal distention, increased girth, ascites</li> <li>• Abdominal tenderness on palpation</li> </ul>
<b>FOOD/FLUID</b>	<ul style="list-style-type: none"> <li>• Recent weight loss or weight loss of 10% or more of body weight within previous 6 months</li> <li>• Unplanned weight loss of more than 20 lb in the last 3 months</li> <li>• Inadequate oral intake (nothing by mouth [NPO]) status for 7 to 10 days</li> <li>• Anorexia</li> <li>• Nausea, vomiting</li> <li>• Problems with chewing, swallowing</li> <li>• Sore mouth and gums</li> <li>• Actual measured weight as compared with usual, or weight is less than 90% of IBW for height, sex, and age</li> <li>• Actual weight equal to or greater than 120% of IBW</li> <li>• Subcutaneous fat loss</li> <li>• Bowel sounds diminished, hyperactive, or absent</li> <li>• Lips and mucous membranes dry, cracked, red, swollen</li> <li>• Edema, generalized or dependent (e.g., feet/ankles; periorbital, abdominal)</li> <li>• Dentition may be poor, such as lack of teeth, multiple cavities, denture problems</li> <li>• Tongue may be smooth, pale, slick, coated; color often magenta, beefy red; lingual papillae atrophy or swelling</li> <li>• Gums swollen, bleeding</li> </ul>
<b>NEUROSENSORY</b>	<ul style="list-style-type: none"> <li>• History of neurological conditions (e.g., brain injury, stroke, multiple sclerosis, Parkinson's disease) affecting eating abilities</li> <li>• Lethargy, apathy, listlessness, irritability, disorientation</li> <li>• Loss of balance and coordination</li> <li>• Decreased cognitive function</li> <li>• Gag and swallow reflex may be decreased or absent</li> </ul>
<b>PAIN/DISCOMFORT</b>	<ul style="list-style-type: none"> <li>• Headache</li> <li>• Various pains dependent on underlying conditions</li> </ul>
<b>RESPIRATION</b>	<ul style="list-style-type: none"> <li>• Shortness of breath; difficulty breathing</li> <li>• Increased respiratory rate; respiratory distress</li> <li>• Breath sounds, crackles (protein deficiency–related fluid shifts)</li> </ul>
<b>SAFETY</b>	<ul style="list-style-type: none"> <li>• Allergies</li> <li>• Exposure to infectious diseases</li> <li>• Altered immune system</li> <li>• Delayed healing</li> <li>• Skin dry, scaly, tented; “flaky paint” dermatosis; edematous</li> <li>• Nails may be brittle, thin, flattened, ridged, spoon-shaped</li> <li>• Draining or unhealed wounds; pressure sores</li> <li>• Ecchymosis; perifollicular petechiae</li> </ul>

(continues on page 528)

## CLIENT ASSESSMENT DATABASE (contd.)

### MAY REPORT (continued)

### MAY EXHIBIT (continued)

#### SEXUALITY

- Loss of libido
- Amenorrhea

#### TEACHING/LEARNING

- History or presence of conditions causing protracted protein and caloric losses—malabsorption or short-gut syndrome, diarrhea, acute pancreatitis, renal dialysis, fistulas, draining wounds, thermal injuries, problems with chewing or swallowing (such as due to stroke or Parkinson's disease)
- Presence of factors known to alter nutritional requirements and increase energy demands—single or multiorgan failure, sepsis, fever, AIDS, cancer, trauma (especially traumatic brain injury [TBI]), extensive burns, pressure ulcers, use of steroids, antitumor agents, immunosuppressants
- Use of treatments that greatly alter intake and medications that cause untoward drug and nutrient interactions—laxatives, anticonvulsants, diuretics, antacids, opioids, immunosuppressants, radiation, high-dose chemotherapy
- Illness of psychiatric origin—anorexia nervosa or bulimia
- Educational and social factors—lack of nutrition knowledge or kitchen facilities, reduced or limited financial resources

#### DISCHARGE PLAN CONSIDERATIONS

- May require assistance with solution preparation, therapy supplies, and maintenance of feeding device for home nutritional care

► Refer to section at end of plan for postdischarge considerations.

## DIAGNOSTIC STUDIES

### TEST

### WHY IT IS DONE

### WHAT IT TELLS ME

#### ANTHROPOMETRICS

- Techniques that deal with the measurement of the size, weight, and proportions of the human body, including:
- **Ideal body weight (IBW):** What people are expected to weigh based on age, gender, and height.
- **Body mass index (BMI):** Calculates body composition.
- **Skinfold measurement:** Estimates subcutaneous body fat by measuring skinfold thickness using calipers. Measurements can use from three to nine different standard anatomical sites around the body.

A malnourished person could weigh less or more than their IBW. Weight may be inaccurate because of factors such as edema or ascites.

Measures ratios of lean-to-fat body weight. Classifications include underweight (less than 18.5), normal weight (18.5 to 24.9), overweight (25 to 29.9), and obese (greater than 30). Fat reserves less than in the 10th percentile suggest advanced depletion; levels less than the 30th percentile suggest mild-to-moderate depletion.

#### BLOOD TESTS

- **Visceral proteins:** Nonmuscular proteins useful in monitoring nutritional status, including:

Deficits suggest malnutrition. Protein is an essential nutrient that functions to promote tissue growth, repair, and wound healing.

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li><b>Serum albumin:</b> Protein deficiency results in decreased synthesis of albumin.</li> </ul>	<p>Albumin is not a definitive measure of visceral protein status but reflects the complex relationship between protein synthesis, degradation, and distribution. Depletion is considered at <math>&lt;3.5</math> g/dL. However, overhydration and dehydration affect albumin concentration, and its long half-life makes it unreliable in acute depletion or repletion. It is more accurate in chronic protein deficiency states (Dawodu et al, 2015).</p>
<ul style="list-style-type: none"> <li><b>Serum transferrin:</b> An iron-transport protein.</li> </ul>	<p>Transferrin is more sensitive to changes in visceral protein stores than albumin; also, its shorter half-life and smaller blood pool make it a more accurate early marker for protein-energy malnutrition (PEM). Level of less than 150 mg/dL is considered severe depletion.</p>
<ul style="list-style-type: none"> <li><b>Prealbumin (PAB), also called transthyretin and thyroxine transport protein,</b> carries thyroxine (the main thyroid hormone) and vitamin A throughout the body.</li> </ul>	<p>PAB has a very short half-life and levels respond quickly to nutritional therapy, making it a more sensitive indicator of improvement and change in protein status. Depletion is considered severe at <math>&lt;11</math> mg/dL (Dawodu et al, 2015).</p> <p><i>Note:</i> Although some healthcare practitioners still use the test (especially to monitor client receiving TPN), there is controversy because changes in prealbumin may actually reflect other conditions such as inflammation, infection, or trauma (Lab Tests Online, 2015).</p>
<ul style="list-style-type: none"> <li><b>Nitrogen balance studies:</b> Nitrogen excretion via urine, stool, and insensible losses often exceeds nitrogen intake in the acutely ill, reflecting catabolic response to stress and use of endogenous protein stores for energy production (gluconeogenesis).</li> <li><b>Glucose:</b> Carbohydrates provide energy and spare body protein.</li> </ul>	<p>Blood urea nitrogen (BUN) may be severely decreased because of chronic malnutrition and depletion of skeletal protein stores.</p>
<ul style="list-style-type: none"> <li><b>Retinol-binding protein (RBP):</b> Carrier protein of vitamin A.</li> <li><b>C-reactive protein (CRP):</b> Acute inflammation phase protein.</li> </ul>	<p>During the critical phase of illness or injury, or in states of malnutrition, carbohydrate metabolism is radically altered. Hyperglycemia is a hallmark of stress and is frequently a side effect of nutritional support. Blood sugars are usually checked every 6 hours during therapy and treated, as needed, using a sliding-scale insulin regimen.</p> <p>Concentration falls during protein and calorie deprivation and rises rapidly with supplementation.</p> <p>Increases dramatically during systemic inflammation and catabolism, while visceral proteins fall. CRP values return to normal once the body starts to synthesize proteins, such as PAB.</p>
<ul style="list-style-type: none"> <li><b>Total lymphocyte count:</b> Indicator of the status of the immune system.</li> </ul>	<p>Less than 1500 cells/mm<sup>3</sup> indicates leukopenia and results from decreased generation of T cells, which are very sensitive to malnutrition. Less than 800 cells/mm<sup>3</sup> indicates severe depletion. Levels are also altered by severe stress, renal failure, cancer, infection, and administration of corticosteroids.</p>
<ul style="list-style-type: none"> <li><b>Tests of micronutrients:</b> Trace elements and electrolytes required for body to produce enzymes, hormones, and substances required for growth and development, as well as numerous body regulations, functions, and balance.</li> </ul>	<p>Deficiency occurs with inadequate intake and with loss of electrolyte-containing fluids—urine, diarrhea, vomiting, fistula drainage, and continuous NG suctioning. Imbalances occur also when excessive or deficient amounts of electrolytes and other micronutrients are supplied in TPN for the daily allowance for nutrition. Protocols should be in place for laboratory studies.</p>
<h3>OTHER DIAGNOSTIC STUDIES</h3> <ul style="list-style-type: none"> <li><b>24-hour creatinine (Cr) excretion:</b> Because Cr is concentrated in muscle mass, there is a correlation between lean body mass and 24-hour Cr excretion. Actual values are compared with ideal values based on height and weight times 100.</li> </ul>	<p>Cr height index (CHI) of 60% to 80% indicates moderate depletion; less than 60% indicates severe depletion.</p>

(continues on page 530)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li>• <b>Chest x-ray:</b> Procedure used to evaluate organs and structures within the chest for symptoms of disease.</li></ul>	May be normal or show evidence of pleural effusion; small heart silhouette in severely malnourished individual. <i>Note:</i> Chest x-ray will also be done after central line is inserted prior to beginning TPN to determine it is a location safe for infusion of hyperosmolar solutions. Also recommended to verify position of NG/Dobhoff tube prior to beginning enteral feedings.
<ul style="list-style-type: none"><li>• <b>Electrocardiogram (ECG):</b> A record of the electrical activity of the heart that provides important information concerning the spread of electricity to the different parts of the heart.</li></ul>	May be normal or demonstrate low voltage, dysrhythmias, and patterns reflective of electrolyte imbalances.
<ul style="list-style-type: none"><li>• <b>Monitoring tests once client is on TPN:</b></li></ul>	Guides changes in TPN formula.
<ul style="list-style-type: none"><li>• Basic metabolic panel, C-reactive protein (CRP), magnesium (Mg), and phosphorus (Phos)</li><li>• Liver function studies, prealbumin, and triglycerides</li><li>• Resting energy expenditure (REE): Measures body's energy at rest using a heat process called calorimetry (via a portable cart available at point of care)</li></ul>	<p>May be done on days 1 and 2 and prn. <i>Note:</i> Blood glucose may be checked every 6 hours for first 72 hours.</p> <p>May be checked weekly and prn.</p> <p>May be done every 2 weeks.</p>

## NURSING PRIORITIES

1. Promote consistent intake of adequate calorie and protein requirements.
2. Prevent complications.
3. Minimize energy losses and needs.
4. Provide information about condition, prognosis, and treatment needs.

## DISCHARGE GOALS

1. Nutritional intake adequate for individual needs.
2. Complications prevented or minimized.
3. Fatigue alleviated.
4. Condition, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: imbalanced Nutrition: less than body requirements

### May Be Related To

Inability to ingest/digest food (e.g., cancer and associated treatments, anorexia, surgical procedures, dysphagia, decreased level of consciousness, hypermetabolic states)

### Possibly Evidenced By

Body weight 20% or more under ideal; [decreased subcutaneous fat or muscle mass]; loss of weight with adequate food intake

Insufficient interest in food; food aversion; perceived inability to ingest food; food intake less than recommended daily allowances

Abdominal pain, cramping

Weakness of muscles required for mastication or swallowing; insufficient muscle tone

Hyperactive bowel sounds; diarrhea; steatorrhea

[Abnormal laboratory studies]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Nutritional Status NOC

Demonstrate stable weight or progressive weight gain toward goal, with normalization of laboratory values and no signs of malnutrition.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Therapy</b> <b>NIC</b>	
<b>Independent</b>	
<b>General Interventions</b>	
Assess nutritional status continually during daily nursing care, noting energy level; condition of skin, nails, hair, oral cavity; and desire to eat.	Provides the opportunity to observe deviations from normal client baseline and influences choice of interventions.
Weigh daily (or as prescribed) and compare with admission weight.	Establishes baseline, aids in monitoring effectiveness of therapeutic regimen, and alerts nurse to inappropriate trends in weight loss or gain.
<b>Collaborative</b>	
Refer to nutritional team and registered dietitian.	Aids in identification of nutrient deficits and specific need for parenteral or enteral nutritional intervention.
Determine nutritional and caloric needs, using appropriate method, such as TEE, BMI, Harris-Benedict equation, and indirect calorimetry test, as indicated.	Several methods are available to provide an estimation of calorie and protein needs. TEE is based on resting and activity energy expenditure and thermic effect of food. BMI estimates caloric needs according to energy requirements per kilogram of body weight. The Harris-Benedict equation provides a reasonable estimate of resting energy expenditure in kilocalories per day. Indirect calorimetry test measures oxygen ( $O_2$ ) consumption at basal or resting metabolic rate to aid in estimating calorie and protein requirements. Note: Although any of these tests may accurately determine individual needs, a standard formula for projecting energy requirements in the ill client is to provide 30 kcal/kg for weight maintenance, 25 kcal/kg for weight loss, or 35 kcal/kg for weight gain.
Monitor laboratory studies: serum glucose, electrolytes, transferrin, prealbumin, albumin, total protein, phosphate, BUN/Cr, liver enzymes, complete blood count (CBC), and arterial blood gases (ABGs).	Serum chemistries, blood counts, and lipid profiles are performed before initiation of therapy, providing a baseline for comparison with repeat studies to determine therapy needs and monitor for complications. Note: Untoward metabolic effects of TPN include hypokalemia, hyponatremia and fluid retention, hyperglycemia, hypophosphatemia, increased $CO_2$ production resulting in respiratory compromise, elevation of liver function tests, and renal dysfunction.
<b>For Client Receiving Enteral Therapy</b>	
<b>Enteral Tube Feeding</b> <b>NIC</b>	
<b>Independent</b>	
Determine presence and type of feeding tube, and document that tube is functional before starting nutrition.	Tube placement will be verified at insertion. However, bedside affirmation of tube tip placement (e.g., in stomach [prepyloric] or small bowel [postpyloric]) and tube function (e.g., free flowing or clogged) is advised on a regular basis (e.g., before bolus feedings; before and after administration of medications).
Elevate head of bed (HOB) 30 to 45 degrees, unless contraindicated by client's medical condition(s).	Promotes digestion and helps reduce risk of aspiration of stomach contents (risk factor for pneumonia).
Confirm accuracy of prescribed enteral solution.	Nutritional support prescriptions are based on individually estimated caloric and protein (and micronutrient) requirements. Various medical nutrition products are formulated to target specific needs (e.g., pulmonary conditions, pressure ulcers, wound healing, burns, protein malnutrition, impaired GI function, chronic liver disease) (Elke et al, 2014; McClave & Heyland, 2009; Medtrition, 2015–2017).
Prepare equipment and continually monitor function of equipment used for feeding administration. Make certain label clearly states "For Enteral Use Only—Not for IV Use."	Use of properly functioning pump prevents/limits complications associated with enteral feeding rates. Labeling helps prevent misconnection errors (e.g., tube feeding inadvertently connected to an IV line).

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**ACTIONS/INTERVENTIONS (continued)**

Maintain patency of enteral feeding tubes by flushing with at least 15 to 20 mL sterile/purified water before and after each feeding and as indicated (e.g., between doses of each medication or when checking gastric residuals).

Note date and time of feeding bag set change.

Auscultate for bowel sounds before each feeding (if bolus or every 4 to 8 hours or facility protocol (continuous feeding). Check for abdominal bloating/distention, nausea, vomiting, or diarrhea.

**Collaborative**

Collaborate with insertion and confirmation of proper placement of specified feeding tube.

Administer medications as indicated, such as:

Diphenoxylate with atropine (Lomotil), camphorated tincture of opium (paregoric), and metoclopramide (Reglan)

**RATIONALE (continued)**

Tube occlusion is a frequently occurring problem (20%-45%) often requiring replacement (Guenter & Boullata, 2013). Enteral formulas contain protein that can clog feeding tubes (more likely with small-bore or silicone than with polyurethane tubes), necessitating removal or replacement of tube. Other reasons the enteral tube may become clogged are inadequate water flushing, frequent medication delivery, and use of the tube to check residual volumes (Guenter & Boullata, 2013; Wilkinson et al, 2016).

Bags should be changed every 24 hours or according to facility protocol.

Symptoms may indicate intolerance of feeding or impaired GI motility, placing client at risk for complications (e.g., reflux, aspiration) (Houston, 2017; Wilkinson et al, 2016).

X-ray confirmation of tube placement is carried out prior to starting feedings to eliminate possibility of misplacement and to prevent administration of formula into the lungs. Alternately, tube position may be confirmed by aspiration of green gastric fluid or golden small bowel contents from feeding tube, before administration of solutions Note: Placement of feeding tube is dependent on client's specific needs. For example, although nasogastric (NG) feeding is safe for most patients, small bowel feeding may be best for those at risk for aspiration or GI intolerance. A.S.P.E.N. guidelines recommend that enteral feeding route should be based on patient-specific factors (e.g., patient with persistent dysphagia should be considered for a long-term enteral device [e.g., percutaneous endoscopic or surgically placed gastrostomy tube]) (Boullata et al, 2014; Kreymann et al, 2006; McClave & Heyland, 2009).

**For Client Receiving Parenteral Therapy****Total Parenteral Nutrition (TPN) Administration NIC**  
*Independent*

Assess client's nutrition status and needs ongoing (e.g., daily weight, lab results, intake and output [I&O]).

Determine the type, location, and characteristics of PN access catheters (e.g., Hickman; Broviac; PICC; triple-lumen, double-lumen, or single-lumen catheters; and ports)

GI side effects of enteral feeding may need to be controlled with antidiarrheal agents (Lomotil/paregoric) or peristaltic stimulants (Reglan) if more conservative measures such as alteration of rate or strength or type of formula are not successful. Note: Diarrhea may be a side effect of administered medications, especially those high in sorbitol (which can be found in premade liquid drugs such as potassium chloride, acetaminophen, theophylline) (Houston, 2017).

Client receiving PN has complex nutritional needs (and medical conditions) requiring constant assessment and intervention, especially during initiation of therapy.

Parenteral nutrition access options include central venous **short-term** catheters (put in place in the hospital and generally removed prior to discharge) and **long-term** options such as (1) tunneled Hickman catheter located in the upper chest, (2) peripherally inserted central catheter (PICC) located in the upper arm, and (3) ports implanted under the skin, usually in the upper chest wall. Many catheters are available in multilumen versions to allow for simultaneous infusion of multiple fluids and/or medications. Central venous catheters are commonly used for patients requiring weeks, months, or years of therapy (Kirby & Parisian, 2011).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Check prescriber's orders for type and concentration of additives in each PN solution container and for rate of infusion. Notify physician and document problems (e.g., deviation from prescribed infusion over 24 hours; catheter complication requiring discontinuation of PN).	Helps prevent errors and complications and allows for early intervention where needed.
Prepare and continually monitor function of equipment used for PN administration. Monitor pump alarms (e.g., occlusion may be from clogged filter or kinked tubing) and keep alarms on at all times.	Helps prevent errors and complications associated with inaccurate rate of infusion.
Observe appropriate "hang" time of parenteral solutions per facility protocol.	Solutions in general appear to be stable in the usual facility 24-hour hang time. In one study (2011), many vitamins were stable in the formulation during the 3 days of study when stored at 4°C (39°F) (Ribeiro et al, 2011). Note: In literature, parenteral solution hang times are primarily concerned with intravenous lipid emulsions (IVLEs) and their correlation with catheter-related infections. In general, IVLEs given alone in their original manufacturer's container should be infused within 12 hours. IVLEs administered in an alternative container should be infused within 6 hours. IVLEs administered as a component of 3-in-1 and accompanying administration set should be terminated within 24 hours of infusion (Ayers et al, 2014; Perry, 2003; Sacks & Driscoll, 2002).
Monitor fingerstick glucose per protocol (such as every 6 hours) during initiation of therapy.	Blood glucose levels may be elevated if PN contains too much carbohydrate in the form of dextrose, when the infusion rate is too high, as a side effect of the infection process or of medications (e.g., steroids) used for treatment of medical conditions. Hypoglycemia can also occur (although less common), precipitated by suddenly stopping concentrated dextrose infusions (Thomas, 2017).
Be familiar with electrolyte content of nutritional solutions.	Metabolic complications of nutritional support often result from a lack of appreciation of changes that can occur because of refeeding—hyperglycemia, hyperosmolar nonketotic coma (HHNC), and electrolyte imbalances.
<b>Collaborative</b>	
Administer parenteral solution(s) as prescribed (e.g., dextrose-electrolyte or dextrose-amino acid and lipid emulsions [3-in-1] solutions) or premixed solutions, as indicated.	PN solutions provide calories, essential amino acids, and micronutrients and are modified to meet specific needs, such as lower protein in renal and liver failure or higher fat in respiratory failure. 3-in-1 solution bags are larger (2 to 3 L) and can infuse over a 24-hour period, eliminating the need for frequent bag changes and reducing line manipulation and risk of contamination. Note: Premixed PN solutions may have a number of advantages over compounded PN (e.g., decreased costs and compounding time, reduced chance for error, and reduced incidence of bloodstream infections) (Hall, 2015). However, it remains unclear if premixed solutions should be used in all cases. Comparison studies found that while calories and protein were remarkably similar, dextrose, lipid, and electrolytes differed. It has been suggested that premixed solutions be used in stable non-critically ill patients (Beattie et al, 2016).
Coinfuse lipid emulsions if 3-in-1 solutions are not used.	Lipid emulsions are often added to supply essential fatty acids and triglycerides with 20% to 30% of total calories supplied as lipids. Note: Lipid solutions may be contraindicated in clients with alterations in fat metabolism or in the presence of pancreatitis, liver damage, anemia, coagulation disorders, or pulmonary disease.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications, as indicated, for example:	
Multivitamin preparations	Water-soluble vitamins are added to parenteral solutions. Other vitamins may be given for identified deficiencies.
Insulin	High glucose content of solutions may require exogenous insulin for metabolism, especially in the presence of pancreatic insufficiency or disease. Note: Now insulin is usually added directly to parenteral solution.

NURSING DIAGNOSIS: risk for Infection
<b>Possibly Evidenced By</b>
Malnutrition; stasis of body fluids: chronic illness; immunosuppression [Environmental exposure: invasive procedures—insertion of venous catheter, surgically placed gastrostomy or jejunostomy feeding tube, access devices in place for extended periods; improper preparation and handling or contamination of the feeding solution]
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>
<b>Infection Severity NOC</b>
Experience no fever or chills. Demonstrate clean catheter insertion sites, free of drainage and erythema or edema.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<i>Independent</i>	
Emphasize and model proper handwashing technique.	Reduces risk of cross-contamination.
Maintain sterile technique for invasive procedures. Provide routine site care, as appropriate.	Prevents entry of bacteria, reducing risk of nosocomial infections.
Encourage frequent position changes and being out of bed or ambulation, as tolerated.	Limits stasis of body fluids, promotes optimal functioning of organ systems and GI tract.
Screen visitors and care providers for infectious processes, especially upper respiratory infection (URI).	Reduces risk of transmission of viruses that are difficult to treat.
Monitor and assist with respiratory exercises and use of adjuncts, such as incentive spirometer. Auscultate lungs for adventitious sounds.	Promotes deep breathing to clear airways and reduce risk of pneumonia. Presence of wheezes suggests retained secretions and potential complications requiring intervention.
Assess vital signs, including temperature, per protocol.	A rise in pulse and temperature may provide warning of infectious process unless client's immune system is too compromised to respond.
<b>Total Parenteral Nutrition (TPN) Administration NIC</b>	
Maintain an optimal aseptic environment during bedside insertion of central venous catheters and during changes of TPN bottles and administration tubing.	Catheter-related sepsis may result from entry of pathogenic microorganisms through skin insertion tract or from touch contamination during manipulations of TPN system.
Secure external portion of catheter and administration tubing to dressing with tape. Note intactness of skin suture.	Manipulation of catheter in and out of insertion site can result in tissue trauma or coring and potentiate entry of skin organisms into catheter tract.
Maintain a sterile occlusive dressing over catheter insertion site. Perform central or peripheral venous catheter dressing care per protocol.	Protects catheter insertion sites from potential sources of contamination. Note: Central venous catheter sites can easily become contaminated from tracheotomy or endotracheal secretions or from wounds of the head, neck, and chest.
Inspect insertion site of catheter for erythema, induration, drainage, and tenderness.	The catheter is a potential irritant to the surrounding skin and subcutaneous skin tract, and extended use may result in insertion site irritation and infection.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Refrigerate premixed solutions before use; observe a 24-hour hang time for amino acid or total nutrient admixtures solutions and a 12-hour hang time for IV fat emulsions.	TPN solutions and fat emulsions have been shown to support the growth of a variety of pathogenic organisms once contaminated.
Monitor temperature and serum glucose levels.	A rise in temperature or loss of glucose tolerance (glycosuria, hyperglycemia) is an early indication of possible catheter-related sepsis.
<b>Enteral Tube Feeding NIC</b> Keep manipulations of enteral feeding system to a minimum and wash hands before opening system. Handle the system as little as possible.	Touch contamination of formula is caused by caregiver administration technique.
Alternate nares for tube placement in long-term NG feedings.	Reduces risk of trauma and infection of paranasal tissue, especially important in facial trauma or burns.
Provide daily and as needed site care to abdominally placed feeding tubes.	GI secretions leaking through or around gastrostomy or jejunostomy tube tracts can cause skin breakdown severe enough to require removal of the feeding tube.
Refrigerate reconstituted enteral formulas before use; observe a hang time of 4 to 8 hours; discard unused formula after 24 hours.	Enteral formulas easily support bacterial growth due to high concentration of glucose and lipids and can be contaminated from several sources, including when preparation is mixed or poured or via frequent aspiration of gastric or small bowel contents, use of open system, and use of blue dye.
<b>Infection Protection NIC</b> <i>Collaborative</i> Aseptically prepare parenteral solutions or enteral formulas for administration. When possible, use prepackaged sterile enteral feeding formula.	TPN solutions should be prepared under a laminar flow hood in the pharmacy. Enteral formulas should be mixed in a clean environment in the dietary or pharmacy department. Note: Additives to TPN solutions, as a rule, should not be made on the unit because of the potential for contamination and drug incompatibilities.
Notify physician if signs of infection are present. Follow protocol for obtaining appropriate culture specimens of blood and solutions, and change bottle and tubing, as indicated.	Necessary to identify source of infection and initiate appropriate therapy. May require removal of TPN line and culture of catheter tip.
Administer antibiotics, as indicated.	May be given prophylactically or for specifically identified organism.

### NURSING DIAGNOSIS: risk for Injury

#### Possibly Evidenced By

[Physical (e.g., catheter-related complications; effects of therapy, drug interactions)]  
Impaired primary defense mechanisms; malnutrition; abnormal blood profile; immune dysfunction

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Risk Control NOC

Be free of complications associated with nutritional support.  
Modify environment and correct hazards to enhance safety for in-home therapy.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Surveillance NIC</b> <i>Independent</i> <b>Parenteral</b> Maintain a closed central IV system using Luer-Lock (or similar) connections.	Inadvertent disconnection of central IV system can result in lethal air emboli.
	(continues on page 536)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer appropriate TPN solution via peripheral or central venous route, including peripherally inserted central catheter (PICC) lines and tunneled catheters.	Solutions containing high concentrations of dextrose more than 10% must be delivered via a central vein because they result in chemical phlebitis when delivered through small peripheral veins.
Monitor for potential drug and nutrient interactions.	Various interactions are possible, such as digoxin in conjunction with diuretic therapy, which can cause hypomagnesemia; hypokalemia may result from chronic use of laxatives, mineralocorticoid steroids, diuretics, or amphotericin.
Assess catheter for signs of displacement out of central venous position: extended length of catheter on skin surface, leaking of IV solution onto dressing, client complaints of neck/arm pain, tenderness at catheter site, or swelling of extremity on side of catheter insertion.	These measures are necessary for preventing catheter-associated issues (e.g., pulmonary or vascular complications, extravasation of solution(s) into tissue, and infection).
Inspect peripheral TPN catheter site routinely and change sites at least every other day or per protocol.	Peripheral TPN solutions, although less hyperosmolar, can still irritate small veins and cause phlebitis. Peripheral venous access is often limited in malnourished clients, but site should still be changed if signs of irritation develop.
Investigate reports of severe chest pain or coughing in clients with central line. Turn client to left side in Trendelenburg position, if indicated, and notify physician.	Suggests presence of air embolus requiring immediate intervention to displace air into apex of heart away from the pulmonary artery.
Maintain an occlusive dressing on catheter insertion sites for 24 hours after subclavian catheter is removed.	Extended catheter use may result in development of catheter skin tract. Once the catheter is removed, air embolus is still a potential risk until skin tract has sealed.
<b>Enteral</b> Assess gastrostomy or jejunostomy tube sites for evidence of malposition.	Indwelling and mushroom catheters are still used for feeding tubes inserted via the abdomen. Migration of the catheter balloon can result in duodenal or jejunal obstruction. Improperly sutured gastrostomy tubes may easily fall out.
<b>Collaborative</b> Review chest x-ray, as indicated.	Central parenteral line placement is routinely confirmed by x-ray.
Consult with pharmacist in regard to site and time of delivery of drugs that might have action adversely affected by enteral formula.	Absorption of vitamin D is impaired by administration of mineral oil, which inhibits micelle formation of bile salts, and by neomycin, which inactivates bile salts. Aluminum-containing antacids bind with the phosphorus in the feeding solution, potentiating hypophosphatemia. Other medications (e.g., levothyroxine, alendronate, phenytoin, carbamazepine, carbidopa levodopa) need to be given on an empty stomach, requiring interruption of gastric feeding for 1 to 2 hours before and after administration (Houston, 2017).

## NURSING DIAGNOSIS: risk for Aspiration

### Possibly Evidenced By

Presence of gastrointestinal tube, enteral tube feedings  
Delayed gastric emptying; increase in gastric residual

### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status: Airway Patency NOC

Maintain clear airway, free of signs of aspiration.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Aspiration Precautions NIC</b>	
<b>Independent</b>	
<b>Enteral</b>	
Confirm placement of enteral feeding tubes. Determine feeding tube position in stomach by x-ray, confirm pH of 0 to 5 for the gastric fluid withdrawn through tube, or auscultate injected air before intermittent feedings. Observe for ability to speak and cough.	Malplacement of feeding tubes may result in aspiration of enteral formula. Clients at particular risk include those who are intubated, obtunded/comatose, and those who have had a neurological injury (e.g., stroke, MS, Guillain-Barré) or surgery of the head, neck, and upper GI system. Note: The reliability of the pH method is reduced if antacids or certain other medications have been given orally or via NG in the past 4 hours. In addition, when using auscultatory method to assess tube placement, air sounds can be transmitted to the epigastrium even if the tube is malpositioned in lung or proximal jejunum.
Maintain aspiration precautions during enteral feedings, such as the following:	
Keep head of bed elevated at 30 to 45 degrees during feeding and for at least 1 hour after feeding. Interrupt continuous feeding when client is in prone position for repositioning or transport.	Reduces risk of regurgitation or gastric reflux.
Inflate tracheostomy cuff during and for 1 hour after intermittent feeding.	Aspiration of enteral formulas is highly irritating to the lung parenchyma and may result in pneumonia and respiratory compromise.
Monitor gastric residual volumes (GRVs) between or before bolus feedings (as previously noted in ND: imbalanced Nutrition: less than body requirements) and high bolus feeding volumes.	Presence of large gastric residuals may potentiate an incompetent esophageal sphincter, leading to vomiting and aspiration. In addition, fast feeding rates with volumes exceeding 1500 mL/d are at higher risk of aspiration (Houston, 2017).
Note characteristics of sputum and tracheal aspirate. Investigate development of dyspnea, cough, tachypnea, and cyanosis. Auscultate breath sounds.	Presence of formula in tracheal secretions or signs and symptoms reflecting respiratory distress suggest aspiration.
Note indicators of NG tube intolerance, such as absence of gag reflex, high risk of aspiration, and frequent removal of NG feeding tubes.	May require consideration of surgically placed feeding tube, percutaneous endoscopic gastrostomy (PEG), or jejunostomy (J tube) for client safety and consistency of enteral formula delivery.
<b>Collaborative</b>	
Review abdominal x-ray if performed.	Confirmation of placement of gastric feeding tube should be obtained by x-ray.

### NURSING DIAGNOSIS: risk for imbalanced Fluid Volume

#### Possibly Evidenced By

Treatment regimen; [complications of nutrition therapy—high-glucose solutions, hyperglycemia; overhydration or dehydration]

Failure of regulatory mechanisms specific to underlying disease process or trauma

Inability to obtain or ingest fluids

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Fluid Balance NOC

Display moist skin, moist mucous membranes, stable vital signs, and adequate urinary output; be free of edema and excessive weight loss or inappropriate gain.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Management NIC</b>	
<b>Independent</b>	
Note presence of conditions (e.g., diabetes, intestinal obstruction, burns, sepsis, kidney or liver failure).	These underlying conditions associated with fluid imbalances may be present in the client receiving nutritional therapy. Both the conditions and nutritional therapies have fluid imbalance implications.
Note current treatment modalities (e.g., mechanical ventilation, surgery, major invasive procedures and devices).	These can cause/exacerbate fluid imbalances.
Assess for clinical signs of <b>dehydration</b> such as thirst, dry skin and mucous membranes, hypotension, or <b>fluid excess</b> , including peripheral edema, tachycardia, and adventitious breath sounds.	Early detection and intervention may prevent occurrence of excessive fluctuation in fluid balance. Note: Severely malnourished clients have an increased risk of developing <b>refeeding syndrome</b> (life-threatening fluid overload, intracellular electrolyte shifts, and cardiac strain occurring during initial 3 to 5 days of therapy). This potentially catastrophic complication can usually be prevented by starting feedings at low rates and advancing them slowly over several days (Mehler et al, 2010).
Incorporate knowledge of caloric density of enteral formulas into assessment of fluid balance.	Enteric solutions are usually concentrated and do not meet free water needs.
Provide additional free water via feeding tube or at bedside (if client can drink) and via feeding tube flushing tubing.	With higher calorie formula, additional water is needed to prevent dehydration or hyperglycemic complications.
Record intake and output (I&O), calculate 24-hour fluid balance, and measure urine-specific gravity.	Indicators of fluid balance. Specific gravity is an indicator of hydration and renal function.
Weigh daily, or as indicated; evaluate changes.	Provides for early detection and intervention as needed. Note: Rapid weight gain reflecting fluid retention can predispose or potentiate heart failure (HF) or pulmonary edema. Gain of more than 0.5 lb/d indicates fluid retention and not deposition of lean body mass.
<b>Collaborative</b>	
Monitor laboratory studies, such as the following:	
Serum potassium and phosphorus	Hypokalemia and phosphatemia can occur because of intracellular shifts during initial refeeding and may compromise cardiac function if not corrected.
Hematocrit (Hct)	Reflects hydration and circulating volume.
Serum albumin	Hypoalbuminemia and decreased colloidal osmotic pressure lead to third spacing of fluid and edema.
Serum transferrin	Reacts quickly to changes in protein status.
Prealbumin	Sensitive to low levels of protein.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

**May Be Related To**

Insufficient information; insufficient knowledge of resources or interest in learning  
Alteration in cognitive functioning or memory  
[Information misinterpretation]

**Possibly Evidenced By**

Insufficient knowledge  
Inaccurate follow-through of instructions  
Development of preventable complications

<b>NURSING DIAGNOSIS:</b> <b>deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs</b> (continued)	
<b>Desired Outcomes/Evaluation Criteria—Client/Caregiver Will</b>	
<b>Knowledge: Disease Process NOC</b> Verbalize understanding of condition or the disease process and individual nutritional needs. Participate in learning process of treatment regimen. Be free of preventable complications.	
<b>Knowledge: Treatment Procedure NOC</b> Perform necessary procedures correctly, and explain reasons for the actions.	
ACTIONS/INTERVENTIONS	RATIONALE
<b>Enteral Tube Feeding/Total Parenteral Nutrition (TPN) Administration NIC</b>	
<i>Independent</i>	
Assess client's and significant other's (SO's) knowledge of nutritional state.	Determines content matter to be presented.
Review individual situation, signs and symptoms of malnutrition, future expectations, and transitional feeding needs.	Provides information from which client and SO can make informed choices. Knowledge of the interaction between malnutrition and illness is helpful in understanding need for special therapy.
Discuss reasons for use of nutrition support.	May experience anxiety regarding inability to eat and may not comprehend the nutritional value of the prescribed TPN or tube feedings.
Provide adequate time for teaching client and SO when client is going home on enteral or parenteral feedings. Document client's and SO's understanding, ability, and competence to deliver safe home therapy.	Generally, 3 to 4 days is sufficient for client and SO to become proficient with tube feedings. Parenteral therapy is more complex, and client and SO may require a week or longer to feel ready for home management; follow-up in the home is required.
Discuss proper handling, storage, and preparation of nutritional solutions; also discuss aseptic or clean techniques for care of insertion sites and use of dressings.	Reduces risk of formula or solution-related problems, metabolic complications, and infection.
Review use and proper care of nutritional delivery devices.	Client understanding and cooperation are key to the safe insertion and maintenance of nutritional support access devices and prevention of complications.
Review specific precautions (depending on type of feeding), such as checking placement of tube, sitting upright for enteral feeding, maintaining patency of tube, anchoring of tubing, and adequate length of tubing for nighttime feeding.	Promotes safe self-care and reduces risk of complications.
Discuss and demonstrate reinsertion of enterostomal feeding tube, if appropriate.	Tube may be changed routinely or inserted only for feedings. Intermittent feedings enhance client mobility and aid in transition to regular feeding pattern.
Identify signs and symptoms requiring medical evaluation—nausea and vomiting, abdominal cramping or bloating, diarrhea, rapid weight changes, erythema, drainage, foul odor at tube insertion site, fever and chills, coughing and choking, or difficulty breathing during enteral feeding.	Early evaluation and treatment of problems such as feeding intolerance, infection, and aspiration may prevent progression to complications that are more serious.
Instruct client and SO in glucose monitoring, if indicated.	Timely recognition of changes in blood glucose levels reduces risk of hyperglycemic or hypoglycemic reactions in client on TPN.
Discuss signs, symptoms, and treatment of hyperglycemia and hypoglycemia.	Hyperglycemia is more common for clients receiving parenteral feedings and those who have pancreas or liver disease or are taking large doses of corticosteroids. Rebound hypoglycemia can occur when feedings are intentionally or accidentally discontinued.

(continues on page 540)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage use of diary for recording test results, physical feelings and any reactions, activity level, oral intake if any, I&O, and weekly weight. Report trends to appropriate healthcare providers.	Provides resource for review by healthcare providers for optimal management of individual situation. Note: Journaling (by client or caregiver) about intake may be especially important when efforts are being made to transition from enteral or parenteral feeding to oral feeding. Note: The client with conditions interfering with oral intake (e.g., stroke or Parkinson's disease; brain injury; facial trauma, burns) may require additional referrals and interventions by healthcare providers to manage nutrition needs.
Recommend daily exercise and activity to tolerance, scheduling of adequate rest periods.	Enhances gastric motility for enteral transition feedings, promotes feelings of general well-being, and prevents undue fatigue.
Ascertain that all supplies are in place in the home before discharge; make arrangements as needed with suppliers, such as hospital, pharmacy, medical equipment company, and laboratory.	Provides for successful, smooth transition from acute care setting to home and competent home therapy.
Refer to nutritional support team, home healthcare agency, and counseling resources. Provide with immediate-access phone numbers.	Client and SO need readily available support persons to assist with nutrition therapy, equipment problems, and emotional adjustments in long-term or home-based therapy.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Fatigue**—disease states; malnutrition; stress; altered body chemistry (e.g., medications, chemotherapy)
- **risk for Injury**—physical (e.g., catheter-related complications—catheter breaks, dislodgement, occlusion air emboli, septic thrombo-phlebitis); malnutrition; effects of therapy, drug interactions
- **risk for Infection**—invasive tubes, environmental exposure, malnutrition, chronic disease
- **interrupted Family Processes**—situational crises; shift of health status of a family member; shift in family roles

# Diseases of the Blood/ Blood-Forming Organs

## ANEMIAS—IRON DEFICIENCY, ANEMIA OF CHRONIC DISEASE, PERNICOUS, APLASTIC, HEMOLYTIC

**I. Pathophysiology**—decreased number of circulating red blood cells (RBCs), due to blood loss, increased destruction of RBCs (hemolysis), or decreased production of RBCs, resulting in diminished oxygen-carrying capacity of the blood (Maakaron et al, 2016)

- a. Iron deficiency anemia (ID): inadequate iron stores, which results in insufficient hemoglobin (Hgb) (key molecule in RBCs), causing cells to appear abnormal, unusually small (microcytic), and pale (hypochromic)
  - b. Anemia of chronic disease (ACD): Common conditions associated with ACD may include *infections* (e.g., human immunodeficiency virus [HIV], tuberculosis [TB], sepsis, osteomyelitis), *inflammation* (e.g., arthritis, inflammatory bowel disease), and *malignancies* (e.g., carcinomas, myeloma, lymphoma) (Betcher et al, 2015; Schrier & Camaschella, 2016).
  - c. Pernicious anemia (PA): Lack of intrinsic factor in the stomach results in inability to absorb vitamin B<sub>12</sub>, causing abnormal RBC formation.
  - d. Aplastic anemia: failure of bone marrow to produce cells, including RBCs and white blood cells (WBCs) and platelets
  - e. Hemolytic anemia: premature destruction of RBCs
- II. Etiology** (Maakaron et al, 2016; National Institutes of Health [NIH], 2012)
- a. Three main causes of anemia exist. They are:
    - i. Blood loss (acute or chronic)
    - ii. Decreased RBC production as may occur with (1) defect in stem cells (e.g., aplastic anemia), defect in heme (see Glossary) production (e.g., iron deficiency, thalassemias), and (3) defective DNA production
    - iii. Increased RBC destruction caused by (1) external factors, (2) hereditary internal factors, and (3) acquired defects
    - iv. Within these causes, there are a number of specific etiologies. Some examples of these specifics include (1) genetics (e.g., thalassemias, Fanconi anemia); (2) nutritional (e.g., iron deficiency, vitamin B<sub>12</sub> and folate deficiency; starvation and malnutrition); (3) physical (e.g., trauma, burns, frostbite, prosthetic valves); (4) chronic disease and malignancies (e.g., kidney and liver disease, chronic infections, neoplasms); (5) infectious: viral (e.g., hepatitis), bacterial (e.g., gram-negative sepsis, *Clostridia*), and protozoal (e.g., malaria, toxoplasmosis); (6) drugs or chemicals (common cause of aplastic and hypoplastic disorders) and bone marrow suppression (e.g., antibiotics, anticonvulsants); and (7) active bleeding (e.g., trauma, ulcers, varices, use of medications such as nonsteroidal anti-inflammatory drugs [NSAIDs] or warfarin).
  - b. Adult anemia is usually defined as an Hgb level lower than 11 g/dL, with severe anemia defined as an Hgb lower than 8 g/dL. Not all sources agree with these numbers. For example, Maakaron opines that anemia is defined by the lower limits set for the Hgb range and that “the World Health Organization (WHO) chose 12.5 g/dL for both adult males and females. In the United States, limits of 13.5 g/dL for men and 12.5 g/dL for women are probably more realistic” (Maakaron et al, 2016).
  - c. Anemia is a common condition, occurring in all age groups, both male and female (although incidence is twice as prevalent in females), and in all races and ethnic groups. Certain races and ethnic groups have an increased prevalence of genetic anemias (e.g., sickle cell anemia has greater morbidity and mortality in African Americans than in general population) (Maakaron et al, 2016).
  - d. Anemias are associated with many physiological complications, including dyspnea, fatigue, dizziness, decreased cognition, impaired sleep, sexual dysfunction, and significant debilitation. The most serious complications of severe anemia arise from tissue hypoxia such as may occur in shock or coronary and pulmonary insufficiency.
  - e. ID
    - i. Most frequently occurring form of anemia
    - ii. Lack of iron in the body due to a variety of causes (Nabili, 2016)
      - 1. Blood loss due to disease, such as gastric or duodenal ulcers, diverticula, hemorrhoids, ulcerative colitis; injury or trauma; or certain medications, including aspirin or nonsteroidal anti-inflammatory drugs (NSAIDs)
      - 2. Inadequate nutrition, such as not eating enough foods that contain iron

(continues on page 542)

- 3. Malabsorption syndromes, such as not utilizing iron from food that is eaten
  - 4. Lead exposure
  - f. ACD
    - i. Primarily due to slowed production of RBCs as a result of low reticulocyte production
    - ii. Develops slowly and is only evident after time
    - iii. Symptoms are usually associated with the disease causing the anemia rather than the anemia itself. Examples are the anemias associated with chronic kidney disease, chronic malnutrition, or cancers (Nabili, 2016).
    - iv. Second most prevalent form of anemia.
  - g. PA—an autoimmune disorder
    - i. Characterized by the production of autoantibodies to gastric parietal cells and their secretory product—*intrinsic factor*—which is needed for vitamin B<sub>12</sub> absorption
    - ii. Conditions that interfere with the body's absorption and use of B<sub>12</sub> include Crohn's and Whipple's diseases, gastrectomy or gastric bypass, and the use of chemotherapeutic medications.
  - h. Aplastic anemia—bone marrow failure
    - i. May be associated with conditions that affect erythropoietin production and secretion, such as certain cancers and cancer treatments and renal, hepatic, or endocrine disorders
    - ii. Other known causes include exposure to chemicals, such as benzene, insecticides, solvents; certain drugs, such as chemotherapy, gold, seizure medications, some antibiotics; viruses, such as HIV, Epstein-Barr; immune conditions, such as systemic lupus erythematosus, rheumatoid arthritis; radiation; and certain inherited disorders, such as Fanconi's anemia.
- i.** Hemolytic anemia—marked by an accelerated destruction of RBCs
- i. Several types of hemolytic anemias, including sickle cell anemia (Maakaron & Taher, 2017; Nabili, 2016). (See CP: Sickle Cell Crisis.)
  - ii. Causes include hereditary factors; blood transfusion reactions; immune disorders, acute viral or infectious agents; certain drugs, such as quinidine, penicillin, and methyldopa; and toxins, such as chemicals and venoms.
- III. Statistics**
- a. Morbidity: The most serious complications of severe anemia arise from tissue hypoxia. Shock, hypotension, or coronary and pulmonary insufficiency can occur. In a study conducted between 2009 and 2011, 152,757 (72%) of hospitalization discharge diagnoses contained the condition “anemia,” with 17% of those classified as severe. Discharge anemia was associated with severity-dependent increased odds for 30-day hospital readmission compared with those without anemia (Koch et al, 2014).
  - b. Mortality: 5219 people died of anemia during 2014 in the United States according to the Centers for Disease Control and Prevention (CDC), National Center for Health Statistics. Persons with sickle cell anemia (Hgb SS) have the worst prognosis, since they have more frequent crises. The 2-year fatality rate for severe aplastic anemia is 70% without bone marrow transplantation or a response to immunosuppressive therapy. Untreated hemolytic-uremic syndrome carries a 40% mortality rate (CDC, 2014; Maakaron et al, 2016).
  - c. Cost: Because anemia rarely stands on its own and is listed as one diagnosis among others in many chronically ill patients with a variety of diseases, direct care costs are difficult to determine.

## G L O S S A R Y

**Acquired anemia:** Client is not born with anemia but develops it. Includes conditions and factors that can lead to anemia, such as poor diet, abnormal hormone (erythropoietin) levels, bone marrow suppression due to cancer treatment, certain medications and toxins, and pregnancy. Some anemias are mixed acquired and inherited (e.g., aplastic).

**Cheilitis:** Inflammation of the lips with cracking at the corners of the mouth.

**Echymosis:** Superficial bleeding (bruising) under the skin or mucous membrane.

**Erythropoiesis:** Red blood cell (RBC) production in the bone marrow.

**Glossitis:** Inflammation of tongue.

**Hematemesis:** Bloody vomitus.

**Hematinic:** An agent that improves the quality of blood by stimulating RBC production erythrocytes and/or the hemoglobin concentration. Examples include iron preparations and the B complex vitamins.

**Heme:** The nonprotein, insoluble, iron compound, and constitutes the pigment portion or protein-free part of the hemoglobin molecule and is responsible for its oxygen-carrying properties.

**Inherited anemia:** Gene for certain anemia is passed on by parents. Anemias of this type include sickle cell, thalas-

semia, Fanconi, and others. Some anemias are mixed acquired and inherited (e.g., aplastic).

**Koilonychia:** Dystrophy of the nails, resulting in thinning and concave or spoon shape.

**Lymphadenopathy:** Enlargement of the lymph nodes.

**Macrocytic anemia:** The red blood cells are larger than normal. Major causes of this type are pernicious anemia and anemia related to alcoholism (Nabali, 2016).

**Melena:** Black, tarry stools due to digested blood in the gastrointestinal (GI) tract.

**Microcytic anemia:** The red blood cells are smaller than normal. The major causes of this type are iron deficiency anemia and thalassemia (inherited disorders of hemoglobin).

**Normocytic anemia:** The red blood cells are normal in size but low in number. This type of anemia accompanies chronic diseases and kidney disorders.

**Petechiae:** Small, purplish, hemorrhagic spots on the skin.

**Pica:** Insatiable craving to eat nonfood items, such as starch, clay, crayons, and paper.

**Red blood cell characterization of anemias:** Based on the mean corpuscular volume (MCV), or average RBC size, reported in the complete blood count (CBC) test:

- (1) *microcytic*: most commonly caused by iron deficiency; other causes include thalassemia, anemia of

**G L O S S A R Y** (continued)

chronic disease, and sideroblastic anemia; (2) *normocytic*: may be caused by hemorrhage, hemolysis, bone marrow failure, anemia of chronic inflammation, or renal insufficiency; and (3) *macrocytic*: the larger red cells are always associated with insufficient numbers of cells and often also insufficient hemoglobin content per cell. Most are megaloblastic (cells are larger because they cannot produce DNA quickly enough to divide at the right time) and include vitamin B<sub>12</sub> or folate deficiencies

caused by insufficient uptake or inadequate absorption through lack of intrinsic factor (pernicious anemia) (Rogers et al, 2012).

**Romberg's sign:** Inability to maintain body balance when eyes are shut and feet are close together, sometimes noted with movement disorders accompanying pernicious anemia.

**Stomatitis:** Inflammation, ulceration of mucosal lining of any structures in the mouth.

**CARE SETTING**

Clients are treated at the community level except in the presence of severe cardiovascular or immune compromise. Although the medical treatments vary widely due to the many variations in anemia presentation, nursing care for the anemic client has a common theme: managing physical symptoms and maximizing quality-of-life issues.

**RELATED CONCERNS**

Acquired immunodeficiency syndrome (AIDS), page 800  
 Burns: thermal, chemical, and electrical—acute and convalescent phases, page 740  
 Cancer, general considerations, page 945  
 Cirrhosis of the liver, page 494  
 Heart failure: chronic, page 38  
 Psychosocial aspects of care, page 835  
 Pulmonary tuberculosis (TB), page 204  
 Renal failure: chronic (end-stage renal disease), page 607  
 Rheumatoid arthritis (RA), page 824  
 Upper gastrointestinal bleeding, page 340

**CLIENT ASSESSMENT DATABASE****DIAGNOSTIC DIVISION  
MAY REPORT****ACTIVITY/REST**

- Fatigue, weakness, general malaise
- Low exercise tolerance
- Greater need for rest and sleep

**MAY EXHIBIT**

- \*\*\*\*Note: Signs and symptoms listed here may be due to either the underlying disease or the anemia itself. For example, chronic kidney disease (CKD) and anemia of chronic disease (ACD) may present with very similar symptoms (Verma & Stein, 2017).
- Tachycardia and tachypnea, dyspnea on exertion or at rest (severe or aplastic anemia)
  - Muscle weakness and decreased strength
  - Slumping shoulders, drooping posture, slow walk, and other cues indicative of fatigue
  - Lethargy, withdrawal, apathy, lassitude, and lack of interest in surroundings

**CIRCULATION**

- Angina (particularly in elderly)
- Palpitations (compensatory tachycardia)
- Cold hands and feet
- Brittle nails
- History of chronic blood loss, such as chronic GI bleeding, heavy menses (ID)

- Tachycardia
- Systolic murmur (ID)
- Blood pressure (BP)—increased systolic with stable diastolic and a widened pulse pressure, postural hypotension
- Bounding pulse and throbbing carotid pulsations reflect increased cardiac output as a compensatory mechanism to provide oxygen and nutrients to cells.
- Dysrhythmias, electrocardiogram abnormalities—ST-segment depression and flattening or depression of the T wave, tachycardia

(continues on page 544)

## CLIENT ASSESSMENT DATABASE (contd.)

MAY REPORT (continued)	MAY EXHIBIT (continued)
	<ul style="list-style-type: none"> <li>Skin color—pallor of the skin, palms, and nailbeds, or grayish cast in black client; waxy, pale skin (aplastic, PA) or bright lemon-yellow (PA)</li> <li>Nails brittle, spoon-shaped or koilonychia (ID)</li> <li>Capillary refill delayed due to diminished blood flow to the periphery, resulting in vasoconstriction</li> <li>Sclera blue or pearl white (ID), jaundice (PA), pale mucous membranes—conjunctiva, mouth, pharynx, lips</li> </ul>
<b>EGO INTEGRITY</b>	<ul style="list-style-type: none"> <li>Depression</li> </ul>
<ul style="list-style-type: none"> <li>Negative feelings about self, ability to handle situation, events</li> </ul>	
<b>ELIMINATION</b>	<ul style="list-style-type: none"> <li>Abdominal distention</li> </ul>
<ul style="list-style-type: none"> <li>History of pyelonephritis, renal failure (ACD)</li> <li>Flatulence, malabsorption syndrome (ID)</li> <li>Hematemesis, fresh blood in stool, melena</li> <li>Diarrhea or constipation</li> <li>Diminished urine output</li> </ul>	
<b>FOOD/FLUID</b>	<ul style="list-style-type: none"> <li>Skin turgor poor with dry, shriveled appearance and loss of elasticity (ID)</li> <li>Beefy red, smooth appearance of tongue (PA, folic acid and vitamin B<sub>12</sub> deficiencies)</li> <li>Beefy red, smooth appearance of tongue (PA, folic acid and vitamin B<sub>12</sub> deficiencies)</li> <li>Hair dry, brittle, thinning; premature graying (PA)</li> <li>Cheilitis (ID)</li> </ul>
	<ul style="list-style-type: none"> <li>Unkempt appearance, poor personal hygiene</li> </ul>
<b>HYGIENE</b>	
<ul style="list-style-type: none"> <li>Difficulty maintaining activities of daily living (ADLs)</li> </ul>	
<b>NEUROSENSORY</b>	<ul style="list-style-type: none"> <li>Mentation—notable slowing and dullness in response</li> <li>Irritability, restlessness, depression, drowsiness, apathy</li> <li>Disturbed coordination, ataxia, decreased vibratory and position sense, positive Romberg's sign, paralysis (PA)</li> <li>Retinal hemorrhages (aplastic, PA)</li> <li>Epistaxis, bleeding from other orifices (aplastic)</li> </ul>
<b>PAIN/DISCOMFORT</b>	
<ul style="list-style-type: none"> <li>Vague abdominal pains, headache (ID)</li> <li>Oral pain</li> </ul>	
<b>RESPIRATION</b>	<ul style="list-style-type: none"> <li>Tachypnea</li> <li>Dyspnea, particularly during and after exercise</li> <li>Orthopnea</li> </ul>
<b>SAFETY</b>	<ul style="list-style-type: none"> <li>Low-grade fever</li> <li>Generalized lymphadenopathy</li> <li>Petechiae and ecchymosis (aplastic)</li> </ul>
<ul style="list-style-type: none"> <li>Poor wound healing, frequent infections</li> <li>Impaired vision</li> <li>Cold and heat intolerance</li> <li>Skin problems, including cracks in side of mouth (PA)</li> <li>Previous or multiple blood transfusions</li> </ul>	

MAY REPORT (continued)	MAY EXHIBIT (continued)
<ul style="list-style-type: none"> <li>History of occupational exposure to chemicals—benzene, lead, insecticides, phenylbutazone, naphthalene (aplastic, hemolytic)</li> <li>History of exposure to radiation, either as a treatment modality or by accident (aplastic, hemolytic)</li> <li>History of cancer, cancer therapies (aplastic, hemolytic)</li> </ul>	
<b>SEXUALITY</b>	
<ul style="list-style-type: none"> <li>Changes in menstrual flow—menorrhagia or amenorrhea in women (ID)</li> <li>Loss of libido—both men and women</li> <li>Impotence</li> </ul>	<ul style="list-style-type: none"> <li>Pale cervix and vaginal walls</li> </ul>
<b>TEACHING/LEARNING</b>	
<ul style="list-style-type: none"> <li>Family tendency for anemia (ID, PA)</li> <li>Past or present use of anticonvulsants, antibiotics, chemotherapeutic agents (bone marrow failure), aspirin, anti-inflammatory drugs, or anticoagulants</li> <li>Chronic use of alcohol</li> <li>Religious or cultural beliefs affecting treatment choices—refusal of blood transfusions</li> <li>Recent or current episode of active bleeding (ID)</li> <li>Prior surgeries—splenectomy, tumor excision, prosthetic valve replacement, surgical excision of duodenum or gastric resection, partial or total gastrectomy for weight loss or diseases (ID, PA)</li> <li>Problems with wound healing or bleeding, chronic infections</li> </ul>	
<b>DISCHARGE PLAN CONSIDERATIONS</b>	
<ul style="list-style-type: none"> <li>May require assistance with treatment, such as injections, self-care activities, homemaker and maintenance tasks; changes in dietary plan</li> </ul> <p>► Refer to section at end of plan for postdischarge considerations.</p>	

<b>DIAGNOSTIC STUDIES</b>	
TEST	WHAT IT TELLS ME
<b>BLOOD TESTS</b>	
<ul style="list-style-type: none"> <li><b>Complete blood count (CBC):</b> Battery of screening tests, which typically includes hemoglobin, hematocrit; RBC count, morphology, indices, and distribution width index; platelet count and size; and WBC count and differential.</li> <li><b>Hemoglobin (Hgb):</b> The oxygen-carrying pigment and predominant protein in the RBCs.</li> </ul>	<p>Evaluates for known or suspected anemia. Types of anemias may be differentiated by the number of red blood cells as well as their color and shape. <i>Note:</i> Methods for measuring RBC mass are time-consuming and expensive. Thus, in practice, anemia is usually confirmed and expressed by measurement of the RBC count, Hgb concentration, and hematocrit (Hct) (Maakaron et al, 2016).</p> <p>Usual Hgb varies somewhat among healthy individuals, making a universal “normal” value elusive. For client with a known baseline level, a decrease of 2 g/dL or more is cause for concern and assessment. Both Hgb and Hct are decreased with blood loss and bone marrow suppression (Rogers et al, 2012).</p>

(continues on page 546)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li>• <b>Hematocrit (Hct):</b> The proportion of packed RBCs to serum.</li>     <li>• <b>RBC (also called erythrocyte) count:</b> Number of RBCs per unit volume.</li> <li>• <b>Reticulocyte count:</b> Immature RBCs. Helps assess bone marrow function.</li> <li>• <b>RBC survival time:</b> Evaluates age of RBCs.</li>     <li>• <b>Erythrocyte fragility test:</b> Evaluates susceptibility of RBCs to breakdown (hemolysis) under certain conditions.</li> <li>• <b>Erythrocyte sedimentation rate (ESR):</b> Measures rate at which RBCs settle.</li>     <li>• <b>WBCs:</b> Total cell count and specific WBCs, called differential.</li> <li>• <b>Platelet count:</b> Platelets have essential function in coagulation.</li> <li>• <b>Erythropoietin:</b> Hormone that stimulates bone marrow to produce red blood cells.</li>     <li>• <b>Serum iron panel</b></li> <li>• <b>Serum iron:</b> Measures the level of iron in the liquid part of blood.</li>     <li>• <b>Total iron-binding capacity (TIBC):</b> Measures the amount of iron that can be carried through blood by transferrin.</li> <li>• <b>Serum ferritin:</b> Reflects the amount of stored iron in body.</li> <li>• <b>Vitamin B<sub>12</sub> (cobalamin) and folate (folic acid):</b> Measures the concentration of vitamin B<sub>12</sub> and folate in the serum. The amount of folate inside RBCs may also be measured; it will normally be at a higher concentration inside the cell than in the serum.</li> <li>• <b>Serum bilirubin:</b> Product that results from the breakdown of Hgb.</li> <li>• <b>Serum lactate dehydrogenase (LDH):</b> Serum LDH levels may occasionally be ordered to monitor damage caused by muscle trauma or injury and to help identify hemolytic anemia.</li> </ul>	<p>Aids in determining source of hemolytic anemia or anemias related to deficiencies in dietary intake or malabsorption. Sometimes used when a person has a family history of anemia; this test provides information on sickle cell anemia or thalassemia (Nabili, 2016).</p> <p>Decreased in ID and PA; severely decreased in aplastic anemia.</p> <p>Decreased in PA and aplastic anemia. Elevated in blood loss and hemolytic and compensated anemias.</p> <p>Useful in the differential diagnosis of anemias because RBCs have shortened life spans in pernicious and hemolytic anemias.</p> <p>Decreased in ID. Increased fragility confirms hemolytic and autoimmune anemias.</p> <p>While not specific to a certain anemia, higher ESR indicates presence of inflammatory reaction, such as increased RBC destruction or malignant disease.</p> <p>May be increased as in hemolytic anemia or decreased in aplastic anemia.</p> <p>Decreased in blood loss and aplastic anemias. Increased in ID, posthemorrhagic, and hemolytic anemias.</p> <p>Determines whether the amount of erythropoietin being produced is appropriate for the level of anemia present. It may be ordered to distinguish between a condition that is suppressing bone marrow function and an insufficiency of erythropoietin.</p> <p>Iron is needed to help form adequate numbers of normal RBCs. Iron may be decreased or absent (ID) or elevated (hemolytic and aplastic anemias).</p> <p>Increased in ID; normal or slightly reduced in PA.</p> <p>Decreased in ID.</p> <p>Anemia caused by folic acid deficiency is common. Helps diagnose the cause of anemia or neuropathy (nerve damage) or to evaluate nutritional status in some clients.</p> <p>Direct or total bilirubin is elevated in PA and hemolytic anemia.</p> <p>May be elevated in PA and hemolytic anemia.</p> <p>The Schilling's test and a therapeutic trial of vitamin B<sub>12</sub> injections help distinguish folic acid deficiency anemia from pernicious anemia.</p> <p>May be positive in urine, stools, and gastric contents, reflecting acute or chronic bleeding (ID).</p> <p>Megaloblasts increased in PA; fatty marrow, with diminished or absence of blood cells at several sites, found in aplastic anemia.</p> <p>Checks for bleeding sites—acute or chronic upper GI bleeding—causing blood loss anemia.</p> <p>Checks for bleeding sites—acute or chronic lower GI bleeding—causing blood loss anemia.</p>

**NURSING PRIORITIES**

1. Enhance tissue perfusion.
2. Provide nutritional and fluid needs.
3. Prevent complications.
4. Provide information about disease process, prognosis, and treatment regimen.

**DISCHARGE GOALS**

1. ADLs met by self or with assistance of others.
2. Complications prevented or minimized.
3. Disease process, prognosis, and therapeutic regimen understood.
4. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS:** **Activity Intolerance****May Be Related To**

Imbalance between oxygen supply and demand (anemia)

**Possibly Evidenced By**

Fatigue; generalized weakness  
Abnormal heart rate or blood pressure response to activity  
Electrocardiogram (ECG) change (e.g., arrhythmia, ischemia)  
Exertional discomfort; dyspnea

**Desired Outcomes/Evaluation Criteria—Client Will****Endurance NOC**

Report a measurable increase in activity tolerance, including performance of ADLs.

Demonstrate reduced physiological signs of intolerance—pulse, respirations, and BP within client's normal range.

Display laboratory values (Hgb/Hct) within acceptable range.

**ACTIONS/INTERVENTIONS****RATIONALE****Energy Management NIC***Independent*

Assess client's ability to perform normal tasks and ADLs, noting reports of weakness, fatigue, and difficulty accomplishing tasks.

Influences choice of interventions and needed assistance.

Note changes in balance, gait disturbance, and muscle weakness.

May indicate neurological changes associated with vitamin B<sub>12</sub> deficiency, affecting client safety and increasing risk of injury.

Monitor BP, pulse, and respirations during and after activity.  
Note adverse responses to increased levels of activity—increased heart rate and BP, dysrhythmias, dizziness, dyspnea, tachypnea, and cyanosis of mucous membranes and nailbeds.

Cardiopulmonary manifestations result from attempts by the heart and lungs to supply adequate amounts of oxygen to the tissues.

Recommend frequent rest periods or bedrest (rare), as indicated.

Activity may need to be curtailed until severe anemia is at least partially corrected to lower body's oxygen requirements and reduce strain on the heart and lungs.

Elevate head of bed, as tolerated.

Enhances lung expansion to maximize oxygenation for cellular uptake. Note: May be contraindicated if hypotension is present.

Suggest client change position slowly; monitor for dizziness.

Postural hypotension or cerebral hypoxia may cause dizziness, fainting, and increased risk of injury.

Assist client to prioritize ADLs and desired activities.  
Alternate rest periods with activity periods.

Promotes adequate rest, maintains energy level, and alleviates strain on the cardiac and respiratory systems.

Provide or recommend assistance with activities and ambulation as necessary, allowing client to be an active participant as much as possible.

Although help may be necessary, self-esteem is enhanced when client does some things for self.

Plan activity progression with client, including activities that client views as essential. Increase activity levels, as tolerated.

Promotes gradual return to a more normal activity level and improved muscle tone and stamina. Increases self-esteem and sense of control.

Identify and implement energy-saving techniques: shower chair and sitting to perform tasks.

Encourages client to do as much as possible, while conserving limited energy and preventing fatigue.

(continues on page 548)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct client to stop current activity if palpitations, chest pain, shortness of breath, weakness, or dizziness occur.	Cellular ischemia potentiates risk of infarction, and excessive cardiopulmonary strain and stress may lead to decompensation and failure.
Discuss importance of maintaining environmental temperature and body warmth, as indicated.	Vasoconstriction with shunting of blood to vital organs decreases peripheral circulation, impairing tissue perfusion. Client's comfort and need for warmth must be balanced with need to avoid excessive heat with resultant vasodilation, which reduces organ perfusion.
<b>Collaborative</b> Monitor laboratory studies, such as Hgb/Hct, RBC count, and arterial blood gases (ABGs).	Identifies deficiencies in RBC components affecting oxygen transport, treatment needs, and response to therapy.
Provide supplemental oxygen as indicated.	Maximizing oxygen transport to tissues improves ability to function.
Collaborate in treatment of underlying condition(s):	
Administer the following, as indicated:	
Whole blood, packed RBCs (PRCs); blood products (fresh-frozen plasma [FFP], platelets, blood factors) as indicated for the client's particular needs. Monitor closely for reactions during blood transfusion.	Increases number of oxygen-carrying cells; corrects deficiencies to reduce risk of hemorrhage in acutely compromised individuals. Transfusions are reserved for severe blood loss anemias with cardiovascular compromise and are used after other therapies have failed to restore homeostasis. Note: Packed red blood cells (PRBCs) are preferred over whole blood since they reduce complications associated with volume overload, immunogenic reactions, and storage. The American Association of Blood Banks (AABB) and The Joint Commission (TJC) have recommended restrictive transfusion practices (hemoglobin 7–8 g/dL) in stable hospitalized patients considering symptoms and not just Hgb levels in transfusion decisions. Additional AABB recommendations include avoiding blood products in hemodynamically stable patients with ID, using blood products to reverse warfarin only if a patient has serious bleeding or requires emergency procedures, and avoiding serial blood counts in stable patients (AABB, 2014; The Joint Commission, 2011).
Erythropoiesis-stimulating agents (ESAs), such as epoetin-Alpha (Procrit, EpoGen [EPO]; darbepoetin [Aranesp]); peginesatide (Omontys), methoxy polyethylene glycol-epoetin beta (Micera)	ESAs have been shown to be effective in increasing erythrocyte and Hgb levels and reducing need for RBC transfusions in many clients with anemia of chronic disease, including kidney failure in patients on dialysis. Note: Concerns have been raised about side effects of ESAs and other health risks (e.g., thromboembolic phenomena, tumor progress in cancer, and increased mortality), and research continues (Drugs.com, 2015, 2017; Schrier et al, 2017).
Iron preparations, such as IV iron dextran complex (INFeD), ferinject (Injectafer), or oral iron (e.g., ferrous sulfate [Fer-Iron, Slow-FE] or carbonyl iron [Fesol, Iron Chews]), as indicated	The appropriate treatment of anemia due to blood loss is correction of the underlying condition and oral administration of iron preparations until the anemia is corrected and for several months afterward to ensure that body stores are replete with iron (Maakaron et al, 2016). Note: Certain populations are at sufficiently high risk for iron deficiency to warrant prophylactic iron therapy. These include anemia in pregnant women, women with menorrhagia, and consumers of a strict vegetarian diet (Fernández-Gaxiola & De-Regil, 2011).
Vitamins such as cyanocobalamin (also called vitamin B <sub>12</sub> [Ener-B, Calo-Mist]), folic acid (Folvite), and vitamin K	Vitamins help to correct deficiencies and promote protein synthesis.

**ACTIONS/INTERVENTIONS (continued)**

Prepare for surgical/other procedures, if indicated.

**RATIONALE (continued)**

Surgery is useful to control bleeding in clients who are anemic because of bleeding, such as in ulcers and uterine bleeding, or to remove spleen as treatment of autoimmune hemolytic anemia. Bone marrow and stem cell transplantation may be done in the presence of bone marrow failure—aplastic anemia.

**NURSING DIAGNOSIS: imbalanced Nutrition: less than body requirements****May Be Related To**

Failure to ingest or inability to digest food or absorb nutrients  
Biological factors

**Possibly Evidenced By**

Food intake less than recommended daily allowances  
Weight loss or weight below ideal range; insufficient muscle tone  
Abnormal laboratory studies

**Desired Outcomes/Evaluation Criteria—Client Will****Nutritional Status NOC**

Demonstrate normalization of laboratory values.  
Be free of/experience improvement in signs of malnutrition.  
Verbalize understanding of causative factors when known and needed interventions to prevent complications.

**ACTIONS/INTERVENTIONS****RATIONALE****Nutrition Therapy NIC****Independent**

Review nutritional history, including food preferences.

Identifies deficiencies and suggests possible interventions.  
Note: Daily meal diary over period of time may be necessary to identify anemia related to nutrient deficiencies such as no meat in diet—iron and vitamin B<sub>12</sub> deficiency, or few leafy vegetables in diet—folic acid deficiency.

Observe and record client's food intake.

Monitors caloric intake or insufficient quality of food consumption.

Weigh periodically as appropriate, such as weekly.

Monitors weight loss and effectiveness of nutritional interventions.

Recommend small, frequent meals and between-meal nourishment.

May enhance intake while preventing gastric distention. Use of liquid supplements such as Ensure, Boost, or similar product provides additional protein and calories.

Suggest bland diet, low in roughage, avoiding hot, spicy, or very acidic foods, as indicated.

When oral lesions are present, pain may restrict type of foods client can tolerate.

Have client record and report occurrence of nausea or vomiting, flatus, and other related symptoms, such as irritability or impaired memory.

May reflect the effects of anemias (e.g., hypoxia or vitamin B<sub>12</sub> deficiency) on body organs and systems.

Encourage or assist with oral hygiene; use soft-bristled toothbrush for gentle brushing. Provide dilute, alcohol-free mouthwash if oral mucosa is ulcerated.

Diminishes bacterial growth, minimizing possibility of infection. Special mouth-care techniques may be needed if tissue is fragile, ulcerated, or bleeding and pain is severe.

**Collaborative**

Consult with nutritionist/dietitian.

Aids in establishing dietary plan to meet individual needs.

Monitor laboratory studies, such as Hgb/Hct, blood urea nitrogen (BUN), prealbumin and albumin, protein, transferrin, serum iron, vitamin B<sub>12</sub>, folic acid, TIBC, and serum electrolytes.

Evaluates effectiveness of treatment regimen, including dietary sources of needed nutrients.

(continues on page 550)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications, as indicated, for example:	
Vitamin and mineral supplements, such as cyanocobalamin (vitamin B <sub>12</sub> ), folic acid (Folvite), and ascorbic acid (vitamin C)	Replacements needed depend on type of anemia and presence of poor oral intake and identified deficiencies.

NURSING DIAGNOSIS: <b>risk for Infection</b>
<b>Possibly Evidenced By</b>
Malnutrition; alteration in skin integrity; stasis of body fluids; invasive procedures
Chronic disease; decrease in hemoglobin, leukopenia, decrease in granulocytes; suppressed inflammatory response
<b>Desired Outcomes/Evaluation Criteria—Client/Caregiver Will</b>
<b>Risk Control NOC</b>
Identify behaviors to prevent and reduce risk of infection.
<b>Infection Severity NOC</b>
Be free of signs of infection; achieve timely wound healing if present.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<i>Independent</i>	
Perform and promote meticulous handwashing by caregivers and client.	Prevents cross-contamination or bacterial colonization. Note: Client with severe or aplastic anemia may be at risk from normal skin flora.
Maintain strict aseptic techniques with procedures and wound care.	Reduces risk of bacterial colonization and infection.
Provide meticulous skin, oral, and perianal care.	Reduces risk of skin or tissue breakdown and infection.
Encourage frequent position changes and ambulation, coughing, and deep-breathing exercises.	Promotes ventilation of all lung segments and aids in mobilizing secretions to prevent pneumonia.
Promote adequate fluid intake.	Assists in liquefying respiratory secretions to facilitate expectoration and prevent stasis of body fluids in lungs and bladder.
Emphasize need to monitor and limit visitors, as indicated. Provide protective isolation, if appropriate. Restrict live plants and cut flowers.	Limits exposure to infectious agents. Protective isolation may be required in aplastic anemia, when immune response is most compromised.
Monitor temperature. Note presence of chills and tachycardia with or without fever.	Reflective of inflammatory process or infection, requiring evaluation and treatment. Note: With bone marrow suppression, leukocytic failure may lead to fulminating infections.
Observe for wound erythema and drainage.	Indicators of local infection. Note: Pus formation may be absent if granulocytes are depressed.
<i>Collaborative</i>	
Obtain specimens for culture and sensitivity, as indicated.	Verifies presence of infection, identifies specific pathogen, and influences choice of treatment.
Administer topical antiseptics and systemic antibiotics.	May be used prophylactically to reduce colonization or used to treat specific infectious process.

<b>NURSING DIAGNOSIS:</b> <b>deficient Knowledge regarding condition, prognosis, treatment, self-care, prevention of crisis, and discharge needs</b>	
<b>May Be Related To</b> Insufficient information or knowledge of resources; misinformation presented by others Alteration in cognitive functioning or memory	
<b>Possibly Evidenced By</b> Insufficient knowledge Inaccurate follow-through of instructions Development of preventable complications	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<p><b>Self-Management: Chronic Anemia [NOC]</b></p> <p>Verbalize understanding of the nature of the disease process, causative factors, diagnostic procedures, and potential complications.</p> <p>Verbalize understanding of therapeutic needs.</p> <p>Initiate necessary behaviors or lifestyle changes and participate in treatment regimen.</p>	
ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process [NIC]</b>	
<i>Independent</i>	
Provide information about specific anemia and explain that therapy depends on the type and severity of the anemia.	Provides knowledge base from which client can make informed choices. Allays anxiety and may promote cooperation with therapeutic regimen to manage a condition that may be long-lasting.
Discuss effects of anemias on preexisting conditions.	Anemia aggravates many underlying conditions, and resolution of anemia is impacted by aging and developmental issues, nutritional and socioeconomic issues, and acute and chronic conditions.
Review purpose and preparations for diagnostic studies.	Knowledge of what to expect can diminish anxiety.
Explain that blood taken for laboratory studies typically does not worsen anemia.	This is often an unspoken concern that can potentiate client's anxiety. Note: For the vast majority of hospitalized clients, the blood loss associated with diagnostic testing is of little or no clinical significance. However, studies have confirmed that anemia is a common feature of critical illness, developing in 90% of clients by the third day following admission to intensive care. For around a half of these individuals, anemia is of sufficient severity ( $<9$ g/dL) to warrant red cell transfusion (Corwin et al, 2004; Tinmouth et al, 2008).
Review required diet alterations to meet specific dietary needs, as determined by type of anemia and deficiency.	Red meat, liver, seafood, green leafy vegetables, whole wheat bread, and dried fruits are sources of iron. Green vegetables, whole grains, liver, and citrus fruits are sources of folic acid and vitamin C, which enhance absorption of iron.
Discuss foods to avoid, such as coffee, tea, egg yolks, milk, fiber, and soy protein, at the time when client is eating high-iron foods.	These foods block absorption of iron and should be taken at a different meal. For example, red meat and milk taken at the same time can block absorption of the iron from the meat.
Assess resources, including financial, and ability to obtain, store, and prepare food.	Inadequate resources may affect ability to purchase and prepare appropriate food items.
Refer to appropriate community resources when indicated, such as social services for food stamps and Meals on Wheels.	May need assistance with groceries and meal preparation.
Encourage cessation of smoking.	Smoking decreases available oxygen and causes vasoconstriction.

(continues on page 552)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Suggest use of protective devices, such as sheepskin, egg-crate, alternating air pressure, or water mattress; heel and elbow protectors; and pillows, as indicated.	Avoids skin breakdown by preventing or reducing pressure against skin surfaces.
Review good oral hygiene and necessity for regular dental care.	Effects of anemia such as oral lesions and use of iron supplements increase risk of infection and bacteremia.
Emphasize importance of reporting signs of fatigue, weakness, paresthesias, irritability, and impaired memory.	Indicates that anemia is progressing or failing to resolve, necessitating further evaluation and treatment changes.
<b>Teaching: Prescribed Medication NIC</b> <b>Collaborative</b>	
Provide information about purpose, dosage, schedule, precautions, and potential side effects, interactions, and adverse reactions to all prescribed medications.	Information enhances cooperation with regimen. Recovery from anemias can be slow, requiring lengthy treatment and prevention of secondary complications.
For the client on iron preparations:	
Discuss importance of taking only prescribed dosages.	Overdose of iron medication can be toxic.
Advise taking with meals or immediately after meals.	Iron is best absorbed on an empty stomach. However, iron salts are gastric irritants and can cause dyspepsia, diarrhea, and abdominal discomfort if taken on an empty stomach.
Discuss possibility of iron infusions and refer to healthcare provider.	Depleted iron stores may be best treated in this manner, if client is not responding or is intolerant of oral or injected iron preparations.
Instruct to avoid use of aspirin and other NSAIDs.	Increases bleeding tendencies.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Activity Intolerance**—imbalance between oxygen supply and demand
- **imbalanced Nutrition: less than body requirements**—failure to ingest or inability to digest food or absorb nutrients
- **risk for Infection**—inadequate secondary defenses (e.g., decreased hemoglobin, leukopenia, or decreased granulocytes, suppressed inflammatory response); inadequate primary defenses (e.g., broken skin, stasis of body fluids; invasive procedures); chronic disease; malnutrition
- **ineffective Health Management**—economic difficulties, perceived benefits/susceptibility, insufficient social support

## SICKLE CELL CRISIS

### I. Pathophysiology

- a. Sickle cell disease (SCD) is a severe hereditary form of anemia in which a mutated form of hemoglobin (called hemoglobin S or sickle hemoglobin) causes the red blood cells to change shape (sickle). The sickled cells can clump together inside cells and blood vessels, obstructing blood flow and causing tissue ischemia, which can progressively damage and destroy vital organs (Maakaron & Taher, 2017; NIH, 2017).
- b. After recurrent episodes of sickling, membrane damage occurs and the cells are no longer capable of resuming their normal shape upon reoxygenation. The resulting anemia (termed *sickle cell anemia*) is chronic and hemolytic in nature.
- c. *Sickle cell crisis* is a broad term that describes several different conditions, such as (1) aplastic crisis (temporary bone marrow failure), (2) hemolytic crisis (acute red cell destruction, leading to jaundice), and (3) vaso-occlusive

crisis (VOC) (sudden, severe pain due to infarctions in the bones, organs, or nervous system). Conditions that can trigger a VOC include infection, pregnancy, alcohol or tobacco use, exposure to temperature extremes, dehydration, exposure to high altitude, and extreme physical or psychological stress, although a cause is not always identified. **P** VOC episodes can occur from the first year of life onward (Vacca & Blank, 2017).

### II. Etiology

- a. Sickle hemoglobinopathies compose a group of genetic diseases, consisting of four genotypes: sickle cell anemia (HbSS), sickle hemoglobin C disease (HbSC), and the sickle cell thalassemias ( $S\beta^+$ - and  $S\beta^0$ -thalassemia) (Ellison, 2012). The different forms of sickle cell disease are determined by the combination of genes inherited from the person's parents.
- b. Vaso-occlusion can be caused by infections, dehydration, stress, exercise, temperature extremes, and smoking,

associated with hypoxia and acidosis, inflammation, ischemia, and tissue infarction, and is responsible for a wide variety of the clinical complications of SCD (Vacca & Blank, 2017).

### III. Complications

- i. Painful episodes are the most common complication of SCD, often in extremities, ribs, sternum, vertebral column, or abdomen (Ohene-Frempong & Gupta, 2015).
- ii. Central nervous system: The most severe manifestation is stroke. Cerebrovascular accidents (24% of people with sickle cell disease [SCD] have a stroke by the age of 45 years) (Verduzco & Nathan, 2009). Ischemic strokes are more common in children and older adults and are less common in adults ages 20 to 29 (Yawn et al, 2014).
- iii. Lymphatic system: Splenic sequestration happens when a lot of sickled RBCs become trapped in the spleen. In most older children and adults with HgSS disease, the repetitive RBC sickling in the spleen eventually results in scarring, fibrosis, and a nonfunctional spleen (called autosplenectomy). Acute splenic sequestration (ASS) is a sudden life-threatening pooling of large amounts of blood in the spleen, leading to acute splenomegaly, profound anemia, and, in severe cases, hypovolemic shock. Death may occur in a few hours.
- iv. Cardiopulmonary system: There are several manifestations, including increased airway reactivity, nocturnal oxygen desaturation, increased risk of pneumonias, pulmonary embolism (PE), acute chest syndrome (ACS), sickle cell chronic lung disease (SCCLD), and pulmonary hypertension. Acute chest syndrome is a sudden-onset pulmonary condition that affects about 12% of adults but is more common in children (about 25%) (Meier & Miller, 2012). **P** In children below 9 years of age, infection is a more common etiology for ACS than in older children or adults (Heeney & Mahoney, 2015). ACS is defined in severity categories (mild to very severe), and the severity categories apply equally to adults and children (Field & DeBaun, 2017). Pulmonary hypertension is emerging as a relatively common complication and is one of the leading causes of morbidity and mortality in adults with SCD. Various studies have found that more than 40% of adults with SCD have pulmonary hypertension that worsens with age (Dahoui et al, 2010; Maakaron & Taher, 2017).
- v. Sexual and reproductive manifestations: Infertility in men with SCD appears to have multiple causes, including hypogonadism, sperm abnormalities, and erectile dysfunction (ED) due to priapism. In females, infertility may be a problem (studies not conclusive); however, onset of menses is often delayed, and menstrual bleeding is associated with increased SCD-related pain (Smith-Whitley, 2014). Mother/baby: There is a high risk of fetal loss due to spontaneous abortion. Placenta previa and abruption are common due to hypoxia and placental infarction. **P** At birth, the infant often is premature or has low birth weight (Maakaron & Taher, 2017).
- vi. Gastrointestinal and hepatic systems: **P** Cholelithiasis is common, especially in children. The spleen is

almost always involved in SCD and (**P** often infarcted within the first 18 to 36 months of life, paralleling the disappearance of protective Hb F, resulting in hyposplenism or asplenia; liver dysfunction is common (many develop chronic hepatitis [B or C], acute sickle hepatic crisis, iron overload, pigment stones, and cirrhosis with liver failure) (Banerjee & DeBaun, 2016).

- vii. Genitourinary involvement: Kidneys can lose ability to concentrate. The prevalence of albuminuria and proteinuria is 30% within the first 3 decades of life and increases up to 70% in older patients. The development of nephrotic syndrome has been linked to progression to acute and chronic renal failure (Pham et al, 2000). **P** Renal function is usually normal during adolescence but frequently becomes subnormal as chronic kidney disease progresses. The kidneys eventually shrink, and the capsular surface becomes grossly distorted and scarred.
- viii. Dermatologic involvement: Ischemic ulcers in extremities are due to arterial occlusion (either micro- or macro-occlusion) and can be a chronic, painful problem.
- ix. **P** In addition to any of the complications that adults can have, children also may experience growth retardation, delayed sexual maturation, and being underweight (Maakaron & Taher, 2017). Dactylitis (hand-foot syndrome): Major and unresolved swelling of hands or feet is often first symptom noted in children (Pack-Mabien & Haynes, 2009).

### IV. Statistics

- a. Morbidity: Sickle cell disease is the most common inherited blood disorder in the United States. Although figures vary somewhat, SCD is occurring in approximately 1 in 365 black or African American births and 1 in 1400 Hispanic American births (NIH, 2017). It is believed there are approximately 100,000 people living with SCD in the United States (CDC, 2016; Maakaron & Taher, 2017).
- b. Mortality: Median survival rate for individuals with SCD is 48 years for women and 42 years for men (Maakaron & Taher, 2017). Acute chest syndrome (ACS) is the most common cause of death (Maakaron & Taher, 2017). **P** Mortality rates for sickle cell–related death among black or African American children (younger than 4 years of age) fell by 42% from 1999 through 2002. This drop coincided with the introduction in 2000 of a vaccine that protects against invasive pneumococcal disease (CDC, 2016). In the same time period, the age groups with the highest mortality were 35 to 44 years (males) and 45 to 54 years (females); however, there was a tendency for longer survival than in the previous decade (Hamideh & Alvarez, 2013; Heeney & Mahoney, 2015).
- c. Cost: In 2009, approximately \$1.1 billion was spent for treatment of sickle cell anemia, with roughly 80% of that amount spent for hospital costs (ReutersHealth, 2009). For an average patient with SCD reaching age 45, total lifetime healthcare costs were estimated to be \$953,640 per person (Kauf et al, 2009). \*\*\*It is likely that future costs will be greatly impacted by clinical trials for stem cells and biomodifier medications.

## G L O S S A R Y

**Acute chest syndrome (ACS):** A life-threatening complication defined as an infiltrate on a chest x-ray, accompanied by two or more other symptoms, which can include fever, cough, wheezing, tachypnea, or chest pain (reflects the unique nature of acute pulmonary illness in client with SCD).

**Dactylitis:** Swollen, tender digits of the hands and feet, causing severe pain. Often first sign of sickle cell disease in babies.

**Genetic disease:** The ultimate unit of inheritance, carried by the chromosome. Genes determine various characteristics, such as hair texture, skin color, height, shape of nose, lips, and so on, including the kind of hemoglobin in red blood cells (RBCs).

**Hemoglobin (Hgb):** An iron-containing protein of the RBC, which carries oxygen to the tissues and gives the cell its red color.

**Hemolysis:** Destruction of RBCs and subsequent release of hemoglobin.

**Hyperhemolytic crisis:** A rapid, higher-than-normal rate of hemolysis; reticulocytes are increased in peripheral blood, and bone marrow is hyperplastic, leading to anemia and jaundice due to effects of hemolysis. Often associated with vaso-occlusive crisis.

**Hypoplastic/aplastic crisis:** May be secondary to severe (usually viral) infection or folic acid deficiency, resulting in cessation of production of RBCs and bone marrow.

**Icterus (jaundice):** Yellowing of the skin and the whites of the eyes caused by an accumulation of bile pigment in the blood.

**Priapism:** Abnormal, painful, sustained erection of the penis, usually occurring without sexual desire. Can last for hours or days.

**Pulmonary hypertension:** Increased pressure in the pulmonary arteries that carry blood from the heart to the lungs to pick up oxygen.

**Reticulocytes:** Immature RBCs, typically composing about 1% of the red cells in the human body. Reticulocytes develop and mature in the red bone marrow and then circulate for about a day in the bloodstream before developing into mature RBCs.

**Sickle cell disease (SCD):** A person is born with SCD, an inherited disorder of the RBCs where the individual inherits two genes for hemoglobin S, or a single S gene is combined with a second variant gene such as C or Thal.

**Sickle cell trait:** A person who has sickle cell trait is a carrier of the sickle gene but does not have the disease or incur painful episodes and is generally not affected by the sickle hemoglobin. The gene combination for sickle trait is one gene for the usual hemoglobin (A) and one gene for sickle hemoglobin. *Note:* People with SCT can have children born with sickle cell disease.

**Splenic sequestration crisis:** Occurs when the spleen suddenly traps large numbers of RBCs, causing splenomegaly, a drop in hemoglobin greater than or equal to 20%, hypovolemia, shock, and possible death.

**Thalassemia (Thal):** An inherited disorder of the gene in the RBCs, which results in the impaired ability to produce hemoglobin.

**Vaso-occlusive/sickle cell crisis:** Related to infection, dehydration, fever, hypoxia, and characterized by multiple infarcts of bones, joints, and target organs, with tissue pain and necrosis caused by plugs of sickled cells in the microcirculation.

## CARE SETTING

Sickle cell disease is generally managed at the community level, with many of the interventions included here being appropriate for this focus; however, this plan of care addresses sickle cell crisis, which usually requires hospitalization during the acute phase to address oxygenation and severe pain.

## RELATED CONCERNs

Cerebrovascular accident (CVA)/stroke, page 247  
Cholecystitis with cholelithiasis, page 399  
Heart failure: chronic, page 38  
Pediatric considerations, page 993  
Pneumonia, page 147  
Psychosocial aspects of care, page 835  
Renal failure, chronic, page 607  
Seizure disorders, page 216  
Sepsis/septic shock, page 772

## CLIENT ASSESSMENT DATABASE

\*\*\*\*Depends on severity of condition and presence of complications.

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Lethargy, fatigue, weakness, general malaise
- Decreased exercise tolerance, impaired mobility

### MAY EXHIBIT

- Listlessness, severe weakness, and increasing pallor (aplastic crisis)

**MAY REPORT (continued)**

- Greater need for sleep and rest

**CIRCULATION**

- Palpitations or anginal chest pain due to concomitant coronary artery disease (CAD), myocardial ischemia, or acute chest syndrome (ACS)
- **P** Puffy, tender hands and feet, refusal to bear weight, irritability in children less than 2 years of age (Pack-Mabien, 2009)

**ELIMINATION**

- Frequent voiding, voiding in large amounts
- Nocturia

**EGO INTEGRITY**

- Negative feelings about self, ability to deal with life or situation
- Resentment and frustration with disease, fear of rejection from others
- Concern regarding being a burden to significant others (SOs), financial concerns, possible loss of insurance benefits, lost time at work or school, fear of genetic transmission of disease

**FOOD/FLUID**

- Anorexia
- Nausea, vomiting
- Thirst

**HYGIENE**

- Difficulty maintaining activities of daily living (ADLs) (pain or severe anemia)

**MAY EXHIBIT (continued)**

- Gait disturbances (pain, kyphosis, lordosis), inability to walk (pain)
- Decreased range of motion (ROM)
- Joint, bone deformities
- Generalized retarded growth, tower-shaped skull with frontal bossing, disproportionately long arms and legs, short trunk, narrowed shoulders and hips, and long, tapered fingers

- Apical pulse—point of maximal impulse (PMI) may be displaced to the left
- Tachycardia, S-T elevation
- Systolic heart murmurs may be heard over entire precordium
- **P** Hypertension or abnormal blood pressure patterns (elevations and dips) in children (Maakaron & Taher, 2017)
- Blood pressure (BP)—widened pulse pressure
- Capillary refill delayed (anemia or hypovolemia)
- Generalized symptoms of shock—hypotension; rapid, thready pulse; and shallow respirations during sequestration crisis
- Peripheral pulses throbbing on palpation
- Bruits—reflects compensatory mechanisms of anemia; may also be auscultated over the spleen because of multiple splenic infarcts
- Jugular vein distention (JVD) and general peripheral edema (concomitant heart failure [HF])
- **Skin color:** Pallor or cyanosis of skin, mucous membranes, and conjunctiva (*Note:* Pallor may appear as yellowish- brown color in brown-skinned clients and as ashen gray in black-skinned clients.)
- Scleral icterus, generalized icteric coloring due to excessive RBC hemolysis

- Right upper quadrant (RUQ) abdominal tenderness, enlargement due to hepatomegaly or ascites
- Left upper quadrant (LUQ) abdominal fullness; spleen may be enlarged and nonfunctional and may eventually become fibrotic and shrunken.
- Dilute, pale, straw-colored urine; hematuria or smoky appearance from multiple renal infarcts
- Asymptomatic proteinuria
- Anxiety, restlessness, irritability, apprehension, withdrawal, narrowed focus, self-focusing, unresponsiveness to questions, regression, depression, decreased self-concept
- Dependent relationship with whomever can offer security and protection

- **P** Child's height and weight usually in the lower percentiles (Maakaron & Taher, 2017)
- Dry skin and mucous membranes
- Poor skin turgor with visible tenting during sequestration crisis, infection, and dehydration

- Unkempt appearance, poor personal hygiene

(continues on page 556)

**NEUROSENSORY**

- Headaches or dizziness
- Disturbances in pain and position sense
- Visual disturbances due to retinal vascular changes

- Mental status usually unaffected except in cases of severe sickling (cerebral infarction and intracranial hemorrhage)
- Meningeal irritation (intracranial hemorrhage)—decreasing level of consciousness (LOC), nuchal rigidity, focal neurological deficits, vomiting, severe headache
- Weakness of the mouth, tongue, and facial muscles; aphasia (in cerebral infarction of dominant hemisphere)
- Abnormal reflexes, decreased muscle strength and tone, abnormal involuntary movements, hemiplegia or sudden hemiparesis, quadriplegia
- Ataxia, seizures

**PAIN/DISCOMFORT**

- Pain includes three types: acute recurrent painful crises, chronic pain syndromes, and neuropathic pain.
- Pain onset is sudden and may be acute and severe, throbbing, of varied locations (two or more sites). (The acute painful crisis is the most common cause of hospitalization [Ballas et al, 2012].)
- Pain may be localized or migratory and most commonly involves the lower back, in one or more joints or extremities.
- Joint or bone pain may be low level and chronic or acute and accompanied by warmth, tenderness, erythema, and occasional effusions (vaso-occlusive crisis).
- Intermittent pain in legs when walking
- Bone pain in long bones of extremities (bone marrow infarction) (Maakaron & Taher, 2017)
- Recurrent, sharp, transient headaches
- Abdominal tenderness and pain

- Sensitivity to palpation over affected areas
- Guarding or holding joints in position of comfort, decreased ROM, resulting from joint pain and swelling
- Maladaptive pain behaviors—guilt for being ill, denial of any aspect of disease, indulgence in precipitating factors such as overwork, strenuous exercise

**RESPIRATION**

- Dyspnea on exertion or at rest
- History of repeated pulmonary infections, infarctions, pulmonary fibrosis, pulmonary hypertension, or cor pulmonale

- Acute respiratory distress—dyspnea, chest pain, and cyanosis (especially in crisis)
- **P** Cough with fever (in children with acute chest syndrome; not always present in adults) (Vacca & Blank, 2017)
- Bronchial or bronchovesicular sounds in lung periphery, diminished breath sounds (pulmonary fibrosis)
- Crackles, rhonchi, wheezes, diminished breath sounds (HF)
- Increased anteroposterior (AP) diameter of the chest (barrel chest)

**SAFETY**

- History of repeated, frequent blood transfusions
- Jaundice with skin itching
- Impaired vision (sickle retinopathy), decreased visual acuity (temporary or permanent blindness)

- Leg ulcers—especially common on the internal and external malleoli and the medial aspect of the tibia

**SEXUALITY**

- Loss of libido
- Amenorrhea
- Complications of pregnancy, including placenta previa and abruption; premature birth or fetal death
- Priapism, impotence

- Delayed sexual maturity
- Pale cervix and vaginal walls (anemia)

**TEACHING/LEARNING**

- Chronic anemic state

**MAY REPORT (continued)**

- Pulmonary hypertension or cor pulmonale (multiple pulmonary infections and infarctions)
- Chronic leg ulcers, delayed healing

**MAY EXHIBIT (continued)****DISCHARGE PLAN CONSIDERATIONS**

- May need assistance with shopping, transportation, self-care, homemaker and maintenance tasks

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES**

TEST	WHY IT IS DONE	WHAT IT TELLS ME
<p><b>BLOOD TESTS</b></p> <ul style="list-style-type: none"> <li>• <b>Complete blood count (CBC):</b> Battery of screening tests, which typically includes Hgb; hematocrit (Hct); RBC count, morphology, indices, and distribution width index; platelet count and size; and white blood cell (WBC) count and differential.</li> <li>• <b>Red blood cells</b> <ul style="list-style-type: none"> <li>• <b>Reticulocyte count:</b> Measures how fast red blood cells are made by the bone marrow and released into the blood.</li> </ul> </li> <li>• <b>Stained RBC (erythrocyte) examination:</b> Evaluates changes in morphology of RBCs.</li> <li>• <b>High-performance liquid chromatography (HPLC):</b> Separates different forms of proteins in a column and can detect mutant forms of hemoglobin.</li> <li>• <b>Sickle-turbidity tube test (Sickledex):</b> Detects the presence of hemoglobin S in blood.</li> <li>• <b>Alkaline phosphatase (ALP):</b> Enzyme found primarily in the liver.</li> <li>• <b>Lactate dehydrogenase (LDH):</b> Indicator of the existence and severity of acute or chronic tissue damage.</li> </ul>	<p>Hgb and total RBCs are decreased. Young WBCs (leukocytes) are elevated, especially in vaso-occlusive crisis. Platelets are often increased. <i>Note:</i> Anemia is often well tolerated by the client; however, a major drop in Hgb from previously recorded values indicates a hematologic crisis. If the reticulocyte count is normal, splenic sequestration is the probable cause. If the reticulocyte count is low, an aplastic crisis is the probable cause.</p> <p>Young RBCs (reticulocytes) can be low or elevated if anemia is longstanding. If the reticulocyte count is normal, splenic sequestration is the probable cause. If the reticulocyte count is low, an aplastic crisis is the probable cause. <i>Note:</i> The life span of an RBC is normally 90 to 120 days, while the life of a sickle cell is 10 to 20 days, indicating how fragile sickle cells are and how rapidly they are destroyed as they circulate (Vacca &amp; Blank, 2017).</p> <p>Demonstrates partially or completely sickled, crescent-shaped cells, Howell-Jolly bodies, basophilic stippling, and occasional nucleated RBCs (normoblasts).</p> <p>This technique differentiates between usual hemoglobin (A), sickle hemoglobin (S), and many other different kinds of hemoglobin. In sickle cell <i>trait</i>, more than half of the hemoglobin is normal (hemoglobin A) and less than half is abnormal (hemoglobin S). In sickle cell <i>disease</i>, almost all hemoglobin is hemoglobin S with some hemoglobin called hemoglobin F (Thompson &amp; Steinberg, 2015). <b>P</b> <i>Note:</i> Screening tests for SCD are performed routinely on newborns in most states. Prenatal diagnosis is possible by molecular genetic testing if the beta-globin-related hemoglobinopathies (HBB) pathogenic variants have been identified in the parents.</p> <p>Positive if 10% of hemoglobin S is present but does not differentiate between sickle cell anemia and sickle cell trait.</p> <p>Elevated during vaso-occlusive crisis, reflecting bone and liver damage.</p> <p>Elevated because of RBC hemolysis.</p>	<p>(continues on page 558)</p>

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li><b>Serum iron:</b> Iron balance is not easily achieved in sickle cell disease.</li></ul>	Deficiency is associated with premature destruction of young RBCs. However, the iron stores released by hemolysis may be available for reuse; therefore, serum iron deficiency is not always present. <b>P</b> A very high iron level is associated with frequent blood transfusions for sickle cell anemia—a condition more common in children than adults.

## OTHER DIAGNOSTIC STUDIES

- Bone x-rays and scans:** Evaluate skeletal changes.
- Chest x-ray:** Performed to check for pulmonary infiltrate.
- Magnetic resonance imaging (MRI):** An imaging test that uses magnets and radio waves to create pictures of the body.
- Transcranial Doppler (TCD) studies:** A noninvasive ultrasound technology for imaging blood flow in the cerebral arteries and veins.
- Echocardiography**
- Urine/fecal urobilinogen:** Substance formed in the intestine from the breakdown of bilirubin; some is excreted in feces and some is reabsorbed and excreted in bile or urine.
- Abdominal/pelvic ultrasound:** Performed to evaluate condition of organs.

May demonstrate bone infarction, osteomyelitis, avascular necrosis of hip, and so forth. *Note:* In the spine, “H-shaped deformity” of the vertebrae is common (formerly termed “Lincoln Log” appearance) (Ramirez & Asrat, 2017).

May confirm presence of acute chest syndrome if a new consolidation or infiltrate is accompanied by other symptoms such as chest pain, elevated temperature, or hypoxemia (Field & DeBaun, 2017; Heeney & Mahoney, 2015).

The definitive test to rule out cerebral infarct. Also identifies bone marrow changes due to acute and chronic bone marrow infarction, marrow hyperplasia, osteomyelitis, and osteonecrosis (Maakaron & Taher, 2017).

Detects large vessel disease that is often involved in overt cerebral vascular accidents in patients with SCD (Meier & Miller, 2012). **P** *Note:* The Stroke Prevention Trial in Sickle Cell Anemia (STOP) demonstrated the value of TCD screening for children with SCD at high risk for ischemic cerebral injury, including stroke (Naffaa et al., 2015).

Can identify pulmonary hypertension or cardiac involvement associated with anemia (e.g., enlarged heart).

These sensitive indicators of RBC destruction are increased.

Documents spleen size and presence of biliary or kidney stones.

## NURSING PRIORITIES

- Promote adequate cellular oxygenation and perfusion.
- Alleviate pain.
- Prevent complications.
- Provide information about disease process, prognosis, and treatment needs.

## DISCHARGE GOALS

- Oxygenation and perfusion are adequate to meet cellular needs.
- Pain relieved or controlled.
- Complications prevented or minimized.
- Disease process, future expectations, potential complications, and therapeutic regimen understood.
- Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: **impaired Gas Exchange**

### May Be Related To

Altered blood flow [altered oxygen-carrying capacity of the blood, reduced RBC life span or premature destruction, abnormal RBC structure, sensitivity to low-oxygen occlusions created by sickled cells packing together within the capillaries]

### Possibly Evidenced By

Abnormal breathing pattern; dyspnea, use of accessory muscles  
Cyanosis (hypoxia)  
Restlessness, confusion, somnolence; fatigue  
Tachycardia

**NURSING DIAGNOSIS: impaired Gas Exchange (continued)****Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Gas Exchange NOC**

Demonstrate improved ventilation and oxygenation as evidenced by respiratory rate within normal limits, absence of cyanosis, use of accessory muscles, and clear breath sounds.

Participate in ADLs without weakness and fatigue.

Display improved or normal pulmonary function tests.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b>	
<i>Independent</i>	
Monitor respiratory rate and depth, use of accessory muscles, and areas of cyanosis.	Indicators of adequacy of respiratory function or degree of compromise and therapy needs and effectiveness.
Auscultate breath sounds, noting presence or absence, and adventitious sounds.	Development of atelectasis and stasis of secretions can impair gas exchange.
Monitor vital signs; note changes in cardiac rhythm.	Changes in vital signs and development of dysrhythmias reflect effects of hypoxia on cardiovascular system.
Investigate reports of chest pain and increasing fatigue. Observe for signs of increased fever, cough, and adventitious breath sounds.	Reflective of developing acute chest syndrome, which increases the workload of the heart and oxygen demand.
Assess LOC and mentation regularly.	Brain tissue is very sensitive to decreases in oxygen, and changes in mentation may be an early indicator of developing hypoxia.
<b>Ventilation Assistance</b>	
<i>Assist</i>	
Assist in turning, coughing, and deep-breathing exercises.	Promotes optimal chest expansion, mobilization of secretions, and aeration of all lung fields; reduces risk of stasis of secretions and pneumonia.
Evaluate activity tolerance; limit activities to those within client's tolerance or place client on bedrest. Assist with ADLs and mobility, as needed.	Reduction of the metabolic requirements of the body reduces the oxygen requirements and degree of hypoxia.
Encourage client to alternate periods of rest and activity. Schedule rest periods, as indicated.	Protects from excessive fatigue and reduces oxygen demands and degree of hypoxia.
Demonstrate and encourage use of relaxation techniques, such as guided imagery and visualization.	Relaxation decreases muscle tension and anxiety and, hence, the metabolic demand for oxygen.
Promote extra fluid intake, such as 2 to 3 L/d within cardiac tolerance.	Sufficient hydration is necessary to provide for mobilization of secretions and to prevent hyperviscosity of blood with associated capillary occlusion.
Screen health status of visitors and staff.	Protects client from potential sources of respiratory infection.
<i>Collaborative</i>	
Administer supplemental humidified oxygen, as indicated.	Maximizes oxygen transport to tissues, particularly in the presence of pulmonary insults or pneumonia. Note: Oxygen should be given only in the presence of confirmed hypoxemia because oxygen can suppress erythropoietin levels, further reducing the production of RBCs.
Monitor laboratory studies—CBC (especially noting Hgb and WBCs), blood cultures, arterial blood gases (ABGs) and pulse oximetry, chest x-ray, and pulmonary function tests (when available).	Client is particularly prone to acute chest syndrome and pneumonia (which is potentially fatal because of its hypoxic effect of increased sickling). Note: Most individuals with sickle cell anemia have hemoglobin (Hgb) values of 6 to 10 g/dL. The hemoglobin S molecule has a low affinity for oxygen (which allows for adequate tissue oxygenation). During a vaso-occlusive crisis, a client's Hgb level often declines by at least 1 g/dL.
Perform or assist with chest physiotherapy, intermittent positive-pressure breathing (IPPB), and incentive spirometry.	Mobilizes secretions and increases aeration of lung fields.

(continues on page 560)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer packed RBCs (PRCs) or exchange transfusions, as indicated.	Simple blood transfusion increases the number of oxygen-carrying cells, dilutes the percentage of hemoglobin S, and improves circulation. PRCs are used because they are less likely to create circulatory overload. Exchange blood transfusions are indicated when the client's condition is deteriorating and may be done for cases of stroke (Kassim et al, 2015) and acute chest syndrome. Note: Studies have shown that blood transfusion therapy for patients with SCD and abnormal TCD velocities can dramatically reduce risk of stroke (Yates, 2017). Partial transfusions are sometimes used prophylactically in high-risk situations, such as chronic, severe leg ulcers, preparation for general anesthesia, and third trimester of pregnancy.
Administer medications, as indicated, for example:  Antibiotics, such as amoxicillin plus clavulanic acid (Augmentin), third-generation cephalosporins (e.g., ceftriaxone [Rocephin]), among others	Broad-spectrum antibiotics are started immediately pending culture results of suspected infections, then may be changed when the specific pathogen is identified.  <b>P</b> Because infection is one of the most common causes of ACS in children and adolescents, broad-spectrum antibiotic coverage has been recommended for all children presenting with ACS (Heeney & Mahoney, 2015).

### NURSING DIAGNOSIS: acute/chronic Pain

#### May Be Related To

Biological injury agent (e.g., intravascular sickling with localized stasis, occlusion, infarction, and necrosis; activation of pain fibers due to deprivation of oxygen and nutrients, accumulation of noxious metabolites)

#### Possibly Evidenced By

Self-report of intensity and characteristics of pain, using standardized pain scale; proxy report of pain behavior and activity changes (e.g., family member, care provider)

Guarding and protective behaviors

Facial grimacing, narrowed or self-focus; sleep disturbances

Changes in physiological parameter in acute pain (e.g., blood pressure, heart and respiratory rate)

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Pain Level NOC

Verbalize relief or control of pain.

##### Pain Control NOC

Demonstrate relaxed body posture, freedom of movement, and ability to sleep and rest appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute /Chronic NIC</b> <i>Independent</i> Assess reports of pain, including location, duration, and intensity (0 to 10 or similar coded scale). Have client help differentiate current pain from typical or usual pain problems.	Acute pain in patients with sickle cell disease can be localized, migratory, or more generalized and described as throbbing, gnawing, or severe and incapacitating. Pain is caused by ischemic tissue injury resulting from the occlusion of microvascular beds by sickled erythrocytes during an acute crisis. Typically, acute pain occurs deep in the bones and muscles of back, ribs, and limbs and lasts 5 to 7 days. However, client may also have chronic pain from previous sickle cell damage (usually bone pain that is present daily) and chronic nerve pain caused by damage from sickle cell blockage or other conditions, such as diabetes.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Observe nonverbal pain cues, such as gait disturbances, body positioning, reluctance to move, and facial expressions, and physiological manifestations of acute pain—elevated BP, tachycardia, and increased respiratory rate. Explore discrepancies between verbal and nonverbal cues.	Nonverbal cues may aid in evaluation of pain and effectiveness of therapy. Pain is unique to each client; therefore, one may encounter varying descriptions because of individualized perceptions. <b>P</b> Note: Evaluating pain in infants, children, and adolescents is not as simple as using a coded scale. Attention must be paid to caregivers' reports and child's behavior (e.g., inconsolable crying, changes in crying patterns, curling up in a fetal position, changes in sleep patterns; going silent; withdrawing from touch, refusing eye contact).
Discuss with the client/SO what pain relief measures were effective in the past.	Involves client/SO in care and allows for identification of remedies that have already been found to relieve pain. Helpful in establishing individualized treatment needs.
Explore alternative pain relief measures, such as relaxation techniques, biofeedback, yoga, meditation, and distraction—visual, auditory, tactile, kinesthetic, guided imagery, and breathing techniques.	Cognitive-behavioral interventions may reduce reliance on pharmacological therapy and enhance client's sense of control, especially when dealing with chronic pain.
Provide support for and carefully position affected extremities.	Reduces edema, discomfort, and risk of injury, especially if osteomyelitis is present.
Apply local massage gently to affected areas.	Helps reduce muscle tension.
Plan activities during peak analgesic effect.	Maximizes movement of joints, enhancing mobility.
Maintain adequate fluid intake.	Dehydration increases sickling vaso-occlusion and corresponding pain.
<b>Collaborative</b>	
Apply warm, moist compresses to affected joints or other painful areas. Avoid use of ice or cold compresses.	Warmth causes vasodilation and increases circulation to hypoxic areas. Cold causes vasoconstriction and compounds the crisis.
Administer medications by appropriate route (such as continuous infusion or around-the-clock intermittent IV or oral, as indicated), for example:	Various types of analgesics are needed to manage different types of pain.
Opioids including morphine (Astramorph, Duramorph), hydromorphone (Dilaudid), and nalbuphine (Nubain); long-acting opiate combinations, such as morphine (MS Contin) and oxycodone (Oxycontin), hydrocodone (Vicodin); oxycodone and acetaminophen (Percocet)	Opioids are the mainstay of pain control during crisis and are usually administered via patient-controlled analgesia (PCA). Oral preparations are preferred for longer-term treatment and can be initiated while client is still on IV analgesia. Note: Meperidine should not be used to treat acute sickle cell pain in client with impaired renal function, history of seizure disorder, or those on serotonergic medications (e.g., certain antidepressants and combination drugs containing serotonin-norepinephrine reuptake inhibitors).
Nonopioid analgesics, such as acetaminophen (Tylenol); nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen (Advil, Motrin); Ketrolac	Acetaminophen and NSAIDs add to the effects of opioids during painful crisis. Acetaminophen can be used for control of headache, pain, and fever. <b>P</b> Ketrolac (a nonsedating analgesic) may be used in children to relieve spine, thoracic, and abdominal pain (often accompanies hypoventilation in acute chest syndrome) (Heeney & Mahoney, 2015). Note: Aspirin should be avoided because it alters blood pH and can make cells sickle more easily.
Consult with or refer to physical therapy.	Determines and provides appropriate therapies, such as massage, heat therapies, and guided exercise.
Administer and monitor RBC transfusion.	Although transfusion does not halt the pain in an acute crisis, frequency of painful crises may be reduced by regular partial exchange transfusions to maintain population of normal RBCs.

**NURSING DIAGNOSIS:** **risk for ineffective Tissue Perfusion [specify: cardiac, cerebral, gastrointestinal, peripheral]**

**Possibly Evidenced By**

Coagulopathy (e.g., vaso-occlusive nature of sickling, inflammatory response)  
Hypovolemia; hypoxemia  
Deficient knowledge of aggravating factors

**Desired Outcomes/Evaluation Criteria—Client Will**

**Tissue Perfusion NOC**

Demonstrate improved tissue perfusion as evidenced by stabilized vital signs, strong and palpable peripheral pulses, adequate urine output, absence of pain; usual mentation; normal capillary refill; skin warm and dry; nailbeds and lips of natural pale, pink color; and absence of paresthesias.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Circulatory Care: Arterial [or] Venous</b>	
<b>Insufficiency NIC</b>	
<i>Independent</i>	
<b>Impaired systemic and cardiovascular perfusion</b>	
Monitor vital signs carefully. Assess pulses for rate, rhythm, and volume. Note changes in blood pressure.	Sludging and sickling in peripheral vessels may lead to complete or partial obliteration of a vessel with diminished perfusion to surrounding tissues.
Assess heart sounds and pulses for dysrhythmias.	May reflect problems with cardiac output (systemic dehydration and/or hypoxemia), electrolyte imbalances, or local or systemic sickling causing inadequate myocardial perfusion.
Assess for restlessness, changes in level of consciousness, increased capillary refill time, diminished peripheral pulses, and pale, cool skin.	Indicative of inadequate systemic perfusion.
Note onset of hypotension with rapid, weak, thready pulse and tachypnea with shallow respirations.	Sudden massive splenic sequestration of cells can lead to systemic shock.
Investigate reports of chest pain.	To evaluate for potential myocardial ischemia, inadequate systemic oxygenation, or perfusion of organs.
<b>Impaired general and peripheral perfusion</b>	
Assess extremities for skin texture, edema, and ulcerations, especially of internal and external ankles.	Edema may reflect both systemic and peripheral effects of sickle cell disease. Reduced peripheral circulation often results in skin and underlying tissue changes (e.g., ulcerations) and delayed healing.
Investigate reports of eye pain or vision disturbances.	Changes may reflect occlusion of vasculature and nerves of the eye.
<b>P Evaluate for developing edema—including hands and feet in children and genitalia in boys and men.</b>	Vaso-occlusion or circulatory stasis may lead to edema of extremities and priapism, potentiating risk of tissue ischemia and necrosis. <b>P Note:</b> Edematous hands and feet are often first sign of SCD in young children.
Maintain comfortable environmental temperature and body warmth without overheating. Avoid hypothermia.	Prevents vasoconstriction, aids in maintaining circulation and perfusion. Excessive body heat may cause diaphoresis, adding to insensible fluid losses and risk of dehydration. Hypothermia may exacerbate cardiovascular compromise with severe anemia.
Monitor urine output.	Decreased output may be indicative of dehydration, impaired cardiac output, or impaired renal perfusion because of vascular occlusions. (Refer to ND: risk for deficient Fluid Volume, following; and CP: Renal Failure/Acute/Chronic.)
<b>Risk for impaired respiratory system perfusion</b>	
Monitor respirations, noting rate outside of acceptable parameters and drop in pulse oximetry. Note client reports of/demonstration of difficult breathing.	May indicate presence of oxygen exchange problems, presence of respiratory infection, or acute chest syndrome.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess skin for coolness, pallor, cyanosis, and diaphoresis.	Changes reflect diminished circulation and hypoxia potentiating capillary occlusion. (Refer to ND: Impaired Gas Exchange.)
<b>Risk for ineffective cerebral perfusion</b> Note changes in level of consciousness and mentation; reports of headaches, dizziness; development of sensory or motor deficits, such as hemiparesis or paralysis; and seizure activity.	Changes may reflect diminished perfusion to the brain and central nervous system (CNS) due to ischemia or infarction (stroke). <b>P</b> Note: Researchers have demonstrated that the scenario of high blood pressure and anemia occurring together places children with SCD at serious danger for symptomless or so-called silent stroke, which causes subclinical brain damage (Wolf et al, 2015). (Refer to CP: Cerebral Vascular Accident/Stroke, if indicated.)
<b>Ineffective Gastrointestinal Perfusion</b> Auscultate abdomen to evaluate for peristaltic activity, especially in the presence of vomiting and abdominal pain.	May indicate presence of bowel ischemia or obstruction, or other abdominal pathology, such as cholecystitis ( <b>P</b> especially common in children) (Maakaron & Taher, 2017).
Note increasing abdominal girth, especially when accompanied by general deterioration in clinical status (i.e., sudden weakness, pale lips, rapid breathing, excessive thirst, belly pain, and rapid heartbeat) and severe anemia.	May indicate presence of splenic sequestration (occurs when large numbers of sickled red blood cells become trapped in the spleen, causing it to suddenly enlarge). <b>P</b> This condition is more common in infants and young children. Without emergency medical care, splenic sequestration can cause death in a matter of hours (Thompson, 2015).
<b>Collaborative</b> Monitor laboratory studies, such as the following:	
Arterial blood gases (ABGs), liver and kidney function tests	Decreased tissue perfusion may lead to gradual infarction of organ tissues, such as the brain, liver, spleen, kidney, and skeletal muscle, with consequent multiorgan failure.
Serum electrolytes; provide replacements as indicated.	Electrolyte losses, especially sodium and potassium, are increased during crisis because of fever, diarrhea, vomiting, diaphoresis, and presence of acidosis.
Administer oxygen by appropriate route and assist with respiratory treatment measures, such as coughing, deep-breathing exercises, and incentive spirometer.	Improves oxygenation and reduces risk of pulmonary complications. (Refer to ND: Impaired Gas Exchange, above.)
Administer intravenous (IV) solutions, such as 0.45 normal saline, via an infusion pump.	Hydration lowers the hemoglobin S concentration, which decreases the sickling tendency and also reduces blood viscosity, which helps to maintain perfusion. Infusion pump may prevent circulatory overload. Note: Lactated Ringer's solution or D <sub>5</sub> W may cause RBC hemolysis and potentiate thrombus formation.
Administer hydroxyurea (hydroxycarbamide [Droxia, Hydrea]) and observe for possible side effects.	Hydroxyurea, a cytotoxic agent, reduces or prevents many complications of SCD by increasing the circulation of normal or fetal hemoglobin (HbF). It dramatically decreases the number of VOC episodes and the need for transfusions and hospitalizations and is given to prevent crises. Note: Hydroxyurea is not used in the acute setting, as it takes weeks to months to be effective, and thus is used to treat complications. <b>P</b> This drug is used across the life span, including in infants and young children, as long as renal clearance is effective (Rodgers & George, 2017; Vacca & Blank, 2017).
Administer deferoxamine (Desferal) and vitamin C.	Chelation therapy may be indicated to correct iron overload associated with regular, frequent transfusions. Vitamin C may enhance iron excretion, especially in clients who are vitamin deficient. Note: Phlebotomy and exchange transfusions may be used in conjunction with chelation therapy.
Prepare for and assist with procedures as needed (e.g., surgical intervention or needle aspiration of blood from corpora cavernosa).	Sickling within the penis can cause priapism and edema. Removal of sludged, sickled cells can improve circulation, decreasing psychological trauma and risk of necrosis and infection.

## NURSING DIAGNOSIS: risk for deficient Fluid Volume

### Possibly Evidenced By

Factors influencing fluid needs (e.g., hypermetabolic state or fever, inflammatory or vaso-occlusive processes; deviations affecting intake or absorption)  
Active fluid loss (compromised regulatory function; renal parenchymal damage or infarctions limiting the kidney's ability to concentrate urine)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Hydration NOC

Maintain adequate fluid balance as evidenced by individually appropriate urine output with a near-normal specific gravity, stable vital signs, moist mucous membranes, good skin turgor, and prompt capillary refill.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Monitoring NIC</b> <i>Independent</i> Maintain accurate intake and output (I&O). Weigh daily.	Client may reduce fluid intake during periods of crisis because of malaise and anorexia. Dehydration from vomiting, diarrhea, and fever may reduce urine output and precipitate a vaso-occlusive crisis.
Note urine characteristics and specific gravity.	The kidney can lose its ability to concentrate urine, resulting in excessive losses of dilute urine and fixation of the specific gravity.
Monitor vital signs, comparing with client's usual or previous readings. Take BP in lying, sitting, and standing positions, if possible.	Reduction of circulating blood volume can occur from increased fluid loss, resulting in hypotension and tachycardia.
Observe for fever, changes in level of consciousness, poor skin turgor, dryness of skin and mucous membranes, and pain.	Symptoms are reflective of dehydration and hemoconcentration with consequent vaso-occlusive state.
Monitor vital signs closely during blood transfusions and note presence of dyspnea, crackles, rhonchi, wheezes, diminished breath sounds, cough, frothy sputum, and cyanosis.	Client's heart may already be weakened and prone to failure because of chronic demands placed on it by the anemic state. Heart may be unable to tolerate the added fluid volume from transfusions or rapid IV fluid administered to treat crisis or shock.
<b>Collaborative</b> Administer IV fluids, as indicated.	Replaces fluid deficits; may reverse renal concentration of RBCs and reduce potential for kidney failure.
Monitor laboratory studies, for example: Hgb/Hct	Elevations may indicate hemoconcentration. Posttransfusion Hgb level of 8 to 9 g/dL is generally recommended to avoid the risk of hyperviscosity that may occur several days after transfusion when RBCs sequestered in the spleen may return to the circulation and increase the Hgb levels.
Serum and urine electrolytes	Kidneys' loss of ability to concentrate urine may result in serum depletions of $\text{Na}^+$ , $\text{K}^-$ , and $\text{Cl}^-$ , necessitating replacement.

## NURSING DIAGNOSIS: impaired physical Mobility

### May Be Related To

Activity intolerance; decreased endurance  
Pain/discomfort; joint stiffness; loss of integrity of bone structures (osteoporosis, osteomyelitis)  
Prescribed movement restrictions (bedrest)

### Possibly Evidenced By

Limited joint ROM, reluctance to initiate movement; slowed movement, gait changes  
Generalized weakness

**NURSING DIAGNOSIS: impaired physical Mobility (continued)****Desired Outcomes/Evaluation Criteria—Client Will****Mobility NOC**

Maintain or increase strength and function of affected body parts.

Participate in activities with absence of or improvement in gait disturbances, increased joint ROM, and absence of inflammatory signs.

\*\*\*\*Refer to CP: Extended/Long Term Care; ND: impaired physical Mobility for appropriate actions and interventions.

**NURSING DIAGNOSIS: risk for impaired Skin Integrity****Possibly Evidenced By**

Impaired circulation (venous stasis and vaso-occlusion); impaired sensation

Mechanical factors—pressure; alteration in skin turgor

Alteration in fluid volume [including presence of edema]

**Desired Outcomes/Evaluation Criteria—Client Will****Tissue Integrity: Skin and Mucous Membranes NOC**

Prevent dermal ischemic injury.

Display improvement in wound or lesion healing if present.

**Risk Control NOC**

Participate in behaviors to reduce risk factors and skin breakdown.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Skin Surveillance NIC</b>	
<i>Independent</i>	
Reposition frequently, even when sitting in chair.	Prevents prolonged tissue pressure where circulation is already compromised, reducing risk of tissue trauma and ischemia.
Inspect skin pressure points regularly for pallor or redness and provide gentle massage.	Poor circulation may predispose to rapid skin breakdown.
Protect bony prominences with sheepskin, heel and elbow protectors, or pillows, as indicated.	Decreases pressure on tissues, preventing skin breakdown.
Keep skin surfaces dry and clean and linens dry and wrinkle-free.	Moist, contaminated areas provide excellent media for growth of pathogenic organisms.
Monitor ischemic areas, leg bruises, cuts, and bumps closely for ulcer formation.	Potential entry sites for pathogenic organisms. In presence of altered immune system, this increases risk of infection and delayed healing.
Elevate lower extremities when sitting.	Enhances venous return, reducing venous stasis and edema formation.
<i>Collaborative</i>	
Provide egg-crate, alternating air pressure, or water mattress.	Reduces tissue pressure and aids in maximizing cellular perfusion to prevent dermal injury.
Provide wound care as indicated, such as cleansing and debriding open wounds and ulcers according to protocol.	Improvement or delayed healing reflects status of tissue perfusion and effectiveness of interventions. Note: These clients are at increased risk of serious complications because of lowered resistance to infection and decreased nutrients for healing.

## NURSING DIAGNOSIS: risk for Infection

### Possibly Evidenced By

Chronic illness; malnutrition; [extremes of age]  
Alteration in skin integrity, tissue destruction (e.g., tissue and bone marrow infarction, necrosis and increased gut permeability, liver fibrosis, loss of spleen [autosplenectomy]); stasis of body fluids, decrease in ciliary action  
Decrease in hemoglobin; inadequate vaccination; immunosuppression [increased environmental exposure]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Risk Control: Infectious Process NOC

Be free of infection; achieve timely wound healing; be free of preventable complications.  
Verbalize understanding of individual causative or risk factors.  
Identify interventions to prevent or reduce risk of infection.

\*\*\*Refer to CPs: Pneumonia, Sepsis/Septicemia, Fractures; ND: risk for Infection for assessments and interventions related to prevention or management of infection.

## NURSING DIAGNOSIS: ineffective Health Management

### May Be Related To

Difficulty managing complex treatment regimen or navigating complex healthcare systems  
Perceived seriousness of condition, susceptibility, benefit, or barrier  
Insufficient knowledge of therapeutic regimen  
Family pattern of healthcare; decisional conflict; excessive demands; insufficient social support

### Possibly Evidenced By

Difficulty with prescribed regimen  
Failure to take action to reduce risk factors  
Ineffective choices in daily living for meeting health goals

### Desired Outcomes/Evaluation Criteria—Client Will

#### Self-Management: Chronic Disease NOC

Verbalize understanding of disease process, including symptoms of crisis and potential complications.  
Verbalize understanding of therapeutic needs.  
Initiate necessary behaviors or lifestyle changes to prevent complications.  
Participate in continued medical follow-up, genetic counseling, and family planning services.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Review disease process and treatment needs.	Provides knowledge base from which client can make informed choices.
Review crisis precipitating factors, such as the following:  Cold environmental temperatures, failure to dress warmly when engaging in winter activities; wearing tight, restrictive clothing; stressful situations	Causes peripheral vasoconstriction, which may result in sludging of the circulation, increased sickling, and may precipitate a vaso-occlusive crisis.
Strenuous physical activity or contact-type sports and extremely warm temperatures	Increases metabolic demand for oxygen and increases insensible fluid losses (evaporation and perspiration), leading to dehydration, which may increase blood viscosity and tendency to sickle.
Travel to places more than 7000 ft above sea level or flying in unpressurized aircraft	Decreased oxygen tension present at higher altitudes causes hypoxia and potentiates sickling of cells. Note: Even though commercial airline cabins are pressurized, low cabin humidity increases risk of dehydration.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage consumption of at least 3 to 4 L of fluid daily, during a steady state, increasing to 6 to 8 L (as individually tolerated, prescribed, or required) during a painful crisis or while engaging in activities that might precipitate dehydration.	Prevents dehydration and consequent hyperviscosity that can potentiate sickling and crisis.
Discuss continuation of use of prescribed medications, such as hydroxyurea (Hydrea).	Has been found to reduce frequency of pain episodes in adults.
Encourage ROM exercise and regular physical activity with a balance between rest and activity.	Prevents bone demineralization and may reduce risk of fractures. Aids in improving general health status and muscle and bone strength.
Review client's current diet, reinforcing the importance of diet including meats and dairy, green leafy vegetables, citrus fruits, and wheatgerm. Provide necessary instruction regarding supplementary vitamins such as folic acid.	Nutritious foods, including vitamins, folate, and B <sub>12</sub> in greater quantities than usual, are essential because of increased demands placed on bone marrow. Folic acid supplements are frequently ordered to prevent aplastic crisis.
Emphasize importance of avoiding smoking and alcohol consumption; identify appropriate medical assistance and community support groups for smoking cessation.	Nicotine induces peripheral vasoconstriction and decreases oxygen tension, which may contribute to cellular hypoxia and sickling. Alcohol increases the possibility of dehydration, which precipitates sickling. Maintaining these changes in behavior or lifestyle may require prolonged support.
Discuss principles of skin and extremity care and protection from injury. Encourage prompt treatment of cuts, insect bites, sores, and lesions.	Because of impaired tissue perfusion, especially in the periphery, distal extremities are especially susceptible to altered skin integrity and infection.
Include instructions on care of leg ulcers that might develop.	Fosters independence and maintenance of self-care at home.
Instruct client to avoid persons with infections such as upper respiratory infections (URIs).	Altered immune response places client at risk for infections, especially bacterial bronchitis and pneumonia.
Recommend avoiding cold remedies and decongestants containing ephedrine and large amounts of caffeine. Stress the importance of reading labels on over-the-counter (OTC) drugs and consulting healthcare provider before consuming any drugs or herbal supplements.	Those remedies containing vasoconstrictors may decrease peripheral tissue perfusion and cause sludging of sickled cells.
Discuss conditions for which medical attention should be sought, such as the following:	
Urine that appears blood tinged or smoky	Symptoms suggestive of sickling in the renal medulla.
Indigestion, persistent vomiting, diarrhea, high fever, and excessive thirst	Dehydration may trigger a vaso-occlusive crisis.
Increasingly severe joint or bone pain	May signify a vaso-occlusive crisis due to sickling in the bones or spleen, leading to ischemia or infarction or onset of osteomyelitis.
Severe chest pain, with or without cough	May reflect acute chest syndrome, with pulmonary infiltrates or pneumonia.
Abdominal pain; gastric distress following meals	Cholelithiasis, primarily with bilirubin stones, is present in more than 50% of adults.
Priapism episode persisting over 4 hours with no resolution	Suggestive of sickling in the penis.
Persistent fever greater than 100°F (38°C); increasing fatigue and pallor; dizziness, drowsiness; and nonhealing leg ulcers	Suggestive of infections that may precipitate a vaso-occlusive crisis if dehydration develops. Note: Severe infections are the most frequent cause of aplastic crisis.
Any neurological symptom or sign	Stroke can occur due to cerebral infarction, although it is more common in children than adults. Without long-term transfusion therapy, approximately one-third of clients will experience recurrent strokes.
Review and strengthen coping abilities, such as how to deal appropriately with anxiety, getting adequate information, and using relaxation techniques.	Promotes client's sense of control and may avert a crisis.

(continues on page 568)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Recommend wearing a medical alert bracelet or carrying a wallet card.	May prevent inappropriate treatment in emergency situation.
Discuss genetic implications of the condition. Encourage SO and family members to seek testing to determine presence of hemoglobin S.	Screening may identify other family members with sickle cell trait. Hereditary nature of the disease with the possibility of transmitting the mutation may have a bearing on reproductive decisions.
Explore concerns regarding childbearing and family planning.	Provides opportunity to correct misconceptions and present information necessary to make informed decisions.
Refer to community resources and obstetrician knowledgeable about sickle cell disease, as indicated.	Evidence shows that pregnant client has increased risk of infections (e.g., pneumonia and genitourinary tract infections), gestational hypertension, intrauterine growth retardation, eclampsia, preterm labor, and postpartum infections (Vichinsky, 2017).
Encourage client to have routine follow-ups, such as:	
Periodic laboratory studies, such as CBC	Monitoring may be needed long term to review status of anemia and to identify potential complications.
Biannual dental examination	Sound oral hygiene limits opportunity for bacterial invasion and sepsis.
Annual ophthalmological examination	Detects development of sickle retinopathy with either proliferative or nonproliferative ocular changes predisposing to retinal hemorrhage and increased intraocular pressure.
Immunizations	Annual influenza vaccination is essential. <b>P</b> For infants with sickle cell disease, provide a suggested schedule for well-child visits to ensure that immunizations and other aspects of routine pediatric care are followed. For children aged 1 to 3 years with hemoglobin (Hb) SS and HbS- $\beta$ -0 thalassemia, consider visits every 3 months, to be certain that parents have sufficient antibiotics for prophylaxis (when used) and to encourage compliance with SCD therapies.
Determine need for vocational and career guidance.	Sedentary career may be necessary because of decreased oxygen-carrying capacity and diminished exercise tolerance.
Encourage participation in community support groups available to clients and SO, such as the Sickle Cell Disease Association of America, March of Dimes, public health services, and visiting nurse.	Helpful in adjustment to long-term situation; reduces feelings of isolation and enhances problem-solving through sharing of common experiences. Note: Failure to resolve concerns and deal with situation may require more intensive therapy and psychological support.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **acute/chronic Pain**—physical agent (e.g., intravascular sickling with localized stasis, occlusion, infarction, and necrosis; activation of pain fibers due to deprivation of oxygen and nutrients, accumulation of noxious metabolites)
- **risk for deficient Fluid Volume**—increased fluid needs (hypermetabolic state or fever, inflammatory processes), active fluid loss (renal parenchymal damage or infarctions limiting the kidney's ability to concentrate urine [hyposthenuria])
- **risk for Infection**—chronic disease; broken skin, tissue destruction, stasis of body fluids, decreased ciliary action

## ADULT LEUKEMIAS

**I. Pathophysiology**—Malignant disorders of the blood and bone marrow in which unrestrained proliferation of white blood cells occurs and is usually accompanied by anemia, impaired blood clotting, and enlargement of the lymph nodes, liver, and spleen.

- a. Blood cells originate primarily in the marrow of bones, such as the sternum, iliac crest, and cranium, and begin as immature cells (blasts or stem cells) that differentiate and mature into red blood cells (RBCs), platelets, and various types of WBCs (National Cancer Institute [NCI], 2017a).
- b. Production of normal blood cells is markedly decreased, leading to anemia, thrombocytopenia, neutropenia
- c. Rapid growth of immature or ineffective WBCs and delayed cell death lead to their accumulation in bone marrow, blood, spleen, and liver.

**II. Categories** (American Cancer Society [ACS], n.d; Hu, 2016; Seiter, 2017; Swierzowski, 2015)

- a. Leukemia is classified by how quickly it progresses. Acute leukemia is fast-growing and can overwhelm the body within weeks or months. Chronic leukemia is slow-growing and progressively worsens over time.
  - b. Leukemia is also classified according to the type of white blood cell that is multiplying—that is, lymphocytes (immune system cells), granulocytes (bacteria-destroying cells), or monocytes (macrophage-forming cells).
  - c. The leukemia designation also includes the site where the cancer develops (i.e., lymphocytes, myeloid [arising from bone marrow])
  - d. Although leukemia is among the most common childhood cancers, it most often occurs in adults (most frequently diagnosed among people aged 65–74) (NCI, 2017a).
  - e. The four types of leukemia that occur most frequently in adults are acute myelogenous leukemia (AML), acute lymphocytic leukemia (ALL), chronic myelogenous leukemia (CML), and chronic lymphocytic leukemia (CLL).
1. Acute leukemias
    - i. Acute leukemia cells begin to replicate before any immune functions have developed. These abnormalities result in loss of the body's ability to fight infections and prevent bleeding.
    - ii. Acute leukemias, in general, progress rapidly without treatment but can be kept in remission in a high percentage of individuals who undergo appropriate therapy. As a group, older clients tend to have worse treatment outcomes than younger ones (i.e., they experience greater treatment-related toxicity, lower remission rates, shorter disease-free survival times, and shorter overall survival times).
    - iii. The most common form of acute leukemias in adults (especially those 65 or older) is acute myelogenous leukemia (AML).
    - iv. AML (also known as acute myeloid leukemia, acute granulocytic leukemia, and nonlymphocytic leukemia) is a rapidly progressing cancer of blood and bone marrow, caused by damage to the DNA of developing cells in the bone marrow. It affects a group of white blood cells (called myeloid cells), which normally develop into the various types of mature blood cells (e.g., RBCs, WBCs, and platelets).

The abnormal cells are unable to function properly, and they can amass, crowding out healthy cells.

- v. Acute lymphoblastic leukemia (also called acute lymphocytic leukemia [ALL]) is a rapidly progressing cancer of blood, where abnormal blood cells (leukemia cells) accumulate in bone marrow and replace healthy functional lymphocytes with leukemia cells that can't mature properly. Typically, ALL is associated with having more B lymphocytes than T lymphocytes, which (1) allows invasion of infection and (2) prevents destruction of previously infected cells. The leukemia cells are then carried in the bloodstream to other organs and tissues, including the brain, liver, lymph nodes, and testes, where they continue to grow and divide.

### 2. Chronic leukemias

- a. Chronic leukemias develop gradually and progress more slowly than acute forms. The cells generally begin to form in bone marrow, mature partly (but not completely), and can affect white blood cells, red blood cells, and platelets. Leukemia cells survive longer than normal cells and can build up, crowding out normal cells. At some point, leukemia cells leave the bone marrow and spill into the bloodstream, where they can spread to other organs. Chronic leukemias can take a long time to cause problems but are generally harder to cure than acute leukemias.
- b. Whether the leukemia is myeloid or lymphocytic is determined by which bone marrow cells the cancer starts in.
- c. The most common form of chronic leukemia in adults is chronic lymphocytic leukemia (CLL). CLL accounts for about one-quarter of all leukemias, mainly affecting older adults with an average age of 71 at time of diagnosis (ACS, n.d.). CLL can spread to other parts of the body, including lymph nodes or other organs such as the liver and spleen, resulting in infections, anemia, and easy bleeding. CLL eventually causes the bone marrow to fail.
- d. Chronic myelogenous leukemia (CML) is a slowly progressing blood and bone marrow disease that usually occurs after middle age. CML (also called chronic myeloid leukemia) starts in certain blood-forming cells of the bone marrow and invades the blood. In CML, a genetic change takes place in an early immature type of myeloid cells that produce RBCs, platelets, and most types of WBCs, except lymphocytes. CML constitutes about 10% of all leukemias.
- e. Most people with CML (and some people with AML and ALL) have a particular genetic marker (the Philadelphia chromosome [Ph1]), which causes uncontrolled proliferation of all types of white blood cells and platelets. Another distinctive feature of CML is its invariable conversion, if untreated, to a more rapidly fulminating acute type, leading to rapid death (NCI, 2017a; Sherbenou & Drucker, 2007; Swierzowski, 2015).
- f. CML tends to occur more in middle-age and older-age persons. Studies have shown that most cases occur in older adults, with more than half occurring after age 67 (Leukemia & Lymphoma Society, 2016–2017).

(continues on page 570)

### III. Etiology

- a. Exact cause is unknown.
- b. Risk factors include the following (Seiter, 2017):
  - i. Antecedent histological disorders: diseases of the bone marrow, such as myelodysplastic syndrome (MDS)
  - ii. Environmental exposures: radiation, benzene (found in some work areas, gasoline-related industries, and cigarette smoke) (Phillips, 2012)
  - iii. Prior chemotherapy for other malignancies
  - iv. Genetics or congenital disorders: Some congenital disorders that predispose patients to AML include Down's syndrome, Fanconi's anemia, and neurofibromatosis.

### IV. Classification or Staging (Hu, 2016; NCI, 2017a)

In general, because leukemias start in the bone marrow and have often spread to other organs by the time of diagnosis, there is no traditional clinical staging but rather are described as untreated, in remission, or recurrent and are classified according to their genotypes, or their unique characteristics, in order to determine the most appropriate therapy. In recent years, researchers have discovered that cellular characteristics such as genetic makeup and numbers of specific cell types help to classify leukemia and predict its outcome.

- a. The most popular classification method for acute leukemia is the French-American-British (FAB) system. For example, according to the FAB classification, acute leukemia is divided into eight subtypes of acute myelogenous leukemia (AML) and three subtypes of acute lymphocytic leukemia (ALL) (NCI, 2017a). Acute promyelocytic leukemia (APL) is one subtype of AML that is considered a medical emergency because of its sudden onset and a significant risk of death due to hemorrhage (17%–29%) more than other leukemias (Draper, 2016).

- b. Chronic leukemia is classified by phase (i.e., chronic phase, accelerated phase, and blast phase [or “blast crisis”]) and is defined by the number of blasts (immature leukemia cells) in the blood and bone marrow. Chronic leukemia uses two different staging systems, both based on the parts of the body affected by the leukemia. For example, chronic lymphocytic leukemia (CLL) is classified by one of two cytologic staging systems, known as the Rai classification and Binet staging, respectively (NCI, 2017a; Swierzewski, 2015).

### V. Statistics

- a. Morbidity: Based on 2010 to 2014 data, the Survey, Epidemiology, and End Results program (SEER) projected that an estimated 62,130 new cases of leukemia (all types) would be diagnosed in 2017 in the United States, more often in males than females (National Cancer Institute, SEER, 2017a). Based on SEER data gleaned from 2008 to 2013, 60.6% of people diagnosed with leukemia will survive 5 years or more. Advances in the treatment of AML have resulted in substantially improved complete remission (CR) rates (ACS, 2017a).
- b. Mortality: Approximately 24,500 deaths from all leukemias were reported for 2010 (National Cancer Institute, SEER, 2017a). Estimated deaths from ALL in 2017 were 1440, and deaths from AML in the same period were estimated at 10,590 (ACS, 2017a). A majority (up to 82%) of those with CLL live 5 to 10 years; however, the presence of complications may shorten survival to 2 to 3 years. The 5-year survival rate for CML increased from 31% in 1992 to 56% for those diagnosed during 2002 to 2008 (National Cancer Institute, SEER, 2017a).
- c. Cost: Estimated national expenditures for care were \$6.3 billion in 2016 (NCI, 2017b).

### G L O S S A R Y

**Anemia:** A low red blood cell (RBC) count. Red blood cells carry oxygen around the body. This condition may contribute to weakness, fatigue, or shortness of breath.

**Blast cell:** Blood cell that is not fully developed and is still immature.

**Leukopenia:** A low white blood cell (WBC) count. A decrease in the production of functional WBCs (leukocytes) weakens the body's immune defense, which can make one more prone to infections.

**Lymphocytic or lymphoblastic:** A cancerous change takes place in a type of marrow cell that forms lymphocytes.

**Lymphopenia:** Low number of lymphocytes in the blood.

**Myelogenous or myeloid:** Cancerous change takes place in a type of marrow cell that normally goes on to form red cells, some types of white cells, and platelets.

**Neutropenia:** Abnormal decrease in the number of neutrophils (type of white blood cell [WBC] that fights infection) in the blood.

**Normocytic, normochromic anemia:** Anemia associated with disturbances of red cell formation and related to endocrine deficiencies, chronic inflammation, and condition in which cancer is spread widely throughout the body or, in some cases, to a relatively large region of the body.

**Progenitor stem cell transplant:** Reestablishment of normal bone marrow function through the infusion of cells committed to forming a specific type of blood cell line—red blood cells (RBCs), WBCs, or platelets. The source of the cells may be from the peripheral blood, bone marrow, or umbilical cord and placenta. The donor may be the client himself or herself (autologous transplant), a genetically compatible relative or individual (allogeneic transplant), or donated cord blood. Syngeneic transplant describes the use of an identical twin as donor.

**Thrombocytopenia:** Disorder in which there are not enough platelets to perform normal clotting functions. This condition is sometimes associated with abnormal bleeding.

**Tumor lysis syndrome (TLS):** Metabolic derangement produced by rapid tumor breakdown as a consequence of therapy. TLS is most likely to occur in clients who have hematologic malignancies (Kaplow & Iyere, 2016). It is characterized by hyperuricemia due to DNA breakdown, hyperkalemia because of cytosol breakdown, hyperphosphatemia because of protein breakdown, and hypocalcemia secondary to hyperphosphatemia. As phosphate level increases, serum calcium decreases. These derangements can result in acute renal failure, cardiac dysrhythmias, and sudden death from hyperkalemia or hypocalcemia.

**CARE SETTING**

Client receives acute inpatient care on medical or oncology unit for initial evaluation and intermittently for treatment, and then care is provided at the community level.

**RELATED CONCERNS**

Cancer, general considerations, page 945

Psychosocial aspects of care, page 835

**CLIENT ASSESSMENT DATABASE**

Data depend on degree and duration of the disease and other organ involvement.

**DIAGNOSTIC DIVISION  
MAY REPORT****MAY EXHIBIT****ACTIVITY/REST**

- Fatigue, increased need for sleep; malaise
- Weakness, inability to engage in usual activities

- Muscle wasting
- Somnolence, lethargy

**CIRCULATION**

- Palpitations

- Tachycardia, heart murmurs
- Pallor of skin, mucous membranes
- Cranial nerve deficits and signs of cerebral hemorrhage

**EGO INTEGRITY**

- Feelings of helplessness, hopelessness

- Mood changes, confusion
- Depression, withdrawal, anxiety, fear, anger, irritability

**ELIMINATION**

- Diarrhea
- Bright red blood or tarry stools
- Perianal tenderness, pain
- Blood in urine, decreased urine output

- Diarrhea
- Bright red blood or tarry stools
- Perianal abscess
- Hematuria

**FOOD/FLUID**

- Loss of appetite, change in taste
- Nausea; vomiting
- Weight loss

- Anorexia; vomiting
- Abdominal distention, enlarged liver or spleen, decreased bowel sounds

**NEUROSENSORY**

- Lack of or decreased coordination
- Muscle cramping
- Dizziness; numbness, tingling, paresthesias
- Mood changes, confusion, disorientation, lack of concentration

- Muscle irritability
- Uncoordinated movements
- Seizure activity
- Mood changes, confusion, disorientation, lack of concentration

**PAIN/DISCOMFORT**

- Abdominal pain
- Bone, joint pain—knees, hips, shoulders, long bones sternum
- Headaches

- Guarding or distraction behaviors, restlessness
- Self-focus

**RESPIRATION**

- Shortness of breath with minimal exertion

- Dyspnea, tachypnea
- Cough
- Decreased breath sounds
- Crackles, rhonchi

**SAFETY**

- History of recent or recurrent infections
- Falls
- Visual disturbances or impairment

- Fever, infections
- Papilledema and exophthalmos; retinal hemorrhages

(continues on page 572)

## CLIENT ASSESSMENT DATABASE (contd.)

### MAY REPORT (continued)

- Nosebleeds or other hemorrhages, spontaneous uncontrollable bleeding with minimal trauma
- Skin and tissue changes
- History of exposure to chemicals—benzene (commercially used toxic liquid that is also present in lead-free gasoline), or excessive levels of ionizing radiation
- Exposure to virus—human T-cell leukemia or lymphoma virus 1 (HTLV-1)

### SEXUALITY

- Changes in libido
- Changes in menstrual flow, menorrhagia
- Testicular pain; impotence

### TEACHING/LEARNING

- Previous treatment with chemotherapy—especially alkalinizing agents
- Chromosomal disorder—Down's syndrome or Fanconi's aplastic anemia

### DISCHARGE PLAN CONSIDERATIONS

- May need assistance with therapy and treatment needs and supplies, shopping, food preparation, self-care activities, homemaker and maintenance tasks, transportation

► Refer to section at end of plan for postdischarge considerations.

### MAY EXHIBIT (continued)

- Bleeding from orifices or tissues
- Gum hypertrophy (may be indicative of AML)
- Petechiae; bruises, purpura
- Leukemic infiltrates (flesh-colored to violet-colored papules, plaques, or nodules in the dermis)
- Jaundice
- Swollen lymph nodes in neck, armpit, or groin

## DIAGNOSTIC STUDIES

### TEST

### WHY IT IS DONE

### WHAT IT TELLS ME

### BLOOD TESTS

- **Complete blood count (CBC):** The most common screening and diagnostic test to demonstrate leukemia. Typically includes hemoglobin (Hgb), hematocrit (Hct), RBC count and morphology and distribution width index, platelet count and size, and WBC count and differential.
- **White blood cell (WBC) count and differential:** Evaluates numbers and characteristics of each of the five types of WBCs: neutrophils, lymphocytes (B cells and T cells), monocytes, eosinophils, and basophils within the bloodstream.
- **Platelet count:** Platelets have essential function in coagulation.

*Note:* Once a diagnosis of leukemia is obtained, additional tests may be performed. These tests may include (and are not limited to) immunophenotyping, fluorescence in situ hybridization (FISH), and IgVH gene mutation test. These more sophisticated tests are not included in this text.

RBC and platelet production is decreased by the leukemic cells and suppression of normal bone marrow activity. WBCs are usually elevated, and in acute leukemia, blasts cells (typically found in bone marrow) may be present in circulating blood.

*Note:* Normally, blasts constitute 5% or less of healthy bone marrow, but in acute, newly diagnosed, or recurrent leukemia, the blasts remain immature and multiply continuously, eventually constituting between 30% and 100% of the bone marrow (Pui et al, 2008).

Persons with ALL or AML often have too many leukocytes—count may be more than 50,000/cm—with increased numbers of immature WBCs (“shift to left”). Leukemic blast cells may be present.

May vary from normal to very low (<50,000/mm). *Note:* Significant bleeding typically does not occur until platelet level drops below 20,000/mm.

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li><b>Prothrombin time (PT)/activated partial thromboplastin time (aPTT):</b> Determines bleeding and clotting time.</li> <li><b>Blood chemistries:</b> Measures the type and amount of enzymes, minerals, and other substances within the blood.</li> <li><b>Alkaline phosphatase (ALP):</b> Aids in differential diagnosis.</li> <li><b>Lactic dehydrogenase (LDH):</b> Substance released by tumors and found in blood.</li> <li><b>Serum vitamin B<sub>12</sub>:</b> May aid in differential diagnosis of type of leukemia and other myeloproliferative conditions.</li> <li><b>Uric acid:</b> Waste product resulting from the breakdown of nitrogen-containing compounds (purines).</li> </ul>	<p>May be prolonged. Disseminated intravascular coagulation (DIC) may occur with AML, but it is especially common in acute promyelocytic leukemia.</p> <p>Identifies kidney or liver damage that may be caused by leukemic cell breakdown or by drugs used for chemotherapy.</p> <p>Elevated with CML.</p> <p>It is considered an accurate marker for the severity of the disease and used to establish a baseline to monitor for response to treatment.</p> <p>Can be increased with CML and some forms of acute leukemia; normal in CLL and undifferentiated stem cell leukemia.</p> <p>Commonly elevated in client with chemotherapy induction. However, if uric acid is significantly elevated, it is indicative of kidney problems, often associated with tumor lysis syndrome (TLS) (see Glossary).</p>
<ul style="list-style-type: none"> <li><b>X-rays:</b> Determine areas of involvement.</li> </ul>	<p>CT scans are not usually used in client with leukemia unless metastasis is suspected. In such cases, CT scan may detect changes in the lymph nodes around the heart, trachea, or abdomen. Lymph node enlargement is more common in patients with ALL or CLL with potential for compression of organs or internal structures, such as airway obstruction or obstructive uropathy. Scans of liver and spleen may reveal splenomegaly.</p> <p>May reveal enlarged lymph nodes in the chest, a localized mass in the lungs, or evidence that leukemia has spread to bones or joints.</p>
<ul style="list-style-type: none"> <li><b>Bone marrow aspiration and biopsy:</b> May be done by needle aspirate or biopsy for microscopic examination of fluid and tissues within the marrow to determine the number, size, and shape of the various cell types as well as the proportion of mature to immature cells.</li> </ul>	<p>Although signs of leukemia are evident in CBC results and platelet counts, a bone marrow biopsy may be necessary for a definitive diagnosis. The bone marrow examination determines the cell type, the type of erythropoiesis, and the maturity of the leukopoietic and erythropoietic cells.</p>
<h3>DEFINITIVE DIAGNOSTIC STUDIES</h3> <ul style="list-style-type: none"> <li><b>Cytogenetic analysis:</b> Cells are studied to see if chromosomal abnormalities are present.</li> <li><b>Flow cytometry (also called immunophenotyping):</b> Uses antibodies to treat the bone marrow or biopsy samples; specific cells undergo a color change that can be identified under microscope.</li> <li><b>Lumbar puncture:</b> Determines if cancer has spread to spinal column or brain.</li> </ul>	<p>Examination of chromosome abnormalities from samples of peripheral blood, bone marrow, or lymph nodes can indicate prognostic features and direct treatment options.</p> <p>Allows for identification of cells and differentiating characteristics of specific types of leukemia.</p> <p>May reveal leukemic cells in cerebrospinal fluid (CSF).</p>

### NURSING PRIORITIES

1. Prevent infection during acute phases of disease and treatment.
2. Maintain circulating blood volume.
3. Alleviate pain.
4. Promote optimal physical functioning.
5. Provide psychological support.
6. Provide information about disease process, prognosis, and treatment needs.

### DISCHARGE GOALS

1. Complications prevented or minimized.
2. Pain relieved or controlled.
3. Activities of daily living (ADLs) met by self or with assistance.
4. Dealing with disease realistically.
5. Disease process, prognosis, and therapeutic regimen understood.
6. Plan in place to meet needs after discharge.

\*\*\*Refer to CP: Cancer for further discussion and expansion of interventions related to cancer care and for client teaching.

## NURSING DIAGNOSIS: risk for Infection

### Possibly Evidenced By

Stasis of body fluids, traumatized tissue, invasive procedures  
Immature WBCs with low granulocyte and abnormal/immature lymphocyte count; immunosuppression, bone marrow suppression; pharmaceutical agents  
Malnutrition; chronic disease

### Desired Outcomes/Evaluation Criteria—Client Will

#### Risk Control: Infectious Process NOC

Identify actions to prevent or reduce risk of infection.

Demonstrate techniques or lifestyle changes to promote safe environment and achieve timely healing.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b> <i>Independent</i> Place in private room. Screen and limit visitors, as indicated. Prohibit use of live plants or cut flowers. Restrict fresh fruits and vegetables or make sure they are washed or peeled.	Protect client from potential sources of pathogens and infection. Note: Profound bone marrow suppression, neutropenia, and chemotherapy place client at great risk for infection.
Model and require good handwashing protocol for all personnel and visitors.	Prevents cross-contamination and reduces risk of infection.
Monitor temperature. Note correlation between temperature elevations and chemotherapy treatments. Observe for fever associated with tachycardia, hypotension, and subtle mental changes.	Although fever may accompany some forms of chemotherapy, progressive hyperthermia occurs in some types of infections, and fever unrelated to drugs or blood products occurs in most leukemia clients. Note: Septicemia may occur without fever.
Prevent chilling. Force fluids and administer tepid sponge bath.	Helps reduce fever, which contributes to fluid imbalance, discomfort, and central nervous system (CNS) complications.
Encourage frequent turning and deep breathing.	Prevents stasis of respiratory secretions, reducing risk of atelectasis and pneumonia.
Auscultate breath sounds, noting crackles and rhonchi; inspect secretions for changes in characteristics, such as increased sputum production or change in sputum color. Observe urine for signs of infection: cloudy, foul smelling, or presence of urgency or burning with voids.	Early intervention is essential to prevent sepsis or septicemia in immunosuppressed person.
Handle client gently. Keep linens dry and wrinkle-free.	Prevents sheet burns (friction injury) and skin excoriation.
Inspect skin for tender, erythematous areas and open wounds. Cleanse skin with appropriate antibacterial solutions.	May indicate local infection. Note: Open wounds may not produce pus because of insufficient number of granulocytes.
Inspect oral mucous membranes. Provide good oral hygiene. Use a soft toothbrush, sponge, or swabs for frequent mouth care.	The oral cavity is an excellent medium for growth of organisms and is susceptible to ulceration and bleeding.
Promote good perianal hygiene. Examine perianal area at least daily during acute illness. Provide sitz baths, using Betadine or Hibiclens™, if indicated. Avoid rectal temperatures and use of suppositories.	Promotes cleanliness, reducing risk of perianal abscess; enhances circulation and healing. Note: Perianal abscess can contribute to septicemia and death in immunosuppressed clients.
Coordinate procedures and tests to allow for uninterrupted rest periods.	Conserves energy for healing and cellular regeneration.
Encourage increased intake of fluids and foods high in protein with adequate fiber.	Promotes healing and prevents dehydration. Note: Constipation potentiates retention of toxins and risk of rectal irritation and tissue injury.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Prepare for/assist with invasive procedures, such as venipuncture, insertion of semipermanent central lines or ports, maintaining sterile technique for insertions and site care per protocol.	Break in skin could provide an entry for pathogenic and potentially lethal organisms. Use of central venous lines, such as tunneled catheter or implanted port, can effectively reduce need for frequent invasive procedures and risk of infection. Note: Myelosuppression may be cumulative in nature, especially when multiple drug therapy, including steroids, is prescribed.
<b>Collaborative</b>	
Monitor laboratory studies, such as the following:	
CBC, noting whether WBC count falls or sudden changes occur in neutrophils	Decreased numbers of normal or mature WBCs can result from the disease process or chemotherapy, compromising the immune response and increasing risk of infection.
Gram's stain cultures and sensitivity	Verifies presence of infections; identifies specific organisms and appropriate therapy.
Review serial chest x-rays.	Indicator of development or resolution of respiratory complications.
Prepare for and assist with leukemia-specific treatments, such as chemotherapy with neoplastic agents; biological therapy (immune modulators [such as interferons] and gene-directed agents [such as imatinib]); radiation, bone marrow and stem cell transplantation. (Refer to ND: deficient Knowledge at end of this care plan for information regarding leukemia-specific medications and other treatments.)	Leukemia treatment falls into two categories: (1) treatment to fight the cancer and (2) treatment to relieve symptoms of the disease and the side effects of therapy (supportive care). A variety of treatment options are available, depending on the type and phase of the client's disease. The most widely used antileukemic treatment is chemotherapy (of which there are many different drugs), typically given in cycles, sometimes referred to as induction, consolidation, and maintenance (Hu, 2016; Seiter, 2017).
Administer other medications, as indicated, for example:	
Anti-infectives, such as ofloxacin (Ocuflax) and rifampin (Rifadin)	May be given prophylactically or to treat specific infection, especially in febrile client who has prolonged granulocytopenia or too few mature neutrophils (Seiter, 2017).
Colony-stimulating factors (CSFs), such as sargramostim (Leukine), filgrastim (Neupogen), and pegfilgrastim (Neulasta)	Restores WBCs destroyed by chemotherapy and reduces risk of severe infection and death in certain types of leukemia.
Avoid use of aspirin-containing antipyretics.	Aspirin can cause gastric bleeding and further decrease platelet count.
Provide nutritious diet, high in protein and calories, avoiding raw fruits, vegetables, or uncooked meats.	Proper nutrition enhances immune system. Minimizes potential sources of bacterial contamination.

### NURSING DIAGNOSIS: risk for deficient Fluid Volume

#### Possibly Evidenced By

[Hypertonic or hypotonic dehydration associated with chronic illness, malnutrition, inadequate free water, renal insufficiency or failure]; compromised regulatory system  
Active fluid loss—vomiting, hemorrhage, diarrhea  
Insufficient fluid intake—nausea, anorexia  
Factors influencing fluid needs—hypermetabolic state, fever, predisposition for kidney stone formation and tumor lysis syndrome

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Hydration NOC

Demonstrate adequate fluid volume, as evidenced by stable vital signs; palpable pulses; urine output, specific gravity, and pH within normal limits.

##### Risk Control: Dehydration NOC

Identify individual risk factors and appropriate interventions.  
Initiate behaviors or lifestyle changes to prevent development of dehydration.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Management NIC</b>	
<i>Independent</i>	
Monitor intake and output (I&O). Calculate insensible losses and fluid balance. Note decreased urine output in the presence of adequate hydration.	These symptoms can occur if circulating volume depletion (shock) is present or if complications of chemotherapy are occurring. Note: In the setting of chemotherapy induction, kidney function can be impaired by tumor lysis syndrome (TLS). TLS is the result of cancer cells being destroyed, resulting in toxins (from cell death), and the release of large amounts of potassium, phosphate, and nucleic acids into systemic circulation. This process impairs kidney renal tubular function and filtration (acute kidney injury), potentially leading to renal failure. TLS is an oncologic emergency (Larson & Pui, 2017).
Weigh daily.	Measure of adequacy of fluid replacement and kidney function. Continued intake greater than output may indicate renal insult or obstruction.
Monitor blood pressure (BP) and heart rate.	Changes may reflect effects of hypovolemia associated with bleeding or dehydration.
Evaluate skin turgor, capillary refill, and general condition of mucous membranes.	Indirect indicators of fluid status.
Note presence of nausea or fever.	Affects intake, fluid needs, and route of replacement.
Encourage liberal fluids when oral intake is resumed.	Promotes urine flow, prevents uric acid precipitation, and enhances clearance of antineoplastic drugs.
<b>Bleeding Precautions NIC</b>	
Inspect skin and mucous membranes for petechiae and ecchymotic areas; note bleeding gums, frank or occult blood in stools and urine, and oozing from invasive line sites.	Suppression of bone marrow and platelet production places client at risk for spontaneous or uncontrolled bleeding.
Implement measures to prevent tissue injury and bleeding: gentle brushing of teeth or gums with soft toothbrush, cotton swab, or sponge-tipped applicator; using electric razor instead of sharp razors when shaving; avoiding forceful nose blowing and needlesticks when possible; and using sustained pressure such as sandbags or pressure dressings on oozing puncture or intravenous (IV) sites.	Fragile tissues and altered clotting mechanisms increase the risk of hemorrhage following even minor trauma.
Limit oral care to mouth rinse, if indicated, such as a mixture of 1/4 tsp baking soda and 1/8 tsp salt in 8 oz water, or may use hydrogen peroxide in water or saline for bleeding or infected oral tissue. Avoid mouthwashes with alcohol.	When bleeding is present, even gentle brushing may cause more tissue damage. Alcohol has a drying effect and may be painful to irritated tissues.
Provide soft foods.	May help reduce risk of gum bleeding.
<b>Fluid Management NIC</b>	
<i>Collaborative</i>	
Administer IV and electrolyte solutions, as indicated.	Maintains fluid and electrolyte balance in the absence of oral intake. Hydration prevents or minimizes tumor lysis syndrome and reduces risk of renal complications. The goal of IV hydration is to improve renal perfusion and glomerular filtration, and induce a high urine output to minimize the likelihood of uric acid or calcium phosphate precipitation in the tubules. Note: IV hydration can lead to potentially dangerous fluid overload in patients with underlying acute kidney injury or cardiac dysfunction (particularly if the patient is in an edematous state). In this setting, close monitoring of vital signs and urine output is mandatory, transfusion (if needed) should be given slowly and in low volume, and diuretics can be given to maintain urine output.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications, as indicated, for example: Antiemetics: such as ondansetron (Zofran), inapsine (Droperidol), aprepitant (Emend), and dronabinol (Marinol)	Chemotherapy-induced nausea and vomiting (CINV) is one of the most feared side effects of chemotherapy. With the correct use of antiemetics, CINV can be prevented in 70% to 80% of patients (NCI, 2017d; Jordan et al, 2014). Relieving nausea and vomiting can reduce fluid deficits and enhance oral intake.
Allopurinol (Zyloprim), rasburicase (Elitek)	Drugs such as these may be given prophylactically to prevent TLS at chemotherapy induction and duration of treatment or to improve renal excretion of toxic by-products from tumor lysis. Reduces the chances of nephropathy as a result of uric acid production.
<b>Bleeding Precautions NIC</b> Monitor laboratory studies, including red blood cells, platelets, and Hgb/Hct.	Low red blood cell counts can be associated with the leukemia (anemia because of reduction/in/destruction of bone marrow cells). If Hgb and Hct are both decreased, bleeding may be occurring. Platelets are the blood cells responsible for blood clotting. When the platelet count is less than 20,000/mm <sup>3</sup> because of proliferation of WBCs or bone marrow suppression, client is prone to spontaneous bleeding.
Assist with insertion/maintain central vascular access device, such as subclavian or tunneled catheter or implanted port, as indicated.	Client with leukemia may require central vascular access to ensure delivery of intravenous therapy and to eliminate peripheral venipuncture as source of bleeding.
Administer packed RBCs, platelets, and clotting factors.	Transfusions may be required from time to time to correct anemia and support clotting. Platelets or fresh-frozen plasma (FFP) may be used to prevent or treat hemorrhage (Seiter, 2017).

**NURSING DIAGNOSIS:** acute Pain**May Be Related To**

Physical agents—enlarged organs and lymph nodes, bone marrow packed with leukemic cells

Chemical agents—antileukemic treatments

Psychological—anxiety, fear

**Possibly Evidenced By**

Verbalized/coded reports of pain

Guarding behaviors

Expressive behaviors—facial grimacing, restlessness

Changes in vital signs

**Desired Outcomes/Evaluation Criteria—Client Will****Pain Level NOC**

Report pain is relieved or controlled.

Appear relaxed and able to sleep and rest appropriately.

**Pain Control NOC**

Demonstrate behaviors to manage pain.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b> <i>Independent</i> Investigate reports of pain. Note changes in intensity (using 0 to 10 [or similar] scale) and location of pain.	Helpful in understanding client's situation and intervention needs and monitoring potential of developing complications.

(continues on page 578)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor vital signs, noting changes in blood pressure, heart rate, and breathing pattern. Note nonverbal cues, such as facial mask of pain, grimacing, crying, withdrawal, muscle tension, and restlessness.	Indicators of acute pain that can corroborate verbal reports or may be only indicators in client unable or unwilling to verbalize pain. Client with long-term condition may have acute pain superimposed on chronic pain issues and be reluctant to report new symptoms. Older client may or may not report pain but may have more pain behaviors.
Determine client's acceptable level of pain and help client achieve pain control.	Pain is a subjective experience and needs to be fully addressed by care providers to promote the best possible quality of life. Client may report having a level of discomfort that is manageable (e.g., can do desired activities when pain is reduced from a 10 to a 3). Another client may need to be pain-free in order to function.
Provide quiet environment and reduce stressful stimuli: noise, lighting, and constant interruptions.	Promotes rest and enhances coping abilities.
Place in position of comfort, and support joints and extremities with pillows and other padding.	May decrease associated bone and joint discomfort.
Reposition periodically and provide or assist with gentle range-of-motion (ROM) exercises.	Improves tissue circulation and joint mobility.
Provide comfort measures, such as massage, cool packs, and psychological support, including encouragement and presence, as appropriate.	Nonpharmacologic measures can enhance effects of medication.
Review and promote client's own comfort interventions—position and physical activity or nonactivity.	Successful management of pain requires client involvement. Use of effective techniques provides positive reinforcement, promotes sense of control, and prepares client for interventions to be used after discharge.
Evaluate and support client's coping mechanisms.	Using own learned perceptions and behaviors to manage pain can help client cope more effectively.
Encourage use of stress management techniques, such as deep-breathing exercises, guided imagery, visualization, and Therapeutic Touch.	Facilitates relaxation, augments pharmacological therapy, and enhances coping abilities.
Assist with or provide diversional activities and relaxation techniques.	Helps with pain management by redirecting attention.
<b>Collaborative</b>	
Monitor uric acid level as appropriate.	Rapid turnover and destruction of leukemic cells during chemotherapy can elevate uric acid, causing swollen painful joints in some clients. Note: Massive infiltration of WBCs into joints can also result in intense pain.
Administer medications, as indicated, for example:	
Analgesics, such as acetaminophen (Tylenol)	Given for mild pain not relieved by comfort measures. Note: Avoid aspirin-containing products because they may potentiate hemorrhage.
Opioids, such as codeine, morphine, and hydromorphone (Dilaudid)	Routinely scheduled medication administration or patient-controlled analgesia (PCA) is beneficial in preventing peaks and valleys associated with intermittent drug administration and increases client's sense of control.
Antianxiety agents, such as diazepam (Valium) and lorazepam (Ativan)	May be given to enhance the action of analgesics and opioids.

## NURSING DIAGNOSIS: Fatigue

### May Be Related To

Physiological condition (e.g., disease state; malnutrition; anemia)  
 Stressors; anxiety; negative life events; sleep deprivation  
 Altered body chemistry (e.g., medications, chemotherapy)

**NURSING DIAGNOSIS:** **Fatigue** (continued)**Possibly Evidenced By**

Insufficient energy; impaired ability to maintain usual routines or physical activity  
Tiredness, nonrestorative sleep pattern; increase in physical symptoms  
Lethargy; apathy; drowsiness; alteration in concentration  
Disinterest in surroundings; ineffective role performance

**Desired Outcomes/Evaluation Criteria—Client Will****Fatigue Level NOC**

Report improved sense of energy; measurable increase in activity tolerance.  
Participate in ADLs to level of ability.  
Demonstrate a decrease in physiological signs of intolerance—pulse, respiration, and BP remain within client's normal range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Energy Management NIC</b> <i>Independent</i> Be aware of client's particular type and severity of leukemia, as well as typical treatment-related symptoms and/or side effects.	Cancer-related fatigue (CRF) is one of the most common side effects of cancer and its treatments and can affect client in varying degrees of magnitude and at different times.
Evaluate and document client's reports of fatigue, using fatigue inventory or numeric (or similar scale), noting client's account of inability to participate in desired activities. Determine alleviating and exacerbating factors.	Evaluation and documentation of subjective reports and objective signs of fatigue are useful for the client and necessary for healthcare provider to establish baseline and effects of interventions. Effects of the disease process, anemia, tumor-induced toxins, pain, depression, and malnutrition associated with chemotherapy can be cumulative, especially during acute and active treatment phase (NCI, 2017d). Note: CRF often comes on suddenly, does not result from activity or exertion, and is not relieved by rest or sleep.
Note client's nutritional status, including appetite, ability and desire to eat, current weight, presence of generalized and muscle weakness.	Factors interfering with intake of needed nutrients can exacerbate fatigue.
Assess for pain and effectiveness of pain management interventions. Note side effects of prescribed analgesics.	Unrelieved pain often increases fatigue. And while pharmacologic pain management can improve client's sense of energy, the medications themselves can exacerbate fatigue.
Determine presence of/client's level of emotional distress (e.g., frustration, fear, anxiety, depression).	Many stressors are associated with the disease process, treatments and treatment-related symptoms, and lifestyle impact. Interventions are needed ongoing (both within and without medications) to promote client's emotional comfort and reduce associated fatigue.
Active-listen to client/SO concerns and coping. Provide information about disease process and desired treatment responses. Provide supportive presence and interventions.	Client may or may not have information about disease process or expectations for treatment. Information (e.g., that sometimes treating the anemia can reduce the fatigue) can improve client/SO's coping abilities. Additional supportive interventions may be needed when client is severely ill or fatigue is chronic.
Encourage client at home to keep a diary of daily routines and energy levels for 1 week, noting activities that increase fatigue.	Helps client prioritize activities and arrange them around fatigue pattern.
Provide quiet environment for sleep and uninterrupted rest periods. Encourage rest periods before activities known to increase fatigue.	Restores energy needed for activity and cellular regeneration and tissue healing.

(continues on page 580)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Implement (and teach) energy-saving techniques, such as sitting rather than standing, or alternate; use shower chair and furniture with good support; combine activities, reducing number of individual actions, reduce sudden or prolonged strains, and so on. Assist with ambulation or other activities, as indicated.	Maximizes available energy for self-care tasks.
Recommend frequent small, nutritious, high-protein meals and snacks throughout the day if client is able to eat.	Smaller meals require less energy for ingestion and digestion than larger meals. Increased intake provides fuel for energy. (Refer to CP: Cancer, general considerations: ND: imbalanced Nutrition: less than body requirements.)
Determine presence and level of attentional fatigue. Provide and encourage use of diversional activities, as tolerated and desired.	The planned use of attention-restoring activities (e.g., watching grandchildren play, following a simple recipe, attending a movie, window gardening) can improve mood and fatigue associated with inactivity and depression.
<b>Collaborative</b> Review laboratory studies (initial and ongoing) such as CBC and red blood cell indices, nutrition state indicators, and vitamin levels.	These lab values (among others) can help identify presence/degree of anemia and other disease- or treatment-related factors associated with fatigue.
Refer to appropriate medical providers, and assist in management of underlying condition, as indicated.	Sometimes treating the disease symptoms (e.g., anemia) will relieve the fatigue. But other interventions may be needed over time, such as discontinuation of certain anticancer drugs, implementation of dietary changes, and titration of pain medications, initiation of physical activity (e.g., graded walking program) to manage fatigue and its effect on client's quality of life.
Administer medications (e.g., nutrient components and vitamin supplements; psychostimulants and antidepressants), as indicated.	Enteral/parenteral feedings, supplemental protein, calories, or vitamins can improve energy, and medications to manage emotional issues/depression can improve mood and reduce fatigue (NCI, 2017a).
Provide supplemental oxygen, as indicated.	Maximizes oxygen available for cellular uptake, improving tolerance of activity, especially in the setting of severe anemia, cardiopulmonary or renal complications.
Administer blood and blood components, as indicated.	Correcting anemia can improve client's stamina and tolerance for activity.

### NURSING DIAGNOSIS: **deficient Knowledge regarding disease, prognosis, treatment, self-care, and discharge needs**

#### May Be Related To

Insufficient information/knowledge of resources  
Information misinterpretation

#### Possibly Evidenced By

Insufficient knowledge  
Inaccurate follow-through of instructions

#### Desired Outcomes/Evaluation Criteria—Client Will

##### **Knowledge: Acute Illness Care/Knowledge: Chronic Disease Management NOC**

Verbalize understanding of condition, disease process, and potential complications.  
Verbalize understanding of therapeutic needs.  
Initiate necessary lifestyle changes.  
Participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Review client's specific form of leukemia and treatment plan, including:  Medications, using newer classes of drugs such as <b>Bcr-Abl tyrosine kinase inhibitors</b> (e.g., imatinib mesylate [Gleevec], dasatinib [Sprycel]); <b>histone deacetylase inhibitors (HDACs)</b> (e.g., vorinostat [Zolinza]); <b>hypomethylating or demethylating agents</b> (e.g., azacitidine [Vidaza] and decitabine [Dacogen]); <b>immunomodulators</b> (e.g., lenalidomide [Revlimid], thalidomide [Thalomid]); <b>monoclonal antibodies</b> (e.g., rituximab [Rituxan]); <b>antibody-drug conjugates</b> (e.g., brentuximab vedotin [Adcetris]); <b>proteasome inhibitors</b> (e.g., bortezomib [Velcade] and carfilzomib [Kyprolis]); <b>chemotherapy agents</b> (e.g., daunorubicin [Cerubidine], mitoxantrone cytarabine [Novantone], idarubicin [Idamycin])	Treatments can include various individual and combinations of therapies.  In the past 10 years, several new drugs (and new uses for established drugs) have greatly improved rates of blood cancer cure and remission (LLS, 2014–2015). Many treatments are targeted to the specific cancer, and combining treating agents is common (Hu, 2016; LLS, 2014–2015; Seiter, 2017).
Radiation therapy	Kills cancer cells by exposure to high-energy radiation. Radiation therapy is typically part of a treatment program including drugs.
Gene therapy	Gene therapy alters a gene's DNA or RNA expression to disable oncogenes (see Glossary) and prevents the formation of corresponding oncoproteins. Gene therapy is considered "personalized medicine" that can be applied if there is enough information about the individual and/or the specific disease to tailor the treatment (LLS, 2014–2015).
Stem cell transplantation (SCT), including peripheral stem cell transplant or umbilical cord blood transplant	After chemotherapy and/or radiation, the injured bone marrow is replenished by a transplant of stem cells, which can manufacture the necessary new blood cells. Stem cell transplantation may be autologous (uses client's own stem cells) or allogenic (donor cells).
Surgery	While rare, surgery may be performed to remove an enlarged spleen or to install a venous access device to give medications and withdraw blood samples (Swierzewski, 2015).
Discuss side effects of treatment, as indicated, and possible solutions.	Client may want opportunity to prepare for certain side effects, such as temporary hair loss. Client and significant other (SO) may benefit from knowledge that certain discomforts, such as nausea, vomiting, weakness, mouth sores, bruising, and anorexia, are treatment related, not indications of escalating disease, and will subside.
Inform client and SO of potential sexual side effects of treatment and provide opportunity to consider options. Discuss sperm banking and pregnancy issues, when appropriate, before beginning treatment.	In males, permanent sterility can occur as a result of radiation when combined with certain chemotherapeutic agents. In females, menstruation may cease during the active phase of treatment, with older women subsequently experiencing menopause. Pregnancy should be avoided during treatment and for 2 to 3 years after treatment as that is when recurrence is most common. Vaginal dryness can be a distressing side effect as well.

For additional interventions, refer to CP: Cancer: General Considerations; ND: deficient Knowledge.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **risk for Infection**—alterations in mature WBCs (low granulocyte and abnormal lymphocyte count), increased number of immature lymphocytes, immunosuppression, bone marrow suppression (effects of therapy/transplant)
- **ineffective Role Performance**—situational crisis, physical illness, fatigue, stressors
- **ineffective Health Management**—difficulty managing complex treatment regimen, decisional conflicts, excessive demands, perceived benefit, powerlessness economically disadvantaged
- **interrupted Family Processes**—situational crisis (illness, disabling and expensive treatments); shift in health status of a family member, shift in family roles

## ADULT LYMPHOMAS

### I. Pathophysiology

- a. **Lymphoma** is a general term for many blood cancers that originate in the lymphatic system.
- b. Malignant growth involving reticuloendothelial and lymphoid system, resulting in accumulation of abnormal lymphocytes in lymph tissue forming masses; may travel to distant sites, including the lungs, liver, gastrointestinal (GI) tract, meninges, skin, and bones (NCI, 2017c).
- c. Major sites of lymphoid tissue are lymph nodes, spleen, thymus gland, adenoids and tonsils, and digestive tract. Lymphoma is the second most common primary malignancy occurring in the head and neck (Dunleavy, Kass, & Wilson, 2017).

### II. Classifications and treatments (Dunleavy et al, 2017; LSS, 2014–2015)

- a. Lymphomas are divided into two major categories: Hodgkin's lymphoma (HL), formerly called Hodgkin's disease, and non-Hodgkin's lymphoma (NHL).
- b. Staging (typically using the Ann Arbor Staging system I–IV) provides a general idea of how far the disease has spread and how it should be treated. This is done after testing determines which parts of the body are affected.
- c. Letters of the alphabet are also used in conjunction with the stage to further describe the lymphoma. The most important ones are A and B. For example, if the client complains of fever, weight loss, or excessive night sweats (called "B" symptoms), a "B" is added to the stage description. If none of these symptoms exist, an "A" is added. If any organ that does not belong to the lymph system is involved, it is denoted with an "E" for extranodal (organ involvement) after the stage. If the spleen is involved, the corresponding letter is "S." An "X" designation is used for bulky lymphadenopathy (a cancer with considerable tumor masses that may be felt or seen) (Dunleavy et al, 2017).
- i. Hodgkin's lymphoma (HL) is divided into two main classifications: (1) classical HL (CHL), which accounts for most cases of HL, and (2) nodular lymphocyte-predominant HL.
  1. A characteristic that distinguishes CHL is the presence of a large malignant cell called the Reed-Sternberg (R-S) cell. This characteristic does not appear in nodular lymphocyte-predominant HL.
  2. HL status is grouped for treatment (after staging) as early favorable, early unfavorable, and advanced.
  3. HL is now considered to be one of the most curable forms of cancer.

4. **HL treatments** for early stage (I and II) HL include some form of chemotherapy (usually combinations of drugs), plus limited radiation (external or internal involved field or site) therapy, and sometimes bone marrow transplantation (BMT) and peripheral blood stem cell transplantation (PBSCT). Treatment for advanced stage HL is typically combination chemotherapy (Canellos, 2016; LymphomaInfo.net, 2016; PDQ™ Adult Treatment Editorial Board, 2017).

- ii. Non-Hodgkin's lymphoma (NHL) (LSS, 2014–2015; PDQ™ Adult Editorial Board, 2017)
  1. Most common cancer of the lymphatic system
  2. Incidence is consistently higher than HL, with NHL the sixth most common cancer in the United States (LSS, 2014–2015).
  3. Divided into two broad categories: B-cell or T-cell lymphomas. B-cell lymphomas develop from abnormal B cells and account for 85% of all NHLs. T-cell lymphomas develop from abnormal T cells and account for the remaining 15% of all NHLs.
  4. B-cell lymphomas are designated as indolent (slow-growing) or (fast-growing).
    - a. **Indolent B-cell lymphomas:** These lymphomas are characterized by a slow progression because the client can remain well for several years without therapy. These lymphomas include multiple subtypes (e.g., cutaneous T cell, follicular, and small lymphocytic [SLL]). Indolent lymphomas are, however, usually not considered curable because the cancer grows too slowly to be targeted accurately by most conventional therapies (Cyberfamily Staff, 2017).
    - b. **Aggressive B-cell lymphomas:** These include diffuse large B-cell lymphoma (DLBC), and Burkitt's, mantle-cell, and lymphoblastic lymphomas. DLBC is the most common type of NHL, making up about 30% of all lymphomas (Freedman & Friedberg, 2017). The standard treatment of advanced DLBCL is combination chemotherapy plus immunotherapy.
  5. **NHL treatments** differ from person to person, depending on the type and stage and whether the disease is indolent or aggressive. In general, treatments include chemotherapy, radiation (whole body or specific zone), newer versions of

established agents, immunotherapy (such as monoclonal antibody therapy [Mab]), radioimmunotherapy (which combines radiotherapy with monoclonal antibody therapy), and stem cell bone marrow transplantation. Surgery may be performed to remove the lymphoma in certain circumstances (e.g., gastrointestinal lymphoma with perforation, or splenectomy) (Duleavy et al, 2017; LymphomaInfo.net, 2016; PDQ™ Adult Editorial Board, 2017).

### III. Etiology

- Exact causes are unknown.
- Several factors have been linked to an increased risk (Iarocci, 2017; Mayo Clinic Staff, 2017).
  - Age:** Risk of NHL generally increases with advancing age. It is most common in people 60 or older and is greatly increased in people between the ages of 80 and 84 (LLS, 2014–2015).
  - Infections:** Bacteria, viruses, and parasites have all been implicated in the development of various lymphomas, including HL and NHL. For example, human T-lymphocytic virus type 1 (HTLV-1) has been linked to adult T-cell leukemia-lymphoma (ATL); Epstein-Barr virus (EBV) has been linked to Burkitt's lymphoma; *Helicobacter pylori* (*H. pylori*) has been linked to

gastric lymphoma of mucosa-associated lymphoid tissue (MALT), a rare type of NHL.

- Medical conditions that suppress the immune system, such as HIV, rheumatoid arthritis; conditions requiring immunosuppressive therapy, such as organ transplantation
- Exposure to toxic chemicals: occupational exposure to pesticides, herbicides, or benzene and other solvents; woodworking

### IV. Statistics

- Morbidity:** In 2017, there were an estimated 630,037 people living with non-Hodgkin's lymphoma in the United States and 186,607 people living with Hodgkin's lymphoma (LLS, 2016–2017). The National Cancer Institute SEER report estimated 72,240 new cases of NH for 2017. Cancer.net estimated that 8260 people would be diagnosed with HL in 2017. The 5-year survival rate, according to Cancer.net, is 85% to 87% for HL and, according to SEER, is 71% for NHL.
- Mortality:** In 2017, according to SEER and Cancer.net, there were an estimated 21,200 deaths (1060 from HL and 20,140 from NHL).
- Cost:** In 2016, the national direct costs for care were an estimated \$14 billion (NCI, 2017b).

## GLOSSARY

**Bone marrow transplant (BMT):** Bone marrow is taken from a compatible donor or the client's own body, prior to high-dose chemotherapy and/or radiation treatment. After treatment, the marrow, which may or may not have been treated with chemotherapy, is reinfused into the patient to restore the immune system.

**Erythroderma:** Generalized redness (erythema) of the skin involving more than 90% of the body surface with variable scaliness (lesions). Skin is red and warm to touch. Client appears uncomfortable, with complaints of intense skin itching and pain and of feeling cold. The most common malignant cause is cutaneous T-cell lymphoma (CTCL) (Mistry et al, 2015).

**Hilar lymphadenopathy:** Enlargement of the tracheobronchial and pulmonary lymph nodes.

**Lymphopenia:** Low number of lymphocytes in the blood.

**Neuralgia:** Pain in the distribution of a nerve or nerve pathway.

**Normocytic, normochromic anemia:** Anemia associated with disturbances of red blood cell (RBC) formation, which is related to endocrine deficiencies, chronic inflammation, and condition in which cancer is spread widely throughout the body or, in some cases, to a relatively large region of the body.

**Pel-Ebstein fever:** Fever pattern common in HL, in which temperature varies during each 24-hour period but never reaches normal.

**Peripheral blood cell transplantation:** The most common form of stem cell transplant with the source of stem cells being the circulating blood, rather than the bone marrow. Client with NHL can have either an autologous or an

allogeneic peripheral blood cell transplant, depending on whether or not his or her own stem cells are suitable for use and whether a suitable donor can be found.

**Stem cell transplant:** Reestablishment of normal bone marrow function through the infusion of cells committed to forming a specific type of blood cell line—RBCs, white blood cells (WBCs), or platelets. The source of the cells may be from the peripheral blood, bone marrow, or umbilical cord and placenta. The donor may be the client (autologous transplant), a genetically compatible relative or individual (allogeneic transplant), or donated cord blood. Syngeneic transplant describes the use of an identical twin as donor.

**Superior vena cava syndrome (SVC):** Obstruction of venous drainage from enlarged lymph nodes due to lymphoma disease.

**Tumor lysis syndrome:** Metabolic derangement produced by rapid tumor breakdown as a consequence of therapy for some lymphomas (e.g., Burkitt's lymphoma, lymphoblastic lymphoma, or B-cell acute lymphoblastic leukemia). It is characterized by hyperuricemia because of DNA breakdown, hyperkalemia because of cytosol breakdown, hyperphosphatemia because of protein breakdown, and hypocalcemia secondary to hyperphosphatemia. As phosphate level goes up, serum calcium goes down. These derangements can result in acute renal failure, cardiac dysrhythmias, and sudden death from hyperkalemia or hypocalcemia. *Note:* In studies, laboratory evidence of TLS has been found much more frequently (42%) than the clinical symptoms of TLS (6%) (Ikeda et al, 2017).

## CARE SETTING

The client receives acute inpatient care on a medical unit for initial evaluation and treatment and then at the community level. This plan of care addresses potential complications that may be encountered in acute care or palliative settings.

## RELATED CONCERNS

Adult leukemias, page 569  
Anemias—iron deficiency, anemia of chronic disease, pernicious, aplastic, hemolytic, page 541  
Cancer: general considerations, page 945  
Psychosocial aspects of care, page 835  
Sepsis/septic shock, page 772  
Upper gastrointestinal bleeding, page 340

## CLIENT ASSESSMENT DATABASE

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- Fatigue
- Weakness or general malaise
- Loss of productivity and decreased exercise tolerance

- Diminished strength, slumping of the shoulders, slow walk, and other cues indicative of fatigue

#### CIRCULATION

- Palpitations, chest pain
- Painless swelling of one or more lymph nodes (common early sign in both HL and NHL)

- Tachycardia, dysrhythmias
- Painless swelling of the lymph nodes, beginning in the neck and progressing to axillary, inguinal, mediastinal, and mesenteric regions
- Cyanosis and edema of the face and neck or arms due to superior vena cava syndrome, a rare occurrence, but more common in lymphomas with large mediastinal mass
- Pallor
- Diaphoresis, night sweats

#### EGO INTEGRITY

- Increased stress from school, job, family
- Fear related to diagnosis and possibility of dying
- Concerns about diagnostic testing and treatment modalities—chemotherapy, radiation therapy, surgery
- Financial concerns—hospital costs, treatment expenses, fear of losing job-related benefits because of lost time from work
- Relationship status—fear and anxiety related to being a burden on family and significant other (SO)

- Varied behaviors—angry, withdrawn, passive

#### ELIMINATION

- Changes in characteristics of urine or stool
- History of intestinal obstruction, such as intussusception or malabsorption syndrome (infiltration from retroperitoneal lymph nodes)

- Decreased output, dark and concentrated urine, anuria
- Abdomen: Right upper quadrant (RUQ) tenderness and enlargement on palpation (hepatomegaly); left upper quadrant (LUQ) tenderness and enlargement on palpation (splenomegaly)
- Bowel and bladder dysfunction (spinal cord compression occurs late)

#### FOOD/FLUID

- Anorexia
- Dysphagia (pressure on the esophagus)
- Severe nausea and vomiting, often treatment related
- Recent unexplained weight loss
- Drenching night sweats of whole body (HL)

- Abdominal distention, enlarged spleen (NHL)
- Ascites and edema of the lower extremities (inferior vena cava obstruction from intra-abdominal lymph node enlargement associated with NHL)

**MAY REPORT (continued)****MAY EXHIBIT (continued)****NEUROSENSORY**

- Nerve pain reflecting compression of nerve roots by enlarged lymph nodes in the brachial, lumbar, and sacral plexuses
- Muscle weakness, paresthesia

**PAIN/DISCOMFORT**

- Bone pain (NHL)
- Tenderness or pain over involved lymph nodes—in or around the mediastinum (chest)
- Stiff neck
- Abdominal pain (NHL)

**RESPIRATION**

- Dyspnea on exertion or at rest, chest pain
- Persistent cough with shortness of breath (HL)

**SAFETY**

- History of frequent or recurrent infections (abnormalities in cellular immunity predispose client to systemic herpes virus infections, tuberculosis [TB], toxoplasmosis, or bacterial infections); history of infectious mononucleosis (higher risk of HL in client with high titers of EBV)
- HIV positive: Risk of NHL is higher in these clients compared with the general population. However, antiretroviral therapy (ART) has cut the rate of NHL in HIV-positive people significantly (Blahd, 2016).
- Administration of immunosuppressive drugs after organ transplantation
- History or presence of ulcers, *H. pylori*
- Waxing and waning pattern of lymph node size
- Cyclical pattern of evening temperature elevations lasting a few days to weeks (Pel-Ebstein fever) followed by alternate afebrile periods; drenching night sweats without chills
- Rash, itching
- Whole-body red, itchy skin

**SEXUALITY**

- Concerns about sterility, fertility, and pregnancy
- Decreased libido

**TEACHING/LEARNING**

- Familial risk factors—higher incidence of HL among families than in general population
- Occupational exposure to pesticides and herbicides or other chemicals—benzene, creosote, lead, formaldehyde, paint thinner

**DISCHARGE PLAN CONSIDERATIONS**

- May need assistance with medical therapies and supplies, self-care activities, and homemaker or home maintenance tasks, transportation, shopping

► Refer to section at end of plan for postdischarge considerations.

- Lethargy, withdrawal, general lack of interest in surroundings

- Self-focusing; guarding behaviors

- Dyspnea, tachypnea
- Dry, nonproductive cough (hilar lymphadenopathy)
- Hoarseness, laryngeal paralysis (pressure from enlarged nodes on the laryngeal nerve)

- Unexplained, intermittent persistent fever without symptoms of infection (HL)
- Generalized pruritus and urticaria (HL)
- Scleral icterus and a generalized jaundice related to liver damage and consequent obstruction of bile ducts by enlarged lymph nodes (may be a late sign)
- Tonsillar or other lymph node enlargement
- Patchy areas of loss of melanin pigmentation (vitiligo)
- Ethroderma (red skin inflamed skin on more than 90% of the body)

## DIAGNOSTIC STUDIES

### TEST

### WHY IT IS DONE

### WHAT IT TELLS ME

## BLOOD TESTS

Blood studies may vary from completely normal to marked abnormalities.

- **Complete blood count (CBC):** Battery of screening tests, which typically includes hemoglobin (Hgb); hematocrit (Hct); RBC count, morphology, indices, and distribution width index; platelet count and size; and WBC count and differential.
- **Differential WBCs:** Percentage of each of the five types of mature WBCs: neutrophils, lymphocytes (B cells and T cells), monocytes, eosinophils, and basophils.
- **Platelets:** Platelets have essential function in coagulation.
- **Erythrocyte sedimentation rate (ESR):** Useful to monitor clients in remission and to detect early evidence of recurrence of disease.
- **Serum lactate dehydrogenase (LDH):** Substance released by tumors; important prognostic indicator in NHL.

*Note:* In stage I, few clients have abnormal blood findings.

RBC production may be decreased due to the lymphoma and suppression of bone marrow activity. Client with HL may have mild to severe normocytic, normochromic anemia associated with hypersplenism. WBCs are variable; that is, they may be normal, decreased, or markedly elevated.

Increased percentage of neutrophils, monocytes, basophils, and eosinophils may be found initially, but these lymphocytes can be profoundly decreased by suppression of marrow activity or by lymphoma treatments. A relative or absolute lymphopenia is a late sign.

Decreased in bone marrow involvement or as a side effect of therapy.

Elevated during active stages and indicates inflammatory or malignant disease.

Elevated; may indicate a more aggressive form of NHL.

## OTHER DIAGNOSTIC STUDIES

- **Chest x-ray:** Determines lung involvement, status of airway, and presence of complications.
- **X-rays or bone scans of thoracic, lumbar vertebrae, proximal extremities, pelvis, or areas of bone tenderness:** Determines areas of involvement and assists in staging.
- **Computed tomography (CT) scans: e.g., head, neck, chest, abdomen, pelvis:** Generally accepted as the primary staging modality for suspected lymphoma and for evaluating therapy response.
- **Positron emission tomography (PET) scan:** Type of nuclear scan that follows course of injected radioactive glucose.
- **Positron emission tomography (PET)-CT scan:** Procedure that combines pictures from both procedures. (Done at the same time on the same machine.)
- **Abdominal ultrasound:** Aids in identifying additional sites and assesses organ status.
- **Biopsies (fine-needle aspiration or excisional)**
- **Bone marrow:** Sampling may be done by needle aspirate or excisional biopsy to determine bone involvement and staging.
- **Cytogenetic analysis:** Cells are studied to see if chromosomal abnormalities are present.
- **Flow cytometry:** Method of counting types of cells with fluorescent tags on the surfaces of the cells.
- **Laparotomy or laparoscopy**

May reveal mediastinal or hilar adenopathy, nodular infiltrates, or pleural effusions.

Bone lesions often associated with acute form of adult T-cell or diffuse large B-cell lymphomas.

Used to assess the extent of disease and responsiveness to therapy. Detects enlarged lymph nodes as well as enlargement of liver and spleen. *Note:* CT scanning of the head and/or neck is mandatory for client with head and neck presentation or symptoms of cranial neuropathies such as hearing loss, vertigo, or visual changes (Dunleavy et al, 2017). Most people have repeated CT scans to monitor the status of their disease or evaluate for recurrence.

Malignant cells take up more glucose than normal cells. Thus, PET scanning identifies hypermetabolic areas that suggest malignancy and assists with staging of the disease. *Note:* Combined images from PET-CT scans provide a more detailed picture than either test would make by itself.

Evaluates extent of involvement of retroperitoneal lymph nodes and determines size of kidneys and patency of urinary tract in preparation for chemotherapy.

Establishes diagnosis and cell type involved. *Note:* Presence of Reed-Sternberg cells from blood and lymph cells confirms diagnosis of HL (Foster & Prevost, 2012).

Detects different types of chromosome aberrations and can be used to plan treatment and measure the results of treatment. Often used to determine the type of lymphoma cells present. For example, each disease subtype has a specific pattern of markers on its cell surface.

For some of the more aggressive types of lymphoma, this test can sometimes detect residual disease long before it grows large enough to be detected by any other means.

Procedures may be done to examine organs inside abdomen for signs of disease and to obtain tissue samples for cytology.

**NURSING PRIORITIES**

1. Provide physical and psychological support during extensive diagnostic testing and treatment regimen.
2. Prevent complications.
3. Alleviate pain.
4. Provide information about disease process, prognosis, and treatment needs.

**DISCHARGE GOALS**

1. Complications prevented or minimized.
2. Individual situation dealt with realistically.
3. Pain relieved or controlled.
4. Disease process, prognosis, possible complications, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

**\*\*\*Refer to CPs: Cancer: General Considerations for shared related nursing diagnoses such as Pain, Fatigue, Nausea, Nutrition, Anxiety, Self-Esteem and Grieving, to accomplish corresponding nursing priorities and discharge goals.**

**See also other related cancer care plans for nursing interventions related to treatments such as radiation, chemotherapy, and bone marrow transplant.**

**NURSING DIAGNOSIS:** risk for impaired Gas Exchange**Possibly Evidenced By**

[Altered oxygen-carrying capacity of blood]

[Tracheobronchial obstruction (disease invasion: enlarged mediastinal nodes and airway edema (HL and NHL), superior vena cava syndrome (NHL)]

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status: Ventilation NOC**

Maintain a normal, effective respiratory pattern, free of dyspnea, cyanosis, or other signs of respiratory distress, and arterial blood gases (ABGs) within normal limits (WNL).

**ACTIONS/INTERVENTIONS****RATIONALE****Ventilation Assistance NIC****Independent**

Ascertain presence of lymphoma affecting head and neck; determine client's particular disease condition, stage, and severity of lymphoma and treatment status (e.g., post-surgery, in chemotherapy, or experiencing late and long-lasting treatment side effects).

Aids in establishing baseline respiratory status and can point to potential cause and needed interventions if client is having difficulty breathing. For example, symptoms may be associated with late-stage primary lymphoma of head or neck (not easily treated). Conversely, client might be in the immediate postoperative phase for throat and neck surgery with tissue and airway edema (more easily treated condition). Also, chemotherapies, radiation, or splenectomy render the client more prone to lung infections and lung damage. While both conditions can lead to shortness of breath, lung damage is much more likely to present poor prognosis. Note: It has been established that lymphoma is the second most common primary malignancy occurring in the head and neck (Dunleavy et al., 2017).

Assess and monitor respiratory rate, depth, and rhythm.

Note reports of dyspnea or use of accessory muscles, nasal flaring, and altered chest excursion.

Changes (e.g., tachypnea, dyspnea, and use of accessory muscles) may indicate progression of disease- or treatment-related respiratory involvement, requiring prompt intervention.

Place client in position of comfort, usually with head of bed elevated or sitting upright, leaning forward with weight supported on arms, and feet dangling.

Maximizes lung expansion, decreases work of breathing, and reduces risk of aspiration.

Reposition and assist with turning periodically.

Promotes aeration of all lung segments and mobilizes secretions.

Instruct in and assist with deep-breathing techniques and pursed-lip or abdominal diaphragmatic breathing, if indicated.

Helps promote gas diffusion and expansion of small airways. Provides client with some control over respiration, helping to reduce anxiety.

(continues on page 588)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Evaluate skin color, noting pallor or development of cyanosis, particularly in nailbeds, ear lobes, and lips.	Proliferation of WBCs and anemia can reduce oxygen-carrying capacity of the blood, leading to systemic hypoxemia.
Assess respiratory response to activity. Note reports of dyspnea and increased fatigue. Schedule rest periods between activities.	Decreased cellular oxygenation reduces activity tolerance. Rest reduces oxygen demands and minimizes fatigue and dyspnea.
Encourage energy-saving techniques, such as rest periods before and after meals, use of shower chair, and sitting for care.	Aids in reducing fatigue and dyspnea and conserves energy for cellular regeneration and respiratory function.
Promote bedrest and provide care as indicated during acute or prolonged exacerbation.	Worsening respiratory involvement and hypoxia may necessitate cessation of activity to prevent more serious respiratory compromise.
Encourage expression of feelings. Acknowledge reality of situation and normality of feelings.	Anxiety increases oxygen demand, and hypoxemia potentiates respiratory distress or cardiac symptoms, which in turn escalates anxiety.
Provide calm, quiet environment.	Promotes relaxation, conserving energy and reducing oxygen demand.
Observe for neck vein distention, headache, dizziness, periorbital or facial edema, dyspnea, and stridor.	NHL client is at risk for superior vena cava syndrome (SVC) when lymphoma has invaded the mediastinum, which can result in tracheal deviation and airway obstruction, an oncological emergency.
Provide support to family and SOs.	Development of SVC is very frightening for client and family because it may indicate the end stage of disease process. Keeping family informed may diminish their anxiety and minimize transmission to client.
<b>Collaborative</b>	
Assist with treatment of disease process and side effects of therapies.	Interventions to correct or manage anemia can improve oxygenation.
Provide supplemental oxygen by appropriate route.	Maximizes oxygen available for circulatory uptake, aids in reducing hypoxemia improving tolerance of activity, especially in the setting of severe anemia, cardio-pulmonary or renal complications.
Monitor laboratory studies, such as ABGs and pulse oximetry.	Measures adequacy of respiratory function and effectiveness of therapy.
Administer analgesics and tranquilizers, as indicated.	Reducing physiological responses to pain and anxiety decreases oxygen demands and may limit respiratory compromise.
Assist with respiratory treatments and adjuncts, such as intermittent positive-pressure breathing (IPPB) and incentive spirometer, if appropriate.	Promotes maximal aeration of all lung segments, preventing atelectasis.
Assist with intubation and mechanical ventilation.	May be necessary to support respiratory function until airway edema is resolved in acutely ill hospitalized client.
Prepare for other procedures—thrombolysis, emergency radiation, endovascular stenting, or thoracentesis when indicated.	SVC rarely presents as an acute emergency, but when it does, life-saving treatments must be immediately carried out.

## NURSING DIAGNOSIS: acute/chronic Pain

### May Be Related To

Physical injury agents—[neoplasm of lymphoid tissue; disease invasion of organs]; nerve compression, ischemia; [treatment-related damage to peripheral nerves]

Chemical injury agents—chemotherapy

Alteration in sleep pattern, anxiety, fear

**NURSING DIAGNOSIS:** **acute/chronic Pain** (continued)**Possibly Evidenced By**

Self-report of pain intensity and characteristics using a standardized scale  
 Guarding behaviors  
 Expressive behaviors—facial grimacing, restlessness  
 Changes in vital signs (acute pain)

**Desired Outcomes/Evaluation Criteria—Client Will****Pain Level NOC**

Report pain is relieved or controlled.  
 Appear relaxed and able to sleep and rest appropriately.

**Pain Control NOC**

Demonstrate behaviors to manage pain.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute/Chronic NIC</b>	
<b>Independent</b>	
Identify contributing factors (i.e., diagnosed lymphoma of one or body systems, late-stage disease, side effects of cancer therapies).	Pain associated with lymphomas is often twofold: (1) primary pain is caused by the cancer itself. Many NHL patients experience bone and/or nerve pain. And, since the disease may develop in many parts of the body—such as the neck, groin, breastbone, and underarm—pain varies for each individual. (2) Secondary pain may result from common cancer treatments such as chemotherapy, radiation therapy, and surgery. For example, chemotherapy may lead to peripheral neuropathy, a condition that causes tingling, numbness, and weakness in the hands and arms or legs and feet.
Investigate reports of pain. Note changes in intensity, character, and location of pain.	Pain with lymphomas may be (1) acute (depending on stage of disease and organs involved), (2) chronic (and acute superimposed upon chronic), and (3) breakthrough (triggered by a particular activity or change in medications) in a client already on pain management measures.
Monitor vital signs, noting changes in blood pressure, heart rate, and breathing pattern. Note nonverbal cues, such as facial mask of pain, grimacing, crying, withdrawal, muscle tension, and restlessness.	Indicators of acute pain that can corroborate verbal reports or may be only indicators in client unable or unwilling to verbalize pain. Client with long-term condition may have acute pain superimposed on chronic pain issues and be reluctant to report new symptoms. Older client may or may not report pain but may have more pain behaviors.
Determine client's acceptable level of pain and help client achieve pain control.	Pain is a subjective experience and needs to be fully addressed by care providers to promote the best possible quality of life. Client may report having a level of discomfort that is manageable (e.g., can do desired activities when pain level is reduced from a 10 to a 3). Another client may need to be pain-free in order to function.
Provide quiet environment and reduce stressful stimuli: noise, lighting, and constant interruptions.	Promotes rest and enhances coping abilities.
Provide comfort measures, such as massage, cool packs, and psychological support, including encouragement and presence, as appropriate.	Nonpharmacologic measures can enhance effects of medication.
Review and promote client's own comfort interventions—position and physical activity or nonactivity.	Successful management of pain requires client involvement. Use of effective techniques provides positive reinforcement, promotes sense of control, and prepares client for interventions to be used after discharge.
Evaluate and support client's coping mechanisms.	Using own learned perceptions and behaviors to manage pain can help client cope more effectively.

(continues on page 590)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage use of stress management techniques, such as deep-breathing exercises, guided imagery, visualization, and Therapeutic Touch.	Facilitates relaxation, augments pharmacological therapy, and enhances coping abilities.
Assist with or provide diversional activities and relaxation techniques.	Helps with pain management by redirecting attention.
<b>Collaborative</b> Collaborate in treatment of underlying condition(s) and protocols for management of treatment side effects.	***Note: There is no one-size-fits-all treatment plan for lymphomas, because while there are similarities in lymphomas, they are also unique to the individual and subtype of the disease. Therefore, treatments are highly individualized. Thus, nurse is referred to physician treatment plan for each individual and pharmacologic/medical resources for information regarding treatment types and related concerns for each one.
Administer other medications, as indicated, for example:	
Analgesics, such as acetaminophen (Tylenol), and NSAIDs ( <i>including and not limited to</i> ) motrin (Advil), naproxen (Naprosyn), and ketorolac (Toradol)	Given for mild to moderate acute and chronic pain not relieved by comfort measures. Note: Avoid aspirin-containing products because they may potentiate hemorrhage.
Opioids ( <i>including and not limited to</i> ) (1) codeine, morphine, and hydromorphone (Dilaudid) and (2) fentanyl (Duragesic), hydrocodone (Vicodin), and oxycodone (Oxycontin)	Opioids may be used for acute and chronic pain. Typically, those in list 1 are used to manage disease-related organ pain and breakthrough pain. Drugs in list 2 are often needed to manage the chronic pain syndromes often associated with lymphomas.
Antianxiety agents, such as diazepam (Valium) and lorazepam (Ativan)	May be given to enhance the action of analgesics and opioids.

## NURSING DIAGNOSIS: Nausea

### May Be Related To

Treatment regimen [chemotherapeutic agents; radiation therapy]  
Gastrointestinal irritation

### Possibly Evidenced By

Gagging sensation  
Aversion toward food

### Desired Outcomes/Evaluation Criteria—Client Will

#### Nausea & Vomiting Severity NOC

Be free of nausea.

#### Nausea & Vomiting Disruptive Effects NOC

Manage nausea as evidenced by acceptable level of dietary intake.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nausea Management NIC</b> <i>Independent</i> Identify client at risk for nausea and vomiting (e.g., receiving chemotherapy treating, presence of localized GI disease, pain).	Nausea is associated with both the lymphoma condition and treatment, which can result in severe discomfort, malnutrition, and fluid deficits. Note: Chemotherapy-induced nausea and vomiting (CINV) is one of the most feared side effects of chemotherapy. With the correct use of antiemetics, CINV can be prevented in 70% to 80% of patients (Jordan et al, 2014; NCI, 2017a).
Assess/document the presence and severity of nausea ongoing.	Helps identify therapy needs and response to interventions.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Control environmental factors, such as strong or noxious odors or noise. Avoid overly sweet, fatty, or spicy foods.	Can trigger nausea and vomiting response.
Encourage use of relaxation techniques, such as visualization, guided imagery, and moderate exercise before meals.	May prevent onset or reduce severity of nausea, decrease anorexia, and enable client to increase oral intake.
Provide or encourage frequent oral hygiene.	Prevents drying of mucosa, promotes comfort, and reduces sour taste sometimes associated with cancer therapies.
Evaluate effectiveness of antiemetic agents.	Individuals respond differently to all medications. First-line antiemetics may not work, requiring alteration in or use of combination drug therapy.
Identify client who experiences anticipatory nausea or vomiting and take appropriate measures.	Psychogenic nausea and vomiting occurring before chemotherapy generally does not respond to antiemetic drugs. Change of treatment environment or client routine on treatment day may be effective.
Encourage open communication regarding anorexia.	Often a source of emotional distress, especially for SO who wants to feed client frequently. When client refuses, SO may feel rejected or frustrated.
Adjust diet before and immediately after treatment (such as providing clear, cool liquids; light or bland foods; dry crackers; toast), as indicated.	The effectiveness of diet adjustment is individualized in relief of posttherapy nausea. Clients must experiment to find best solution.
<b>Collaborative</b> Refer to other healthcare providers and services as indicated.	Assistance may be needed over time from various experienced providers (e.g., nutritionist/dietary services, oncology physician, nurse, and pharmacist) who provide advice and a comprehensive coordinated approach to treating cancer-associated nausea.
Administer medications, as indicated, for example:	Antiemetics may be given prophylactically or on a regular schedule during and after treatments. Note: Relieving nausea and vomiting can reduce fluid deficits, enhance oral intake, and greatly improve client's quality of life.
Antiemetics: such as ondansetron (Zofran), inapsine (Droperidol), aprepitant (Emend), and dronabinol (Marinol)	Most antiemetics act to interfere with stimulation of the vomiting center in the brain, and chemoreceptor trigger zone agents also act peripherally to inhibit reverse peristalsis.
Antacids and proton pump inhibitors, such as esomeprazole (Nexium), lansoprazole (Prevacid), and pantoprazole (Protonix)	Minimizes gastric irritation, decreases nausea, and reduces risk of mucosal ulceration. Note: Client with <i>H. pylori</i> gastritis is at increased risk for lymphoma; therefore, it is conceivable that client with lymphoma may have gastritis or ulcers associated with <i>H. pylori</i> .

## NURSING DIAGNOSIS: Sexual Dysfunction

### May Be Related To

Altered body structure or function (e.g., disease process, surgery, chemotherapy, radiation)

### Possibly Evidenced By

Alteration in sexual activity/satisfaction

Actual or perceived limitations

Insufficient knowledge/misinformation about sexual function

[Change in relationship with SO]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Sexual Functioning NOC

Verbalize understanding of individual reasons for sexual problems.

Identify stressors in lifestyle that may contribute to the dysfunction.

Discuss concerns about body image, sex role, and desirability as a sexual partner with partner or SO.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Sexual Counseling NIC</b>	
<b>Independent</b>	
Assess knowledge of client and SO regarding sexual function and effects of current situation.	Lymphomas often affect the relatively young in their reproductive years, who may be less knowledgeable about the possibilities of change.
Collaborate with other healthcare team members in informing client and partner of potential sexual side effects of treatment plans and provide opportunity to consider options. Discuss sperm banking and pregnancy issues, when appropriate, before beginning treatment.	Some lymphomas and the treatments used for them can affect male and female sexual development, libido, fertility, and the success of pregnancy. In males, impotence and permanent sterility can occur as a result of radiation when combined with certain chemotherapeutic agents. In females, menstruation may cease during the active phase of treatment, and infertility may occur. The woman's age during treatment and certain chemotherapy regimens (e.g., type and dose of alkylating agent) are more likely than others to impact fertility. In addition, side effects of treatment can impact sexual enjoyment (e.g., vaginal dryness and atrophy of vaginal tissues) but can be managed when client and partner are given information and resources (Harel et al, 2010; Recklitis et al, 2010).
Identify preexisting and current stress factors that may be affecting the relationship.	Client may be concerned about other issues, such as job, financial, and illness-related problems.
Determine specific pathophysiology involved and impact on, or perception of, individual.	Client's perception of the individual effects of this illness is crucial to planning interventions that will be appropriate to those affected.
Assist with treatment of underlying condition.	As illness is treated and client can see improvement, hope is restored and client can begin to look to the future.
Provide factual information.	Promotes trust in caregivers.
Encourage and accept expressions of concern, anger, grief, and fear.	Helps client identify feelings and begin to deal with them.
Encourage client to share thoughts and concerns with partner and to clarify values and impact of condition on relationship.	Helps couple begin to deal with issues that can strengthen or weaken relationship.
<b>Collaborative</b>	
Refer to appropriate community resources or support groups for sexual dysfunction, such as the American Cancer Society.	Provides information about resources that are available to help with individual needs. Meeting with others who are dealing with the effects of devastating illness can help client and family.
Provide written material, informational websites such as Fertile Hope, and other resources appropriate to age and situation.	Reinforces information client has received regarding sexual and fertility issues.
Refer to psychiatric clinical nurse specialist or professional sexual therapist, as indicated.	May need additional in-depth assistance to resolve existing problems.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding disease process, prognosis, treatment regimen, self-care, and discharge needs**

**May Be Related To**

Lack of exposure, recall  
Insufficient information; misinformation presented by others  
Insufficient knowledge of resources  
Alteration in cognitive functioning

**Possibly Evidenced By**

Insufficient knowledge  
Inaccurate follow-through of instruction

<b>NURSING DIAGNOSIS:</b> <b>deficient Knowledge regarding disease process, prognosis, treatment regimen, self-care, and discharge needs</b> (continued)	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Knowledge: Cancer Management NOC</b>	
ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b>	
<i>Independent</i>	
Review with client and SO their understanding of client's diagnosis and outlook.	Although lymphomas are complex and have intensive treatment regimens, the outlook has improved in recent years. The 5-year survival rate after treatment in both categories of lymphomas has improved significantly, and many people live with lymphoma in remission.
Review potential treatments client may be considering.	May assist client and SO in making informed choices. Note: In general, the goal of therapy is remission of the lymphoma, and treatments vary according to the disease process and stage.
Various combinations of chemotherapy agents and/or radiation therapy	Chemotherapy and radiation therapy are the most commonly used treatments and may be used alone or combined. Chemotherapy is a systemic treatment that uses a combination of several drugs, given by IV injection or by mouth, typically given in cycles, based on the duration of the drug's effect and other factors. Radiation therapy targets and kills cancer cells in a specific area, using an external beam (EBRT) or radioisotope-targeted therapy (see below). Since lymphoma cells are likely to be present in widespread areas, radiation therapy is not commonly used alone.
Interferon-alpha (INF- $\alpha$ ) and monoclonal antibodies, such as rituximab (Rituxan) and alemtuzumab (Campath)	Biological therapies may be used to treat HL or NHL.
Targeted therapies such as:	In this therapy, radioisotopes are attached to monoclonal antibodies and delivered intravenously to target and destroy specific cancer cells. By delivering the radiation directly to the tumor cells, this treatment helps limit toxic effects on normal tissues.
Stem cell transplantation	Stem cell transplant from bone marrow is now standard therapy for selected clients with NHL. May be combined with high-dose chemotherapy for clients with HL who have relapsed or who have experienced a failed primary chemotherapy regimen.
Discuss potential complications relative to specific therapeutic regimen.	Receiving radiation or chemotherapy increases the risk of contracting another type of lymphoma or another type of cancer, so client will continue to need monitoring after treatment. After 5 disease-free years, however, risk becomes close to normal.
Emphasize need for ongoing medical follow-up, posttreatment surveillance, and testing.	After completion of primary therapy, appropriate tests will be repeated to determine efficacy of therapy. Also, monitoring for certain late or long-term side effects of HL treatment (e.g., fertility issues, infections, thyroid dysfunction) are continued (ACS, 2017c).

(continues on page 594)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Identify signs and symptoms requiring further evaluation, such as cough, fever, chills, malaise, dyspnea, weight gain, slow pulse, decreased energy level, intolerance to cold; moderate fever, chest pain, dry cough, dyspnea, rapid pulse (pericarditis [rare]); or dyspnea, fatigue, chest pain, dizziness, or syncope (cardiomyopathy [rare]).	Prompt intervention can identify recurrence or perhaps limit progression of complications, thereby reducing further debilitating effects.
Recommend regular exercise in moderation, with adequate rest. Discuss energy conservation techniques. Refer for physical therapy or cancer exercise program, as indicated.	Promotes general well-being. Note: Fatigue is associated with disease process and treatment regimen as well as developing complications. Therefore, balancing activity with rest enhances client's ability to perform activities of daily living (ADLs).
Recommend or refer to appropriate community resources—support groups, social worker, counselor, pastor; home health assistance, medical equipment and supplies; hospice; and Lymphoma Research Foundation and American Cancer Society.	Client and SO can benefit from many available resources and networks for such help as care assistance, transportation to treatments, sources of financial resources, and long-term support or counseling.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **ineffective Health Management**—complexity of therapeutic regimen, decisional conflicts, economic difficulties, excessive demands made on individual or family, perceived benefits, powerlessness
- **risk for Infection**—inadequate secondary defenses: alterations in mature WBCs (low granulocyte and abnormal lymphocyte count), increased number of immature lymphocytes, immunosuppression, bone marrow suppression (effects of therapy/transplant)
- **ineffective Role Performance**—situational crisis, physical illness, fatigue, stress
- **interrupted Family Processes**—situational crisis (illness, disabling and expensive treatments); shift in health status of a family member, shift in family roles

# Renal and Urinary Tract Disorders

## ACUTE KIDNEY INJURY (ACUTE RENAL FAILURE)

### I. Pathophysiology

Acute kidney injury (AKI) has been defined as a sudden decrease in kidney function that happens within a few hours or few days, which may or may not be associated with a decrease in urine output, and is usually marked by a rise in serum creatinine concentration or by azotemia (a rise in blood urea nitrogen [BUN] concentration). The term *acute renal failure* is used when the kidney injury results in the need for renal replacement therapies (RRT), including (but not limited to) intermittent hemodialysis.

### II. Stages and Phases (Dirkes, 2015; Palevsky, 2017)

Several classifications have been used over time to describe kidney failure. In recent years, more work has been applied to defining and classifying acute kidney injury (formerly called acute renal failure) including:

- a. In 2012, the Kidney Disease Improving Global Outcomes (KDIGO) work group released clinical practice guidelines for AKI to improve definition and staging criteria. These define AKI as **any** of the following:
  - i. Increase in serum creatinine by 0.3 mg/dL or more within 48 hours, **OR**
  - ii. Increase in serum creatinine to 2.5 times baseline or more within the last 7 days, **OR**
  - iii. Urine output less than 0.5 mL/kg/h for 6 hours (Acute Kidney Injury Work Group, 2012).
- b. AKI has four phases, described as:
  - i. Onset: has a triggering event, renal blood flow is diminished; lasts hours to days
  - ii. Oliguric/anuric: BUN and creatinine (Cr) are elevated; electrolyte and acid base disturbances present; may last 8 to 14 days (or longer), depending on cause and renal replacement therapies.
  - iii. Diuretic: occurs as AKI is corrected; increased glomerular filtration rate (GFR); typically lasts 1 to 2 weeks
  - iv. Recovery: normalization of fluid and electrolyte imbalances. GFR returns to 70% to 80% of normal; lasts several months to a year.
- c. Urine output phases are described as anuria, oliguria, and nonoliguria and can point to causes of AKI. *Note:* Approximately 50% to 60% of all causes of AKI are nonoliguric (Workeneh et al, 2017).
  - i. Anuria (<100 mL/d): may be associated with such conditions as urinary tract obstruction, renal artery

obstruction, rapidly progressive glomerulonephritis, and bilateral diffuse renal cortical necrosis

- ii. Oliguria (100–400 mL/d): may be associated with conditions such as prerenal failure and hepatorenal syndrome
- iii. Nonoliguria (>400 mL/d): may be associated with conditions such as acute interstitial nephritis, acute glomerulonephritis, partial obstructive nephropathy, nephrotoxic and ischemic acute tubular necrosis (ATN), radiocontrast-induced AKI, and rhabdomyolysis

### III. Etiology (National Kidney Foundation, 2017; Workeneh et al, 2017)

- a. Multiple causes include conditions causing decreased blood flow (prerenal), diseases or conditions causing direct damage to kidney (intrarenal), and blockage of structures of the urinary tract (postrenal).
  - i. Prerenal failure: blood volume depletion due to hemorrhage, “third-space” sequestration of fluid as in edema or ascites in advanced liver disease, or burns; dehydration due to gastrointestinal (GI) losses or overuse of diuretics; septic or anaphylactic shock; heart failure (HF) with renal insufficiency, myocardial infarction (MI), trauma; renal artery obstruction; and certain nephrotoxic drugs, such as nonsteroidal anti-inflammatory drugs (NSAIDs), cyclooxygenase inhibitors, angiotensin-converting enzyme (ACE) inhibitors; synthetic cannabinoids (SCs).
  - ii. Intrarenal (intrinsic) failure: resulting from direct injury with structural and functional damage to kidney from ischemia, hypoperfusion, and primary kidney disease. Can be caused by infections (*Note:* Sepsis is one of the most common causes of AKI); blood transfusion reaction, renal artery stenosis; and direct damage from nephrotoxic substances, such as radiocontrast media, cyclosporine, heavy metals (e.g., lead, mercury), cytotoxic drugs (e.g., certain chemotherapy agents), and certain antibiotics (e.g., carbamiphenilins, aminoglycosides).
  - iii. Postrenal failure: most commonly occurs with stones in the ureters, bladder, or urethra; from trauma or edema associated with infection, prostatic hypertrophy, or cancer; cervical cancer; strictures of renal artery

(continues on page 596)

**II. Risk factors**—While there are many risk factors, the older client (75 or older) is at particular risk. This may be due to age-related structural and functional changes in the kidney; comorbid conditions (e.g., diabetes, hypertension, influenza, sepsis, heart or liver failure), polypharmacy (including a variety of nephrotoxic drugs) and an increase in hospitalizations, and high-risk medical and surgical procedures (Thornburg & Gray-Vickrey, 2016; Workeneh et al, 2017).

**III. Statistics**

- a. Morbidity: Infections commonly complicate the course of AKI and have been reported to occur in as many as 33% of patients with AKI. Neurologic signs of uremia are a common complication of AKI and have been reported in approximately 38% of patients with AKI (Workeneh et al,

2017). In one study, survivors of severe AKI had an unfavorable health-related quality of life (mentally and physically) compared with general population (Wang et al, 2015).

- b. Mortality: One recent study revealed that while acute kidney injury requiring dialysis (AKI-D) admissions are on the rise, hospital mortality for AKI-D has declined significantly between 2001 and 2011 (Brown et al, 2016).
- c. Costs: A recent study based on 2012 figures found that AKI in the United States was associated with increased hospitalization costs of \$7933 per patient/per day compared to patients without AKI and that costs were comparable to those for stroke, pancreatitis, and pneumonia (Zeng et al, 2014).

## G L O S S A R Y

**Acute tubular necrosis (ATN):** Structural injury or tissue necrosis within the kidney, caused by ischemia or toxic injury. Necrosis is usually patchy, but injury can be widespread. ATN should be suspected in any individual presenting after a period of hypotension secondary to cardiac arrest, hemorrhage, sepsis, drug overdose, or surgery.

**Anuria:** Urine output less than 100 mL/d.

**Azotemia:** Buildup of nitrogenous waste products, specifically urea, in the blood.

**Calculus:** Mass of solid material or metabolic substance—kidney or bladder stone.

**Catabolic:** Destructive metabolism, or breakdown, of proteins for energy results in muscle wasting, loss of lean muscle mass, and negative nitrogen balance.

**Glomerular filtration rate (GFR):** Rate of fluid filtration through the kidney glomeruli.

**Glomerulonephritis:** Inflammation of the glomerular capillary walls, causing impaired filtration.

**Hydronephrosis:** Kidney enlargement caused by urine backing up from the bladder into the kidney or inability of urine to drain from the kidney into bladder; excessive reflux stretches the kidney, causing functional damage to it.

**Myoglobin:** Form of hemoglobin found in muscle tissue and released into urine when tissue damage occurs.

**Nephrotoxins:** Chemical substances, including medications that can cause kidney damage.

**Nonoliguric AKI:** Urinary output more than 400 mL/d.

**Oliguria:** Urinary output less than 400 mL/d.

**Orthostatic hypotension:** Decrease in blood pressure when person rises from seated or lying position; often associated with hypovolemia.

**Parenchymal disease:** Connective tissue of the kidney is damaged and scarred.

**Polyuria:** Excretion of large amounts (2–6 L/24 hr) of urine, lacking concentration and regulation of waste products; occurs during diuretic phase of AKI, with head injury (diabetes insipidus [DI]) and diabetic ketoacidosis (DKA).

**Porphyrins:** Nitrogen-containing chemical components of hemoglobin.

**Pyelonephritis:** Infection of the kidney's medulla or cortex.

**Renal replacement therapy (RRT):** Umbrella term used for life-saving treatments for renal failure, including hemodialysis, peritoneal dialysis, hemofiltration, and renal transplantation.

**Uremia:** Toxic clinical syndrome associated with fluid, electrolyte, and hormone imbalances and metabolic abnormalities due to deterioration of renal function and the deleterious effects of azotemia on organ systems.

## CARE SETTING

Client will be treated in inpatient acute medical, surgical, or intensive care unit.

## RELATED CONCERNs

Fluid and electrolyte imbalances (see *DavisPlus*)  
Metabolic acidosis—primary base bicarbonate deficiency (see *DavisPlus*)

Psychosocial aspects of care, page 835

Renal dialysis—general considerations, page 623

Chronic kidney disease with end stage renal failure, page 607

Sepsis/septicemia, page 772

Total nutritional support: parenteral/enteral feeding, page 525

Upper gastrointestinal bleeding, page 340

**CLIENT ASSESSMENT DATABASE****DIAGNOSTIC DIVISION  
MAY REPORT****MAY EXHIBIT****ACTIVITY/REST**

- Fatigue, weakness, malaise

**CIRCULATION**

- Muscle weakness, loss of tone
- Hypotension or hypertension, including accelerated (malignant) hypertension, eclampsia, or gestational hypertension
- Cardiac dysrhythmias associated with hyperkalemia and hypocalcemia
- Weak, thready pulses; orthostatic hypotension (hypovolemia)
- Jugular vein distention (JVD), full and bounding pulses (hypervolemia)
- Generalized tissue edema, including periorbital area, ankles, sacrum
- Pallor (anemia); bleeding tendencies

**ELIMINATION**

- Change in usual urination pattern—increased frequency (early failure and early recovery) or decreased frequency or oliguria (later phase)
- Dysuria, hesitancy, urgency, and retention (obstruction or infection)
- Abdominal bloating, diarrhea, or constipation
- History of benign prostatic hyperplasia (BPH) or kidney or bladder stones

- Change in urinary color; for example, ranges from absence of color to deep yellow, reddish-brown, and cloudy
- Oliguria: Production of a small amount of urine with no other indicators (e.g., presence of stones or prostate enlargement) generally favors AKI. A gradually diminishing urine output may indicate a urethral stricture or bladder outlet obstruction due to prostate enlargement.
- Polyuria: occurs during diuretic phase of AKI, with head injury (diabetes insipidus [DI]) and diabetic ketoacidosis (DKA).
- Anuria: Abrupt anuria suggests acute urinary obstruction, acute and severe glomerulonephritis, or embolic renal artery occlusion (Workeneh et al, 2017).

**FOOD/FLUID**

- Nausea, anorexia, heartburn
- Vomiting
- Weight gain (edema), weight loss (dehydration)
- Use of diuretics

- Changes in skin turgor and moisture
- Edema—generalized, dependent

**NEUROSENSORY**

- Headache, blurred vision
- Muscle cramps or twitching, “restless leg” syndrome, numbness, tingling

- Altered mental state—decreased attention span, inability to concentrate, loss of memory, confusion, decreasing level of consciousness (LOC) (azotemia, electrolyte and acid-base imbalance)
- Twitching, muscle fasciculation, seizure activity

**PAIN/DISCOMFORT**

- Flank pain, headache

- Guarding or distraction behaviors, restlessness

**RESPIRATION**

- Shortness of breath

- Tachypnea, dyspnea, increased rate and depth; Kussmaul’s respiration can be compensatory mechanism because of metabolic acidosis.
- Cough productive of pink-tinged sputum (pulmonary edema)

**SAFETY**

- Recent transfusion reaction
- Current or recent hospitalization (*Note:* Most community-acquired AKI is secondary to volume depletion; as many as 90% of cases are estimated to have a potentially reversible cause) (Sinert & Peacock, 2015)

- Fever (sepsis, dehydration)
- Petechiae, ecchymotic areas on skin
- Pruritus, dry skin

(continues on page 598)

**TEACHING/LEARNING**

- Family history of polycystic disease, hereditary nephritis, urinary calculus, malignancy
- History of exposure to toxins, such as drugs (cyclosporine, amphotericin B, cocaine), environmental poisons (e.g., ethyl alcohol, ethylene glycol, mercury vapors, lead, cadmium, or other heavy metals), substance abuse
- Current or recent use of nephrotoxic drugs, such as aminoglycoside antibiotics, amphotericin B; anesthetics; ACE inhibitors and vasodilators; NSAIDs such as ibuprofen, naproxen
- Recent diagnostic testing with radiographic contrast media reaction
- Concurrent conditions—tumors in the urinary tract, gram-negative sepsis, trauma or crush injuries, hemorrhage, disseminated intravascular coagulation (DIC), burns, electrocution injury, autoimmune disorders (e.g., scleroderma, vasculitis), vascular occlusion or surgery, diabetes mellitus (DM), cardiac or liver failure

**DISCHARGE PLAN CONSIDERATIONS**

- May require alteration or assistance with medications, treatments, supplies, transportation, and homemaker or maintenance tasks

♦ Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****TEST  
WHY IT IS DONE****WHAT IT TELLS ME****BLOOD TESTS*****Kidney function studies:***

- **Blood urea nitrogen (BUN):** Measures the by-product of protein metabolism in the liver, filtered by the kidneys and excreted in urine.
- **Creatinine (Cr):** End product of muscle and protein metabolism filtered by the kidneys and excreted in urine.
- **BUN/Cr ratio:** Ratio helps determine whether factors other than kidney failure are causing changes in the levels. Normal ratio is 10:1.

*Note:* BUN, Cr, GFR, and urine output have long been standard tests for assessing renal function. But recent research shows BUN and creatinine tests don't reflect real-time kidney function or accurately reflect the GFR or degree of tubular injury. Recently, the emphasis has been shifting from biomarkers indicating kidney failure to those that signal a change in kidney function.

Elevated BUN is highly suggestive of kidney dysfunction. *Note:* Although BUN can be affected by many factors, including drug therapy, nutritional status (including high protein intake), GI bleeding, trauma, and infection, and because BUN takes up to 24 hours to rise, it doesn't indicate when kidney injury occurred. AKI presents clinically as a rapidly rising creatinine (Cr) over several hours or days. *Note:* Serum creatinine level is affected by the person's muscle mass, age, race, and gender. Also, it may not rise for 12 to 24 hours after kidney injury. In normal individuals and in client with intrinsic renal disease, the BUN will be approximately 10 times that of Cr. Therefore, a BUN/Cr ratio considerably greater than 10 suggests a prerenal (decreased renal perfusion) or postrenal (obstruction) cause of renal failure.

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li><b>AKI biomarkers (e.g., cystatin C, kidney injury molecule 1 [KIM-1], neutrophil gelatinase-associated lipocalin [NGAL], interleukin-18 [IL-18])</b></li> <li><b>Complete blood count (CBC):</b> Battery of screening tests, which typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; and white blood cell (WBC) count and differential.</li> <li><b>Arterial blood gases (ABGs):</b> Determines the pH and the percentage of oxygen, carbon dioxide, and bicarbonate in arterial blood.</li> <li><b>Electrolytes or renalytes:</b> Electrically charged minerals found in body tissues and blood in the form of dissolved salts. They help move nutrients into and wastes out of the body's cells, maintain water balance, and stabilize the body's pH level.</li> <li><b>Serum osmolality:</b> Measures the amount of chemicals dissolved in the serum. Kidneys excrete or reabsorb water to keep osmolality in range of 280 to 300 mOsm/kg. Chemicals that affect serum osmolality include sodium, chloride, bicarbonate, protein, and glucose.</li> </ul>	<p>Research is currently being conducted regarding use of new biomarkers for more accurate, real-time indicators of AKI and need for renal replacement therapies (Dirkes, 2015; Siew et al, 2011).</p> <p>Hgb is decreased in presence of acute blood loss or chronic anemia, which is the main hematologic effect of AKI. RBCs are often decreased because of increased fragility and decreased survival time. Elevated WBC count (leukocytosis) can point to infection (such as sepsis) as a cause of AKI (Workeneh et al, 2017).</p> <p>Metabolic acidosis (pH less than 7.2) may develop because of decreased renal ability to excrete hydrogen and end products of metabolism. Bicarbonate is decreased.</p> <p>Sodium—usually increased but may vary.</p> <p>Potassium—elevated related to retention and cellular shifts (acidosis) or RBC hemolysis.</p> <p>Rapid increase in K<sup>+</sup> is common with AKI.</p> <p>Chloride, phosphorus, and magnesium—usually elevated.</p> <p>Calcium—commonly decreased in AKI and may require replacement.</p> <p>Higher-than-normal levels can indicate dehydration or renal tubular necrosis. Lower-than-normal levels are associated with fluid volume overload or syndrome of inappropriate antidiuretic hormone secretion (SIADH).</p>

## URINE TESTS

- Volume:** In AKI, volume is variable.

Often less than 400 mL/24 hr (oliguric phase), which occurs within 24 to 48 hours after renal insult. May be less than 100 mL/24 hr (anuric phase) or more than 400 mL/24 hr (nonoliguric) when renal damage is associated with nephrotoxic agents such as contrast media or antibiotics. *Note:* Recently, practitioners have been emphasizing the importance of the volume of urine output as a marker for AKI because it's easy to measure and directly reflects glomerular filtration rate (GFR)/kidney function in real time (Dirkes, 2015).

Presence of RBCs is always pathologic (Workeneh et al, 2017). Reddish-brown, cola-, or tea-colored urine is suggestive of glomerular damage and acute tubular necrosis (ATN) or presence of myoglobin in the urine.

Increased in poor renal perfusion. Decreased in kidney disease, such as glomerulonephritis and pyelonephritis with loss of ability to concentrate. Specific gravity that is fixed at 1.010 reflects severe renal damage.

Alkaline urine (pH greater than 7) can be found in urinary tract infections (UTIs) and renal tubular necrosis.

Urine with higher osmolarity is concentrated with less water and a higher solute load, indicating a prerenal cause. Urine with decreased osmolarity is dilute with few solutes, indicating that the cause of renal failure resides in the kidney itself.

Best indicator of overall kidney function, as reduced Cr clearance correlates with increased circulating creatinine.

Usually increased if ATN is cause of AKI and if kidney is not able to reabsorb sodium, although it is typically decreased in other causes of prerenal azotemia.

(continues on page 600)

- Color:** Determine presence of RBCs, Hgb, myoglobin, and porphyrins.

- Specific gravity:** Measures density of urine compared to water with normal range of 1.005 to 1.030.

- pH:** Measures level of acidity.

- Osmolality or osmolarity:** Measures the ratio of water and solutes, such as electrolytes, acids, and other metabolic wastes, processed by the kidneys and released in urine. When body fluid is balanced, normal urine osmolarity is in the range of 300 to 900 mOsm/L.

- Cr clearance:** Calculates glomerular filtration rate (GFR) by measuring the amount of Cr cleared from the blood and filtered into urine in 24 hours.

- Sodium:** Determines hydration status and ability to conserve or excrete Na.

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li><b>Fractional excretion sodium (FeNa):</b> Calculated measure of renal tubule function.</li></ul>	Reveals inability of tubules to reabsorb sodium. Readings of less than 1% indicate prerenal disorders; higher than 1% reflects intrarenal disorders.
<ul style="list-style-type: none"><li><b>Protein:</b> The protein most likely to appear in urine is albumin. The term <i>albuminuria</i> is sometimes used when a urine test detects albumin specifically.</li></ul>	High-grade proteinuria (3 to 4+) strongly indicates glomerular damage when RBCs and casts are also present. Low-grade proteinuria (1 to 2+) and WBCs may be indicative of infection or interstitial nephritis. In ATN, proteinuria is usually minimal.
<ul style="list-style-type: none"><li><b>Casts:</b> Tubules in the kidneys secrete proteins. Under some circumstances, these proteins precipitate out to form cylindrical impressions of the tubules called casts.</li></ul>	Usually signal renal disease or infection. Cellular casts with brownish pigments and numerous renal tubular epithelial cells are diagnostic of ATN. Red casts suggest acute glomerular nephritis.
<h3>OTHER DIAGNOSTIC STUDIES</h3> <ul style="list-style-type: none"><li><b>Kidney/abdominal ultrasound:</b> Imaging technique that uses high-frequency sound waves and a computer to create images of blood vessels, tissues, and organs.</li><li><b>Kidney, ureter, bladder (KUB) x-ray:</b> X-ray of the abdomen, showing the kidneys, ureters, and bladder.</li><li><b>Computed tomography (CT) scan, with or without enhancement:</b> X-ray procedure that uses a computer to produce a detailed picture of a cross section of the body.</li><li><b>Magnetic resonance imaging (MRI):</b> Imaging test that uses powerful magnets and radio waves to create pictures of the body. It does not use radiation.</li><li><b>CT or MRI urography:</b> Examines the urinary tract before and after administration of intravenous contrast material that includes excretory phase images.</li><li><b>Intravenous pyelogram (IVP) also called intravenous urography (IVU):</b> X-ray examination and fluoroscopic visualization of the kidneys, ureters, and bladder using contrast material.</li><li><b>Aortorenal angiography:</b> Fluoroscopic examination using contrast to examine the renal blood vessels for signs of blockage or abnormalities.</li><li><b>Endourology:</b> Diagnostic and therapeutic operative procedures performed through instruments—cystoscopic, pelviscopic, or laparoscopic.</li><li><b>Renal biopsy</b></li></ul>	Evaluates existing renal disease and obstruction of the urinary collecting system. The degree of hydronephrosis does not necessarily correlate with the degree of obstruction. Demonstrates size and structure of kidneys, ureters, and bladder; reveals presence of abnormalities, such as cysts, tumors, or stones. Ultrasound and computed tomography (CT) are modalities of first choice in renal imaging.  Can be used in case of compromised renal function, severe contrast allergy, or in case radiation exposure is a problem (e.g., in children and pregnant women) or as a problem-solving modality when CT findings are nondiagnostic. These tests provide detailed anatomic depiction of each of the major portions of the urinary tract—the kidneys, intrarenal collecting systems, ureters, and bladder—and thus allow for comprehensive evaluation of the entire urinary system at work. Magnetic resonance (MR) has the advantage of not using ionizing radiation and the potential to provide more functional information than CT. This test has largely been replaced by CT, CT urography, and MRI as the primary test for evaluating the urinary system (Fulgham & Bishoff, 2011). However, it may be used alone or in combination with CT to identify filling defects such as caused by trauma, stones, or tumors. Determines if blood vessel blockage is reducing renal flow.  Provides direct visualization of urethra, bladder, ureters, and kidneys to diagnose problems or to biopsy or remove small lesions or calculi. May be indicated when renal function does not return for a prolonged time.

### NURSING PRIORITIES

1. Reestablish or maintain fluid and electrolyte balance.
2. Prevent complications.
3. Provide emotional support for client and significant other (SO).
4. Provide information about disease process, prognosis, and treatment needs.

### DISCHARGE GOALS

1. Homeostasis achieved.
2. Complications prevented or minimized.
3. Current situation dealt with realistically by client/family.
4. Disease process, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS:** **excess Fluid Volume****May Be Related To**

Compromised regulatory mechanism (renal failure)  
Excessive sodium intake; excessive fluid intake

**Possibly Evidenced By**

Intake exceeds output, oliguria; alteration in specific gravity  
Alteration in blood pressure (BP), increase in central venous pressure (CVP); jugular vein distention  
Edema, weight gain over short period of time  
Pulmonary congestion  
Alteration in mental status, restlessness  
Decrease in Hgb/Hct, electrolyte imbalance, azotemia

**Desired Outcomes/Evaluation Criteria—Client Will****Fluid Overload Severity NOC**

Demonstrate stabilized fluid volume as evidenced by balanced intake and output with urinary specific gravity and other laboratory studies near normal, stable weight and vital signs within client's normal range, and absence of edema.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hypervolemia Management NIC</b>	
<b>Independent</b>	
Record accurate intake and output (I&O). Include "hidden" fluids, such as intravenous (IV) antibiotic additives, liquid medications, ice chips, and frozen treats. Measure GI losses and estimate insensible losses, such as diaphoresis.	Low urine output less than 400 mL/24 hr may be first indicator of acute failure, especially in a high-risk client. Accurate I&O are necessary for determining fluid replacement needs and reducing risk of fluid overload. Note: Hypervolemia occurs in the anuric phase of AKI.
Monitor urine specific gravity.	Measures the kidney's ability to concentrate urine. In intrarenal failure, specific gravity is usually equal to or less than 1.010, indicating loss of ability to concentrate the urine.
Weigh daily at same time of day, on same scale, with same equipment and clothing.	Daily body weight is best monitor of fluid status. A weight gain of more than 0.5 kg/d suggests fluid retention.
Assess skin, face, and dependent areas for edema. Evaluate degree of edema (on scale of +1 to +4).	Edema occurs primarily in dependent tissues of the body, such as hands, feet, and lumbosacral area. Client can gain up to 10 lb (4.5 kg) of fluid before pitting edema is detected. Periorbital edema may be a presenting sign of this fluid shift because these fragile tissues are easily distended by even minimal fluid accumulation.
Monitor heart rate, BP, and central venous pressure (CVP), if available.	Tachycardia and hypertension can occur because of (1) failure of the kidneys to excrete urine, (2) excessive fluid resuscitation during efforts to treat hypovolemia or hypotension, and (3) changes in the renin-angiotensin system, which helps regulate long-term blood pressure and blood volume. Note: Invasive monitoring may be needed for assessing intravascular volume, especially in clients with poor cardiac function.
Auscultate lung and heart sounds.	Fluid overload may lead to pulmonary edema and heart failure (HF), as evidenced by development of adventitious breath sounds and extra heart sounds. (Refer to ND: risk for decreased Cardiac Output, below.)
Assess level of consciousness; investigate changes in mentation and presence of restlessness.	May reflect fluid shifts, accumulation of toxins, acidosis, electrolyte imbalances, or developing hypoxia.
Plan oral fluid replacement with client, within multiple restrictions. Intersperse desired beverages throughout 24 hours. Vary offerings, such as hot, cold, and frozen.	Helps avoid periods without fluids, minimizes boredom of limited choices, and reduces sense of deprivation and thirst.

(continues on page 602)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Correct any reversible cause of AKI, such as replacing blood losses, discontinuing nephrotoxic drug, removing obstruction via surgery.	Current treatment for AKI is mainly supportive. Maintenance of circulating volume and correction of biochemical abnormalities are the primary goals of treatment. Kidneys may be able to return to near-normal functioning, thus preventing or limiting long-term residual effects.
Insert and maintain indwelling catheter, as indicated.	Catheterization excludes lower tract obstruction and provides means of accurate monitoring of urine output during acute phase; however, indwelling catheterization may be contraindicated because of increased risk of infection.
Monitor laboratory and diagnostic studies, such as the following:	
BUN, Cr	Assesses progression and management of renal dysfunction, failure. Note: Dialysis is indicated if ratio is higher than 10:1 or if therapy fails to correct fluid overload or metabolic acidosis.
Serum sodium	Hyponatremia may result from fluid overload (dilutional) or kidney's inability to conserve sodium. Hypernatremia indicates total body water deficit.
Serum potassium	Lack of renal excretion or selective retention of potassium by the tubules leads to hyperkalemia, requiring prompt intervention.
Hgb/Hct	Decreased values may indicate hemodilution associated with hypervolemia; however, during prolonged failure, anemia frequently develops as a result of decreased RBC production. Other possible causes—active or occult hemorrhage—should also be evaluated.
Serial chest x-rays	Increased cardiac size, prominent pulmonary vascular markings, pleural effusion, and infiltrates indicate acute responses to fluid overload or chronic changes associated with renal failure and HF.
Administer and restrict fluids, as indicated.	Fluid management is usually calculated to replace output from all sources as well as estimate insensible losses due to metabolism and diaphoresis. Prerenal failure is treated with volume replacement and vasopressors. The oliguric client with adequate circulating volume or fluid overload who is unresponsive to fluid restriction and diuretics requires dialysis.
Administer medication, as indicated, for example:	
Diuretics, such as furosemide (Lasix), bumetanide (Bumex), torsemide (Demadex), and mannitol (Osmitrol)	Given early in oliguric phase of AKI in an effort to convert to diuretic phase, flush the tubular lumen of debris, reduce hyperkalemia, and promote adequate urine volume.
Vasodilators, such as fenoldopam (Corlopam)	May be given to decrease systemic vascular resistance (SVR) and increase renal blood flow. It has been noted to improve renal function in patients with severe hypertension.
Antihypertensives, such as clonidine (Catapres), methyldopa (Aldomet), and prazosin (Minipress)	May be given to treat hypertension by counteracting effects of decreased renal blood flow and/or circulating volume overload.
Prepare for renal replacement therapy (RRT) as indicated, such as hemodialysis (HD), peritoneal dialysis (PD), or continuous renal replacement therapy (CRRT).	Done to reduce volume overload, correct electrolyte and acid-base imbalances, and remove toxins. The type of dialysis chosen for AKI depends on the degree of hemodynamic compromise and client's ability to withstand the procedure. Note: Although it technically can be used, peritoneal dialysis is not frequently used in patients with AKI (Workeneh et al, 2017). (Refer to CP: Renal Dialysis.)

**NURSING DIAGNOSIS:** risk for decreased Cardiac Output**Possibly Evidenced By**

Altered preload—fluid deficit, hypovolemia caused by vasodilation, insufficient intake, excessive fluid losses

Altered afterload—fluid overload, fluid shifts (venous distention)

Alteration in heart rate or rhythm (e.g., potassium, calcium imbalance; uremic effects on cardiac muscle)

**Desired Outcomes/Evaluation Criteria—Client Will****Cardiac Pump Effectiveness NOC**

Maintain cardiac output as evidenced by BP and HR and rhythm within client's usual limits and peripheral pulses strong and equal, with appropriate capillary refill time.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hemodynamic Regulation NIC</b>	
<i>Independent</i>	
Monitor BP and heart rate.	Fluid volume excess, combined with hypertension, which often occurs in renal failure, and effects of uremia increase cardiac workload and can lead to cardiac failure. In AKI, cardiac failure is usually reversible.
Observe electrocardiogram (ECG) or telemetry for changes in rhythm.	Changes in electromechanical function may become evident in response to accumulation of toxins and electrolyte imbalance. For example, hyperkalemia is associated with a peaked T wave, wide QRS complex, prolonged PR interval, and flattened or absent P wave. Hypokalemia is associated with flattened T wave, peaked P wave, and appearance of U waves. Prolonged QT interval may reflect calcium deficit.
Auscultate heart sounds.	Development of $S_3/S_4$ is associated with fluid volume excess and congestive HF. Pericardial friction rub may be only manifestation of uremic pericarditis, requiring prompt intervention and, possibly, acute dialysis.
Assess color of skin, mucous membranes, and nailbeds. Note capillary refill time.	Pallor may reflect vasoconstriction or anemia—common in AKI, whether associated with actual blood loss or abnormalities in life of RBCs. Cyanosis is a late sign and is related to pulmonary congestion or cardiac failure. A long capillary refill time is associated with hypovolemic states.
Note occurrence of cardiac dysrhythmias and changes in blood pressure, especially when accompanied by mental status changes, muscle and generalized weakness.	These are clinical manifestations of magnesium deficiency (along hypocalcemia and hypokalemia) and include risk of cardiac arrest. Note: Magnesium deficiency in AKI has been associated with nonrecovery of renal function in the intensive care unit (ICU) population (Fulop et al, 2017; Tomasi et al, 2013)
Investigate reports of muscle cramps, numbness or tingling of fingers, with muscle twitching and hyperreflexia.	These are symptoms of hypocalcemia. Calcium levels are typically somewhat decreased with AKI. If phosphorus levels are also high, hypocalcemia can become severe, which can also affect cardiac contractility and function.
Maintain bedrest or encourage adequate rest and provide assistance with care and desired activities.	Reduces oxygen consumption and cardiac workload.
<i>Collaborative</i>	
Monitor laboratory studies, such as the following:	
Potassium	During oliguric phase, hyperkalemia is present but often shifts to hypokalemia in diuretic or recovery phase. Any potassium value associated with ECG changes requires intervention. Note: A serum level of 6.5 mEq or higher constitutes a medical emergency.
Calcium	In addition to its own cardiac effects, calcium deficit enhances the toxic effects of potassium.

(continues on page 604)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Phosphorus	May be abnormal because of reduced renal excretion or excess release of cellular phosphate.
Magnesium	In acute renal failure, hypermagnesemia can occur during the oliguric phase, then return to normal during the diuretic phase. If a client receives exogenous magnesium (e.g., magnesium-containing laxative or antacid) during the oliguric phase, severe hypermagnesemia can result, especially if the patient is acidotic. Dialysis or calcium administration may be necessary to combat the CNS-depressive effects of an elevated serum magnesium level.
Administer and restrict fluids as indicated. (Refer to NDs: excess Fluid Volume and risk for deficient Fluid Volume.)	Cardiac output depends on circulating volume—affected by both fluid excess and deficit—and myocardial muscle function.
Provide supplemental oxygen, as indicated.	Maximizes available oxygen for myocardial uptake to reduce cardiac workload and cellular hypoxia.
Administer medications, as indicated:	
Inotropic agents	May be used to improve cardiac output by increasing myocardial contractility and stroke volume.
Calcium gluconate	Serum calcium is often low but usually does not require specific treatment in AKI. Calcium gluconate may be given to treat hypocalcemia and to offset the effects of hyperkalemia by modifying or reducing cardiac irritability.
Aluminum hydroxide gels (Amphojel, Basalgel)	Increased phosphate levels may occur as a result of failure of glomerular filtration and require use of phosphate-binding antacids to limit phosphate absorption from the GI tract.
Glucose and insulin solution	Temporary measure to lower serum potassium by driving potassium into cells when cardiac rhythm is endangered.
Sodium bicarbonate or sodium citrate	May be used to correct metabolic acidosis or hyperkalemia by increasing serum pH if client is severely acidotic. Used with caution as it can exacerbate fluid overload and cause tetany by decreasing the ionized calcium concentration. Acidosis that does not respond to medical therapy is an indication for dialysis.
Prepare for and assist with dialysis, as necessary.	May be indicated for persistent dysrhythmias and progressive HF unresponsive to other therapies.

### NURSING DIAGNOSIS: risk for deficient Fluid Volume

#### Possibly Evidenced By

Active fluid loss (e.g., excessive loss of fluid losses through urine, nasogastric [NG] or wound drainage; [diuretic phase of AKI])  
Insensible losses—diaphoresis; fever

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Fluid Balance NOC

Display I&O near balance, good skin turgor, moist mucous membranes, palpable peripheral pulses, stable weight and vital signs, and electrolytes within normal range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Monitoring NIC</b> <i>Independent</i> Measure I&O accurately. Weigh daily.	Helps estimate fluid replacement needs. Note: Rising urinary volume and delayed return of tubular reabsorption capabilities may lead to hypovolemia.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Calculate insensible fluid losses.	Fluid intake should approximate losses through urine, nasogastric (NG) or wound drainage, and insensible losses—diaphoresis and metabolism. Note: Some sources believe that fluid replacement should not exceed two-thirds of the previous day's output to prevent prolonging the diuresis.
Encourage fluid intake. Provide allowed fluids throughout 24-hour period.	Diuretic phase of AKI may revert to oliguric phase if fluid intake is not maintained or nocturnal dehydration occurs.
Monitor BP, noting postural changes, and heart rate.	Orthostatic hypotension and tachycardia suggest hypovolemia.
Note signs and symptoms of dehydration, such as dry mucous membranes, thirst, dulled sensorium, and peripheral vasoconstriction.	In diuretic or postobstructive phase of renal failure, urine output can exceed 3 L/d. Extracellular fluid (ECF) volume depletion activates the thirst center, and sodium depletion causes persistent thirst, unrelieved by drinking water. Continued fluid losses and inadequate replacement may lead to hypovolemic state.
<b>Collaborative</b>	
Monitor laboratory studies, such as sodium.	In nonoliguric AKI or in diuretic phase of AKI, large urine losses may result in sodium wasting, while elevated urinary sodium acts osmotically to increase fluid losses. Restriction of sodium may be indicated to break the cycle.

### NURSING DIAGNOSIS: risk for Infection

#### Possibly Evidenced By

Chronic illness; malnutrition  
Invasive procedures/devices; alteration in skin integrity  
Immunosuppression; decrease in hemoglobin [anemia]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Infection Severity NIC

Experience no signs or symptoms of infection.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<b>Independent</b>	
Model and promote good handwashing by client and staff.	Reduces risk of cross-contamination.
Avoid invasive procedures, instrumentation, and manipulation of indwelling catheters whenever possible. Use aseptic technique when caring for IVs and invasive lines. Change site and dressings per protocol. Note edema and purulent drainage.	Limits introduction of bacteria into body. Early detection and treatment of developing infection may prevent sepsis.
Provide routine catheter care and promote meticulous perianal care. Keep urinary drainage system closed and remove indwelling catheter as soon as possible.	Reduces bacterial colonization and risk of ascending urinary tract infection (UTI).
Encourage deep breathing, coughing, and frequent position changes.	Prevents atelectasis and mobilizes secretions to reduce risk of pulmonary infections. Note: Sepsis can be present when AKI occurs but also can follow AKI in a critically ill client.
Assess skin integrity. Note if client is scratching, reports itching. (Refer to CP: Renal Failure: Chronic; ND: risk for impaired Skin Integrity.)	Excoriations from scratching may become secondarily infected.

(continues on page 606)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor vital signs.	Fever higher than 100.4°F (38.0°C) with increased pulse and respirations is typical of increased metabolic rate resulting from inflammatory process, although sepsis can occur without a febrile response.
<b>Collaborative</b> Monitor laboratory studies, such as WBC count with differential.	Although elevated WBCs may indicate generalized infection, leukocytosis is commonly seen in AKI and may reflect inflammation or injury within the kidney. A shifting of the differential to the left is indicative of infection.
Obtain specimen(s) for culture and sensitivity and administer appropriate antibiotics, as indicated.	Verification of infection and identification of specific organism aids in choice of the most effective treatment. Note: A number of anti-infective agents require adjustments of dose or time while renal clearance is impaired.

### NURSING DIAGNOSIS: **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

#### May Be Related To

Insufficient information or interest in learning; insufficient knowledge of resources  
Alteration in cognitive functioning or memory

#### Possibly Evidenced By

Insufficient knowledge  
Inaccurate follow-through of instructions; development of preventable complications

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Knowledge: Kidney Disease Management NOC

Verbalize understanding of condition, disease process, prognosis, and potential complications.  
Verbalize understanding of therapeutic needs.  
Participate in learning process.  
Initiate necessary lifestyle changes and participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b>	
<b>Independent</b>	
Review disease process, prognosis, and precipitating factors, if known.	Provides knowledge base from which client can make informed choices.
Explain level of renal function after acute episode is over.	Client may experience residual defects in kidney function, which may or may not be permanent.
Discuss renal dialysis or transplantation if these are likely options for the future.	Although these options would have been previously presented by the physician, client may now be at a point when options need to be considered and decisions made and may desire additional input.
Review dietary plan and restrictions. Include fact sheet listing food and fluid restrictions.	Adequate nutrition is necessary to promote healing and tissue regeneration; adherence to restrictions may prevent complications.
Encourage client to observe characteristics of urine and amount and frequency of output.	Changes may reflect alterations in renal function and need for dialysis.
Establish regular schedule for weighing.	Useful tool for monitoring fluid and dietary status and needs.
Review fluid intake and restriction (if indicated). Remind client to spread fluids over entire day and to include all fluids (e.g., ice) in daily fluid counts.	Depending on the cause and phase of AKI, client may need to either restrict or increase intake of fluids.
Discuss activity restriction and gradual resumption of desired activity. Encourage use of energy-saving and relaxation techniques and diversional activities.	Client with severe AKI may need to restrict activity and may feel weak for an extended period during lengthy recovery phase, requiring measures to conserve energy and reduce boredom and depression.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss reality of continued presence of fatigue.	Decreased metabolic energy production, presence of anemia, and states of discomfort commonly result in fatigue.
Determine and prioritize activities of daily living (ADLs) and personal responsibilities. Identify available resources and support systems.	Helps client manage lifestyle changes that may be needed to meet personal and family needs.
Recommend scheduling activities with adequate rest periods.	Prevents excessive fatigue and conserves energy for healing and tissue regeneration.
Review medication use. Encourage client to discuss all medications, including over-the-counter (OTC) drugs and herbal supplements, with healthcare provider.	Medications that are concentrated in or excreted by the kidneys can cause toxic cumulative reactions and permanent damage to kidneys. Some supplements may interact with prescribed medications and may contain electrolytes.
Emphasize necessity of follow-up care and laboratory studies.	Renal function can be slow to return—up to 12 months following AKI—and deficits may persist, requiring frequent monitoring to avoid complications.
Identify symptoms requiring medical intervention, such as decreased urinary output, sudden weight gain, presence of edema, lethargy, bleeding, signs of infection, and altered mental status.	Prompt evaluation and intervention may prevent serious complications and progression to chronic renal failure (CRF).

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **risk for imbalanced Fluid Volume (specify)**—dependent on cause, duration, and stage of recovery
- **Fatigue**—disease state, malnutrition, anemia
- **risk for Infection**—immunosuppression, malnutrition, increased environmental exposure
- **ineffective Health Management**—complexity of therapeutic regimen, economic difficulties, perceived benefit/barriers

## RENAL FAILURE: CHRONIC KIDNEY DISEASE AND END-STAGE RENAL DISEASE

### I. Pathophysiology

- a. Renal failure is the end result of chronic kidney disease (CKD), which is the consequence of gradual, progressive destruction of nephrons and decrease in glomerular filtration rate (GFR) over time, resulting in loss of kidney function that produces major changes in all body systems.
  - b. CKD is defined as an abnormality in kidney function or structure for more than 3 months and is classified based on cause, glomerular filtration rate (GFR) category, and albuminuria category (Kidney Disease Improving Global Outcomes [KDIGO], 2012; The Renal Association, 2017; Smith, 2016). The risk of CKD progressing to kidney failure increases as kidney function diminishes and/or urine protein (albuminuria) increases.
  - c. Client with CKD generally experiences progressive loss of kidney function and is at risk for end-stage renal disease (ESRD). The rate of progression is unique to the individual and depends on age, the underlying diagnosis, the success of preventive measures.
- II. CKD Stages (KDIGO, 2012; Pradeep, 2017)** Chronic kidney disease is classified in stages G1 to G5 (based on the GFR

and A1 to A3 (based on the albumin to creatinine ratio [ACR]). These classifications correspond to the degree of nephron loss and changes in GFR and are used in conjunction with other markers of kidney disease such as albuminuria, hematuria, and electrolyte abnormalities due to tubular disorders, renal histological abnormalities, and/or structural abnormalities detected by imaging. (Note: People with CKD stages 1 to 3 are frequently asymptomatic, and despite reduction in GFR, they do not experience clinically evident disturbances in water or electrolyte balance or endocrine/metabolic derangements.)

- a. Stage 1
  - i. GFR may be normal or slightly higher than normal ( $>90 \text{ mL/min}/1.73 \text{ m}^2$ ).
  - ii. Albuminuria (excretion  $>30 \text{ mg}/24 \text{ hr}$  or albumin/creatinine ratio  $>30 \text{ mg/g}$  [ $>3 \text{ mg/mmol}$ ])
  - iii. Urine sediment abnormalities, electrolyte and other abnormalities (tubular disorders), and histological and structural abnormalities may be identified in lab or imaging studies.
  - iv. Kidney dysfunction is present; however, it may be undiagnosed due to lack of symptoms.

(continues on page 608)

- b. Stage 2
    - i. GFR is mildly decreased (60 to 89 mL/min/1.73 m<sup>2</sup>), slight elevation in BUN/Cr
    - ii. Albuminuria (excretion >30 mg/24 hr or albumin/creatinine ratio >30 mg/g [>3 mg/mmol])
    - iii. Urine sediment abnormalities, electrolyte and other abnormalities (tubular disorders), and histological and structural abnormalities
    - iv. Client may be asymptomatic or have hypertension.
    - v. Polyuria and nocturia may be present—high-output failure.
  - c. Stages 3a and 3b
    - i. Moderate reduction in GFR (45 to 59 mL/min/1.73 m<sup>2</sup>) **in 3a** and (30 to 44 mL/min/1.73 m<sup>2</sup>) **in 3b**
    - ii. Albuminuria (excretion >30 mg/24 hr or albumin/creatinine ratio >30 mg/g [>3 mg/mmol])
    - iii. Fluid and electrolyte abnormalities may be present but are not clinically significant.
    - iv. Client may be asymptomatic or have hypertension.
  - d. Stage 4
    - i. Severe reduction in GFR (15 to 29 mL/min/1.73 m<sup>2</sup>) and/or very high albuminuria (>300 mg/24 hr)
    - ii. Client has endocrine/metabolic derangements or disturbances in water or electrolyte balance, protein-energy malnutrition, loss of lean body mass, muscle weakness; peripheral and pulmonary edema
    - iii. Timely referral to a nephrologist when glomerular filtration rate approaches 30 mL/min/1.73 m<sup>2</sup> is believed to improve ESRD outcome and appropriate selection of dialysis modality.
  - e. Stage 5
    - i. End-stage renal disease/kidney failure (GFR <15 mL/min/1.73 m<sup>2</sup>, or on dialysis)
    - ii. Client has metabolic acidosis, cardiovascular complications such as pericarditis, encephalopathy, neuropathies, and many other manifestations demonstrating end-stage disease.
- III. Etiology (Pradeep, 2017)**
- a. Multiple causes, including (but not limited to):
    - i. Primary renal (i.e., primary glomerular and tubular) disorders (e.g., polycystic kidney disease, glomerulonephritis, IgA nephropathy)
    - ii. Acute tubular necrosis (ATN) from unresolved acute kidney injury (AKI)
    - iii. Diabetes (40%) and hypertension (25.2%) are responsible for most cases of ESRD resulting in dialysis (Alper et al, 2017).
- iv. Chronic infections: glomerulonephritis, pyelonephritis, beta-hemolytic streptococci infection; hepatitis B and C; HIV; syphilis
  - v. Vascular diseases: hypertensive nephrosclerosis, renal artery stenosis, renal vein thrombosis, vasculitis
  - vi. Obstructive processes: longstanding renal calculi, benign prostatic hyperplasia (BPH)
  - vii. Cystic disorders: polycystic or medullary kidney disease
  - viii. Collagen and connective tissue diseases: rheumatoid arthritis (RA), systemic lupus erythematosus (SLE), and collagen vascular disease
  - ix. Tumors: malignant (multiple myeloma) or benign
  - x. Genetics: Although most cases of CKD are acquired, researchers have begun to identify genetic contributions to increased risk for development or progression of CKD.
  - xi. Nephrotoxic agents: drugs, such as aminoglycosides, tetracyclines; contrast dyes; heavy metals, NSAIDs
  - b. Highest incidence of ESRD occurs in individuals older than age 70 years; men are 64% more likely than women to develop ESRD (although CKD is more common in women than men [16% vs 13%]), and African Americans are three times more likely than whites to have ESRD (Alper et al, 2017; Centers for Disease Control and Prevention [CDC], 2017; Pradeep, 2017).

#### IV. Statistics

- a. Morbidity: In 2015, 124,111 new cases of end-stage renal disease (ESRD) were reported with a total of nearly 500,000 patients receiving dialysis treatment and well over 200,000 living with a kidney transplant (United States Renal Data System [USRDS], 2017).
- b. Mortality: In 2013, adjusted mortality rates remained higher for Medicare patients with CKD (117.9/1000) than for those without CKD (47.5/1000), and these rates increased with CKD severity, although this gap narrowed during the period from 2001 to 2013 (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2016a). Deaths in the dialysis population are associated with (1) cardiovascular disease, (2) sepsis, and (3) cerebrovascular disease (Pradeep, 2017). Mortality rates continue to decrease for dialysis and transplant patients, having fallen by 28% and 40%, respectively, since 1996 (NIDDK, 2016a).
- c. Cost: In 2015, the total Medicare spending for beneficiaries with kidney disease was nearly \$100 billion. This included over \$64 billion in spending for all Medicare beneficiaries who have CKD and another \$34 billion for beneficiaries with ESRD (USRDS, 2017).

#### G L O S S A R Y

**ACR (albumin to creatinine ratio):** Determines the relationship between the albumin and creatinine in the urine and estimates the amount of albumin excreted in 24 hours. A urine albumin-to-creatinine ratio above 30 mg/g is higher than normal.

**Acute tubular necrosis (ATN):** Structural injury or tissue necrosis within the kidney, caused by ischemia or toxic injury. Necrosis is usually patchy, but injury can be widespread.

**Albuminuria:** Too much albumin in the urine is a sign of **kidney disease**. Albumin is a protein found in the blood

and should not be found in urine. A damaged kidney lets some albumin pass into the urine.

**Anuria:** Urine output less than 100 mL/24 hr.

**Azotemia:** Buildup of nitrogenous waste products, specifically urea, in the blood (BUN).

**Chronic kidney disease or chronic renal failure:**

Kidney damage or decreased kidney GFR of less than 60 mL/min/1.73 m<sup>2</sup> for 3 or more months.

**Ecchymosis:** Superficial bleeding under the skin—purple or black-and-blue bruise.

**G L O S S A R Y** (continued)

**End-stage renal disease (ESRD):** GFR less than 15 mL/min or receiving dialysis.

**Glomerular filtration rate (GFR):** Rate of fluid filtration through the kidney glomeruli.

**Nephrotoxins:** Chemical substances, including medications that can cause kidney damage.

**Nocturia:** Frequent urination after retiring to bed.

**Oliguria:** Urinary output less than 400 mL/24 hr.

**Osteitis fibrosa:** Bones become soft and deformed due to increased metabolism or high bone turnover associated with increased levels of parathyroid hormone. Leads to bone pain, tenderness, and increased risk of fractures.

**Polyuria:** Excretion of large amounts (2–6 L/24 hr) of urine, lacking concentration and regulation of waste products. Occurs during diuretic phase of AKI.

**Porphyrins:** Nitrogen-containing chemical components of hemoglobin.

**Purpura:** Hemorrhagic state characterized by patches of purplish discoloration, resulting from extravasation of blood into the skin. Purpura does not blanch with pressure.

**Pyelonephritis:** Infection of the kidney medulla or cortex.

**Renal osteodystrophy:** Bone disease that occurs when the kidneys fail to maintain the proper levels of calcium and phosphorus in the blood.

**Uremia:** Toxic clinical syndrome associated with fluid, electrolyte, and hormone imbalances and metabolic abnormalities due to deterioration of renal function and the deleterious effects of azotemia on organ systems.

**CARE SETTING**

Primary care of the individual with chronic kidney disease is at the community level, although inpatient acute hospitalization may be required for life-threatening complications.

**RELATED CONCERNs**

Anemias—iron deficiency, anemia of chronic disease, pernicious, aplastic, hemolytic, page 541  
 Fluid and electrolyte imbalances (see *DavisPlus*)  
 Heart failure: chronic, page 38  
 Hypertension: severe, page 26  
 Metabolic acidosis—primary base bicarbonate deficiency (see *DavisPlus*)  
 Psychosocial aspects of care, page 835  
 Upper gastrointestinal bleeding, page 340

**Additional associated nursing diagnoses are found in:**  
 Acute kidney injury (acute renal failure), page 595  
 Renal dialysis—general considerations, page 623

**CLIENT ASSESSMENT DATABASE**

Clients with chronic renal failure may not have any symptoms at all until normal kidney function declines to 20% or less. At that stage, an array of symptoms, such as the following, may appear.

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<b>ACTIVITY/REST</b> <ul style="list-style-type: none"> <li>• Extreme fatigue, weakness, malaise</li> <li>• Sleep disturbances—insomnia, restlessness, somnolence</li> </ul>	<ul style="list-style-type: none"> <li>• Muscle weakness, loss of tone, decreased range of motion (ROM)</li> </ul>
<b>CIRCULATION</b> <ul style="list-style-type: none"> <li>• History of prolonged or severe hypertension</li> <li>• Palpitations, chest pain (angina)</li> </ul>	<ul style="list-style-type: none"> <li>• Hypertension, jugular vein distention (JVD)</li> <li>• Cardiac dysrhythmias, distant heart sounds</li> <li>• Pericardial friction rub if uremic pericarditis is present</li> <li>• Full or bounding pulses</li> <li>• Generalized tissue and pitting edema of feet, legs, and hands</li> <li>• Enlargement of liver, spleen, and heart</li> <li>• Pallor, bronze-gray, yellow skin</li> </ul>

(continues on page 610)

**CLIENT ASSESSMENT DATABASE (contd.)****MAY REPORT (continued)****MAY EXHIBIT (continued)****EGO INTEGRITY**

- Stress factors—financial, relationship
- Feelings of helplessness, hopelessness, powerlessness

**ELIMINATION**

- Decreased urinary frequency, oliguria, anuria (advanced failure)
- Abdominal bloating, diarrhea, or constipation

**FOOD/FLUID**

- Anorexia
- Heartburn, nausea, vomiting, unpleasant metallic taste in mouth
- Rapid weight gain (edema), weight loss (malnutrition)
- Use of diuretics

**HYGIENE**

- Difficulty performing activities of daily living (ADLs)

**NEUROSENSORY**

- Headache, blurred vision
- Numbness, tingling, and weakness, especially of lower extremities (peripheral neuropathy)
- Muscle cramps or twitching, “restless leg” syndrome, burning numbness of soles of feet

**PAIN/DISCOMFORT**

- Flank pain, headache, muscle cramps, or leg pain—worse at night

**RESPIRATION**

- Shortness of breath, sudden nighttime dyspnea
- Cough with or without thick, tenacious sputum

**SAFETY**

- Itching skin, frequent scratching
- Recent or recurrent infections
- Bleeding tendencies

**SEXUALITY**

- Decreased libido, amenorrhea, infertility
- Erectile dysfunction

**SOCIAL INTERACTION**

- Difficulties imposed by condition, such as unable to work, maintain social contacts, or usual role function in family

**TEACHING/LEARNING**

- Family history of polycystic disease, hereditary nephritis, urinary calculus, malignancy

- Denial, anxiety, fear, anger, irritability, personality changes

- Change in urine color—deep yellow, red, brown, cloudy
- Oliguria, may become anuric

- Muscle wasting, decreased subcutaneous fat, debilitated appearance
- Gum ulcerations; bleeding of gums, tongue
- Abdominal distention, ascites, liver enlargement (end stage)
- Changes in skin turgor and moisture
- Edema—generalized, dependent

- Thin, dry, brittle nails and hair

- Altered mental state—continuum of symptoms can be present, depending on stage of disease, such as decreased attention span, inability to concentrate, loss of memory, confusion, decreasing level of consciousness, stupor, coma
- Twitching, muscle fasciculation, seizure activity
- Gait abnormalities

- Guarding, distraction behaviors, restlessness

- Tachypnea, dyspnea, increased rate and depth (Kussmaul's respiration may be associated with metabolic acidosis)
- Cough productive of pink-tinged sputum (pulmonary edema)

- Scratch marks, petechiae, ecchymotic areas on skin
- Fever (sepsis, dehydration); normothermia may actually represent an elevation in client who has developed a lower-than-normal body temperature (effect of chronic renal failure [CRF] and depressed immune response)
- Bone fractures; calcium phosphate deposits (metastatic calcifications) in skin, soft tissues, joints; limited joint movement

**MAY REPORT (continued)****MAY EXHIBIT (continued)**

- History of poorly controlled hypertension or diabetes (high risk for renal failure), exposure to toxins, such as nephrotoxic drugs, drug overdose, environmental poisons
- Current or recent use of nephrotoxic antibiotics, angiotensin-converting enzyme (ACE) inhibitors, chemotherapy agents, heavy metals, NSAIDs, radiocontrast agents

**DISCHARGE PLAN CONSIDERATIONS**

- May require alteration or assistance with medications, treatments, supplies; transportation; homemaker or maintenance tasks

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES**

TEST	WHY IT IS DONE	WHAT IT TELLS ME
<b>BLOOD TESTS</b>		
• <b>Blood urea nitrogen (BUN):</b>	Measures the by-product of protein metabolism in the liver, filtered by the kidneys and excreted in urine.	Levels are elevated in chronic kidney disease. ESRD is characterized by marked elevation of BUN.
• <b>Creatinine (Cr):</b>	End product of muscle and protein metabolism filtered by the kidneys and excreted in urine.	The level of creatinine in the blood helps estimate the glomerular filtration rate (GFR). Can be quite elevated before symptoms of CRF are present in unmonitored client. Markedly elevated in late stage.
• <b>BUN/Cr ratio:</b>	Ratio helps determine whether factors other than kidney failure are causing changes in numbers. Normal ratio is 10:1.	Ratio is less than 10:1, especially in later stages of CRF. Impaired filtration causes reduced BUN reabsorption, thereby lowering BUN/Cr ratio.
• <b>Glomerular filtration rate (GFR):</b>	Calculated from serum Cr levels and adjusted for mean normal body surface area. GFR is approximately 90 mL/min in the healthy adult.	GFR is used to stage renal failure. Symptoms are typically absent until GFR falls below 60 (stage 3). The client in severe CRF with a GFR between 15 and 29 (stages 4–5) is a candidate for dialysis or transplantation.
• <b>Complete blood count (CBC):</b>	Battery of screening tests, which typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; and white blood cell (WBC) count and differential.	Hgb decreases because of anemia, usually less than 7 to 8 g/dL. Anemia develops from decreased renal synthesis of erythropoietin, the hormone responsible for bone marrow stimulation for RBC production. RBC survival is decreased, and bleeding tendency is increased from the uremia-induced platelet dysfunction.
• <b>Arterial blood gases (ABGs):</b>	Determines the pH and the percentage of oxygen, carbon dioxide, and bicarbonate in arterial blood.	Decreased pH. Metabolic acidosis (less than 7.2) occurs because of loss of renal ability to excrete hydrogen and ammonia or end products of protein catabolism. Bicarbonate and PCO <sub>2</sub> decreased.
• <b>Electrolytes (renalytes):</b>	Electrically charged minerals found in body tissues and blood in the form of dissolved salts that help move nutrients into and wastes out of the body's cells, maintain water balance, and stabilize the body's pH level.	
• <b>Sodium:</b>	Helps to evaluate hydration status and progression of renal failure.	May be low if kidney "wastes sodium" or normal, reflecting dilutional state of hypernatremia.

(continues on page 612)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li>• <b>Potassium:</b> Fluctuation in levels can create life-threatening situations, affecting therapeutic choices.</li> </ul>	Elevated related to potassium retention, with decline in GFR below 20 to 25 mL/min diminishes kidney ability to excrete potassium, or with cellular shifts (acidosis), or tissue release (RBC hemolysis). In ESRD, electrocardiogram (ECG) changes may not occur until potassium is 6.5 mEq or higher. The resulting hyperkalemia poses a life-threatening emergency, which requires frequent and immediate intervention. Note: Potassium may also be decreased if client is on potassium-wasting diuretics or when client is receiving dialysis treatment.
<ul style="list-style-type: none"> <li>• <b>Phosphorus:</b> Has a direct impact on parathyroid function and bone health.</li> </ul>	As GFR declines, less phosphate is filtered and excreted; however, serum levels may remain normal initially because of increased parathyroid hormone (PTH) secretion and the associated increase in renal excretion of phosphorus. As CRF advances to stages IV and V, serum levels rise and bone complications such as osteitis fibrosa may develop.
<ul style="list-style-type: none"> <li>• <b>Calcium:</b> Important in feedback mechanism for inhibiting PTH synthesis and skeletal bone turnover.</li> </ul>	Hypocalcemia may become severe as a result of low plasma calcitriol levels impairing intestinal absorption or from calcium binding to elevated serum phosphate levels.
<ul style="list-style-type: none"> <li>• <b>Magnesium:</b> Helps maintain normal muscle and nerve function, keeps heart rhythm steady, promotes normal blood pressure, and is known to be involved in energy metabolism and protein synthesis.</li> </ul>	In end-stage renal disease, the limited ability of the kidney to excrete an increased magnesium load may result in toxic concentrations in serum. While hypermagnesemia is a hazard when magnesium-containing drugs are given, magnesium balance may be normal or even decreased in many uremic individuals. This is usually due to decreased dietary intake combined with the impaired intestinal magnesium absorption that characterizes late-stage renal failure.
<ul style="list-style-type: none"> <li>• <b>Proteins (especially albumin):</b> Evaluates nutritional status and predicts mortality in clients receiving dialysis.</li> </ul>	Decreased serum level may reflect protein loss via urine, fluid shifts, decreased intake, or decreased synthesis because of malnutrition.
<ul style="list-style-type: none"> <li>• <b>Serum osmolality:</b> Measures the amount of chemicals dissolved in the serum. Kidneys excrete or reabsorb water to keep osmolality in range of 285 to 295 mOsm/kg. Chemicals that affect serum osmolality include sodium, chloride, bicarbonate, proteins, and glucose.</li> </ul>	Higher than 285 mOsm/kg; often equal to urine.
<b>URINE TESTS</b>	
<ul style="list-style-type: none"> <li>• <b>Volume:</b> Reflection of declining renal function, possible development of AKI superimposed on CRF.</li> </ul>	Usually less than 400 mL/24 hr (oliguria) or urine is absent (anuria).
<ul style="list-style-type: none"> <li>• <b>Color:</b> Changes in color or clarity indicate developing complications.</li> </ul>	Abnormally cloudy urine may be caused by pus, bacteria, fat, colloidal particles, phosphates, or urates. Dirty, brown sediment indicates presence of RBCs, Hgb, myoglobin, and porphyrins.
<ul style="list-style-type: none"> <li>• <b>Specific gravity:</b> Measures density of urine compared to water, with normal range of 1.005 to 1.030.</li> </ul>	Less than 1.015 or fixed at 1.010 reflects severe renal damage.
<ul style="list-style-type: none"> <li>• <b>Protein (albuminuria):</b> Dipstick test used as a screening tool to detect glomerular injury (prevalent in persons with diabetes, hypertension, or glomerular disease) that has caused glomeruli to lose selective permeability and leak protein, particularly albumin, which is excreted in the urine.</li> </ul>	High-grade persistent proteinuria (3 to 4+) strongly indicates glomerular damage, especially when RBCs and casts are also present. Low-grade proteinuria (1 to 2+) and WBCs may be indicative of infection or interstitial nephritis.
<ul style="list-style-type: none"> <li>• <b>Total protein-Cr (albumin-Cr) ratio:</b> Spot urine collection for total protein-to-creatinine ratio allows reliable approximation (extrapolation) of total 24-hour urinary protein excretion.</li> </ul>	A value greater than 3.0 to 3.5 g is within the nephrotic range; less than 2.0 g is characteristic of tubulointerstitial problems.
<ul style="list-style-type: none"> <li>• <b>Osmolality:</b> Measures the ratio of water and solutes, such as electrolytes, acids, and other metabolic wastes, processed by the kidneys and released in urine. When body fluid is balanced, normal urine osmolality is in the range of 300 to 900 mOsm/kg.</li> </ul>	Less than 350 mOsm/kg is indicative of tubular damage, and urine/serum ratio is often 1:1.

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li>• <b>Cr clearance:</b> Calculates GFR by measuring the amount of Cr cleared from the blood and filtered into urine in 24 hours.</li> <li>• <b>Sodium:</b> Determines hydration status and ability to conserve or excrete Na.</li> </ul>	<p>Best indicator of overall kidney function, as reduced Cr clearance correlates with increased circulating Cr. May be significantly decreased—less than 80 mL/min in early kidney disease; less than 10 mL/min in ESRD.</p> <p>More than 40 mEq/L because kidney is not able to reabsorb sodium.</p>
<b>OTHER DIAGNOSTIC STUDIES</b>	
<ul style="list-style-type: none"> <li>• <b>Renal ultrasound:</b> Imaging technique that uses high-frequency sound waves and a computer to create images of blood vessels, tissues, and organs.</li> </ul>	Kidney size can be correlated with certain conditions—large kidney may be present in hyperfiltration, or small, echogenic kidney may be associated with advanced kidney disease.
<ul style="list-style-type: none"> <li>• <b>Doppler ultrasound/duplex Doppler study:</b> Test that uses high-frequency sound waves (ultrasound) to measure the amount of blood flow through your arteries and veins.</li> </ul>	Ultrasound can also document presence of tumors, polycystic disease, or other obstruction in upper urinary system.
<ul style="list-style-type: none"> <li>• <b>Computed tomographic (CT) scans:</b> X-ray procedure that uses a computer to produce a detailed picture of a cross section of the body.</li> </ul>	Noninvasive study to evaluate problems in the kidneys caused by restricted blood flow (renal artery stenosis).
<ul style="list-style-type: none"> <li>• <b>Magnetic resonance imaging (MRI):</b> Imaging technique that uses a magnetic field and radio waves to create detailed images of the organs and tissues within the body.</li> </ul>	Demonstrates vessel disorders and kidney mass.
<ul style="list-style-type: none"> <li>• <b>Kidney, ureter, bladder (KUB) x-ray:</b> X-ray of the abdomen, showing the kidneys, ureters, and bladder.</li> </ul>	Useful in person who requires a CT scan but who cannot receive intravenous contrast; reliable in the diagnosis of renal vein thrombosis.
<ul style="list-style-type: none"> <li>• <b>Aortorenal angiography:</b> Fluoroscopic examination, which uses contrast to examine the renal blood vessels for signs of blockage or abnormality.</li> </ul>	Demonstrates size and structure of kidneys, ureters, and bladder; reveals presence of abnormalities, such as cysts, tumors, or stones.
<ul style="list-style-type: none"> <li>• <b>Renal biopsy:</b> Percutaneous renal biopsy currently is performed most often with ultrasound guidance.</li> </ul>	Assesses renal circulation and identifies extravascularities and masses. <i>Note:</i> Contrast media can precipitate renal failure in damaged kidney.
	Biopsy is generally indicated when renal impairment or proteinuria approaching the nephrotic range is present and diagnosis is still unclear.

## NURSING PRIORITIES

1. Maintain homeostasis.
2. Prevent complications.
3. Provide information about disease process, prognosis, and treatment needs.
4. Support adjustment to lifestyle changes.

## DISCHARGE GOALS

1. Fluid and electrolyte balance stabilized.
2. Complications prevented or minimized.
3. Disease process, prognosis, and therapeutic regimen understood.
4. Dealing realistically with situation and initiating necessary lifestyle changes.
5. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: risk for Electrolyte Imbalance

#### Possibly Evidenced By

Renal dysfunction; compromised regulatory function  
Excessive fluid volume; vomiting diarrhea  
Insufficient fluid volume

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Electrolyte & Acid/Base Balance NOC

Be free of complications resulting from electrolyte imbalances (e.g., muscle weakness/cramps, fatigue, dysrhythmias, impaired cognition)

ACTIONS/INTERVENTIONS	RATIONALE
<b>Electrolyte Management [NIC]</b>	
<b>Independent</b>	
Assess specific client risk, noting disease process that may lead to/exacerbate electrolyte imbalances (e.g., chronic kidney disease, noncompliance with kidney diet; home dialysis program; presence of other conditions, such as diabetes/other endocrine disorders, heart failure with chronic use of diuretics).	Helps to identify potential concerns requiring evaluation and intervention.
Note client's age and developmental level, which can increase the risk for electrolyte imbalance.	This risk group may include the elderly or individuals unable to meet their own needs or monitor their health status (e.g., client who is unconscious for unknown cause or length of time; homeless person, trauma victim).
Review client's daily medications. Discuss client's medications with primary healthcare provider to determine if changes should or can be made in client's medications or dosages.	To identify those associated with risk for electrolyte imbalance (e.g., including and not limited to diuretics, laxatives, certain antidepressants, corticosteroids).
Evaluate fluid intake and output, being aware whether client is currently on dialysis and, if so, what type. Measure and document 24-hour fluid deficit or excess.	Many factors (e.g., inability to take fluids for any reason; hemorrhage, excessive fluid resuscitation; vomiting, use of diuretics or dialysis) affect fluid balance, disrupting electrolyte transport, function, and excretion.
Suggest client keep a diary of foods/fluids ingested when electrolyte imbalances occur or are difficult to manage.	Review of actual intake may help identify hidden sources of electrolyte-containing foods, especially in ethnic diets that are not included on standard nutritional lists.
Assess mental status, noting client/caregiver report of change, such as altered attention span, recall of current events, and other cognitive functions.	Changes can be associated with electrolyte imbalance (e.g., commonly sodium).
Monitor heart rate and rhythm.	Tachycardia, bradycardia, and other dysrhythmias are associated with potassium, calcium, and magnesium imbalance.
Note presence/severity of anorexia; persistent vomiting, acute or chronic diarrhea; high nasogastric tube output; loss of bowel sounds.	Any disturbance of the gastrointestinal system carries with it the potential for electrolyte imbalances.
Evaluate motor strength and function, noting steadiness of gait, handgrip strength, and reactivity of reflexes.	Imbalances of sodium, potassium, calcium, magnesium, and phosphorus can impact neuromuscular function.
<b>Collaborative</b>	
Collaborate in the treatment of underlying conditions.	To prevent, limit, or treat effects if electrolyte imbalances caused by disease or organ dysfunction.
Consult with nutritionist/dietician to educate client/SO and to recommend or provide balanced nutrition, using best route for feeding as prescribed by condition. Restrict micronutrients (e.g., foods high in sodium, potassium glucose) as indicated, according to kidney function and comorbid conditions.	Obtaining and utilizing electrolytes and other minerals are dependent on client receiving them in a readily available form (including food and supplements via ingestion, enteral or parenteral feeding). If client with CKD is on dialysis (either peritoneal or hemodialysis), nutrients and electrolytes may be restricted or added depending on client's needs. Refer to CP: Renal dialysis for general and specific dietary concerns for client's needs.

### NURSING DIAGNOSIS: **risk for decreased Cardiac Output**

#### **Risk Factors May Include**

- Altered afterload—[e.g., systemic vascular resistance (SVR)]
- Altered preload—[e.g., decreased venous return]
- Alteration in heart rate, rhythm

**NURSING DIAGNOSIS:** **risk for decreased Cardiac Output** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Cardiac Pump Effectiveness NOC**

Maintain cardiac output as evidenced by blood pressure (BP) and heart rate/rhythm within client's usual range; peripheral pulses strong and equal with prompt capillary refill time.

Identify signs of cardiac decompensation, alter activities, and seek help appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hemodynamic Regulation NIC</b>	
<i>Independent</i>	
Identify client at risk.	Client may have preexisting cardiac problems. But there is also potential for cardiac output issues to develop in client with CKD, particularly in later stages.
Assess presence and degree of hypertension: Monitor BP and note postural changes, such as sitting, lying, and standing.	Significant hypertension can occur because of disturbances in the renin-angiotensin-aldosterone system caused by renal dysfunction. Although hypertension is common, orthostatic hypotension may develop because of intravascular fluid deficit, response to effects of antihypertensive medications, or uremic pericardial tamponade.
Auscultate heart and lung sounds. Evaluate presence/degree of peripheral edema, vascular congestion, and reports of dyspnea.	S <sub>3</sub> /S <sub>4</sub> heart sounds with muffled tones, tachycardia, irregular heart rate, tachypnea, dyspnea, crackles, wheezes, and edema or jugular distention suggest heart failure (HF).
Investigate reports of chest pain, noting location, radiation, severity (0 to 10 or similar scale), and whether or not it is intensified by deep inspiration and supine position.	Although myocardial infarction (MI) is common, approximately half of clients on dialysis develop pericarditis, potentiating risk of pericardial effusion and tamponade.
Evaluate heart sounds, noting onset of friction rub, falling blood pressure, diminished or absent peripheral pulses, distended jugular veins, pallor, and obvious changes in mentation.	Can indicate cardiac tamponade, a medical emergency.
Assess activity level and response to activity.	Weakness can be attributed to heart failure and anemia.
<i>Collaborative</i>	
Monitor laboratory and diagnostic studies, such as the following:	
Electrolytes—potassium, sodium, calcium, magnesium; BUN/Cr	Imbalances can alter electrical conduction and cardiac function.
Chest x-rays	Useful in identifying developing cardiac failure and response to therapies.
Collaborate in treatment of underlying disease or conditions, where possible.	Slowing progression of CKD in early stages can be aided by interventions, such as controlling BP, managing diabetes, treating hyperlipidemia, and avoiding toxins such as NSAIDs, intravenous (IV) contrast dye, and aminoglycosides.
Administer medications, as indicated, for example:	Aggressive treatment of hypertension is needed to reduce SVR and aid in prevention of HF and MI. Note: Doses and dosing intervals of drugs that are excreted or metabolized renally are adjusted according to the residual GFR.
Statins, such as atorvastatin (Lipitor) and simvastatin (Zocor)	Statins may be used to treat elevated plasma cholesterol because of increased risk for coronary events, especially when GFR is below 60.
ACE inhibitors, such as enalapril (Vasotec), or angiotensin receptor blockers (ARBs), such as irbesartan (Avapro) and losartan (Cozaar)	These drugs may be prescribed not only to lower BP and reduce protein in the urine but also to slow the progression of kidney disease.

(continues on page 616)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Erythropoietin-stimulating agents (ESAs) such as Epojen, EPO or erythropoietin-stimulating proteins, such as somatropin (Nutropin) or darbepoetin alpha (Aranesp)	May be given to treat anemia associated with CKD when hemoglobin falls below 10 to improve oxygen-carrying capacity of circulating hemoglobin and reduce left ventricular strain. Note: ESA resistance, or hyporesponsiveness, can occur in client with CKD (not on dialysis) where the desired hemoglobin (Hb) concentration is not achieved despite higher than usual doses of ESAs (Berns, 2017).
Administer oxygen, as indicated.	Cardiac function can be improved with use of oxygen if client is severely anemic or metabolic acidosis and electrolyte abnormalities are causing dysrhythmias.
Prepare for renal replacement therapy (RRT), such as hemodialysis, peritoneal dialysis, or renal transplantation.	Reduction of uremic toxins and correction of electrolyte imbalances and fluid overload may limit or prevent cardiac manifestations, including hypertension and pericardial effusion.
Assist with pericardiocentesis, as indicated.	Accumulation of fluid within pericardial sac can compromise cardiac filling and myocardial contractility, impairing cardiac output and potentiating risk of cardiac arrest.

### NURSING DIAGNOSIS: risk for Activity Intolerance

#### Possibly Evidenced By

Circulatory problem [anemia]; physical deconditioning

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Activity Tolerance NOC

Participate in desired activities free of physiological signs of intolerance (e.g., pulse, respirations, and blood pressure remain within client's normal range).

ACTIONS/INTERVENTIONS	RATIONALE
<b>Energy Management NIC</b> <i>Independent</i> Note reports of increasing fatigue and weakness. Observe for tachycardia, pallor of skin and mucous membranes, dyspnea, and chest pain.	May reflect effects of anemia and cardiac response necessary to keep cells oxygenated.
Monitor level of consciousness (LOC) and behavior.	Anemia may cause cerebral hypoxia manifested by changes in mentation, orientation, and behavioral responses.
Evaluate response to activity and ability to perform tasks. Assist as needed and develop schedule for rest.	Anemia decreases tissue oxygenation and increases fatigue, which may require intervention, changes in activity, and rest.
<b>Collaborative</b> Monitor laboratory studies, such as RBCs, Hgb/Hct.	Uremia decreases production of erythropoietin in the bone marrow, thus depressing RBC production and survival time. In CKD, Hgb and Hct are usually low but tolerated (e.g., client may not be symptomatic until Hgb is below 7).
Administer fresh blood and packed red cells (PRCs), as indicated.	May be necessary when client is symptomatic with anemia. PRCs are usually given when client is experiencing fluid overload or receiving dialysis treatment. Washed RBCs are used to prevent hyperkalemia associated with stored blood.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications, as indicated, for example: Erythropoietin-stimulating agents such as preparations (Epogen, Procrit)	Stimulates the production and maintenance of RBCs, thus decreasing the need for transfusion. Note: Recent data showing increased risks of cardiovascular events with ESAs in CKD caused the Food and Drug Administration (FDA) to issue a black box warning about their use. Thus, clinicians have been advised to use the lowest possible ESA dose to reduce the need for transfusion and discontinue the ESA as quickly as possible (Alper et al, 2017; FDA, 2011).
Iron preparations, such as folic acid (Folvite) and cyanocobalamin (Rubesol-1000)	Useful in managing symptomatic anemia related to nutritional and dialysis-induced deficits. Note: Iron should not be given with phosphate binders because they may decrease iron absorption.

NURSING DIAGNOSIS: <b>risk for Bleeding</b>
<b>Possibly Evidenced By</b> Abnormal blood profile—decreased RBC production and survival, altered clotting functions (suppressed erythropoietin production or secretion) [Hypertension]
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>
<b>Blood Loss Severity NOC</b> Experience no signs and symptoms of bleeding or hemorrhage. Maintain or demonstrate improvement in laboratory values.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bleeding Precautions NIC</b>	
<b>Independent</b>	
Note client report of pain in specific areas and whether the pain is increasing and is diffuse or localized.	To determine possible sources of bleeding.
Assess vital signs, noting changes such as new or worsening hypertension. Investigate potential causes (especially if client has frequent nosebleeds).	Nosebleeds are a common occurrence with CKD (especially when on dialysis) and may be associated with hypertension and use of medications such as anticoagulants, immunosuppressants, and glucocorticoids.
Review medications periodically.	To identify those (prescriptions, OTC products, and herbals) that may cause, or exacerbate, bleeding.
Observe for oozing from venipuncture sites, bleeding, or ecchymotic areas following slight trauma, petechiae, and joint swelling or mucous membrane involvement—bleeding gums, recurrent epistaxis, hematemesis, melena, and hazy or red urine.	Bleeding can occur easily because of capillary fragility and altered clotting functions and may worsen anemia.
Test gastrointestinal (GI) secretions and stool for occult blood.	Mucosal changes and altered platelet function due to uremia may result in gastric mucosal erosion and GI hemorrhage.
Provide soft toothbrush and electric razor. Use smallest needle possible and apply prolonged pressure following injections or vascular punctures.	Reduces risk of bleeding and hematoma formation.
Protect at-risk client from trauma such as falls.	To reduce risk of injury causing overt or hidden hemorrhage.
<b>Collaborative</b>	
Monitor laboratory studies, such as the following:	
Platelet count, clotting factors	Suppression of platelet formation and inadequate levels of factors III and VIII impair clotting and potentiate risk of bleeding. Note: Bleeding may become intractable in ESRD.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Prothrombin time (PT) level	Abnormal prothrombin consumption lowers serum levels and impairs clotting.
Collaborate in evaluating need for replacing blood (or specific components).	May be needed to replace losses or prevent complications associated with severe anemia.
Administer medications, as indicated, for example:	
Iron preparations, such as folic acid (Folvite) and cyanocobalamin (Rubesol-1000)	Useful in managing symptomatic anemia related to nutritional and dialysis-induced deficits. Note: Iron should not be given with phosphate binders because they may decrease iron absorption.
Cimetidine (Tagamet), ranitidine (Zantac), and antacids	May be given prophylactically to reduce or neutralize gastric acid and thereby reduce the risk of GI hemorrhage.

### NURSING DIAGNOSIS: risk for acute Confusion

#### Possibly Evidenced By

Metabolic abnormalities—electrolyte imbalances, increased blood urea nitrogen (BUN)/creatinine, azotemia, decreased

hemoglobin

Fluctuations in sleep-wake cycle

Infection

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Cognition NOC

Maintain or regain optimal level of mentation.

Identify ways to compensate for cognitive impairment and memory deficits.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Reality Orientation NIC</b>	
<i>Independent</i>	
Monitor for impairment in thinking ability, memory, and orientation. Note attention span.	Uremic syndrome's effect can begin with minor confusion or irritability and progress to altered personality, inability to assimilate information or participate in care. Awareness of changes provides opportunity for evaluation and intervention.
Ascertain from significant other (SO) client's usual level of mentation.	Provides comparison to evaluate development, progression, or resolution of impairment.
Provide SO with information about client's status.	Some improvement in mentation may be expected with restoration of more normal levels of BUN, electrolytes, and serum pH.
Provide quiet, calm environment and judicious use of TV, radio, and visitation.	Minimizes environmental stimuli to reduce sensory overload and confusion while preventing sensory deprivation.
Reorient to surroundings, person, and so forth. Provide calendars, clocks, and outside window.	Provides clues to aid in maintaining reality.
Present reality concisely and briefly, and do not challenge illogical thinking if present.	Confrontation potentiates defensive reactions and may lead to client mistrust and heightened denial of reality.
Communicate information and instructions in simple, short sentences. Ask direct, yes or no questions. Repeat explanations as necessary.	May aid in reducing confusion when present and increases possibility that communications will be understood and remembered.
Establish a regular schedule for expected activities.	Aids in maintaining reality orientation and may reduce fear and confusion.
Promote adequate rest and undisturbed periods for sleep.	Sleep deprivation may further impair cognitive abilities.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Fluid/Electrolyte Management NIC</b> <i>Collaborative</i>	
Monitor laboratory studies, such as BUN/Cr, serum electrolytes, glucose level, and ABGs (PO <sub>2</sub> , pH).	Correction of imbalances can have profound effects on cognition.
Provide supplemental oxygen (O <sub>2</sub> ) as indicated.	Correction of hypoxia alone can improve cognition.
Avoid use of barbiturates and opiates.	Drugs normally detoxified in the kidneys will have increased half-life and cumulative effects, worsening confusion.
Prepare for dialysis.	Marked deterioration of thought processes may indicate worsening of azotemia and general condition, requiring prompt intervention to regain homeostasis.

**NURSING DIAGNOSIS:** risk for impaired Skin Integrity**Possibly Evidenced By**

Accumulation of toxins in the skin  
Impaired circulation (anemia with tissue ischemia) or sensation (peripheral neuropathy)  
Changes in skin turgor—edema  
Reduced activity, immobility

**Desired Outcomes/Evaluation Criteria—Client Will****Tissue Integrity: Skin and Mucous Membranes NOC**

Maintain intact skin.

**Risk Management NOC**

Demonstrate behaviors and techniques to prevent skin breakdown or injury.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Skin Surveillance NIC</b> <i>Independent</i>	
Inspect skin for changes in color, turgor, and vascularity. Note redness and excoriation. Observe for ecchymosis and purpura.	Indicates areas of poor circulation and early breakdown that may lead to decubitus formation and infection.
Monitor fluid intake and hydration of skin and mucous membranes.	Detects presence of dehydration or fluid overload that affects circulation and tissue integrity at the cellular level.
Inspect dependent areas for edema. Elevate legs, as indicated.	Edematous tissues are more prone to breakdown. Elevation promotes venous return, limiting venous stasis and edema formation.
Change position frequently, move client carefully, pad bony prominences with sheepskin, and use elbow and heel protectors.	Decreases pressure on edematous, poorly perfused tissues to reduce ischemia.
Provide soothing skin care, restrict use of soaps, and apply ointments or creams such as lanolin or Aquaphor.	Baking soda and cornstarch baths decrease itching and are less drying than soaps. Lotions and ointments may be desired to relieve dry, cracked skin.
Keep linens dry and wrinkle-free.	Reduces dermal irritation and risk of skin breakdown.
Investigate reports of itching.	Although dialysis has largely eliminated skin problems associated with uremic frost, itching can occur because the skin is an excretory route for waste products, such as phosphate crystals associated with hyperparathyroidism in ESRD.
Recommend client use cool, moist compresses to apply pressure to, rather than scratch, pruritic areas. Keep fingernails short; encourage use of gloves during sleep, add vinegar (acetic acid) to bath water, as needed.	Alleviates discomfort and reduces risk of dermal injury.
Suggest wearing loose-fitting cotton garments.	Prevents direct dermal irritation and promotes evaporation of moisture on the skin.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Provide foam or flotation mattress.	Reduces prolonged pressure on tissues, which can limit cellular perfusion, potentiating ischemia and necrosis.

### NURSING DIAGNOSIS: risk for impaired Oral Mucous Membrane

#### Possibly Evidenced By

Decrease in salivation; dehydration; fluid restrictions; inadequate nutrition; immunosuppression  
Treatment regimen; chemical irritation (conversion of urea in saliva to ammonia)

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Oral Health NOC

Maintain integrity of oral mucosa.

##### Risk Control NOC

Identify and initiate specific interventions to promote healthy oral mucosa.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Oral Health Maintenance NIC</b>	
<b>Independent</b>	
Inspect oral cavity: note moistness, character of saliva, presence of inflammation, ulcerations, and leukoplakia.	Provides opportunity for prompt intervention and prevention of infection.
Provide fluids throughout 24-hour period within prescribed limit.	Prevents excessive oral dryness from prolonged period without oral intake.
Offer frequent mouth care or rinse with 0.25% acetic acid solution. Provide gum, hard candy, or breath mints between meals.	Mucous membranes may become dry and cracked. Mouth care soothes, lubricates, and helps freshen mouth taste, which is often unpleasant because of uremia and restricted oral intake. Rinsing with acetic acid helps neutralize ammonia formed by conversion of urea.
Encourage good dental hygiene after meals and at bedtime. Recommend avoidance of dental floss.	Reduces bacterial growth and potential for infection. Dental floss may cut gums, potentiating bleeding.
Recommend client stop smoking and avoid lemon and glycerin products or mouthwash containing alcohol.	These substances are irritating to the mucosa and have a drying effect, potentiating discomfort.
Provide artificial saliva as needed, such as Ora-Lube.	Prevents dryness, buffers acids, and promotes comfort.

### NURSING DIAGNOSIS: ineffective Health Management

#### May Be Related To

Complexity of therapeutic regimen; complexity of healthcare system; insufficient knowledge of therapeutic regimen  
Economically disadvantaged

Perceived seriousness of condition, benefit or barrier; powerlessness

Insufficient social support

#### Possibly Evidenced By

Difficulty with prescribed regimen

Ineffective choices in daily living for meeting health goals

Unexpected acceleration of illness symptoms

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Self-Management: Kidney Disease NOC

Verbalize understanding of condition, disease process, and potential complications.

Verbalize understanding of therapeutic needs.

Correctly perform necessary procedures and explain reasons for the actions.

Demonstrate and initiate necessary lifestyle changes.

Participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process</b> <b>NIC</b>	
<i>Independent</i>	
Review disease process, prognosis, and future expectations. Educate regarding natural disease progression, different dialysis modalities, renal transplantation, and client's option to refuse or discontinue chronic dialysis.	Provides knowledge base from which client can make informed choices. Kidney failure choices depend on stage of disease and include doing no treatment, hemodialysis, peritoneal dialysis, and kidney transplantation. No matter which option is chosen, the client faces many lifestyle changes, including a complicated treatment plan involving several medications, diet and exercise modification, and appointments with numerous healthcare providers. Note: Client at stage 4 must be evaluated and prepared for renal replacement therapy—dialysis or transplantation.
Address client's and SO's feelings, concerns, and methods of dealing with situation. Offer compassionate listening and honest answers to questions. Refer to appropriate support resources.	Common reactions to diagnosis include disbelief, anxiety, anger at self and others, and mild to severe depression (including suicidal ideation). (Refer to CP: Psychosocial Aspects of Care; ND: risk for self-/other-directed Violence.)
Review dietary modifications or restrictions, including the following:	Dietary modifications are primarily required for person not on dialysis.
Phosphorus—milk, cheese, carbonated drinks, processed foods, poultry, corn, and peanuts	Dietary restrictions to control serum phosphorus, which are routinely recommended, are usually associated with a reduction in protein intake. This may lead to protein-energy wasting and poor survival. A better solution may be the use of specific nutritional supplements high in energy and protein content but lower in phosphorus (González-Parra et al, 2012).
Fluid, potassium, and sodium restrictions, when indicated	If fluid retention is a problem, client may need to restrict intake of fluid, such as previous day's output plus 500 mL for insensible losses, and restrict dietary potassium and sodium as prescribed. If fluid overload is present, diuretic therapy or dialysis will be part of the regimen. (Refer to CP: Acute Kidney Injury, ND: excess Fluid Volume.)
Discuss other nutritional concerns such as regulating protein intake according to level of renal function—generally 0.6 to 0.7 g/kg of body weight per day of good-quality protein, such as meat, chicken, fish, and eggs.	Metabolites that accumulate in blood derive almost entirely from protein catabolism; as renal function declines, proteins may be restricted proportionately. Too little protein can result in malnutrition. Note: Client on dialysis may not need to be as vigilant with protein intake.
Encourage adequate calorie intake, especially from carbohydrates in the nondiabetic client.	Spares protein, prevents wasting, and provides energy. Note: Use of special glucose polymer powders can add calories to enhance energy level without extra food or fluid intake.
Discuss drug therapy, including use of vitamin D, calcium supplements, and phosphate binders, such as calcium acetate (PhosLo), calcitriol (Caltrate), sevelamer (Renagel), and avoidance of magnesium antacids (Mylanta, Maalox, Gelusil).	Prevents serious complications, such as reducing phosphate absorption from the GI tract and supplying calcium to maintain normal serum levels, reducing risk of bone demineralization and fractures and tetany; however, use of aluminum-containing products should be monitored because accumulation in the bones potentiates osteodystrophy. Magnesium-containing products potentiate hypermagnesemia, which is already present late in chronic kidney disease and carries the risk of causing neurological problems (e.g., seizures). Note: Supplemental vitamin D may be required to facilitate calcium absorption.
Emphasize importance of reading all product labels—drugs and foods—and not taking medications (including over-the-counter products) without prior approval of healthcare provider.	It is difficult to maintain electrolyte balance when exogenous intake is not factored into dietary restrictions; for example, hypercalcemia can result from routine supplement use in combination with increased dietary intake of calcium-fortified foods and medications containing calcium.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct in (or review) BP or glucose monitoring at home and provide information on obtaining monitoring equipment, as indicated.	Because hypertension and poor glycemic control are high risk factors in kidney disease progression, self-monitoring and management are important. Also, hypertension is worsened by CRF, often requiring management with antihypertensive drugs, necessitating close observation of treatment effects, such as vascular response to medication.
Emphasize need for smoking cessation, if client smokes. Refer for nicotine medications and support resources.	Smoking increases renal vasoconstriction and exacerbates hypertension.
Review strategies to prevent constipation, including stool softeners, such as Colace, and bulk laxatives, such as Metamucil, but avoiding magnesium products (milk of magnesia).	Reduced fluid intake, changes in dietary pattern, and use of phosphate-binding products often result in constipation that is not responsive to nonmedical interventions. Use of products containing magnesium increases risk of hypermagnesemia.
Review measures to prevent bleeding or hemorrhage, such as use of soft toothbrush, electric razor, avoidance of constipation, forceful blowing of nose, strenuous exercise, or contact sports.	Reduces risks related to alteration of clotting factors and decreased platelet count.
Caution against exposure to external temperature extremes.	Peripheral neuropathy may develop, especially in lower extremities, because of effects of uremia and electrolyte/acid-base imbalances impairing peripheral sensation and potentiating risk of tissue injury.
Discuss role of fatigue in client's daily or desired activities. Advise establishing a routine exercise program within limits of individual ability and rest periods with activities. Instruct in energy conservation techniques.	Fatigue due to anemia, sleep disturbances, malnutrition, and failure of kidneys to clear toxins can greatly reduce client's tolerance for activity. At the same time, exercise is needed to maintain muscle tone and joint flexibility; reduces risks associated with immobility, including bone demineralization.
Address sexual concerns.	Physiological effects of uremia and antihypertensive therapy may impair sexual desire and performance.
Identify available resources such as nephrologist, nutritionist, and other specialists, as indicated. Emphasize necessity of medical and laboratory follow-up.	Close monitoring of renal function and electrolyte balance is necessary to adjust dietary prescription, treatment, and to make decisions about possible options such as dialysis or transplantation.
Discuss quality-of-life concerns, such as pros and cons of each treatment option, refusing or withdrawing dialysis, medical care advance directives, and durable power of attorney.	When kidney disease is chronic or end stage, client and SO may want to discuss issues with others, such as family, social worker, and religious counselor, and should have the opportunity to receive information to make informed choices.
Identify signs and symptoms requiring immediate medical evaluation, such as the following:	
Low-grade fever, chills, changes in characteristics of urine or sputum, tissue swelling or drainage, and oral ulcerations	Depressed immune system, anemia, and malnutrition all contribute to increased risk of infection.
Numbness or tingling of digits, abdominal and muscle cramps, carpopedal spasms, and pain and tenderness in extremities	Uremia and decreased absorption of calcium may lead to peripheral neuropathies. Note: Client is also at risk for development of thrombophlebotic complications.
Joint swelling or tenderness, decreased ROM, and reduced muscle strength	Hyperphosphatemia with corresponding calcium shifts from the bone may result in deposition of the excess calcium phosphate as calcifications in joints and soft tissues. Symptoms of skeletal involvement are often noted before impairment in organ function is evident.
Headaches, blurred vision, periorbital or sacral edema, and red eyes	Suggestive of development and poor control of hypertension and changes in eyes caused by calcium.
Provide client and family information resources, such as books, articles, and informational websites; the National Kidney Foundation; and the American Association of Kidney Patients.	Offers client and SO opportunity to obtain information, support, and sources of funding.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **excess Fluid Volume**—compromised regulatory mechanism
- **Fatigue**—disease state, malnutrition, anemia, stress, depression
- **ineffective Health Management**—complexity of therapeutic regimen, decisional conflicts (e.g., client value system, health beliefs, cultural influences), powerlessness, economic difficulties, family conflict, social support deficit
- **Hopelessness**—deteriorating physiological condition, long-term stress, prolonged activity limitations

## RENAL DIALYSIS—GENERAL CONSIDERATIONS

### I. Procedure

- a. Process that substitutes for kidney function by removing excess fluid and accumulated endogenous or exogenous toxins
- b. Type of fluid and solute removal depends on the client's underlying pathophysiology, current hemodynamic status, vascular access, availability of equipment and resources, and healthcare providers' training.

### II. Indications

- a. Treatment for acute kidney injury (AKI) or chronic end-stage renal disease (ESRD)
- b. Indicated in AKI for (Spinner, 2014) the following:
  - i. Acid-base problems: such as severe acidosis
  - ii. Electrolyte problems: such as acute life-threatening hyperkalemia
  - iii. Intoxications: removal of toxins due to overdose of certain drugs (e.g., ethanol, some antiretroviral drugs, aminoglycosides, and antibiotics)
  - iv. Overload: (fluid)
  - v. Uremic symptoms caused by the inability to excrete nitrogenous wastes, parathyroid hormone, proteins, and other physiological substances in toxic levels
- c. Indicated in chronic kidney disease (Lameire & Biesen, 2010; Pradeep, 2017)
  - i. Pericarditis or pleuritis (urgent indication)
  - ii. Progressive uremic encephalopathy or neuropathy, with signs such as confusion, asterixis, myoclonus, wrist or foot drop, or, in severe cases, seizures (urgent indication)
  - iii. A significant tendency for bleeding attributable to uremia (urgent indication)
  - iv. Fluid overload unresponsive to diuretics
  - v. Life-threatening hypertension unresponsive to antihypertensive medications
  - vi. Persistent metabolic disturbances unresponsive to medical therapy (such as hyperkalemia, metabolic acidosis, hypercalcemia, hypocalcemia, and hyperphosphatemia)
  - vii. Failure to thrive; malnutrition

### III. Types

- a. Choice of dialysis is determined by three main factors:
  - i. Type of renal failure (acute or chronic)
  - ii. Client's particular physical condition
  - iii. Access to dialysis resources
- b. Two primary types of dialysis
  - i. Hemodialysis (HD)
    1. Requires placement of a venous access and a filtering machine removing the blood from the body, running it through a dialyzer, and then returning it to the body
    2. Conventional HD may be done three times a week over 3 to 4 hours, either at a facility or in the home, or daily dialysis may be done during the day or night hours, often at home.
  - ii. Peritoneal dialysis (PD)
    1. Requires a surgically placed abdominal catheter for infusing dialysate fluid into the peritoneal cavity for a predetermined dwell time and then draining it out
    2. Procedure may be carried out at home through gravity system or automated pump.

### IV. Statistics

- a. Morbidity: In 2014, approximately 468,000 individuals with ESRD received dialysis in the United States (414,180 receiving HD and 53,820 receiving PD). An additional 193,000 with ESRD received transplants as the initial mode of therapy (USRDS, 2015a).
- b. Mortality: Dialysis patients continue to have substantially higher mortality, and fewer expected remaining life years, when compared with the general population who have cancer, diabetes, or cardiovascular disease. However, the relative and absolute decline in mortality for dialysis patients in the past 15 years has been greater than for cancer, diabetes, or cardiovascular disease. In 2014, the adjusted mortality rate for dialysis patients was 166 per 1000 patient-years (USRDS, 2015a).
- c. Costs: In 2014, total Medicare payments for HD treatments were \$26.1 billion, while payments for PD were approximately \$3.6 billion (USRDS, 2015b).

## G L O S S A R Y

- Access:** Point on the body where a needle or catheter is inserted to gain entry to the bloodstream. Arteriovenous (AV) access is via graft, fistula, or central vein line.
- AV fistula:** Vascular access is made by joining an artery to a vein under the skin to make a bigger blood vessel.
- AV graft:** Soft plastic tube to join an artery and a vein under the skin.
- Dialysate:** Fluid used in both PD and HD that cleanses the blood and replaces needed electrolytes.
- Disequilibrium syndrome:** Nausea, vomiting, and hypertension, occasionally with convulsions, which develops within several hours after starting HD for renal failure; it is apparently caused by too rapid removal of urea from the extracellular fluid (ECF) compartment, with movement of water into cells and cerebral edema.
- Dry weight:** The lowest weight a patient can tolerate without the development of symptoms or hypotension.

Because physiological dry weight is that weight resulting from normal renal function, vascular permeability, serum protein concentration, and body volume regulation, dry weight in HD should, theoretically, be lower.

**Intradialytic parenteral nutrition (IDPN):** Involves infusing hyperalimentation fluids during the time of dialysis—through the vascular shunt or intraperitoneally—to normalize the amounts of albumin, glucose, and other nutrients in the bloodstream and to decrease the associated morbidity and mortality associated with protein-calorie malnutrition.

**Ultrafiltration:** Blood management method that removes noncellular water and low-molecular-weight solutes from anticoagulated blood through an extracorporeal (external from the body) filter.

## CARE SETTING

Primary focus is at the community level at the dialysis center, although inpatient acute stay may be required during initiation of therapy.

## RELATED CONCERNS

- Anemias—iron deficiency, anemia of chronic disease, pernicious, aplastic, hemolytic, page 541
- Heart failure: chronic, page 38
- Peritonitis, page 389
- Psychosocial aspects of care, page 835
- Sepsis/septic shock, page 772
- Total nutritional support: parenteral/enteral feeding, page 525

## CLIENT ASSESSMENT DATABASE

\*\*\*Refer to CPs: Acute Kidney Injury and/or Chronic Kidney Disease and End-Stage Renal Disease for assessment information.

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### DISCHARGE PLAN CONSIDERATIONS

- May require assistance with treatment regimen, transportation, activities of daily living (ADLs), homemaker and maintenance tasks, end-of life decisions, palliative care
- ♦ Refer to section at end of plan for postdischarge considerations.

## DIAGNOSTIC STUDIES

\*\*\*Studies and results are variable, depending on reason for dialysis, degree of kidney involvement, and client considerations, such as distance from treatment center, cognition, available support, and insurance options. Refer to CPs: Acute Kidney Injury and/or Chronic Kidney Disease and End-Stage Renal Disease for diagnostic studies.

**NURSING PRIORITIES**

1. Promote homeostasis and general well-being.
2. Maintain comfort.
3. Prevent complications.
4. Support client independence and self-care.
5. Provide information about disease process, prognosis, and treatment needs.

**DISCHARGE GOALS**

1. Fluid and electrolyte balance maximized.
2. Complications prevented or minimized.
3. Discomfort alleviated.
4. Dealing realistically with current situation; independent within limits of condition.
5. Disease process, prognosis, and therapeutic regimen understood.
6. Plan in place to meet needs after discharge.

This section addresses the general nursing management issues of client receiving some form of dialysis.

**NURSING DIAGNOSIS:** **imbalanced Nutrition: less than body requirements****May Be Related To**

Insufficient dietary intake, [increased metabolic demands]; inability to digest food/absorb nutrients (result of uremia, medication side effects; loss of peptides/amino acids; abdominal distention)

**Possibly Evidenced By**

Food intake less than recommended daily allowance; satiety immediately upon ingesting food; abdominal pain/cramping

Insufficient interest in food; perceived inability to ingest food; alterations in taste sensation; food [renal diet] aversion

Insufficient muscle tone; [decreased subcutaneous fat or muscle mass]

**Desired Outcomes/Evaluation Criteria—Client Will****Nutritional Status NOC**

Demonstrate stable weight or gain toward goal with normalization of laboratory values and no signs of malnutrition.

**ACTIONS/INTERVENTIONS****RATIONALE****Nutrition Therapy NIC***Independent*

Ascertain type and stage of kidney disease and note client's food intake and nutrition status before starting dialysis.  
Note type of dialysis client is (or will be) receiving (hemodialysis [HD] or peritoneal [PD]).

Client may present with widely varying nutrition needs (e.g., new diabetic with kidney failure, severe malnutrition related to long-term kidney disease, or be new to renal replacement therapy [RRT] and require dietary modifications). Each person's diet prescription is different, but the principal restrictions include protein, potassium, sodium, and phosphorus.

Monitor amount and type of ingested food. Calculate daily caloric intake prior to and periodically during dialysis.

Identifies nutritional deficits and diet therapy needs. Caloric intake during dialysis must be adequate for meeting daily metabolic demands, as well as for treating the malnutrition typically associated with ESRD.

Recommend client/significant other (SO) keep a food diary, including estimation of ingested calories, protein, and electrolytes of individual concern—sodium, potassium, chloride, magnesium, and phosphorus.

Helps client realize "big picture" and allows opportunity to alter dietary choices to meet individual desires within identified restrictions.

Note presence of nausea and anorexia.

These symptoms accompany accumulation of endogenous toxins and can alter or reduce food intake. Medical interventions may be needed to improve client's desire and ability to eat.

Encourage client to participate in menu planning.

May enhance oral intake and promote sense of control.

Recommend small, frequent meals. Schedule meals according to dialysis needs.

Smaller portions may enhance intake. Type of dialysis influences meal patterns; for instance, clients receiving HD might not be fed directly before or during procedure because this can alter fluid removal, and clients undergoing PD may be unable to ingest food while abdomen is distended with dialysate.

(continues on page 626)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage use of herbs and spices such as garlic, onion, pepper, parsley, cilantro, and lemon.	Adds zest to food to help reduce boredom with diet, while reducing potential for ingesting too much potassium and sodium.
Suggest socialization during meals.	Provides diversion and promotes social aspects of eating.
Encourage frequent mouth care.	Reduces discomfort of oral stomatitis and metallic taste in mouth associated with uremia, which can interfere with food intake.
<b>Collaborative</b>	
Perform complete nutrition assessment, using appropriate anthropometric and nutrition tools, consisting of laboratory studies (e.g., total proteins, glucose, micronutrients), comparison of initial weight with both usual body weight and percent of ideal body weight, and review of food diaries.	Assesses adequacy of nutrient utilization and points to diet therapy needs. Note: Malnutrition is often present to some degree in any client with severe or chronic kidney disease. Studies have shown that the presence of malnutrition prior to initiation of dialysis is strongly predictive of increased mortality (Kalantar-Zadeh & Fouque, 2017).
Refer to nutritionist or dietitian to develop diet appropriate to client's needs.	It is necessary to develop a highly individual dietary program to meet needs within specific limitations. Nutrition-related concerns include maintenance of acceptable weight and serum proteins, prevention of renal osteodystrophy (defective bone development), and reduction of cardiovascular risks associated with protein energy malnutrition, electrolyte and micronutrient deficiencies (Kalantar-Zadeh & Fouque, 2017).
Provide a balanced diet with prescribed calories and high-quality protein.	The client on hemodialysis (HD) may not be calorie limited. However, in peritoneal dialysis (PD), some calories come from dialysate solution (contains dextrose), thus reducing client's calories requirements from food (Swaford, n.d.). Protein intake in a clinically stable hemodialysis client is currently recommended to be 1.2 to 1.4 g/kg body weight/d, 60% of which should come from sources high in biological value (e.g., fish, poultry eggs) (Kalantar-Zadeh & Fouque, 2017; Swaford, n.d.).
Restrict sodium (usually to 2 g or less/d) to manage body fluids and potassium as prescribed. Avoid bacon, ham, other processed meats and foods, orange juice, and tomato soup.	These electrolytes can quickly accumulate, causing fluid retention, weakness, and potentially lethal cardiac dysrhythmias. Note: Potassium removal is more efficient on PD because the treatment occurs daily. A typical daily goal for PD patients is 3000 to 4000 mg of potassium (Swaford, n.d.).
Limit foods high in calcium and phosphorus, as indicated.	Mineral and bone disorder in CKD occurs when damaged kidneys and abnormal hormone levels cause calcium and phosphorus to be out of balance. This disorder commonly occurs in people with CKD and affects most people receiving dialysis. Note: It has been recommended that (in general) calcium intake should be limited to 2000 mg/d and phosphorus limited to 800 to 1000 mg/d while on either HD or PD (National Institute for Diabetes and Digestive and Kidney Diseases [NIDDK], 2015; Swaford, n.d.).
Administer multivitamins, including folic acid; vitamins B <sub>6</sub> , C, and D; and iron supplements, as indicated.	Replaces vitamin and mineral deficits resulting from malnutrition, anemia, or loss during dialysis.
Administer parenteral supplements, as indicated, or interdialytic parenteral nutrition (IDPN), as necessary.	Parenteral nutrition may be given to provide nutrients only if oral intake is insufficient to prevent malnutrition and enteral feeding is contraindicated. IDPN may be required in client who (1) continues to lose weight, (2) has very low serum albumin despite oral supplementation, or (3) when parenteral route is unavailable or contraindicated. Note: IDPN is convenient because it is delivered during dialysis and is beneficial in some clients. However, only about 70% of the nutrients are actually delivered to the patient.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor laboratory studies, for example:	because of loss into the dialysate. Recent treatment guidelines and reimbursement schedules indicate that use of IDPN should be limited and initiated only after aggressive attempts at enteral feeding (Beddhu et al, 2017).
Comprehensive metabolic panel (e.g., glucose, total proteins, calcium, electrolytes)	Provides information about the current status of a person's metabolism and nutrition status. Abnormal results, especially combinations of abnormal results, can indicate a dietary problem that needs to be addressed.
Hemoglobin (Hgb), red blood cell (RBC), and iron levels	Anemia is the most pervasive complication affecting energy levels in ESRD.
Administer medications, as appropriate, for example:	
Antiemetics, such as prochlorperazine (Compazine)	Reduces stimulation of the vomiting center.
Histamine blockers, such as famotidine (Pepcid)	Gastric distress is common and may be a neuropathy-induced gastric paresis. Hypersecretion can cause persistent gastric distress and digestive dysfunction.
Hormones and supplements as indicated, such as erythropoietin (EPO, Epogen) and iron infusions or oral supplements (e.g., Feosol, Ferrex 150)	Although EPO is given to increase numbers of RBCs, it is not effective without iron supplementation.
Insert and maintain nasogastric (NG) or enteral feeding tube, if indicated.	May be necessary when persistent vomiting occurs or when enteral feeding is desired.

### NURSING DIAGNOSIS: risk for impaired Skin Integrity

#### Possibly Evidenced By

Chemical injury agent (e.g., uremia; phosphorus); pharmaceutical agent(s) [and drug allergies]  
Alteration in skin turgor/fluid volume  
Inadequate nutrition; alteration in metabolism  
Impaired circulation; alteration in sensation

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Tissue Integrity: Skin & Mucous Membranes NOC

Maintain structural intactness of epidermis and dermis.

##### Risk Control NOC

Participate in prevention measures.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Skin Surveillance NIC</b>	
<i>Independent</i>	
Perform routine skin inspections in at-risk client, documenting observed changes. Ask client about skin sensations.	Skin conditions that can affect client on dialysis include (1) itching (pruritus) from high level of phosphorus; (2) dry skin (xerosis)—CKD-related changes in sweat and oil glands; and (3) skin discoloration (hyperpigmentation) due to retention of urochromes normally excreted by kidneys (DaVita Kidney Care Staff, n.d.).
Assess activity limitations, noting presence and degree of restriction or ability.	Influences choice of interventions. Note: Fear of or real danger of dislodging dialysis lines or catheter may cause client to be reluctant to initiate movement.
Encourage frequent change of position when on bedrest or chair rest; support affected body parts and joints with pillows, rolls, sheepskin, and elbow and heel pads, as indicated.	Decreases discomfort, maintains muscle strength and joint mobility, enhances circulation, and prevents skin breakdown.

(continues on page 628)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide and encourage soothing skin care (e.g., bathing with soap for sensitive skin; applying high-water content gel, lotion, or cream right after bath while skin is still damp; avoiding alcohol-based lotions).	Helps to maintain softer and more elastic skin, making it more protective against breakdown.
Keep body pressure points and skin folds clean and dry. Keep bed linens dry and wrinkle-free.	Reduces skin irritation and likelihood of breaking down/injury at pressure points. Note: Dry bed linens may be of special importance in client with uremic pruritus, which is often generalized and especially bothersome when it affects the back.
Instruct in and assist with active and passive range-of-motion (ROM) exercises.	Promotes circulation, maintains joint flexibility, prevents contractures, and aids in reducing muscle tension. Note: A high level of phosphorus may cause calcium-phosphorus crystals to build up in the joints, muscles, and other body organs, leading to bone and joint pain. To avoid these risks, client may be prescribed a phosphate binder (e.g., calcium acetate [PhosLo]).
Encourage client to be up and about as much as possible. Institute a planned activity or exercise program as appropriate, with client's input.	Improves systemic circulation (good for the skin) and increases client's energy and sense of well-being. Note: Recent studies report findings of significant beneficial effects of various exercise interventions in CKD patients (including those on dialysis), positively impacting muscular functioning, walking capacity, cardiovascular function, and quality of life (Heiwe & Jacobson, 2014).

**Collaborative**

Provide foam, water, or air flotation mattress or soft chair cushion.

Reduces tissue pressure and may enhance circulation, thereby reducing risk of dermal ischemia and breakdown.

### NURSING DIAGNOSIS: **Self-Care deficit (specify)**

#### May Be Related To

Weakness, fatigue; decrease in motivation

Pain, discomfort

Alteration in cognitive functioning; perceptual disorders (accumulated toxins)

#### Possibly Evidenced By

Impaired inability to perform ADLs

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Self-Care Status NOC

Performs ADLs within level of own ability and constraints of the illness.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Care Assistance NIC</b>	
<i>Independent</i>	
Determine client's physical ability to participate in self-care activities (scale of 0 to 4). Note degree of fatigue, cognitive and emotional factors that may impact self-care, and presence/location/intensity of pain.	Underlying condition dictates level of deficit, affecting choice of interventions. Note: Multiple other factors associated with CKD (e.g., fatigue, cognitive impairment, pain, depression, lack of motivation or support) also have a major impact on the client's abilities.
Active-listen client's/SOs concerns. Participate in working on solutions and mutual goal setting.	Exhibits regard for client's values and beliefs, clarifies barriers to participation in self-care, provides opportunity for problem-solving, and provides support.
Provide assistance with activities as necessary. Encourage client/SO to participate in planning and decision making of needed/desired activities.	Meets immediate needs while supporting client participation and independence.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage use of energy-saving techniques: sitting, not standing; using shower chair; resting between activities; and doing tasks in small increments.	Conserves energy, reduces fatigue, and enhances client's ability to perform tasks.
Recommend scheduling activities to allow client sufficient time to accomplish tasks to fullest extent of ability.	Unhurried approach reduces frustration and promotes client participation, enhancing self-esteem.
<b>Collaborative</b> Collaborate with PT/OT to evaluate individual abilities and assistive devices as needed.	Modified exercise program aids in maintaining muscle strength and appropriate use of assistive devices supports independence.
Provide analgesics as indicated.	Alleviation of discomforts/pain can give client energy and motivation to address needed tasks.

### NURSING DIAGNOSIS: risk for Constipation

#### Possibly Evidenced By

Eating habit change; insufficient food/fluid intake  
Decrease in gastrointestinal motility  
Electrolyte imbalance

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Bowel Elimination NOC

Maintain usual or improved bowel function.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Constipation/Impaction Management NIC</b>	
<b>Independent</b>	
Auscultate bowel sounds. Note consistency and frequency of bowel movements (BMs) and presence of abdominal distention.	Decreased bowel sounds, passage of hard-formed or dry stools suggest constipation and requires ongoing intervention to manage.
Review current medication regimen.	Side effects of some treatment-related drugs, such as iron products and some antacids, may compound problem.
Ascertain usual dietary pattern and food choices.	Although restrictions may be present, thoughtful consideration of menu choices can aid in controlling problem.
Suggest adding fresh fruits, vegetables, and fiber to diet within restrictions, when indicated.	Provides bulk, which improves stool consistency and reduces incidence of constipation. Note: The National Academy of Sciences Institute of Medicine noted that fiber prompts the absorption of calcium in person with CKD (thus improving calcium balance and bone mineral density) and helps control both high blood pressure and high blood sugar levels (Kidney Cares Community, 2013).
Encourage or assist with ambulation, and exercise program when able.	Activity may stimulate peristalsis, promoting return to normal bowel activity.
Provide privacy at bedside commode and bathroom.	Promotes psychological comfort needed for elimination.
<b>Collaborative</b>	
Administer stool softeners, such as docusate sodium (Colace), or bulk-forming laxatives, such as psyllium (Metamucil), as appropriate.	Produces a softer, more easily evacuated stool.

## NURSING DIAGNOSIS: risk for acute Confusion

### Possibly Evidenced By

Impaired metabolic functioning—electrolyte imbalances, increased blood urea nitrogen (BUN)/creatinine, azotemia, decreased hemoglobin; malnutrition  
Alteration in sleep-wake cycle; pain; impaired mobility

### Desired Outcomes/Evaluation Criteria—Client Will

#### Cognition NOC

Maintain or regain usual or improved level of mentation.  
Recognize changes in thinking and behavior and demonstrate behaviors to prevent or minimize changes.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Delirium Management NIC

##### Independent

Assess for behavioral changes or change in level of consciousness (LOC)—disorientation, lethargy, decreased concentration, memory loss, and altered sleep pattern.

May indicate level of uremic toxicity, developing complication of dialysis such as disequilibrium syndrome, and need for further assessment and intervention.

Keep explanations simple and reorient frequently as needed.  
Provide “normal” day or night lighting patterns, clock, and calendar.

Improves reality orientation.

Provide a safe environment and providing presence (someone with client) during procedure, as appropriate.

Prevents client injury and inadvertent removal of dialysis lines or catheter if client is confused.

Drain peritoneal dialysate promptly at end of specified equilibration period.

Prompt outflow will decrease risk of hyperglycemia or hyperosmolar fluid shifts affecting cerebral function.

Investigate reports of headache, associated with onset of dizziness, nausea, and vomiting, and note onset of progressive confusion, agitation, hypotension, tremors, or seizure activity.

May reflect development of disequilibrium syndrome (DDS), a neurological phenomenon, which can occur near completion of or following HD, particularly when client is first starting dialysis therapy. It is thought to be associated with cerebral edema (Mailloux, 2016).

##### Collaborative

Monitor lab studies such as:

BUN/Cr and serum glucose levels, determine urea reduction ratio (URR)

Follows progression or resolution of azotemia. Pre- and postdialysis BUN levels are used to determine efficacy of procedure. Also, urea reduction ratio (URR) of at least 60% to 65% (measured monthly) is considered a desirable response to dialysis (NIDDK, 2014).

Aluminum level, as indicated

Elevation may warn of impending cerebral involvement or dialysis dementia.

Alternate or change dialysate concentrations according to protocol, and add insulin, as indicated.

Hyperglycemia may develop secondary to glucose crossing peritoneal membrane and entering circulation. May require initiation of insulin therapy.

Administer normal saline intravenously (IV), as appropriate.

Volume restoration may be sufficient to reverse effects of disequilibrium syndrome.

Administer medication, as indicated, such as phenytoin (Dilantin), mannitol (Osmotrol), and barbiturates.

If disequilibrium syndrome occurs during dialysis, medication may be needed to control seizures in addition to a change in dialysis prescription or discontinuation of therapy.

## NURSING DIAGNOSIS: Anxiety [specify level]

### May Be Related To

Situational crisis; stressors; threat of death

Threat to current status (e.g., change in health status, role functioning, or socioeconomic status)

**NURSING DIAGNOSIS:** **Anxiety [specify level]** (continued)**Possibly Evidenced By**

Worried about change in life event  
 Increase in tension; apprehensiveness; uncertainty, fear; hypervigilance; insomnia  
 Sympathetic stimulation; alteration in attention/concentration; diminished ability to problem solve

**Desired Outcomes/Evaluation Criteria—Client Will****Anxiety Self-Control NOC**

Verbalize awareness of feelings and reduction of anxiety to a manageable level.  
 Demonstrate problem-solving skills and effective use of resources.  
 Appear relaxed and able to rest and sleep appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction NIC</b>	
<i>Independent</i>	
Assess level of concern of both client and SO. Note signs of denial, depression, or narrowed focus of attention.	Helps determine the kind of interventions required.
Explain procedures and care as delivered. Repeat explanations frequently, as needed. Provide information in multiple formats, including pamphlets and films.	Fear of unknown is lessened by information and knowledge and may enhance acceptance of permanence of ESRD and necessity for dialysis. Alteration in thought processes and high levels of anxiety or fear may reduce comprehension, requiring repetition of important information. Note: Uremia can impair short-term memory, requiring repetition or reinforcement of information provided.
Acknowledge normalcy of feelings in this situation.	Knowing feelings are normal can allay fear that client is losing control.
Provide opportunities for client and SO to ask questions and verbalize concerns.	Creates feeling of openness and cooperation and provides information that will assist in problem identification and solving.
Encourage SO to participate in care, as able and desired.	Involvement promotes sense of sharing, strengthens feelings of usefulness, provides opportunity to acknowledge individual capabilities, and may lessen fear of the unknown.
Acknowledge concerns of client and SO.	Prognosis and possibility of need for long-term dialysis and resultant lifestyle changes are major concerns for this client and those who may be involved in future care.
Point out current positive indicators of treatment—improvement in laboratory values, stable BP, or lessened fatigue.	Promotes sense of progress in an otherwise chronic process that seems endless while client still is experiencing physical deterioration and depression.
<i>Collaborative</i>	
Arrange for visit to dialysis center and meeting with another dialysis client, as appropriate.	Interaction with others who have encountered similar problems may assist client and SO to work toward acceptance of chronic condition and focus on problem-solving activities.
Address financial considerations. Refer to appropriate resources.	Treatment for kidney failure is expensive, although Medicare and other health insurance programs pay much of the cost. Loss of income/need for home care and so on increase financial worries.

**NURSING DIAGNOSIS:** **disturbed Body Image****May Be Related To**

Illness; treatment regimen  
 Alteration in body function, self-perception, cognitive functioning

(continues on page 632)

**NURSING DIAGNOSIS:** **disturbed Body Image** (continued)**Possibly Evidenced By**

Perceptions that reflect an altered view of one's body appearance; negative feeling about body (e.g., feelings of helplessness, powerlessness)  
Focus on past function; refusal to acknowledge change; preoccupation with change  
Change in lifestyle, social involvement  
Extension of body boundary (incorporates environmental objects—dialysis equipment)

**Desired Outcomes/Evaluation Criteria—Client Will****Body Image NOC**

Identify feelings and methods for coping with negative perception of self.  
Verbalize acceptance of body function/change in health status.

**Psychosocial Adjustment: Life Change NOC**

Demonstrate adaptation to changes and events that have occurred, as evidenced by setting realistic goals and active participation in care and life in general.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Body Image Enhancement NIC</b> <i>Independent</i>	
Assess level of client's knowledge about condition and treatment and anxiety related to current situation.	Identifies extent of problem or concern and necessary interventions.
Discuss meaning of loss and change to client.	Many clients and their families have difficulty dealing with changes in life and role performance as well as the client's loss of ability to control own body.
Note withdrawn behavior, ineffective use of denial, or behaviors indicative of overconcern with body and its functions. Investigate reports of feelings of depersonalization or the bestowing of humanlike qualities on machinery.	Indicators of developing difficulty handling stress of what is happening. Note: Client may feel tied to and controlled by the technology central to his or her survival, even to the point of extending body boundary to incorporate dialysis equipment.
Assess for use of addictive substances, primarily alcohol, other drugs, and self-destructive or suicidal behavior.	May reflect dysfunctional coping and attempt to handle problems in an ineffective manner.
Determine stage of grieving. Note signs of severe or prolonged depression.	Identification of grief stage client is experiencing provides guide to recognizing and dealing appropriately with behavior as client and SO work to come to terms with loss and limitations associated with condition. Prolonged depression may indicate need for further intervention.
Acknowledge normalcy of feelings.	Recognition that feelings are to be expected helps client accept and deal with them more effectively.
Encourage verbalization of personal and work conflicts that may arise. Actively listen to concerns.	Helps client identify problems and problem-solve solutions. Note: Home dialysis may provide more flexibility and enhance sense of control for clients who are appropriate candidates for this form of therapy.
Determine client's role in family constellation and client's perception of expectation of self and others.	Long-term and permanent illness or disability alters client's ability to fulfill usual role(s) in family and work setting. Unrealistic expectations can undermine self-esteem and affect outcome of illness.
Recommend SO treat client normally and not as an invalid.	Conveys expectation that client is able to manage situation and helps maintain sense of self-worth and purpose in life.
Assist client to incorporate disease management into lifestyle.	Necessities of treatment assume a more normal aspect when they are a part of the daily routine.
Identify strengths, past successes, and previous methods client has used to deal with life stressors.	Focusing on these reminders of own ability to deal with problems can help client deal with current situation.
Help client identify areas over which he or she has some measure of control. Provide opportunity to participate in decision-making process.	Provides sense of control over seemingly uncontrollable situation, fostering independence.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Recommend participation in local support group.	Reduces sense of isolation as client learns that others have been where client is now. Provides role models for dealing with situation, problem-solving, and “getting on with life.” Reinforces that therapeutic regimen can be beneficial.
Refer to healthcare and community resources, such as social service, vocational counselor, and psychiatric clinical nurse specialist.	Provides additional assistance for long-term management of chronic illness and change in lifestyle.

### NURSING DIAGNOSIS: risk for ineffective Health Management

#### Possibly Evidenced By

Difficulty managing complex treatment regimen/navigating complex healthcare systems  
 Perceived seriousness of condition, susceptibility, benefit or barriers  
 Excessive demands; family conflict; decisional conflicts; powerlessness  
 Economically disadvantaged; insufficient social support

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Self-Management: Kidney Disease NOC

Verbalize understanding of condition and relationship of signs and symptoms of the disease process and potential complications.  
 Verbalize understanding of therapeutic needs.  
 Correctly perform necessary procedures and explain reasons for actions.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <b>Independent</b> Note level of anxiety or fear and alteration of thought processes. Time teaching appropriately.	These factors directly affect ability to access and use knowledge. In addition, during the dialysis procedure, client’s cognitive function may be impaired, and clients themselves state that they feel “fuzzy.” Therefore, learning may not be optimal during this time.
Review particular disease process, prognosis, and potential complications in clear concise terms, periodically repeating and updating information, as necessary.	Providing information at the level of the client’s and SO’s understanding will reduce anxiety and misconceptions about what client is experiencing.
Encourage and provide opportunity for questions.	Enhances learning process, promotes informed decision making, and reduces anxiety associated with the unknown.
Acknowledge that certain feelings and patterns of response are normal during course of therapy.	Client and SO may initially be hopeful and positive about the future, but as treatment continues and progress is less dramatic, they can become discouraged and depressed, and conflicts of dependence versus independence may develop.
Emphasize necessity of reading all product labels—food, beverage, and over-the-counter (OTC) drugs—and not taking medications or herbal supplements without checking with healthcare provider.	It is difficult to maintain electrolyte balance when exogenous intake is not factored into dietary restriction; for example, hypercalcemia can result from routine supplement use in combination with increased dietary intake of calcium-fortified foods and medicines.
Emphasize importance of adhering to medication schedule required for the client’s specific form of renal disease, timing of dialysis, and properties of the individual medications.	This is necessary to ensure that therapeutic levels of the drugs are reached and that toxic levels are avoided.
Discuss significance of maintaining nutritious eating habits, preventing wide fluctuation of fluid and electrolyte balance, and avoidance of crowds or people with infectious processes.	Depressed immune system, presence of anemia, invasive procedures, and malnutrition potentiate risk of infection.

(continues on page 634)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct client about ESOs (e.g., epoetin [Epogen], darbepoetin [Aransep]), when used. Have client or SO demonstrate ability to administer and state adverse side effects and healthcare practices associated with this therapy.	Used for the management of the anemia associated with CRF and ESRD. Contraindications may include adverse side effects such as polycythemia, increased clotting, failure to administer correctly or have appropriate follow-up.
Identify healthcare and community resources, such as dialysis support group, social services, and mental health clinic.	Knowledge and use of these resources assist client and SO to manage care more effectively. Interaction with others in similar situation provides opportunity for discussion of options and making informed choices, including stopping dialysis or renal transplantation.
<b>Teaching: Procedure/Treatment NIC</b> Discuss procedures and purpose of dialysis in terms understandable to client. Repeat explanations as required.	A clear understanding of the purpose, process, and what is expected of client and SO facilitates their cooperation with regimen and may enhance outcomes.
Instruct client and SO in home dialysis, as indicated:	Home dialysis is associated with better outcomes in general and better survival rates as dialysis is usually performed 5 to 7 days/week and is more intensive. This decreases fluctuations in fluid, solute, and electrolyte balance, more closely mimicking renal function. However, specific criteria for client and SO participation and training, home resources, and professional oversight must be met in order to consider this option.
Operation and maintenance of equipment (including vascular shunt), sources of supplies	Information diminishes anxiety of the unknown and provides opportunity for client to be knowledgeable about own care.
Aseptic or clean technique	Prevents contamination and reduces risk of infection.
Self-monitoring of effectiveness of procedure	Provides information necessary to evaluate effects of therapy and need for change.
Management of potential complications	Reduces concerns regarding personal well-being; supports efforts at self-care.
Provide contact information for dialysis support persons.	Readily available support person can answer questions, troubleshoot problems, and facilitate timely medical intervention, when indicated, reducing risk and severity of complications. Note: Home dialysis clients usually are monitored by conventional dialysis center or interdisciplinary team.
Identify sources for supplies at home and when away from home.	Home dialysis clients are often capable of travel, even overseas, with proper preplanning and support.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Fatigue**—disease state, malnutrition, altered body chemistry, stress, depression
- **excess Fluid Volume**—compromised regulatory mechanism
- **risk for Infection**—invasive procedures, decreased hemoglobin, chronic disease, malnutrition
- **ineffective Health Management**—complexity of therapeutic regimen, economic difficulties, decisional conflicts; excessive demands made on individual and family
- **risk for caregiver Role Strain**—illness severity of care receiver, caregiver is spouse, presence of situational stressors, complexity/amount/duration of caregiving required

## PERITONEAL DIALYSIS (PD)

### I. Procedure

- a. Requires a surgically placed abdominal catheter and uses the peritoneum to filter toxins and excess fluid from the body
- b. Fluid removal is controlled by adjusting the dextrose concentration in the dialysate (e.g., 1.5%, 2.5%, 4.25%) to create an osmotic gradient for water with higher dextrose concentrations and more frequent exchanges increasing the rate of fluid removal.
- c. May be preferred over hemodialysis because it uses a simpler technique and provides more gradual physiological changes
- d. Long-term PD typically calls for three to four exchanges a day, each with a dwell time of 4 to 6 hours, and a long (8- to 10-hour) dwell time at night.

### II. Types (NIDDK, 2016b)

- a. Continuous ambulatory peritoneal dialysis (CAPD)
  - i. Most commonly used type of long-term PD, allowing client to manually manage the procedure at home with bag and gravity flow
  - ii. Some clients experience problems with the long overnight dwell time because, as dextrose in the solution crosses into body, it becomes glucose and starts to draw fluid from the peritoneal cavity back into the body,

thereby reducing the efficiency of the exchange and requiring a mini-cycler machine during the night.

### b. Automated peritoneal dialysis (APD)

- i. Continuous cycler-assisted peritoneal dialysis (CCPD)
  1. Uses a machine (cycler) to fill and empty the abdomen three to five times during the night while the person sleeps. In the morning, the last fill remains in the abdomen with a dwell time that lasts the entire day. May be a method of choice for younger individuals engaged in work activities.
  2. A combination of APD and CAP may be needed under certain client conditions (e.g., client is over the weight restrictions; client's peritoneum filters wastes too slowly).

### c. Statistics

- a. Morbidity: In 2014, approximately 129,450 Americans received PD (USRDS, 2015a).
- b. Mortality: In 2014, adjusted mortality rate was 157 for peritoneal dialysis patients, per 1000 patient-years (USRDS, 2015c).
- c. Costs: In 2014, Medicare payments for outpatient PD were approximately \$3.6 billion. Per patient per year costs for all PD patients averaged \$73,612 (USRDS, 2015b).

### G L O S S A R Y

**Automated peritoneal dialysis (APD):** Uses a machine to control the time of exchanges; warm, infuse, and drain the used solution at preset intervals; and fill the peritoneal cavity with new solution.

**Continuous ambulatory peritoneal dialysis (CAPD):** Uses three to five cycles daily and one long overnight dwell time, 7 days/week.

**Continuous cycler-assisted peritoneal dialysis (CCPD):** Mechanical device cycles shorter dwell times during the night (three to six cycles) with one 8-hour dwell time during daylight hours, thus increasing the client's independence.

**Cycle:** The infusion and drainage of a specific volume of peritoneal dialysis solution. The dwell time may vary from a few minutes to several hours.

**Cycler:** Machine used to infuse and drain dialysate from the peritoneal cavity.

**Dialysate (dialysis fluid):** A mixture of water, electrolytes, and dextrose. Electrolyte levels in dialysate are propor-

tioned to ensure that the levels in the blood remain within physiological range. Waste products, such as BUN and creatinine, are not present in the dialysate and will readily move out of the blood into the dialysis fluid.

**Nocturnal intermittent peritoneal dialysis (NIPD):** Similar to CCPD, except the number of overnight exchanges is greater (six to eight) and no exchange is performed during the day.

**Peritoneal dialysis (PD):** Treatment for both acute kidney injury (AKI) and end-stage renal disease (ESRD) using the peritoneum as the semipermeable membrane permitting transfer of nitrogenous waste products, toxins, and fluid from the blood into a dialysate solution.

**Ultrafiltrate:** The net amount of fluid resulting when the original volume of the dialysate used for a certain dwell is subtracted from the volume of the drained dialysate (effluent-infused dialysate = ultrafiltrate).

### NURSING DIAGNOSIS: risk for excess Fluid Volume

#### Possibly Evidenced By

Compromised regulatory mechanism (e.g., inadequate osmotic gradient of dialysate; fluid retention—malpositioned, kinked, or clotted internal catheter)

Excess fluid intake—oral (PO) or intravenous (IV)

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Fluid Overload Severity NOC

Demonstrate dialysate outflow exceeding or approximating infusion.

Experience no rapid weight gain, edema, or pulmonary congestion.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Peritoneal Dialysis Therapy NIC</b>	
<b>Independent</b>	
Monitor client's oral fluid intake (and educate client about fluid management) during and between dialysis.	Fluid overload is not usually a big problem with PD because procedure is performed every day. The exception may be if client is not following kidney diet or misses a dialysis session.
Maintain a record of inflow and outflow volumes and cumulative fluid balance.	In most cases, the amount drained should equal or exceed the amount instilled. A positive balance with more fluid in than out indicates need for further evaluation.
Record serial weights, compare with intake and output (I&O) balance. Weigh client when abdomen is empty of dialysate, providing a consistent reference point.	Serial body weights are an accurate indicator of fluid volume status. A positive fluid balance with an increase in weight indicates fluid retention.
Turn from side to side, elevate the head of the bed, and apply gentle pressure to the abdomen.	May enhance outflow of fluid when catheter is malpositioned or obstructed by the peritoneal omentum.
Note abdominal distention associated with poor dialysate outflow, decreased bowel sounds, changes in stool consistency, and reports of constipation.	Bowel distention or constipation may impede outflow of effluent. Note: Constipation, the most common cause of poor outflow, is associated with several factors (e.g., lack of fiber in diet, fluid restrictions, peritoneal catheter malfunction or occasionally peritonitis), which can result in dialysis failure. (Refer to CP: Renal Dialysis: general considerations, ND: risk for Constipation.)
Monitor blood pressure (BP) and pulse, noting escalating hypertension, shortness of breath, neck vein distention, and peripheral edema; measure central venous pressure (CVP), if available.	Elevations indicate hypervolemia. Assess heart and breath sounds, noting S <sub>3</sub> and crackles and rhonchi. Fluid overload may potentiate heart failure (HF) or pulmonary edema.
Evaluate development of tachypnea, dyspnea, and increased respiratory effort. Drain dialysate and notify physician.	Abdominal distention or diaphragmatic elevation may cause respiratory distress.
Assess for headache, muscle cramps, mental confusion, and disorientation.	Symptoms suggest hyponatremia or water intoxication.
Monitor equipment:	
Assess patency of catheter, noting difficulty in draining. Note presence of fibrin strings or plugs.	Slowing of flow rate or presence of fibrin suggests partial catheter occlusion requiring further evaluation or possible intervention.
Check tubing for kinks; note placement of bags. Anchor catheter so that adequate inflow and outflow are achieved.	Improper functioning of equipment may result in retained fluid in abdomen and insufficient clearance of toxins.
<b>Collaborative</b>	
Alter dialysate regimen, as indicated.	Changes may be needed in the glucose or sodium concentration to facilitate efficient dialysis.
Monitor blood glucose as prescribed when client is a diabetic.	Elevated glucose increases fluid retention and causes dialysate imbalance and reduced effectiveness of PD.
Monitor serum sodium.	Hypernatremia may be present, although serum levels can be low, reflecting dilutional effect of fluid volume overload.
Maintain fluid restriction, as indicated.	Fluid restrictions may have to be continued to decrease fluid volume overload. Between dialysis treatments, fluids accumulate in the body, particularly in the heart, lungs, and ankles.

#### NURSING DIAGNOSIS: risk for deficient Fluid Volume

##### Possibly Evidenced By

Loss of fluid through abnormal routes (e.g., use of hypertonic dialysate with excessive removal of fluid)

**NURSING DIAGNOSIS:** risk for deficient Fluid Volume (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Systemic Toxin Clearance: Dialysis NOC**

Achieve desired alteration in fluid volume and weight with BP and electrolyte levels within acceptable range. Experience no symptoms of dehydration.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Peritoneal Dialysis Therapy NIC</b>	
<i>Independent</i>	
Maintain record of inflow and outflow volumes and individual and cumulative fluid balance.	Provides information about the status of client's loss or gain at the end of each exchange.
Adhere to schedule for draining dialysate from abdomen.	Prolonged dwell times, especially when 4.5% glucose solution is used, may cause excessive fluid loss.
Weigh when abdomen is empty, following initial 6 to 10 runs, then as indicated.	Detects rate of fluid removal by comparison with baseline body weight.
Monitor BP lying and sitting and pulse. Note level of jugular pulsation.	Decreased BP, postural hypotension, and tachycardia are early signs of hypovolemia.
Note reports of dizziness, nausea, and increasing thirst.	May indicate hypovolemia or hyperosmolar syndrome.
Inspect mucous membranes; evaluate skin turgor, peripheral pulses, and capillary refill.	Dry mucous membranes, poor skin turgor, and diminished pulses and capillary refill are indicators of dehydration and need for increased intake or changes in strength of dialysate.
<i>Collaborative</i>	
Monitor laboratory studies, as indicated, such as:	
Serum sodium and glucose levels	Hypertonic solutions may cause hypernatremia by removing more water than sodium. In addition, dextrose may be absorbed from the dialysate, thereby elevating serum glucose.
Serum potassium levels	Hypokalemia may occur and can cause cardiac dysrhythmias.

**NURSING DIAGNOSIS:** risk for physical Trauma**Possibly Evidenced By**

Invasive procedure (e.g., catheter inserted into peritoneal cavity, site near the bowel and bladder with potential for perforation during insertion or manipulation of the catheter)

**Desired Outcomes/Evaluation Criteria—Client Will****Risk Control NOC**

Experience no injury to bowel or bladder.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Peritoneal Dialysis Therapy NIC</b>	
<i>Independent</i>	
Have client empty bladder before peritoneal catheter insertion if indwelling catheter not present.	An empty bladder is more distant from insertion site and reduces likelihood of being punctured during catheter insertion.
Anchor catheter and tubing with appropriate connectors and/or tape. Emphasize importance of client avoiding pulling or pushing on catheter.	Reduces risk of trauma by manipulation of the catheter.
Note presence of fecal material in dialysate effluent or strong urge to defecate, accompanied by severe, watery diarrhea.	Suggests bowel perforation with mixing of dialysate and bowel contents. This requires immediate medical intervention as it is a potentially lethal complication including peritonitis, sepsis, and death.

(continues on page 638)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Note reports of intense urge to void or large urine output following initiation of dialysis run. Test urine for sugar, as indicated.	Suggests bladder perforation with dialysate leaking into bladder. Presence of glucose-containing dialysate in the bladder will elevate glucose level of urine.
Stop dialysis if there is evidence of bowel or bladder perforation, leaving peritoneal catheter in place.	Prompt action will prevent further injury. Immediate surgical repair may be required. Leaving catheter in place facilitates diagnosing and locating the perforation.

## NURSING DIAGNOSIS: acute Pain

### May Be Related To

Physical agents (e.g., insertion of catheter through abdominal wall, catheter irritation, improper catheter placement; abdominal distention)  
 Chemical agents (e.g., infusion of cold or acidic dialysate, rapid infusion of dialysate)  
 Biological agents (e.g., infection within the peritoneal cavity)

### Possibly Evidenced By

Verbalization/coded reports of pain  
 Self-focusing  
 Guarding behaviors, positioning to avoid pain  
 Expressive behavior (e.g., restlessness, irritability)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Level NOC

Verbalize decrease of pain and discomfort.  
 Demonstrate relaxed posture and facial expression; be able to sleep and rest appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<i>Independent</i>	
Investigate client's reports of pain; note intensity (using 0 to 10 [or similar] scale), location, and precipitating factors.	Assists in identification of source of pain and appropriate interventions.
Explain that initial discomfort usually subsides after the first few exchanges.	Information may reduce anxiety and promote relaxation during procedure.
Monitor for pain that begins during inflow and continues during equilibration phase. Slow infusion rate, as indicated.	Pain will occur if acidic dialysate causes chemical irritation of peritoneal membrane.
Note reports of abdominal discomfort that is most pronounced near the end of inflow.	Likely the result of abdominal distention from dialysate. Amount of infusion may have to be decreased initially. Note: Dialysis solution comes in 1.5-, 2-, 2.5-, or 3-liter bags for manual exchanges and 5- or 6-liter bags for automated exchanges. The dialysis dose can be increased by using a larger fill volume, but only within the limits of the person's abdominal capacity.
Prevent air from entering peritoneal cavity during infusion. Note report of pain in area of shoulder blade.	Inadvertent introduction of air into the abdomen irritates the diaphragm and results in referred pain to shoulder blade. This type of discomfort may also be reported during initiation of therapy or during infusions and usually is related to stretching or irritation of the diaphragm with abdominal distention. Smaller exchange volumes may be required until client adjusts.
Elevate head of bed at intervals. Turn client from side to side. Provide back care and tissue massage.	Position changes and gentle massage may relieve abdominal and general muscle discomfort.
Warm dialysate to body temperature before infusing.	Warming the solution increases the rate of urea removal by dilating peritoneal vessels. Cold dialysate causes vasoconstriction, which can cause discomfort and excessively lower the core body temperature, precipitating cardiac dysrhythmias.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor for severe or continuous abdominal pain and temperature elevation, especially after dialysis has been discontinued.	May indicate developing peritonitis. (Refer to ND: risk for Infection, following.)
Encourage use of relaxation techniques, such as deep-breathing exercises, guided imagery, and visualization. Provide diversional activities.	Redirects attention and promotes sense of control.
<b>Collaborative</b> Administer analgesics, as indicated.	Relieves pain and discomfort.

### NURSING DIAGNOSIS: risk for Infection

#### Possibly Evidenced By

Alteration in skin integrity (skin contaminants at catheter insertion site, contamination of the catheter during insertion  
Invasive procedure—periodic changing of tubing and bags; sterile peritonitis [response to the composition of dialysate])

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Risk Control NOC

Identify interventions to prevent or reduce risk of infection.

##### Infection Severity NOC

Experience no signs or symptoms of infection.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b> <i>Independent</i> Observe meticulous aseptic technique and wear masks during catheter insertion, dressing changes, and whenever the system is opened. Change tubing per protocol.	Prevents the introduction of organisms and airborne contamination that may cause infection, the most common complication of PD. Infection can be associated with problems at the exit or skin tunnel sites or multiple disconnections of the transfer tubings during dialysis procedures, as well as impaired immune system functioning.
Change dressings as indicated, being careful not to dislodge the catheter. Note character, color, odor, or drainage (if any) from insertion site.	Moist environment promotes bacterial growth. Purulent drainage at insertion site suggests presence of local infection, often involving skin organisms, which can be difficult to treat and sometimes require catheter removal and temporary HD. Note: Polyurethane adhesive film (e.g., blister film) dressings have been found to decrease amount of pressure on catheter and exit site as well as reduce the incidence of site infections.
Observe color and clarity of effluent fluid.	Cloudy effluent is suggestive of peritoneal infection.
Cleanse the insertion site with antibiotic solutions such as povidone-iodine (Betadine) or chlorhexidine (CHG, Hibiclens™) per protocol.	Helps reduce infective agents on the skin.
Cleanse the distal, clamped portion of catheter prior to reattachment, when intermittent dialysis therapy used.	Reduces risk of bacterial entry through catheter between dialysis treatments when catheter is disconnected from closed system.
Investigate reports of nausea or vomiting, increased or severe abdominal pain, rebound tenderness, or fever.	Signs and symptoms suggesting peritonitis, requiring prompt intervention.
<b>Collaborative</b> Monitor white blood cell (WBC) count of effluent.	Presence of WBCs initially may reflect normal response to a foreign substance; however, continued or new elevation of WBCs suggests developing infection.

(continues on page 640)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Obtain specimens of blood, effluent, and drainage from insertion site, as indicated, for culture and sensitivity.	Identifies types of organism(s) present and influences choice of interventions. Note: Elevated leukocytes and a positive dialysate effluent culture (along with abdominal pain) are indicative of peritonitis.
Monitor the peritoneal equilibration test (PET), as indicated.	Measures the effectiveness of dialysis and points to changes in dialysis prescription that might be needed, especially in the early phase of therapy. In the clearance test, samples of used solution (drained over a 24-hour period) are collected, and a blood sample is obtained during the same day when the solution is collected. The amount of urea in the solution is compared with the amount in the blood to see how effective the current PD schedule is in clearing the blood of urea.
Administer broad-spectrum antibiotics (e.g., cephalosporins, vancomycin) intravenously or in dialysate, as indicated.	Early and vigorous antibiotic therapy may be used to treat peritonitis without having to remove PD catheter or changing to hemodialysis modality. Note: Studies are inconclusive about the advantage of one route of antibiotic administration over another. However, intraperitoneal antibiotics may be preferred over intravenous, as infection is most often localized and bacteremia is rare (Ballinger et al, 2014).

### NURSING DIAGNOSIS: risk for ineffective Breathing Pattern

#### Possibly Evidenced By

Body position that inhibits lung expansion [abdominal pressure, restricted diaphragmatic excursion, rapid infusion of dialysate]

Pain

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Respiratory Status: Ventilation NOC

Display an effective respiratory pattern with clear breath sounds and arterial blood gases (ABGs) within client's normal range.

Experience no signs of dyspnea or cyanosis.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b>	
<i>Independent</i>	
Monitor respiratory rate and effort.	Tachypnea, dyspnea, shortness of breath, and shallow breathing during dialysis suggest diaphragmatic pressure from distended peritoneal cavity or may indicate developing complications.
Auscultate lungs, noting decreased, absent, or adventitious breath sounds, such as crackles, wheezes, and rhonchi.	Decreased areas of ventilation suggest presence of atelectasis, whereas adventitious sounds may suggest fluid overload, retained secretions, or infection.
Note character, amount, and color of secretions.	Client is susceptible to pulmonary infections, possibly due to chronic debilitating disease and altered immune response. Note: Death rates from pulmonary infections are estimated to be 14- to 16-fold higher in dialysis patients than in the general population (Guo et al, 2008).
Elevate head of bed or have client sit up in chair. Promote deep-breathing exercises and coughing.	Facilitates chest expansion and ventilation and mobilization of secretions.
<i>Collaborative</i>	
Review ABGs, pulse oximetry, and serial chest x-rays.	Changes in PaO <sub>2</sub> and PaCO <sub>2</sub> and appearance of infiltrates and congestion on chest x-ray suggest developing pulmonary problems.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer supplemental oxygen, as indicated.	Maximizes oxygen for vascular uptake, thus preventing or lessening hypoxia.
Administer analgesics, as indicated.	Alleviates pain and promotes comfortable breathing and maximal cough effort.

## HEMODIALYSIS (HD)

### I. Procedure

- a. Removal of urea and other toxic products from the bloodstream and correction of fluid and electrolyte imbalances
- b. Blood is shunted through an artificial kidney or membrane (dialyzer) for removal of toxins and excess fluid and then returned to the venous circulation.
- c. Requires placement of vascular access (Sofocleous et al., 2015)
  - i. Arteriovenous (AV) fistula: A direct connection is created surgically between a native artery and vein (termed *native arteriovenous fistulas* [AVFs]). Once matured, the fistula allows access to blood flow for dialysis through a percutaneous needlestick. Usually requires a maturation time of at least 4 to 6 weeks to heal before it can be used, which allows time for the vein to enlarge and thicken enough to withstand multiple needle sticks every week.
  - ii. AV graft (AVG): a looped tube (of polyurethane or other materials, such as bovine vessels or saphenous veins) that connects an artery to a vein; usually ready for use within 2 to 4 weeks
  - iii. Temporary access: provides immediate access with insertion of a central line catheter into a vein in the neck, chest, or groin. Used for immediate access while waiting for an AVF to mature or for short-term dialysis, such as with acute kidney failure.

**II. Types of hemodialysis (HD)**—Determining factors in which modality is chosen include the client's catabolic state, hemodynamic stability, and whether the primary goal is solute removal (e.g., uremia, hyperkalemia), fluid removal, or both (Golper, 2016).

- a. Intermittent HD
  - i. Requires permanent AV access, such as primary AV fistula or synthetic graft
  - ii. Standard modality in hemodynamically stable client with acute kidney failure (AKF)
  - iii. Permanent renal replacement therapy for client with stage 5 chronic kidney disease (CKD) who is not a candidate for kidney transplant or to whom a kidney transplant is unavailable
  - iv. Usually performed three times per week for 3 to 5 hours per procedure, or six to seven times per week for 1.5 to 2 hours
- b. Continuous renal replacement therapy (CRRT)
  - i. Blood is usually accessed via a central venous catheter.
  - ii. Treatment for acute kidney injury (AKI) with fluid and toxins removed at a continuous and slower rate than intermittent HD

- iii. Also indicated for clients with AKI who are too hemodynamically unstable to tolerate conventional hemodialysis
- iv. Commonly used types of CRRT
  - 1. Continuous arteriovenous hemofiltration (CAVH): removes fluid and solutes by convection; solute removal generally slow since no diffusion occurs
  - 2. Continuous venovenous hemofiltration (CVVH): similar to CAVH, except the venovenous access requires use of blood pump
  - 3. Slow continuous ultrafiltration (SCUF): a dehydrating procedure with no intent to substantially remove solute
  - 4. Continuous arteriovenous hemodialysis (CAVD): similar to CAVH with two exceptions—dialysate is run at low flow rate countercurrent to blood flow, and the ultrafiltration rate does not protect against the development of hypotension
  - 5. Continuous venovenous hemodialysis (CVVD): similar to CAVD but uses venous access and a blood pump
  - 6. Continuous arteriovenous hemodiafiltration (CAVHDF): similar to CAVD, except that ultrafiltration is allowed, and solute removal is aggressive. Volume of ultrafiltered fluid is large, so that replacement fluid must be given.
  - 7. Continuous venovenous hemodiafiltration (CVVHDF): similar to CAVHDF except that venous access is utilized and blood pump is needed.

### III. Statistics

- a. Morbidity: In 2014, 87.9% of all incident cases began renal replacement therapy with hemodialysis, and 63.1% of prevalent cases were receiving hemodialysis therapy. Among hemodialysis cases, 88.0% used in-center hemodialysis, and 1.8% used home hemodialysis (USRDS, 2015a). As many as 25% of hospital admissions in the dialysis population have been attributed to vascular access problems, including fistula malfunction and thrombosis (Al-Jaishi et al., 2014).
- b. Mortality: The mortality rate for hemodialysis patients in 2014 was 169 per 1000 patient-years. The reported mortality is highest in month 2 of HD but declines thereafter; this effect is more pronounced for patients aged 65 and over.
- c. Cost: Medicare expenditures for HD in 2014 were \$26.1 billion and \$87.638 per patient per year, remaining nearly flat compared to 2013 expenditures (USRDS, 2015b).

## G L O S S A R Y

- Arteriovenous (AV) fistula:** An artery, usually in the forearm, is surgically connected to a vein.
- Arteriovenous (AV) graft:** A synthetic tube or graft is surgically implanted in the arm to connect an artery and vein.
- Continuous renal replacement therapy (CRRT):** Continuous 24-hour dialysis therapy, which provides a more normal physiological response by removing plasma water more slowly, thus compensating for the loss of

intravascular volume; particularly useful in intensive care setting.

**Thrill:** Palpable vibration or buzzing sensation caused by turbulence of high-pressure arterial blood flow entering low-pressure venous system, indicating AV shunt is patent.

**Venous access:** The point on the body where a needle or catheter is inserted to gain entry to the bloodstream. AV access is via graft, fistula, or central venous line.

\*\*\*\*This plan of care addresses the typical HD procedure usually performed three times per week and carried out in the hospital, community dialysis center, or at home.

### NURSING DIAGNOSIS: risk for Injury

#### Possibly Evidenced By

[Clotting/problem with vascular access; infection]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Hemodialysis Access NOC

Maintain patent vascular access.

Demonstrate behaviors, lifestyle changes to reduce risk factors and protect self from injury.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hemodialysis Therapy NIC</b> <i>Independent</i>	
<b>Clotting</b>	
Assess client's pulse and tissue color distal to shunt.	Determines general circulatory status of limb.
Monitor internal AV fistula or graft patency at frequent intervals:	Clotting (thrombosis) and fistula malfunction are the most common complications (Sofocleous et al, 2015).
Palpate for thrill.	A constant vibration should be palpable above venous exit site. If the thrill stops or even feels different, this could indicate clotting. With early intervention, many clots can be dissolved or removed.
Auscultate for a bruit.	Bruit is the sound caused by the turbulence of arterial blood entering the venous system and should be audible by stethoscope, although may be very faint. If the bruit gets higher in pitch, it could mean narrowing of the blood vessels; if it stops, clot may have formed.
Observe for a decrease in amount of delivered doses of dialysis (infusion difficulties). Note color of blood in visible tubing at access site, and watch for obvious separation of cells and serum. Document and immediately report changes to appropriate provider(s).	Signs of access problems. Change of color from uniform medium red to dark purplish red suggests sluggish blood flow and early clotting. Separation in tubing is indicative of clotting. Very dark reddish-black blood next to clear yellow fluid indicates full clot formation.
Palpate skin around shunt for warmth.	Diminished blood flow results in "coolness" of shunt.
Evaluate reports of pain, numbness, and tingling; note extremity swelling distal to access.	May indicate inadequate blood supply.
Handle tubing gently and maintain cannula alignment. Limit activity of extremity. Avoid taking blood pressure (BP) or drawing blood samples in shunt extremity. Instruct client not to sleep on side with shunt or carry packages, books, or purse on affected extremity.	Decreases risks of shunt-related complications (e.g., clotting, dislodgement, or disconnection).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Infection</b>	
Assess skin around vascular access, noting redness, swelling, local warmth, exudate, and tenderness.	Signs of local infection, which can progress to sepsis if untreated.
Avoid contamination of access site. Use aseptic technique and masks when giving shunt care, applying and changing dressings, and starting and completing dialysis process.	Prevents introduction of organisms that may cause infection.
Monitor temperature. Note presence of fever, chills, and hypotension.	Signs of infection or sepsis requiring prompt medical intervention.
<b>Collaborative</b>	
Culture the site and obtain blood samples, as indicated.	Determines presence of pathogens and how best to treat.
Monitor prothrombin time (PT) and activated partial thromboplastin time (aPTT), as appropriate.	Provides information about coagulation status, identifies treatment needs, and evaluates effectiveness.
Administer medications, as indicated, for example:	
Low-dose heparin	Infused on arterial side of filter to prevent clotting in the filter without systemic side effects.
Antibiotics—systemic and topical	Prompt treatment of infection may save access and prevent sepsis.
Prepare for/assist with procedures, such as angioplasty and vascular stenting/stent grafting, or catheter-directed thrombolysis.	All three types of vascular access—AV fistula, AV graft, and venous catheter—can have complications that require further treatment or surgery. The most common complications are access infection and low blood flow due to blood clotting in the access. In the past two decades, radiological interventions have greatly improved the treatment of venous stenosis and fistula thrombosis without surgery. However, shunt revision can require surgical intervention and replacement of stenotic area or placement of new vascular access (RadiologyInfo.org, 2017; Sofocleous et al, 2015).

### NURSING DIAGNOSIS: risk for deficient Fluid Volume

#### Possibly Evidenced By

Active fluid volume loss (e.g., ultrafiltration, systemic heparinization, actual blood loss—disconnection of the shunt)  
Fluid restrictions

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Fluid Balance NOC

Maintain fluid balance as evidenced by stable vital signs, good skin turgor, moist mucous membranes, absence of bleeding, and appropriate weight.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Monitoring NIC</b>	
<i>Independent</i>	
Measure all sources of intake and output (I&O).	Aids in evaluating fluid status, especially when compared with weight. Note: Voided urine output is an inaccurate evaluation of renal function in dialysis clients. Some individuals have water output with little renal clearance of toxins, whereas others have oliguria or anuria.
Weigh daily, as well as before and after dialysis run.	Weight loss over precisely measured time is a measure of ultrafiltration and fluid removal. Dry weight determines how much excess fluid has been removed and serves as a guide for subsequent dialysis run time and solution.
Monitor BP, pulse, and hemodynamic pressures, if available, during dialysis.	Hypotension, tachycardia, and falling hemodynamic pressures suggest volume depletion.

(continues on page 644)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Observe for access site bleeding, noting severity. Elevate arm and apply firm (nonocclusive) pressure as indicated. Document and report bleeding that fails to stop or becomes hemorrhage.	Bleeding may be due to a combination of factors: (1) uremic coagulopathy, (2) large needles used for fistula cannulation, and (3) heparin used in the dialysis circuit to prevent clotting. Note: In the immediate postdialysis period, medication (Protamine) may be used to reverse the effect of heparin, thus reducing risk of heavy or life-threatening bleeding (Krause, 2015).
<b>Hemodialysis Therapy NIC</b>	
Ascertain whether diuretics and antihypertensives are to be withheld.	Dialysis potentiates hypotensive effects if these drugs have been administered.
Verify continuity of shunt or access catheter.	Disconnected shunt or open access permits exsanguination.
Apply external shunt dressing. Permit no puncture of shunt.	Minimizes stress on cannula insertion site to reduce inadvertent dislodgement and bleeding from site.
<b>Hemorrhage Emergency Measures</b>	
Attach two cannula clamps to shunt dressing. Have tourniquet available. If cannulae separate, clamp the arterial cannula first, then the venous. If tubing comes out of vessel, clamp cannula that is still in place and apply and maintain direct pressure to bleeding site. Place client in a supine or Trendelenburg position, as necessary.	Prevents massive blood loss while awaiting medical assistance if cannula separates or shunt is dislodged. Maximizes venous return if hypotension occurs.
<b>Fluid Management NIC</b>	
<i>Collaborative</i>	
Monitor laboratory studies, as indicated, such as the following:	
Hemoglobin/hematocrit (Hgb/Hct)	May be reduced because of anemia, hemodilution, or actual blood loss.
Serum electrolytes and pH	Imbalances may require changes in the dialysate solution or supplemental replacement to achieve balance.
Clotting times—PT/aPTT and platelet count	Use of heparin to prevent clotting in blood lines and hemofilter alters coagulation and potentiates active bleeding.
Administer IV solutions during dialysis, as indicated, for example:	
Normal saline (NS)	Saline or dextrose solutions, electrolytes, and NaHCO <sub>3</sub> may be infused in the venous side of continuous arteriovenous hemofilter when high ultrafiltration rates are used for removal of extracellular fluid (ECF) and toxic solutes.
Volume expanders, such as albumin	Volume expanders may be required during or following hemodialysis if sudden or marked hypotension occurs.
Packed red blood cells (RBCs), if needed	Destruction of RBCs (hemolysis) by mechanical dialysis, hemorrhagic losses, or decreased RBC production may result in profound and progressive anemia requiring corrective action.
Reduce rate of ultrafiltration during dialysis, as indicated.	Reduces the amount of water being removed and may correct hypotension or hypovolemia.
Administer protamine sulfate, as appropriate.	May be needed to return clotting times to normal or if heparin rebound occurs within 16 hours after hemodialysis.

#### NURSING DIAGNOSIS: risk for excess Fluid Volume

##### Possibly Evidenced By

Excessive [or rapid] fluid intake: receiving hemodialysis (e.g., IV, blood, plasma expanders, saline given to support BP during dialysis)

**NURSING DIAGNOSIS:** risk for excess Fluid Volume (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Fluid Balance NOC**

Maintain “dry weight” within client’s normal range; be free of edema; with clear breath sounds and serum sodium levels within normal limits.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Monitoring NIC</b>	
<i>Independent</i>	
Measure all sources of I&O. Weigh routinely.	Aids in evaluating fluid status, especially when compared with weight. Weight gain between treatments should not exceed 0.5 kg or approximately 1 lb/d.
Monitor BP and pulse.	Hypertension and tachycardia between hemodialysis runs may result from fluid overload and heart failure (HF).
Note rate and regularity of pulse.	Rapid rate, or irregularity in heart rate, may indicate changes in volume status.
Note presence of peripheral or sacral edema, respiratory crackles, dyspnea, orthopnea, distended neck veins.	Fluid volume excess due to inefficient dialysis or repeated hypervolemia between dialysis treatments may cause or exacerbate HF, as indicated by signs and symptoms of respiratory and systemic venous congestion.
<i>Collaborative</i>	
Monitor serum sodium levels. Restrict sodium intake, as indicated.	High sodium levels are associated with fluid overload, edema, hypertension, and cardiac complications.
Restrict fluid intake as indicated, spacing allowed fluids throughout a 24-hour period.	The intermittent nature of hemodialysis results in fluid retention and volume overload between procedures and may require fluid restriction. Spacing fluids helps reduce thirst.

**URINARY DIVERSIONS: UROSTOMY (POSTOPERATIVE CARE)****I. Procedure**

- a. Diversion of urine out of the body through an opening in the abdominal wall bypassing the bladder, which requires a pouch to be worn outside the body
- b. Types: At present, several varieties of urinary diversions are performed using different bowel segments and based on the individual’s disease, functional condition, and desire. Both continent and incontinent (also called noncontinent) urinary diversions are being performed, although the latter is still done more frequently. In recent years (and especially in larger surgical centers), client may be offered a continent cutaneous diversion or an orthotopic neobladder urinary reconstruction (ONR) (Siracusano et al, 2012).
  - i. Noncontinent urinary diversions
    - 1. Ileal conduit (or urostomy): **most common type of the procedure**
    - 2. Colonic conduit: uses a segment of the bowel to anastomose ureters to the anterior body wall for ostomy bag drainage
    - 3. Cutaneous ureterostomy: directly anastomoses ureters to anterior body wall for ostomy bag drainage
  - ii. Continent urinary diversions (Costa & Kreder, 2016)
    - 1. Uses bowel segments (either ileum or combination of ileum and ascending colon fashioned into a spherical

shape for a reconstructed bladder [pouch] that is anastomosed to the urethra). This is known as an orthotopic diversion.

- 2. Orthotopic diversions are categorized into three types:
  - i. Neobladder diversion (also known as orthotopic neobladder reconstruction [ONR]), widely accepted as a first procedure where possible (Herdiman et al, 2013)
  - ii. Continent catheterizable diversion: A one-way valve is fashioned at the insertion site that leads into the reconstructed urinary storage system. Catheterization is carried out through a small stoma on the abdominal wall.
  - iii. Ureterosigmoidostomy: consists of anastomosing the ureters to the sigmoid colon in a nonrefluxing manner. This diversion method relies on the anal sphincter for continence and is rarely performed.

- II. Indications (Costa & Kreder, 2016)—Need for urostomy is associated with several factors, which is connected to a problem in the urinary system that needs to be removed or bypassed, or disorders resulting in severe incontinence, including:

- a. Bladder cancer, primary or metastatic, requiring cystectomy—**fourth most common cancer in men in the United States** (American Cancer Society [ACS], 2017)

(continues on page 646)

- b. Neurologic dysfunction, such as may occur from a birth defect, trauma, surgery, or spinal injury, causing intractable incontinence
  - c. Severe radiation injury to the bladder
  - d. Chronic pelvic pain syndromes, such as might occur with chronic prostatitis without evidence of urinary tract infection, Crohn's disease, interstitial cystitis, past sexual abuse, pelvic inflammatory disease (Mayo Clinic Staff, 2017)
- III. Statistics (ACS, 2017; National Cancer Institute, Surveillance, Epidemiology, and End Results [SEER], 2017)**
- a. Morbidity: In 2013, a nationwide inpatient sample study of trends in urinary diversion reported that 92% of patients

undergoing radical cystectomy for bladder cancer received incontinent urinary diversion, while 8% patients received continent diversion in the time period from 2001 to 2008 (Kim et al, 2013). In 2014, there were an estimated 696,440 people living with bladder cancer in the United States.

- b. Mortality: It is estimated by both the ACS and SEER that 16,870 deaths from bladder cancer occurred in 2017.
- c. Costs: Estimates of national expenditures for treatment of bladder cancer in 2016 were \$4.5 billion (NCI, 2017).

## G L O S S A R Y

**Appliance:** Pouch and accessories worn over stoma to collect urine.

**Colonic conduit:** Similar to an ileal conduit but uses a segment of colon instead of ileum.

**Continent urinary diversion:** Ureters carry urine to a pouch or reservoir created inside the body from a section of stomach or small or large intestine.

**Cystectomy:** Surgical removal of the urinary bladder.

**Enterostomal:** A surgically created permanent opening into the intestine through the abdominal wall.

**Ileal conduit:** Ureters are anastomosed to a segment of ileum, usually 15 to 20 cm long, and resected with the blood supply intact. The proximal section is closed, and the distal end is brought through an opening in the skin to form a stoma or a passageway, not a storage reservoir.

**Incontinent or noncontinent urinary diversions:** Urine flows through ureters directly anastomosed to the abdominal wall (cutaneous ureterostomy) or into a short segment of ileum or colon also attached to the abdominal

wall where the urine drains into an external collecting device through a permanent stoma.

**Intractable incontinence:** Loss of bladder control that becomes impossible to manage, alleviate, or remedy.

**Orthotopic neobladder:** A urinary reservoir fashioned from a bowel segment that is in the normal anatomic position of the bladder and attached directly to the urethra, with discharge of urine through the urethra.

**Peristomal:** Skin around and closest to the stoma.

**Stoma:** An opening that, when used in reference to ostomy care, is the segment of bowel or ureter brought to the surface of the abdomen. It is formed of mucosal tissue and is red and moist in appearance.

**Ureterostomy:** The ureter(s) is brought directly through the abdominal wall to form its own stoma.

**Urostomy:** Surgically constructed method of bypassing a dysfunctional or removed bladder in order to discharge urine. Most commonly, a conduit is created from a section of the ileum and the ureters are connected to it. The open end of the conduit is brought to the abdomen to create a stoma.

## CARE SETTING

Client is treated in acute surgical unit.

## RELATED CONCERNs

Cancer, general considerations, page 945

Peritonitis, page 389

Psychosocial aspects of care, page 835

Surgical intervention, page 873

## CLIENT ASSESSMENT DATABASE

Data depend on underlying problem, duration, and severity, for example, malignant bladder tumor, congenital malformations, trauma, chronic infections, or intractable incontinence due to injury or disease of other body systems, such as with multiple sclerosis. (Refer to appropriate CP.)

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### TEACHING/LEARNING

- **Discharge plan considerations:** May require assistance with management of ostomy and acquisition of supplies

► Refer to section at end of plan for postdischarge considerations.

PREOPERATIVE DIAGNOSTIC STUDIES	
TEST	WHAT IT TELLS ME
<b>URINE TESTS</b>	
• <i>Urodynamic tests (e.g., may include uroflowmetry, postvoid residual measurement, cystometric test, leak point pressure measurement, pressure flow study, electromyography, video urodynamic tests)</i>	Any or all of these tests may be done preoperatively to determine the presence of urinary tract obstruction, or urine storage abnormalities, and help determine which urinary diversion will be most appropriate (Costa & Kreder, 2016).
• <i>Blood tests (e.g., serum creatinine [CR] liver function tests [LFTs])</i>	A contraindication to any type of continent diversion is compromised renal function or chronic renal failure.
<b>OTHER DIAGNOSTIC STUDIES</b>	
• <i>Imaging studies (e.g., ultrasound, CT, MRI)</i>	Will have been done to determine the etiology for which urinary diversion is required.
• <i>Intravenous pyelogram (IVP) and retrograde pyelogram:</i> X-ray examination and fluoroscopic visualization of the kidneys, ureters, and bladder using contrast material. Retrograde pyelogram requires cystoscopy and the placement of a small tube into the lower part of the ureter to inject contrast and opacify the ureter and renal pelvis.	Study of choice for evaluating a person for a urinary diversion procedure if the client is not azotemic from kidney insufficiency or allergic to contrast media (Costa & Kreder, 2016). Shows size, shape, and location of urinary structures. Identifies filling defects caused by tumors or other obstructive disorders. Retrograde pyelogram may also be done to delineate urinary tract system anatomy in preparation for surgery.
• <i>Cystoscopy with biopsy:</i> Diagnostic procedure that uses a cystoscope (endoscope), which is specially designed to examine the bladder, lower urinary tract, and prostate gland. It can also be used to perform biopsies. Ultraviolet cystoscopy outlines bladder lesions. Bladder washings can also be done during cystoscopy for cytological evaluation.	Initially, may be done to evaluate painless hematuria. If bladder tumor is detected, biopsy will be done to stage the malignancy.
• <i>Pelvic magnetic resonance imaging (MRI) or computed tomography (CT) scans:</i> Imaging techniques that use x-rays, or magnetic energy, and computer analysis to provide a complete picture of pelvic body tissues and structures.	Defines size of tumor mass and degree of cancer spread into surrounding tissues.

**NURSING PRIORITIES**

1. Prevent complications.
2. Assist client and significant other (SO) in physical and psychosocial adjustment.
3. Support independence in self-care.
4. Provide information about procedure, prognosis, treatment needs, potential complications, and resources.

**DISCHARGE GOALS**

1. Complications prevented or minimized.
2. Adjusting to perceived or actual changes.
3. Self-care needs met by self or with assistance, as necessary.
4. Procedure, prognosis, therapeutic regimen, and potential complications understood and sources of support identified.
5. Plan in place to meet needs after discharge.

\*\*\*\*This plan of care primarily addresses the nursing care of the client with incontinent urinary diversion with a permanent stoma and urine-collecting device.

**NURSING DIAGNOSIS: risk for impaired Skin Integrity****Possibly Evidenced By**

- Excretions (e.g., continuous flow of urine, improper fitting of appliance); moisture
- Chemical injury agent (e.g., reaction to skin product or chemicals)
- Mechanical factors (e.g., surgery, removal of adhesive)

(continues on page 648)

**NURSING DIAGNOSIS:** **risk for impaired Skin Integrity** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Tissue Integrity: Skin and Mucous Membranes NOC**

Display timely healing of stoma and peristomal skin.

**Ostomy Self-Care NOC**

Identify individual risk factors.

Demonstrate behaviors and techniques to promote healing and prevent skin breakdown.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Ostomy Care NIC</b> <i>Independent</i> Be aware of skin problems common to urostomies (e.g., rashes, ill-fitting pouch openings, allergies to adhesives, urine pooling).	Helps guide assessment and points to appropriate interventions. Early identification of changes provides for timely interventions to prevent skin complications (resources for interventions and rationale in this section: American Cancer Society [ACS], 2014; Wound, Ostomy and Continence Nurses Society [WOCN], 2012).
Inspect stoma frequently in early postoperative period.	Stoma should be pink or reddish, similar to mucous membranes. Color changes may be temporary, but persistent changes could require surgical intervention.
Ensure proper opening for adhesive backing of pouch. Using a stoma-measuring guide or ostomy sizer, find the smallest opening that fits over the stoma and does not allow any skin exposure. Cut the barrier to size with adequate adhesive area left to apply pouch.	Prevents trauma to the stoma tissue and protects the peristomal skin from effects of urine pooling and crystallizing on the skin. Adequate adhesive area is important to maintain a pouch seal, but too tight a fit may cause stomal edema or stenosis.
Measure stoma periodically, for example, each appliance change for first 6 weeks, then monthly times six.	As postoperative edema resolves, size of appliance must be altered to ensure proper fit so that urine is collected as it flows from the stoma and contact with the skin is prevented.
Touch stoma gently as needed.	Important to prevent irritation. Mucosa has good blood supply and bleeds easily with rubbing or trauma. Note: Small spots of blood on (or from) the stoma are normal in early postoperative period.
Cleanse peristomal skin with water and pat dry.	Maintaining a clean and dry peristomal area helps prevent or limit severity of skin reaction. Note: Soap is not usually needed but may be used to remove oily residual from adhesive.
Apply effective sealant barrier, such as Skin Prep or similar product, as recommended by appliance manufacturer. Consider the use of extended wear barrier, when indicated.	Protects skin from pouch adhesive, enhances adhesiveness of pouch, and facilitates removal of pouch when necessary. The extended wear barrier does not break down like a standard wear barrier when it comes in contact with urine.
Use a transparent, odor-proof, drainable pouch. Keep gauze square over stoma while cleansing area, and have client cough or strain before applying skin barrier wafer.	A transparent appliance during first 4 to 6 weeks allows easy observation of stoma and ureteral stents (when used), without necessity of removing appliance and irritating skin. Covering stoma prevents urine from wetting the peristomal area during pouch changes. Coughing empties distal portion of conduit, followed by a brief pause in drainage to facilitate application of appliance.
Avoid use of karaya-type appliances.	Will not protect skin because urine melts karaya.
Connect collecting pouch to continuous bedside drainage system when necessary or desired.	May be needed during times when rate of urine formation is increased, such as while intravenous (IV) fluids are administered or at night if client prefers. Weight of the urine can cause pouch to pull loose and leak when pouch becomes more than half full.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Cleanse ostomy pouch on a routine basis, using vinegar solution or commercial product designed for this purpose.	Frequent pouch changes are irritating to the skin and should be avoided. Emptying and rinsing the pouch with vinegar or commercial solution not only removes bacteria but also deodorizes the pouch.
Change pouch every 3 to 7 days, or as needed for leakage. Remove appliance gently while supporting skin. Use adhesive removers as indicated and wash off completely.	Prevents tissue irritation or damage associated with pulling skin barrier wafer off.
Investigate reports of burning or itching around stoma.	Suggests peristomal irritation or possibly yeast infection, both requiring intervention. Note: Continuous exposure of skin to urine can cause hyperplasia around stoma, affecting pouch fit and increasing risk of infection.
Evaluate adhesive product and appliance fit on an ongoing basis.	Provides opportunity for problem-solving. Determines need for further intervention.
Monitor for distention of lower abdomen in presence of ileal conduit; assess bowel sounds.	Intestinal distention can cause tension on new suture lines with possibility of rupture.
<b>Collaborative</b> Consult with ostomy nurse specialist.	Ostomy nurse specialist can help client and caregiver by providing support and education, helping with problem-solving and choosing products appropriate for client's stoma characteristics, evaluating physical and mental status, and seeking financial resources. The client or caregiver should be capable of changing ostomy appliance prior to discharge or receive home care until such time as the client is able to provide self-care.
Apply antifungal spray or powder, as indicated.	Assists in healing if peristomal irritation is caused by fungal infection. Note: These products can have potent side effects and should be used sparingly. Creams and ointments are to be avoided because they interfere with adhesion of the appliance.

## NURSING DIAGNOSIS: disturbed Body Image

### May Be Related To

Illness; alteration in body structure/function (e.g., presence of stoma, loss of control of usual means of urine elimination)

### Possibly Evidenced By

Alteration in view of one's body (e.g., appearance, structure, function); actual change in structure and function (ostomy)

Fear of reaction by others

Negative feeling about body; avoids looking at/touching body part [stoma]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Body Image NOC

Demonstrate beginning acceptance by viewing and touching stoma and participating in self-care.

Verbalize understanding of body changes; begins to express feelings about situation.

Verbalize acceptance of self in situation, incorporating change into self-concept without negating self-esteem.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Body Image Enhancement NIC</b>	
<b>Independent</b> Review reason for surgery and future expectations.	Client may find it easier to accept and deal with an ostomy done for chronic or long-term disease, such as intractable incontinence or infections, than for traumatic injury or cancer.

(continues on page 650)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Ascertain whether counseling was initiated when the possibility or necessity of urinary diversion was first discussed.	Provides information about client's and SO's levels of knowledge about individual situation and process of acceptance. Client with new ostomy is also often struggling to adjust to cancer or other devastating medical condition requiring the diversion.
Answer all questions concerning urostomy and its function.	Establishes rapport and conveys interest and concern of caregiver. Provides additional information for client to consider.
Encourage client and SO to verbalize feelings. Acknowledge normality of feelings of anger, depression, and grief over loss.	Provides opportunity to deal with issues and misconceptions. Helps client and SO to realize that feelings are not unusual and that feeling guilty for them is not helpful.
Note behaviors of withdrawal, increased dependency, manipulation, or noninvolvement in care.	Suggestive of problems in adjustment that may require further evaluation and more extensive therapy. May reflect grief response to loss of body part and function, worry over acceptance by others, and fear of further disability or loss of life from cancer.
Provide opportunities for client and SO to view and touch stoma, using the moment to point out positive signs of healing, normal appearance, and so forth.	Although integration of stoma into body image can take months or even years, looking at the stoma and hearing comments made in a normal, matter-of-fact manner can help client with this process. Touching stoma reassures client and SO that it is not fragile.
Provide opportunity for client to deal with ostomy through participation in self-care.	Independence in self-care helps improve self-esteem.
Maintain positive approach during care activities, avoiding expressions of disdain or revulsion. Do not take client's angry expressions personally.	Assists client and SO to accept body changes and feel all right about self. Anger is most often directed at the situation and lack of control individual has over what has happened.
Plan stoma care activities with client.	Promotes client's sense of control and gives message that client can handle this situation, enhancing self-esteem.
Discuss contacting a person with a urostomy and make arrangements for visit if client desires.	Having a visit from person of same gender and type of procedure can provide an empathetic and valuable support to client in early days of adjustment and self-care. Shared experiences can facilitate acceptance of change as client realizes "life does go on" and can be relatively normal.
Discuss sexual functioning and potential physical changes that may occur or medications that affect sexual function, if applicable. (Refer to ND: risk for Sexual Dysfunction.)	Client may experience anticipatory anxiety and fear of failure in relation to sex after surgery, often because of lack of knowledge. Surgery that removes both the bladder and prostate may disrupt parasympathetic nerve fibers that control erection in men. Newer techniques may be used in individual cases to preserve nerve function.

## NURSING DIAGNOSIS: acute Pain

### May Be Related To

Biological injury agent (e.g., disease process [cancer], trauma)  
Physical injury agent—surgical incisions, drains  
[Psychological factors—fear, anxiety]

### Possibly Evidenced By

Self-report of intensity and characteristics of pain, using standardized pain scale  
Guarding, protective behaviors  
Expressive behaviors—restlessness  
Self-focus  
Changes in vital signs

**NURSING DIAGNOSIS:** **acute Pain** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Pain Level NOC**

Verbalize relief or control of pain.

Appear relaxed and be able to sleep and rest appropriately.

**Pain Control NOC**

Demonstrate use of comfort measures, relaxation skills, and diversional activities.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<i>Independent</i>	
Assess pain, noting location, characteristics, and intensity (0 to 10 [or similar] coded scale).	Helps evaluate degree of discomfort and effectiveness of analgesia or may reveal developing complications. Surgical causes for abdominal pain usually subside gradually as healing begins. Continued or increasing pain may be a sign of infection or intestinal obstruction.
Auscultate bowel sounds; note passage of flatus.	Indicates reestablishment of bowel function. Lack of return of bowel sounds and function within a reasonable timeframe may indicate presence of complication, such as peritonitis, hypokalemia, or mechanical obstruction.
Note urine flow and characteristics, and evaluate need for more intensive interventions.	Decreased flow may reflect urinary retention due to edema, or leakage into peritoneal cavity, with failure of anastomosis. Cloudy urine may be normal initially because of mucus from intestinal tract but, if it fails to clear over time, may indicate infectious process.
Encourage client to verbalize concerns. Active-listen these concerns and provide support by acceptance, remaining with client and giving appropriate information.	Reduction of anxiety and fear can promote relaxation and comfort.
Provide comfort measures, such as back rub, repositioning, and ambulating. Assure client that position change will not injure stoma.	Activity, movement, and comfort measures can reduce muscle tension, promote relaxation, and enhance coping abilities.
Encourage use of relaxation techniques, such as guided imagery, visualization, and diversional activities.	Helps client rest more effectively and refocuses attention, which may enhance coping ability, reducing pain and discomfort.
Investigate and report abdominal muscle rigidity, involuntary guarding, and rebound tenderness.	Suggestive of peritoneal inflammation, requiring prompt medical intervention.
<i>Collaborative</i>	
Administer medications as indicated, such as opioids, analgesics, and patient-controlled analgesia (PCA).	Relieves pain, enhances comfort, and promotes rest. PCA may be more beneficial than intermittent analgesia, especially following radical resection.
Maintain patency of nasogastric (NG) tube, when used.	Decompresses stomach and intestines; prevents abdominal distention when intestinal function is impaired.

**NURSING DIAGNOSIS:** **risk for Infection****Possibly Evidenced By**

Alteration in skin integrity, stasis of body fluids

Immunosuppression; chronic illness

Invasive procedure; increased exposure to pathogens [exposure to multiple healthcare workers/settings]

**Desired Outcomes/Evaluation Criteria—Client Will****Infection Severity NOC**

Achieve timely wound healing.

Be free of signs of localized postoperative or systemic infections.

(continues on page 652)

**NURSING DIAGNOSIS:** **risk for Infection** (continued)**Risk Control: Infectious Process NOC**

Verbalize understanding of individual causative or risk factors.  
Demonstrate techniques or lifestyle changes to reduce risk.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<i>Independent</i>	
Empty ostomy pouch when it becomes one-third to one-half full, once continuous pouch drainage is discontinued.	Reduces risk of urinary reflux and maintains integrity of appliance seal if pouch does not have an antireflux valve.
Document urine characteristics and note whether changes are associated with reports of flank pain.	Cloudy, odorous urine indicates infection, possibly pyelonephritis; however, urine normally contains mucus after a conduit procedure because of natural secretions of the intestine.
Report sudden cessation of urethral drainage (when present).	Constant drainage usually subsides within 10 days; however, abrupt cessation may indicate plugging and lead to abscess formation.
Note red rash around stoma.	Rash is most commonly caused by yeast. Urine leakage or allergy to appliance or products may also cause red, irritated, or macerated skin.
Maintain dry dressings; change dressings as indicated.	Moist dressings act as a wick to the wound and provide media for bacterial growth.
Assess skinfold areas in groin, perineum, and under arms and breasts.	Use of antibiotics and trapping of moisture in skinfold areas increases risk of <i>Candida</i> infections.
Monitor vital signs.	An elevated temperature suggests incisional infection, urinary tract infection (UTI), or respiratory complications.
Auscultate breath sounds.	Client may be at high risk for development of respiratory complications because of length of time under anesthesia. Often this client is older and may already have a compromised immune system. Also, painful abdominal incisions cause client to breathe more shallowly than normal and to limit coughing effort. Accumulation of secretions in respiratory tract predisposes to atelectasis and infections.
<i>Collaborative</i>	
Use pouch with antireflux valve, if available.	Prevents backflow of urine into stoma, reducing risk of infection.
Obtain specimens of exudates, urine, sputum, and blood, as indicated.	Identifies source of infection and most effective treatment. Infected urine may cause pyelonephritis. Note: Urine specimen must be obtained from the conduit because the pouch is considered contaminated.
Administer medications, as indicated, for example:	
Cephalosporins, such as cefoxitin (Mefoxin) and cefazolin (Ancef)	Given to treat identified infection or may be given prophylactically, especially with history of recurrent pyelonephritis.
Antifungal powder	Used to treat yeast infections around stoma.

**NURSING DIAGNOSIS:** **impaired urinary Elimination****May Be Related To**

Surgical diversion, tissue trauma, postoperative edema

**Possibly Evidenced By**

Incontinence (loss of continence)

Changes in amount, character of urine; urinary retention

**NURSING DIAGNOSIS:** **impaired urinary Elimination** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Urinary Elimination NOC**

Display continuous flow of urine, with output adequate for individual situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Urinary Elimination Management NIC</b>	
<i>Independent</i>	
Note presence of stents or ureteral catheters. Label “right” and “left” (or they may be color-coded), and observe urine flow through each.	Stents and ureteral catheters may be placed during surgery to facilitate healing of internal anastomoses.
Record urinary output. Investigate sudden reduction or cessation of urine flow.	Sudden decrease in urine flow may indicate obstruction or dysfunction, such as blockage by edema or mucus, or dehydration. Note: Reduced urinary output not related to hypovolemia, associated with abdominal distention, fever, and clear, watery discharge from the incision; suggests urinary fistula, also requiring prompt intervention.
Observe and record color of urine. Note hematuria or bleeding from stoma.	Urine may be slightly blood-tinged, which should clear up in 2 to 3 days. Rubbing or washing stoma may cause temporary oozing because of vascular nature of mucosal tissues. Continued bleeding, frank blood in the pouch, or oozing around the base of stoma requires medical evaluation and intervention.
Position tubing and drainage pouch so that it allows unimpeded flow of urine. Monitor and protect stents.	Blocked drainage allows pressure to build within urinary tract, risking anastomosis leakage and damage to renal parenchyma. Note: Stents are typically left in place 5 to 10 days to make sure the ureters remain patent during the first few days of healing while the anastomosis (surgical attachment) sites heal. They are not usually sutured in place and may fall out of the urostomy the first week or so, although most surgeons prefer they remain in place at least 5 days (Cowan, 2016).
Encourage increased fluids and maintain accurate intake.	Maintains hydration and good urine flow.
Monitor vital signs. Assess peripheral pulses, skin turgor, capillary refill, and oral mucosa. Weigh daily.	Indicators of fluid balance. Reflects level of hydration and effectiveness of fluid replacement therapy.
<i>Collaborative</i>	
Administer fluids, as indicated.	Assists in maintaining hydration and adequate circulating volume and urinary flow.

**NURSING DIAGNOSIS:** **risk for Sexual Dysfunction****Possibly Evidenced By**

Alteration in body structure and function  
Vulnerability (concern about response of SO)  
Misinformation or insufficient knowledge

**Desired Outcomes/Evaluation Criteria—Client Will****Sexual Functioning NOC**

Verbalize understanding of relationship of physical condition to sexual difficulties.  
Identify satisfying, acceptable sexual practices and explore alternative methods.  
Resume sexual relationship, as appropriate.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Sexual Counseling NIC</b> <i>Independent</i>	
Ascertain client and SO's sexual relationship before surgery, if possible. Identify future expectations and desires.	Mutilation and loss of control of a bodily function can affect client's view of personal sexuality. When coupled with the fear of rejection by a partner, the desired level of intimacy can be greatly impaired. Sexual needs are very basic, and client will be rehabilitated more successfully when a satisfying sexual relationship is continued or developed. Note: Even with nerve-sparing procedures, 15% to 50% of men will experience erectile dysfunction, and 30% to 40% of women will experience painful intercourse (Costa & Kreder, 2016).
Review with client and SO anatomy and physiology of sexual functioning in relation to own situation.	Understanding normal physiology helps client and SO understand the mechanisms of nerve damage and need for exploring alternative methods of satisfaction.
Reinforce information given by the physician. Encourage questions. Provide additional information as needed.	Reiteration of previously given information assists client and SO to hear and process the knowledge again, moving toward acceptance of individual limitations or restrictions and prognosis, for example, that it may take months to regain potency after a radical procedure or that a penile prosthesis may be necessary.
Discuss resumption of sexual activities, beginning slowly and progressing, such as cuddling and caressing until both partners are comfortable with body image and function changes. Include alternative methods of stimulation, as appropriate.	Knowing what to expect in progress of recovery helps client avoid performance anxiety and reduce risk of "failure." If the couple is willing to try new ideas, this can assist with adjustment and may help achieve sexual fulfillment.
Encourage dialogue between client and SO. Suggest wearing pouch cover, T-shirt, or short nightgown.	Disguising urostomy appliance may aid in reducing feelings of self-consciousness and embarrassment during sexual activity.
Encourage use of sense of humor.	Laughter can help individuals deal more effectively with difficult situation and promote a positive sexual experience.
Problem-solve alternative positions for coitus.	Minimizing awkwardness of appliance and physical discomfort can enhance satisfaction.
Discuss and role-play possible interactions or approaches when dealing with new sexual partners.	Rehearsal helps deal with actual situations when they arise, preventing self-consciousness about "different" body image.
Provide birth control information, as appropriate, and stress that impotence does not mean client is necessarily sterile.	Confusion about impotency and sterility can lead to an unwanted pregnancy.
<b>Collaborative</b>	
Arrange meeting with an ostomy visitor or support group, if appropriate.	Sharing of how these problems have been resolved by others can be helpful and reduce sense of isolation.
Refer for counseling or sex therapy, as indicated.	If problems persist longer than several months after surgery, a trained therapist may be required to facilitate communication between client and partner.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

**May Be Related To**

Insufficient information or knowledge of resources; misinformation presented by others; insufficient interest in learning

**Possibly Evidenced By**

Insufficient information

Inaccurate follow-through of instruction or performance of urostomy care

Development of preventable complications

Inappropriate or exaggerated behaviors—hostile, agitated, apathetic, withdrawn

<b>NURSING DIAGNOSIS:</b>	<b>deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs</b> (continued)
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Knowledge: Chronic Disease Management NOC</b> Verbalize understanding of condition, disease process, prognosis, and potential complications.	
<b>Ostomy Self-Care NOC</b> Participated in learning process. Perform necessary procedures correctly and explain reasons for the action. Initiate necessary lifestyle changes and participate in treatment regimen.	

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i>	
Evaluate client's emotional and physical capabilities.	These factors affect client's ability to master tasks and willingness to assume responsibility for ostomy care.
Review anatomy, physiology, and implications of surgical intervention. Discuss future expectations.	Provides knowledge base from which client can make informed choices and an opportunity to clarify misconceptions regarding individual situation.
Include written and visual resources.	Provides references after discharge to support client efforts for independence in self-care.
Instruct client/SO in stomal care, as appropriate. Allow time for return demonstrations and provide positive feedback for efforts.	Promotes positive management and reduces risk of improper ostomy care and development of complications.
Discuss ways to ensure that stoma and appliance are odorless and nonleaking.	When client feels confident about urostomy, energy and attention can be focused on other tasks.
Recommend routine trimming of hair around stoma to edges of pouch adhesive.	Hair can be pulled out when the pouch is changed, causing irritation of hair follicles and increasing risk of local infection.
Encourage optimal nutrition.	Promotes wound healing and increases utilization of energy to facilitate tissue repair. Anorexia may be present for several months postoperatively, requiring conscious effort to meet nutritional needs.
Discuss use of acid-ash diet: cranberries, prunes, plums, cereals, rice, peanuts, noodles, cheese, poultry, and fish; avoidance of salt substitutes, sodium bicarbonate, and antacids; and cautious use of products containing calcium.	May be useful in acidifying urine to decrease risk of infection and crystal or stone formation. Products containing bicarbonate or calcium potentiate risk of crystal and stone formation, affecting both urinary flow and tissue integrity.
Discuss importance of maintaining normal weight.	Changes in weight can affect size of stoma and appliance fit. Note: Weight loss of 10 to 20 lb is not uncommon because of intestinal involvement and anorexia.
Stress necessity of increased fluid intake of at least 2 to 3 L/d (or as prescribed) and cranberry juice or ascorbic acid and vitamin C tablets. Explain to client that urine should be pale yellow to almost colorless.	Maintains urinary output and promotes acidic urine to reduce risk of infection and stone formation.
Discuss resumption of presurgery level of activity and possibility of sleep disturbance, anorexia, and loss of interest in usual activities.	Client should be able to manage same degree of activity as previously enjoyed and in some cases increase activity level, except for contact sports. "Homecoming depression" may occur, lasting several months after surgery, requiring patience, support, and ongoing evaluation.
Encourage regular activity and exercise program.	Immobility or inactivity increases urinary stasis and calcium shift out of bones, potentiating risk of stone formation and resultant urinary obstruction or infection.
Emphasize need for smoking cessation, if indicated. Refer for medication and smoking cessation assistance if client is cooperative.	Smoking cessation is critical to the health of the new bladder, ureters, and kidneys because of the vasoconstrictive, acidic, and carcinogenic effects of smoking.

(continues on page 656)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Identify signs and symptoms requiring medical evaluation: changes in character, amount, and flow of urine; unusual drainage from wound; fatigue or muscle weakness; anorexia; abdominal distention; and confusion.	Early detection and prompt intervention of developing problems (e.g., UTI, ureteral stricture, intestinal fistula) may prevent more serious complications. Urinary electrolytes, especially chloride, are reabsorbed in the intestinal conduit, which leads to compensatory bicarbonate loss, lowered serum pH or metabolic acidosis, and potassium deficit.
Emphasize importance of follow-up appointments.	Monitors healing and disease process and provides opportunity for discussion of appliance problems, general health, and adaptation to condition.
Identify community resources, such as the United Ostomy Association, local ostomy support group, enterostomal therapist, visiting nurse, and pharmacy or medical supply house.	Continued support after discharge is essential to facilitate the recovery process and client's independence in care. Enterostomal nurse can be very helpful in solving appliance problems and identifying alternatives to meet individual client needs.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

**In addition to postsurgical concerns:**

- **impaired urinary Elimination**—anatomic diversion
- **situational low Self-Esteem**—loss of or altered control of body function
- **risk for ineffective Health Management**—complexity of therapeutic regimen, perceived barriers

## URINARY STONES (CALCULI)

### I. Pathophysiology (Chirag et al, 2016; Massini et al, 2014)

Urolithiasis is the presence of stones (uroliths/calculi) anywhere in the urinary tract caused by accumulation of solid material (crystals), which is damaging to the lining of the urinary tract and decreases the inhibitor substances that would prevent crystal accumulation.

- a. Stones most commonly are formed in the kidney and leave the body in the urine stream. There may be a single or multiple calculi, ranging in size from very small (a grain of salt) to the size of a pebble or larger (such as the staghorn calculus, which fills the kidney pelvis, with branches extending into the infundibula and calices).
- b. Client may remain asymptomatic until a stone moves into a ureter or urine flow is obstructed, at which time the potential for renal damage is acute and the level of pain is at its highest.
- c. Heredity may play a part in hypercalciuria; some familial correlations have been found.
- d. Risk factors: The lifetime risk of kidney stones is about 19% in men and 9% in women. In men, the first episode is most likely to occur after age 30, but it can occur earlier (NKF, 2016).

### II. Etiology

- a. Formed of mineral deposits—predominantly calcium oxalate and calcium phosphate. *Note:* About 75% to 85% of renal calculi are calcium stones. Uric acid (5% to 10%), struvite (5%), and cystine (1%) are also calculus formers.
- b. Casual associations have been made with:
  - i. Certain chronic conditions (e.g., cystic fibrosis, inflammatory bowel disease, gout; hyperparathyroidism, hypertension)
  - ii. Systemic dehydration; drinking too little water over time

- iii. Exercise (too much or too little)
- iv. Obesity; eating food with too much salt or sugar over time
- v. Weight loss surgery
- vi. Prolonged bedrest or immobility such as with spinal cord injury
- vii. Excessive intake of vitamins A and D, antacids, aspirin; side effects of some medications, such as acetazolamide (Diamox), Dilantin; certain antibiotics (e.g., ceftriaxone [Rocephin], ciprofloxacin [Cipro])
- viii. Some geographic locations—southeastern United States (Wedro, 2017).

### III. Statistics

- a. Morbidity: The prevalence of kidney stones in the United States increased from 3.8% in the late 1970s to 8.8% in the late 2000s. Each year in the United States, more than 500,000 people go to emergency rooms for kidney stone problems (NKF, 2016; National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2015).
- b. Mortality: Rare and related to development of acute kidney injury or comorbidities. In 2015, urolithiasis was listed as the underlying cause of death in 498 people in the United States. Of those who died, the sex, race, and age group most affected were women, Caucasians, ages 85+ (CDC, 2015).
- c. Cost: In 2009, charges for emergency department visits increased to \$5 billion (does not reflect hospitalization or treatment costs). In 1984, the annual estimated financial burden imposed by urinary calculi was \$898 million, *rising to \$5.3 billion in 2014* (Ghani et al, 2014).

**G L O S S A R Y**

**Calcium oxalate stones:** Kidney stones formed by calcium and oxalate crystals, which usually develop in acidic urine.

**Calcium phosphate stones:** Kidney stones formed by calcium and phosphate crystals, which usually develop in alkaline urine.

**Calculi:** Stones or concretions, especially in the kidney, gallbladder, or urinary bladder.

**Cystine stones:** Kidney stones made of cystine crystals.

**Extracorporeal shock wave lithotripsy (ESWL):** Procedure whereby a shock wave is transmitted through the body to target a stone, thus fragmenting it.

**Hematuria:** Blood in the urine.

**Hypercalciuria:** High calcium in the urine—an inherited condition.

**Hyperoxaluria:** Excretion of excessive amounts of oxalate in the urine.

**Lithotripsy:** Procedure that uses **shock waves** to break up stones in the kidney, bladder, or ureter.

**MET:** Medical expulsive therapy; use of medications to shorten the duration of stone passage and increases the likelihood of stone passage. Medications include alpha blockers and calcium channel blockers in combination with NSAIDs.

**Pyuria:** Pus in the urine.

**Renal calyces:** The perimeter of the renal pelvis is interrupted by cuplike projections called calyces. A minor calyx surrounds the renal papillae of each pyramid and collects urine from that pyramid. Several minor calyces converge to form a major calyx. From the major calyces, the urine flows into the renal pelvis and from there into the ureter.

**Renal colic:** Flank (side) pain caused by obstruction to the flow of urine caused by kidney or ureteral stones.

**Renal pelvis:** The area at the center of the kidney where urine collects and is funneled into the ureter.

**Renal tubular acidosis:** Condition associated with dehydration, metabolic acidosis, low potassium, and high chloride. Often associated with renal stones due to hypercalciuria (high calcium in urine).

**Staghorn calculi:** Develops in the center of the kidney or pelvis, filling the entire pelvis and extending out into the calyces.

**Stent:** Tube inserted into the ureter to bypass a stone or to keep the ureter open so urine flows freely from the kidney to the bladder.

**Struvite stone:** Also known as magnesium ammonium phosphate—stones that are often present with infection.

**Ureteroscopy:** Examination of the upper urinary tract, performed with a flexible ureteroscope passed through the urethra and the bladder, and then directly into the ureter. The procedure is useful in the diagnosis and treatment of kidney stones. Smaller stones in the lower ureter can be removed in one piece, while bigger ones are usually broken before removal.

**Ureterovesical junction:** Joining of the ureters and bladder: a narrow point where stones can get lodged.

**Uric acid stones:** Kidney stones made of pure uric acid crystals. These stones develop in acidic urine.

**Urolithiasis:** A term that refers to the presence of stones in the urinary tract, while nephrolithiasis (nephro= kidney + lithiasis=stone) refers to kidney stones, and ureterolithiasis refers to stones lodged in the ureter (Wedro, 2017).

**CARE SETTING**

Treatment is often handled at the community level or as an outpatient; acute episodes occasionally require inpatient treatment on a medical or surgical unit. On occasion, surgery is necessary to remove the stone(s).

**RELATED CONCERNs**

Acute kidney injury (acute renal failure), page 595  
 Fluid and electrolyte imbalances (see *DavisPlus*)  
 Metabolic acidosis—primary base bicarbonate deficiency (see *DavisPlus*)  
 Metabolic alkalosis—primary base bicarbonate excess (see *DavisPlus*)  
 Psychosocial aspects of care, page 835

**CLIENT ASSESSMENT DATABASE**

Dependent on size, location, and etiology of calculi.

**DIAGNOSTIC DIVISION  
MAY REPORT****ACTIVITY/REST**

- Sedentary occupation or occupation in which client is exposed to high environmental temperatures

**MAY EXHIBIT**

(continues on page 658)

## CLIENT ASSESSMENT DATABASE (contd.)

### MAY REPORT (continued)

- Activity restrictions or immobility due to a preexisting condition—debilitating disease, spinal cord injury—causing bones to release more calcium

### CIRCULATION

### ELIMINATION

- Decreased urinary output, bladder fullness
- Burning, urgency with urination
- History of recent or chronic urinary tract infection (UTI)
- Previous kidney stones
- Diarrhea

### FOOD/FLUID

- Nausea and vomiting (common)
- A high-protein, high-sodium, low-calcium diet, which may increase risk of some types of stones
- Insufficient fluid intake, does not drink fluids well (common)

### PAIN/DISCOMFORT

- Acute episode of excruciating, colicky pain, with location depending on stone location; in the flank in the region of the costovertebral angle, may radiate to back, abdomen, and down to the groin and genitalia; constant dull pain suggests calculi located in the renal pelvis or calyces
- May be described as acute, severe, and not relieved by positioning or any other measures

### SAFETY

- Use of alcohol can contribute to dehydration and to uric acid stone formation.
- Fever (uncommon)

### TEACHING/LEARNING

- Family history of kidney stones, kidney disease, hypertension, gout, chronic UTI, or hereditary disease, such as renal tubular acidosis, cystinuria, hyperoxaluria
- History of small bowel disease, previous abdominal surgery, hyperparathyroidism
- Use of antibiotics, antihypertensives, sodium bicarbonate, allopurinol, phosphates, thiazides, excessive intake of calcium or vitamin D
- Use of herbal remedies for kidney stones, such as valerian, skullcap, wild yam, khella, marshmallow, slippery elm

### DISCHARGE PLAN CONSIDERATIONS

- May require dietary modifications, exercise program, pain management plan

► Refer to section at end of plan for postdischarge considerations.

### MAY EXHIBIT (continued)

- Elevated blood pressure (BP) and pulse associated with pain, anxiety, or kidney failure
- Warm, flushed skin, pallor

- Alterations in voiding pattern
- Oliguria (retention, scant urine), hematuria, pyuria

- Abdominal distention, decreased or absent bowel sounds

- Guarding, distraction behaviors, self-focusing
- Tenderness in renal areas on palpation

**DIAGNOSTIC STUDIES****TEST  
WHY IT IS DONE****WHAT IT TELLS ME****BLOOD TESTS**

- **Serum and urine blood urea nitrogen/creatinine (BUN/Cr):** Helpful in delineating obstructive uropathy due to urolithiasis.
- **Serum and urine pH**
- **Complete blood count (CBC):** Battery of screening tests, which typically includes hemoglobin (Hb); hematocrit (Hct); RBC count, morphology; and white blood cell (WBC) count and differential.
- **Blood chemistry:** Measures levels of calcium, phosphate, uric acid, sodium, potassium, chloride, bicarbonate, and albumin. If serum calcium levels are elevated, then testing for hyperparathyroidism is performed.

Blockage of urine flow below the kidneys causes postrenal azotemia (ratio greater than 15:1) without intrinsic renal disease. Abnormal levels—high in serum and low in urine—are secondary to high obstructive stones with reduced urine output.

May provide insight regarding patient's renal function and type of calculus (e.g., calcium oxalate, uric acid, cystine), respectively.

Hgb/Hct—abnormal if client is severely dehydrated or client is anemic (hemorrhage, kidney dysfunction or failure). RBCs—usually normal. WBCs—may be increased, indicating infection.

These tests are done if complications associated with kidney stones are suspected or present.

**URINE TESTS**

- **Urinalysis:** Simple screening test may suggest type of stone and presence of infection.
- **Urine (24-hour):** Measures urine volume, pH, and levels of calcium, sodium, uric acid, oxalate, citrate, and creatinine.
- **Urine culture:** Identifies presence of infection and causative agent.

Color may be yellow, dark brown, or bloody. Commonly shows RBCs, WBCs, crystals (cystine, uric acid, calcium oxalate), casts, minerals, bacteria, and pus. The pH may be less than 5.0, which promotes cystine and uric acid stones, or higher than 7.5, which promotes magnesium, struvite, phosphate, or calcium phosphate stones.

Helps identify degree of obstruction and type of stone—especially important for long-term management in client who is prone to stone formation.

May reveal UTI and identify organism (e.g., *Staphylococcus aureus*, *Proteus*, *Klebsiella*, *Pseudomonas*) as cause for stone development—struvite or infection stone.

**OTHER DIAGNOSTIC STUDIES**

- **Unenhanced renal computed tomography [helical (spiral CT scan):** Continuous motion image providing detailed views of the kidneys, ureters, and bladder in a shorter period of time.
- **Abdominal x-ray of kidneys-ureters-bladder (KUB):** Usually ordered to evaluate hematuria flank pain.
- **Kidney ultrasound and intrarenal Doppler ultrasound:** Determines obstructive changes and location of stone without the risk of kidney failure that can be induced by contrast medium.
- **Intravenous urogram (IVU; also known as intravenous pyelogram [IVP]):** Kidney x-ray performed by injecting radiopaque contrast into a vein. Multiple pictures of the kidneys are taken to follow the uptake and excretion of the contrast by the kidneys.

Identifies and delineates calculi and other masses, as well as kidney, ureteral, and bladder distention. Contrast is not used because it masks the stones. Note: This test has largely replaced IVP as the definitive diagnostic test for stones (Chirag et al, 2016).

Assess the total stone burden, as well as anatomic changes in the area of the kidneys or along the course of the ureter. May show small stones that can pass unnoticed.

Ultrasound is used to determine presence of a renal stone, and enlargement of the kidney (hydronephrosis) or ureteral dilation to the kidney. However, small kidney stones that are not obstructing may be missed. Renal Doppler ultrasound improves the detection of early obstruction by evaluating for elevated resistive index (RI) in kidney with nondilated collecting system.

Provides rapid confirmation of urolithiasis as a cause of abdominal or flank pain. Shows abnormalities in anatomical structures, such as distended ureter, and outline of calculi.

## NURSING PRIORITIES

1. Alleviate pain.
2. Maintain adequate renal functioning.
3. Prevent complications.
4. Provide information about disease process, prognosis, and treatment needs.

## DISCHARGE GOALS

1. Pain relieved or controlled.
2. Fluid and electrolyte balance maintained.
3. Complications prevented or minimized.
4. Disease process, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: acute Pain

#### May Be Related To

Biological injury agents (e.g., tissue trauma, ureteral contractions, edema formation, cellular ischemia)

#### Possibly Evidenced By

Self-report of intensity and characteristics of pain using a standardized pain scale  
Expressive behaviors (e.g., restlessness, moaning)  
Self-focus; facial mask of pain (e.g., grimacing)  
Guarding behaviors

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Pain Level NOC

Report pain is relieved, with spasms controlled.  
Appear relaxed and able to sleep/rest appropriately.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Pain Management: Acute NIC

##### Independent

Document location, duration, intensity (0 to 10 or similar coded scale), and radiation. Note nonverbal signs—elevated BP, pulse and respirations, moaning and thrashing about.

Helps evaluate site of obstruction and progress of calculi movement. Flank pain suggests that stones are in the kidney area, upper ureter. Flank pain radiates to back, abdomen, groin, and genitalia because of proximity of nerve plexus and blood vessels supplying these areas. Sudden, severe pain may precipitate apprehension, restlessness, and severe anxiety.

Explain cause of pain and importance of notifying care providers of changes in pain occurrence or characteristics.

Provides opportunity for timely administration of analgesia and alerts care providers to possibility of passing of stone or developing complications. Sudden cessation of pain usually indicates stone passage.

Provide such comfort measures as back rub and restful environment.

Promotes relaxation, reduces muscle tension, and enhances coping.

Increase fluid intake to at least 3 to 4 L/d within cardiac tolerance.

Vigorous hydration promotes passing of stone, prevents urinary stasis, and aids in prevention of further stone formation.

Apply warm compresses to back.

Reduces muscle tension and may reduce reflex spasms.

Assist with and encourage use of focused breathing, guided imagery, and diversional activities.

Redirects attention and aids in muscle relaxation.

Note reports of increased or persistent abdominal pain.

Complete obstruction of ureter can cause perforation and extravasation of urine into perirenal space. This represents an acuter surgical emergency.

##### Collaborative

Administer medications, as indicated, for example:

Analgesics, including narcotics (e.g., morphine sulfate [Astramorph], butorphanol [Stadol]; combination opioids such as oxycodone and acetaminophen [Percocet]; and NSAIDs such as ketorolac [Toradol], diclofenac [Voltaren], and ibuprofen)

Acute renal colic may be the most painful event a person can endure. Striking without warning, the pain is often described as excruciating, and the client is unable to find a position of comfort. Parenteral narcotics are typically prescribed for acute renal colic and are often required.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Antispasmodics, such as flavoxate (Urispas) and oxybutynin (Ditropan); calcium channel blockers, such as nifedipine (Adalat); and alpha-adrenergic blockers, such as tamsulosin (Flomax)	in the early phases of treatment, but NSAIDs are also effective for moderate to severe pain. Note: Opioid and NSAIDs in combination are often more effective than either alone (Chirag et al, 2016).
Maintain patency of catheters when used.	Decreases reflex spasm and relaxes ureteral smooth muscle, which facilitates stone passage. Note: Oral analgesics, NSAIDs, and alpha-adrenergic blockers help facilitate stone passage after acute attack.
	Prevents urinary stasis or retention, reduces risk of increased renal pressure and infection.

### NURSING DIAGNOSIS: impaired urinary Elimination

#### May Be Related To

Anatomic obstruction

#### Possibly Evidenced By

Dysuria

Urgency; frequency

Retention

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Urinary Elimination NOC

Void in normal amounts of greater than or equal to 30 mL/hr and usual pattern.

Experience no signs of retention.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Urinary Elimination Enhancement NIC</b>	
<i>Independent</i>	
Note urine output and characteristics of urine.	Provides information about kidney function and presence of complications (such as infection and dehydration). Bleeding may also indicate increased obstruction or irritation of ureter.
Determine client's normal voiding pattern and note variations.	Calculi may cause urinary tract nerve excitability, which causes sensations of urgent need to void. Frequency and urgency usually increase as calculus nears the ureterovesical junction.
Encourage increased fluid intake to 3 to 4 L/d (if nausea is not present and not contraindicated by cardiac/other disease conditions).	Increased hydration dilutes urine and flushes bacteria, blood, and debris and may facilitate stone passage—especially small stones.
Strain all urine. Document any stones expelled and send to laboratory for analysis.	Retrieval of calculi allows identification of type of stone and influences choice of therapy.
Investigate reports of bladder fullness; palpate for suprapubic distention. Note decreased urine output and presence of periorbital or dependent edema.	Urinary retention may develop, causing bladder, ureteral, and kidney distention, exacerbating pain and potentiating risk of infection and renal failure.
Observe for changes in mental status, behavior, or level of consciousness (LOC).	Accumulation of uremic wastes and electrolyte imbalances can be toxic to the central nervous system (CNS).
<i>Collaborative</i>	
Maintain patency of indwelling catheters—ureteral, urethral, or nephrostomy—when used.	May be required to facilitate urine flow, preventing retention and corresponding complications. Catheters are positioned above the stone to promote urethral dilation and stone passage. Continuous or intermittent irrigation can be carried out to flush kidneys and ureters and adjust pH of urine to permit dissolution of stone fragments following lithotripsy.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications, as indicated, for example:	
Acetazolamide (Diamox) and allopurinol (Zyloprim)	Increases urine pH (alkalinity) to reduce formation of uric acid stones. Antigout agents such as allopurinol also lower uric acid production and potential of uric acid stone formation.
Alpha-adrenergic blockers, for example: tamsulosin (Flomax), terazosin (Hytrin)	Although these drugs are designed specifically for prostatic hypertrophy, they have off-label use in treatment of kidney stones as smooth muscle relaxants, which facilitate passage of ureteral stones.
Corticosteroids, such as prednisone (Deltasone)	May be used short term to reduce tissue edema to facilitate movement of stones.
Penicillamine (Cuprimine), tiopronin (Thiola), and potassium citrate (Polycitra-K)	Drugs may be prescribed to make urine more alkaline or bind cystine in the urine when cystine stones cannot be controlled.
Ammonium chloride and potassium or sodium phosphate	Reduces phosphate stone formation.
Antibiotics	Antibiotics may be needed in presence of UTI or to keep urine bacteria-free to prevent struvite stone formation.
Monitor laboratory studies, for example:	
Electrolytes, BUN, and Cr	Elevated BUN, Cr, and certain electrolytes indicate presence and degree of kidney dysfunction.
Urine culture and sensitivities	Determines presence of UTI, which may be causing or complicating kidney stone symptoms; determines appropriate antibiotic therapy.
Prepare client for and assist with endoscopic procedures, such as the following:	For treatment of most kidney stones, shock wave lithotripsy, ureteroscopy, and percutaneous nephrolithotomy have largely replaced open surgery. Note: Extracorporeal shock wave lithotripsy (SWL) and ureteroscopy (URS) with endoscopic lithotripsy are both accepted first-line therapies, according to the American Urology Association guidelines on the management of ureteric calculi (Grasso et al, 2016).
Therapeutic ureteroscopy	Performed with a flexible scope passed through the urethra and the bladder and then directly into the ureter. The most common indication for therapeutic ureteroscopy is to treat upper urinary tract stones, particularly those that are either unsuitable for extracorporeal shock wave lithotripsy (EWSL) or unresponsive to that form of treatment. Smaller stones in the lower ureter can be removed in one piece, while bigger ones are usually broken before removal. A basket procedure is sometimes performed through the scope to retrieve a stone once located in the ureter. Stents are sometimes placed after ureteroscopy, to help prevent ureteric obstruction and pain resulting from ureteral edema or passage of a stone fragment (Grasso et al, 2016; Preminger, 2016).
Shock wave lithotripsy (SWL), also called extracorporeal shock wave lithotripsy (ESWL)	SWL is the most frequently used outpatient procedure for treatment of smaller stones in the upper ureters that are not responsive to medical therapies and is effective 60% of the time (NKF, 2009; Preminger, 2016). Stones are pulverized by shock waves delivered from outside the body while client reclines in water bath or on soft cushion. Note: ESWL is not ideal for large stones.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Percutaneous nephrolithotomy (PNL) or open incision stone removal	PNL and open surgery are equally effective for the management of renal stones. PNL is a minimally invasive procedure to remove stones from the kidney by means of a small puncture wound through the skin. It is most suitable to remove stones of more than 2 cm in size and that are present near the kidney pelvic region. It is usually done under general anesthesia or spinal anesthesia. Open surgery may be necessary in less than 1% (Preminger, 2016) to remove a stone that is (1) too large to pass through ureters (e.g., >8 mm in diameter), (2) is caught in a difficult place, (3) blocks flow of urine, (4) causes or exacerbates ongoing urinary tract infection (UTI), (5) causes constant bleeding, or (6) is potentially damaging to kidney tissue. One advantage to the open procedure is that stone fragments are removed at surgery rather than relying on natural passage from the kidneys or urinary tract. Client may have a small drainage tube left in kidney or ureters during the healing process.

NURSING DIAGNOSIS:	risk for deficient Fluid Volume
<b>Possibly Evidenced By</b>	
Active fluid volume loss (e.g., nausea, vomiting) Failure of regulatory mechanisms (e.g., postobstructive diuresis)	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Fluid Volume NOC</b>	Maintain adequate fluid balance as evidenced by vital signs and weight within client's normal range, palpable peripheral pulses, moist mucous membranes, and good skin turgor.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid/Electrolyte Management NIC</b>	
<i>Independent</i>	
Monitor and document I&O, noting 24-hour fluid balance.	Comparing actual and anticipated output may aid in evaluating presence and degree of renal impairment. Note: Impaired kidney functioning and decreased urinary output can actually result in higher circulating volumes with signs and symptoms of heart failure (HF).
Document incidence and note characteristics and frequency of vomiting and diarrhea, as well as accompanying or precipitating events.	Nausea or vomiting and diarrhea are commonly associated with renal colic because celiac ganglion serves both kidneys and stomach. Documentation may help rule out other abdominal occurrences as a cause for pain or pinpoint calculi.
Increase fluid intake to 3 to 4 L/d within cardiac tolerance.	Maintains fluid balance for homeostasis and “washing” action that may flush the stone(s) out. Note: Patients with recurrent kidney stones traditionally have been instructed to drink enough fluid to decrease chance of urinary supersaturation with stone-forming salts. The goal is a total urine volume in 24 hours in excess of 2 liters (Chirag et al, 2016).
Monitor vital signs. Evaluate pulses, capillary refill, skin turgor, and mucous membranes.	Indicators of hydration and circulating volume and need for intervention.
Weigh daily.	Rapid weight changes suggest water loss or retention.
<i>Collaborative</i>	
Monitor Hgb/Hct and electrolytes.	Assesses hydration and effectiveness of, or need for, interventions.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer IV fluids.	Maintains circulating volume if oral intake is insufficient, promoting renal function.
Provide appropriate diet, clear liquids, and bland foods, as tolerated.	Easily digested foods decrease gastrointestinal (GI) activity or irritation and help improve fluid and nutritional balance.
Administer medications, as indicated, for example, anti-emetics, such as metoclopramide (Reglan), ondansetron (Zofran), promethazine (Phenergan), or droperidol (Inapsine).	Reduces nausea and vomiting.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

**May Be Related To**

Insufficient information or interest in learning  
Insufficient knowledge of resources

**Possibly Evidenced By**

Insufficient knowledge  
Inaccurate follow-through of instructions or performance of a procedure

**Desired Outcomes/Evaluation Criteria—Client Will**

**Knowledge: Acute Illness Management NOC**

Verbalize understanding of disease process and potential complications.  
Correlate symptoms with causative factors.  
Verbalize understanding of therapeutic needs.  
Initiate necessary lifestyle changes and participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b>	
<b>Independent</b>	
Review disease process and future expectations.	Provides knowledge base from which client can make informed choices.
Emphasize importance of increased fluid intake (including water, coffee, milk), roughly 3 to 4 L/d if not contraindicated. Encourage client to notice dry mouth and excessive diuresis or diaphoresis and to increase fluid intake whether or not feeling thirsty.	Water is essential for stone formers as it significantly reduces calcium oxalate and calcium phosphate saturation, and uric acid production. Water also flushes renal system, decreasing opportunity for urinary stasis and stone formation. Research has shown that other fluids taken in sufficient volume (such as coffee [diuretic effect] and milk [raises urinary volume, meets calcium dietary reference intake (DRI), and chelates oxalate in foods and beverages]) are also beneficial in reducing stone formation (Goldfarb et al, 2005). Increased fluid losses or dehydration require additional intake beyond usual daily needs.
Review dietary regimen, as individually appropriate, for example:	Diet may or may not be an issue. However, understanding reason for modifications provides opportunity for client to make informed choices, increases cooperation with regimen, and may prevent recurrence.
Avoid excess salt and protein. Advise that client discuss with physician or nutritionist specific recommendations for protein and animal fat.	If a person is susceptible to forming stones, then foods high in animal proteins and salt may increase the risk; however, if a person isn't susceptible to forming stones, diet probably will not change that risk. There is lack of consensus among clinicians concerning how little or how much protein affects stone formation, because studies have not produced sufficient evidence one way or another. Some clinicians have concluded that eating amounts of protein near the DRI does not increase risk of

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Low-oxalate diet, such as limited chocolate, beets, nuts, rhubarb, strawberries, spinach, and wheat bran	stone formation or recurrence, even if protein is from animal sources. Others are concerned that consuming meat increases renal acid load and may cause supersaturation of calcium, phosphate, and uric acid (Massini et al, 2014).
Avoid very high (>2500 mg/d) or very low (<500 mg/d) total intake of calcium and aim for the dietary reference intake (DRI) of 800 to 1000 mg/d. Use calcium citrate when supplements are required.	Reduces calcium-oxalate stone formation. Note: Research suggests that daily inclusion of coffee, beer, or wine decreases the risk of stone formation, whereas regular intake of apple or grapefruit juice increases the risk (Finkelstein & Goldfarb, 2006; Massini et al, 2014).
Shorr regimen: low-calcium and phosphorus diet with aluminum carbonate gel 30 to 40 mL 30 minutes after meals and at bedtime.	Research suggests that restricting dietary calcium is not helpful in reducing calcium stone formation and may actually increase oxalate stone formation (Ross et al, 2011). Use of citrate (such as in Diet 7Up, Sprite Zero, diet ginger ale) is protective against kidney stones by binding oxalate and improving calcium utilization (Eisner et al, 2010).
Encourage foods rich in magnesium and vitamins B and K.	Prevents phosphoric calculi by forming an insoluble precipitate in the GI tract, reducing the load to the kidney nephrons. Also effective against other forms of calcium calculi. Note: May cause constipation.
Discuss medication and herbal supplement regimen, avoidance of over-the-counter (OTC) drugs, and reading all product and food ingredient labels.	These nutrients reduce stone formation.
Encourage client to reveal all medications and herbs to physician or pharmacist.	Drugs may be given to acidify or alkalinize urine, depending on underlying cause of stone formation. Ingestion of products containing individually contraindicated ingredients, such as calcium and phosphorus, potentiates recurrence of stones. Note: Some herbal supplements—valerian, skullcap, wild yam, khella, and marshmallow—are known to have antispasmodic properties or are soothing to irritated urinary tissues.
Emphasize need for smoking cessation, when indicated.	To reduce risk of dangerous interactions and side effects.
Encourage regular activity and exercise program.	Cigarette smoking may contribute to kidney stones because it increases urine levels of cadmium, a heavy metal.
Active-listen to concerns about therapeutic regimen and lifestyle changes.	Inactivity contributes to stone formation through calcium shifts and urinary stasis.
Identify signs and symptoms requiring medical evaluation, such as recurrent pain, hematuria, and oliguria.	Helps client work through feelings and gain a sense of control over what is happening.
Demonstrate proper care of incisions or catheters if present.	With increased probability of stone recurrence, prompt interventions may prevent serious complications, including heightened risk of end-stage renal disease. Rate of recurrence at 1 year is 14%; at 2 years, 35%; and at 10 years, 52% (Chirag et al, 2016). Note: A recent study reported that in recurrent stone formers, there is elevated risk for both chronic kidney disease and all-cause mortality, most likely the result of repeated, transient reductions in kidney function that accompany each episode of kidney stone formation (Haley et al, 2016).
	Promotes competent self-care and independence.

**POTENTIAL CONSIDERATIONS** following acute hospitalizations (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **impaired urinary Elimination**—recurrence of calculi

# Women's Health

## HYSTERECTOMY

### I. Indications—surgical removal of female reproductive organ(s)

- a. Malignancies: Hysterectomy may be used to treat uterine, cervical, and ovarian cancers. Cancer of the uterus, or endometrial cancer, is the most common gynecological cancer in the United States, accounting for approximately 10% of hysterectomies (West, 2009).
- b. Nonmalignant conditions, such as endometriosis, fibroid tumors, pelvic support problems (e.g., uterine prolapse), chronic pelvic pain, abnormal uterine bleeding. *Note:* The most common reason for hysterectomy is uterine fibroids (American College of Obstetrics and Gynecologists [ACOG], 2015).
- c. Life-threatening bleeding or hemorrhaging, such as obstetric or traumatic complication; irreparable rupture of the uterus
- d. Treatment of intractable pelvic infection

### II. Hysterectomy Types and Approaches

- a. Hysterectomy is classified according to (1) how much of the reproductive organs are removed, (2) surgical approach, and (3) which reproductive organs are removed.
- b. Types
  - i. Partial (subtotal): Only the upper portion of the uterus is removed, leaving the cervix intact. Other reproductive structures may or may not be removed.
  - ii. Total: Surgical removal of the entire uterus and the cervix and in some cases, one or both ovaries (oophorectomy). When a total hysterectomy also involves the removal of ovaries and fallopian tubes, it is known as salpingo-oophorectomy hysterectomy.
  - iii. Radical: Removes the entire uterus and often the ovaries, fallopian tubes, and lymph nodes in the pelvis and/or abdomen for cancerous cells or tumors.
- c. Approaches
  - i. Laparoscopic: an innovative, minimally invasive procedure that can be performed as a vaginal or abdominal procedure
  - ii. Robotic hysterectomy: uses a computer to control the surgical instruments during surgery, which often includes the use of laparoscopic technology. A procedure known as daVinci™ hysterectomy is currently the most commonly used form of robotic hysterectomy (Hysterectomy.com staff, 2017).
  - iii. Abdominal hysterectomy
    1. This is the most common type of hysterectomy.

2. Cancer of the ovary(s) and uterus, endometriosis, and large uterine fibroids is treated with a total abdominal hysterectomy (TAH).
3. May be subtotal (partial) or total. A TAH typically requires a 4- to 6-week recovery period.
4. When an open abdominal approach is used, the incision may be horizontal or vertical, depending on the reason the procedure is performed and the size of the area being treated.
5. Procedure may also be performed via laparoscopically assisted abdominal supracervical hysterectomy (LASH), which spares the cervix, and can usually be done on outpatient basis, with a recovery period of about 1 week.

#### iv. Vaginal hysterectomy

1. Limited to certain conditions, such as uterine prolapse, cystocele or rectocele, carcinoma in situ, and high-risk obesity
2. Requires removal of cervix
3. Advantages: less pain, no visible (or much smaller) scar, shorter hospital stay, and shorter recovery period
4. May be laparoscopically assisted hysterectomy (LAVH)

### III. Statistics

- a. Morbidity: In 2010, it was reported that 500,000 hysterectomies were performed annually (ACOG, 2011). Research supports that early stage uterine cancer has the potential to be cured with surgery alone. The LAP2 trial study of 1696 women reported that open and laparoscopic approaches were equivalent in terms of overall survival (McNally & Berek, 2011).
- b. Mortality: A study published in 2013 reported that the overall mortality rates in a group of 664,229 women at 741 U.S. hospitals who had abdominal hysterectomies between 1998 and 2010 was 0.17% (Wright et al, 2013).
- c. Cost: Direct care costs have been variously reported between \$3.7 and \$5 billion for both abdominal and vaginal hysterectomies (2009 data) (Gor, 2015; Pfunter et al, 2012). A study published in 2012 (based on 2009 data) comparing costs for different types of hysterectomy reported mean total patient costs of \$43,622 for abdominal, \$31,934 for vaginal, \$38,312 for laparoscopic, and \$49,526 for robotic hysterectomies (Wright et al, 2012).

## G L O S S A R Y

**Cervix:** Lower end or neck of the uterus, which protrudes into the vagina.

**DUB:** Dysfunctional uterine bleeding (a common symptom in women undergoing hysterectomy when bleeding does not respond to other treatments).

**Endometriosis:** Ectopic endometrial tissue found outside the uterine cavity, usually in the ovaries, fallopian tubes, and other pelvic structures. Endometriosis is the cause for about one-third of hysterectomies (Gor, 2015); however, there are a variety of surgical treatments that a woman can undergo to treat endometriosis depending on the severity, stage, and abundance of the endometrioma lesions (e.g., endometriosis deep excision surgery) to remove all inflammatory tissue and to help restore fertility (Sekin, 2016).

**Fibroids (also called leiomyomas or myomas):** Benign tumors that form inside or outside the uterus wall. There are five different types of fibroids, and they are identified by their location. For example, intramural fibroids located in the thick wall of the uterus (myometrium) are the most common type of fibroids and also the easiest to remove. Fibroids are the cause for about 33% of hysterectomies (Gor, 2015; Sekin, 2015).

**Laparoscopy:** Use of a slender, light-transmitting tube to view abdominal organs or perform surgery.

**Menopause:** Permanent cessation of menstrual activity.

**Uterine prolapse:** Displacement or sagging of the uterus into the vagina. Prolapse accounts for about 15% of hysterectomies (Gor, 2015).

## CARE SETTING

Procedure is performed in inpatient acute surgical unit or short-stay unit or outpatient, depending on type performed.

## RELATED CONCERNS

Cancer, general considerations, page 945

Psychosocial aspects of care, page 835

Surgical intervention, page 873

Venous thromboembolism (VTE) disease including deep vein thrombosis (DVT) and pulmonary embolism (PE), page 120

## CLIENT ASSESSMENT DATABASE

Data depend on the underlying disease process and the need for surgical intervention—cancer, prolapse, dysfunctional uterine bleeding, severe endometriosis, or pelvic infections unresponsive to medical management—and associated complications, such as anemia.

## TEACHING/LEARNING

### DISCHARGE PLAN CONSIDERATIONS

- May need temporary help with transportation and homemaker and maintenance tasks

► Refer to section at end of plan for postdischarge considerations.

## PREOP DIAGNOSTIC STUDIES

### WHY IT IS DONE

- **Pelvic examination:** Identifies uterine and/or other pelvic organ irregularities.
- **Pap smear:** Screening test for cervical cancer and certain vaginal or uterine infections.
- **Pelvic ultrasound or computed tomography (CT) scan:** Creates an electronic picture of the organs and structures within the pelvis.
- **Sonohysterogram:** A saline-enhanced sonogram or ultrasound.

### WHAT IT TELLS ME

- |  |
|--|
| May reveal masses, tender nodules, visual changes of cervix, requiring further diagnostic evaluation.                                    |
| Cellular dysplasia reflects possibility of or actual presence of cancer, which may affect choice of procedure.                           |
| Aids in identifying size and location of pelvic mass.  |
| Evaluates abnormal growths inside the uterus, lining of the uterus, and deeper tissue layers. Delineates polyps and submucosal fibroids. |

(continues on page 668)

## PREOP DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li>• <b>Hysteroscopy:</b> Uses fiberoptic viewing scope and a distending medium, such as carbon dioxide, to directly view the uterine cavity and/or biopsy growths.</li> <li>• <b>Laparoscopy:</b> Visualizes pathology, obtains biopsies, or performs laser treatment for endometriosis.</li> </ul>	Viewed by some to be the “gold standard.” Determines cause of abnormal bleeding.
<ul style="list-style-type: none"> <li>• <b>Endometrial sampling:</b> Dilation and curettage (D&amp;C) with biopsy of endometrial or cervical tissue for histopathological study of cells.</li> <li>• <b>Schiller's test (staining of cervix with iodine):</b> Useful in identifying abnormal cells.</li> <li>• <b>Complete blood count (CBC):</b> Useful in determining general health status.</li> </ul>	<p>May reveal source of bleeding, presence of tumors, and superficial peritoneal implants of endometriosis; determines cancer staging and assesses effects of chemotherapy.</p> <p>Determines presence and location of cancer.</p>
<ul style="list-style-type: none"> <li>• <b>Sexually transmitted disease (STD) screen:</b> Determines presence of infection, such as (human papillomavirus [HPV]).</li> </ul>	<p>Cervix turns dark brown in noncancerous areas and white or yellow in possible cancerous areas.</p> <p>Decreased hemoglobin (Hgb) may reflect chronic anemia, decreased hematocrit (Hct) suggests active blood loss, and elevated white blood cell (WBC) count may indicate inflammation and infectious process.</p> <p>Oncogenic (tumor-inducing) human papillomaviruses (HPVs) have a causal role in nearly all cervical cancers. HPV types 16 and 18 are responsible for 70% of cervical cancers (Centers for Disease Control and Prevention [CDC], 2015).</p>

### NURSING PRIORITIES

1. Prevent complications.
2. Support adaptation to change.
3. Provide information about procedure, prognosis, and treatment needs.

\*\*\*In addition to these NDs, see nursing actions and interventions listed in CP: Surgical Intervention.

NURSING DIAGNOSIS:	risk for [acute] urinary Retention
<b>Possibly Evidenced By</b>	Blockage of urinary tract (e.g., surgical trauma, surgical manipulation, effects of anesthesia; tissue edema; hematoma) [Preexisting voiding dysfunction; pain] [Sensory and motor impairment—nerve injury such as might occur after radical hysterectomy]
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Urinary Elimination NOC</b>	Void in sufficient amounts with no palpable bladder distention. Experience no postvoid residuals greater than 100 mL

ACTIONS/INTERVENTIONS	RATIONALE
<b>Urinary Elimination Management NIC</b> <p><i>Independent</i></p> <p>Identify client at risk for postoperative urinary retention (POUR), such as can occur with vaginal, laparoscopic, radical hysterectomies; use of regional anesthesia; long duration of surgery; pelvic organ prolapse prior to surgery.</p> <p>Note voiding pattern and monitor urinary output once surgical catheter is removed.</p>	<p>Postoperative urinary retention is a frequent consequence of pelvic surgery (estimates range from 2.5%-43%) (Geller, 2014; Mueller, 2016) typically caused by bladder (detrusor) dysfunction, urethral obstruction, or failure of pelvic floor relaxation.</p> <p>May indicate urinary retention if voiding frequently in small or insufficient amounts (less than 100 mL).</p>

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Palpate bladder. Investigate reports of discomfort, fullness, and inability to void.	Perception of bladder fullness and distention of bladder above symphysis pubis indicates urinary retention.
Provide routine voiding measures, such as privacy, normal position, running water in sink, and pouring warm water over perineum.	Promotes relaxation of perineal muscles and may facilitate voiding efforts.
Provide and/or encourage good perineal cleansing and catheter care when present.	Promotes cleanliness, reducing risk of ascending urinary tract infection (UTI).
Assess urine characteristics, noting color, clarity, and odor.	Urinary retention, vaginal drainage, and possible presence of intermittent or indwelling catheter increase risk of infection, especially if client has perineal sutures.
<b>Collaborative</b>	
Catheterize when indicated per protocol if client is unable to void or is uncomfortable.	Edema or interference with nerve supply may cause bladder atony or urinary retention requiring decompression of the bladder. Note: Indwelling urethral or suprapubic catheter may be inserted intraoperatively if complications are anticipated.
Maintain patency of indwelling catheter; keep drainage tubing free of kinks.	Promotes free drainage of urine, reducing risk of urinary stasis or retention and infection.
Check residual urine volume after voiding (called postresidual volume [PVR]) as indicated.	May not be emptying bladder completely; retention of urine increases possibility for infection and is uncomfortable, even painful. Note: Consensus exists that a PVR of 50 mL to 100 mL is normal, and PVR greater than 200 mL is abnormal (Gehrlich et al, 2007; Geller, 2014).

### NURSING DIAGNOSIS: risk for Constipation

#### Possibly Evidenced By

Abdominal muscle weakness; average daily activity is less than recommended for gender/age  
Postsurgical swelling [pain/discomfort in abdomen or perineal area]  
Decrease in gastrointestinal motility; eating habit change; insufficient fluid/fiber intake  
[Pharmacological—anesthesia; use of opiate analgesics]

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Bowel Elimination NOC

Display active bowel sounds and peristaltic activity.  
Establish/maintain usual pattern of elimination.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bowel Management NIC</b>	
<i>Independent</i>	
Ascertain client's usual (preoperative) elimination pattern.	Provides comparative baseline and can help identify needed interventions in current situation.
Auscultate bowel sounds. Note abdominal distention and presence of nausea or vomiting.	Indicators of presence or resolution of ileus, affecting choice of interventions.
Assist with/encourage early ambulation.	Walking helps stimulate intestinal function and return of peristalsis.
Evaluate medication regimen. Discuss with physician to address modifications, as indicated.	Helps identify drugs (including opiates) that cause or exacerbate constipation.
Evaluate daily fluid intake to note deficits. Encourage increased fluid intake, including fruit juices, when oral intake is resumed.	Promotes softer stool; may aid in stimulating peristalsis.
Provide sitz baths (when prescribed).	Promotes muscle relaxation and minimizes perineal discomfort.

(continues on page 670)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Restrict oral intake as indicated.	Prevents nausea and vomiting until peristalsis returns in 1 to 2 days. Note: Studies show that early feeding after abdominal hysterectomy (oral intake of fluids or food within 24 hr of surgery, irrespective of bowel sounds) is safe and associated with reduced length of hospital stay (Charoenkwan et al, 2007).
Maintain nasogastric (NG) tube, if present.	May be inserted in surgery to decompress stomach, manage nausea and vomiting.
Provide oral fluids and advance to solid foods (with inclusion of fiber) as tolerated.	When peristalsis begins, food and fluid intake promote resumption of normal bowel elimination.
Administer medications, such as stool softeners, mineral oil, and laxatives, as indicated.	Promotes formation and passage of softer stool.

### NURSING DIAGNOSIS: risk for ineffective Tissue Perfusion (specify)

#### Possibly Evidenced By

Insufficient knowledge of disease [and surgical] process  
[Intraoperative pressure on pelvic or calf vessels; pelvic congestion, postoperative tissue inflammation, venous stasis]  
Coagulopathies

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Tissue Perfusion: (Specify) NOC

Demonstrate adequate perfusion, as evidenced by stable vital signs, palpable pulses, good capillary refill, usual mentation, and individually adequate urinary output.  
Be free of edema and signs of thrombus formation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Postanesthesia Care NIC</b> <b>Independent</b> Monitor vital signs, palpate peripheral pulses and note capillary refill, assess urinary output and characteristics, and evaluate changes in mentation.	Indicators of adequacy of systemic perfusion, fluid or blood needs, and developing complications.
Inspect dressings and perineal pads, noting color, amount, and odor of drainage. Weigh pads and compare with dry weight if client is bleeding heavily.	Proximity of large blood vessels to operative site and/or potential for alteration of clotting mechanism (e.g., cancer) increases risk of postoperative hemorrhage.
Turn client and encourage frequent coughing and deep-breathing exercises.	Prevents stasis of secretions and respiratory complications.
Assist with and/or encourage use of incentive spirometer.	Promotes lung expansion and minimizes atelectasis.
<b>Embolus Prevention NIC</b> Avoid high Fowler's position and pressure under the knees or crossing of legs.	Creates vascular stasis by increasing pelvic congestion and pooling of blood in the extremities, potentiating risk of thrombus formation.
Instruct in/assist with and instruct in ankle and leg exercises and ambulate as soon as able.	Movement enhances circulation and prevents stasis complications.
Note erythema, swelling of extremity, or reports of pain in legs or sudden chest pain with dyspnea.	May be indicative of development of thrombophlebitis and pulmonary embolus.
<b>Collaborative</b> Apply sequential compression devices (SCDs): antiembolism stockings or pneumatic compression stocking and boots.	Aids in venous return; reduces stasis and risk of thrombosis.

### Postanesthesia Care NIC

Administer intravenous (IV) fluids and blood products, as indicated.

Replacement of blood losses maintains circulating volume and tissue perfusion.

**NURSING DIAGNOSIS:** **risk for Sexual Dysfunction****Possibly Evidenced By**

Alteration in body structure (e.g., shortening of vaginal canal)  
 Alteration in body function; decrease in sexual desire; alteration in sexual excitation/satisfaction  
 Change in self-interest [sense of femininity]

**Desired Outcomes/Evaluation Criteria—Client Will****Sexual Functioning NOC**

Verbalize understanding of changes in sexual anatomy or function.  
 Discuss concerns about body image, sex role, and desirability as a sexual partner with SO.  
 Identify satisfying and acceptable sexual practices and alternative ways of dealing with sexual expression.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Sexual Counseling NIC</b> <i>Independent</i> Be aware of client's type of surgery and reason for the procedure.	May help in anticipating concerns client may have and questions she may want to address at some point. Hysterectomy can diminish sexual function either directly because of the disconnection of the nerves and blood vessels that supply sexual energy or indirectly via the loss of critical hormones when or if the ovaries are removed or cease to function. Changes to bladder, bowel, and vagina position and function posthysterectomy can likewise affect sexual function and satisfaction.
Listen to comments of client and SO. Provide open environment for client to discuss concerns about sexuality.	Sexual concerns are often disguised as humor and/or offhand remarks. An open environment promotes sharing of beliefs or values about sensitive subject and identifies misconceptions or myths that may interfere with adjustment to situation.
Assess client's and SO's information regarding sexual anatomy, sexual expression and function, and effects of surgical procedure.	May have misinformation or misconceptions that can affect adjustment. Negative expectations are associated with poor overall outcome. Changes in hormone levels can affect libido and decrease suppleness of the vagina. Although a shortened vagina can eventually stretch, intercourse initially may be uncomfortable or painful.
Identify cultural or value factors and conflicts present.	May affect return to satisfying sexual relationship.
Assist client to be aware of and deal with stage of grieving.	Acknowledging normal process of grieving for actual or perceived changes may enhance coping and facilitate resolution.
Encourage client to share thoughts or concerns with partner.	Open communication can identify areas of agreement and problems and promote discussion and resolution.
Problem-solve solutions to potential problems, such as postponing sexual intercourse when fatigued, substituting alternative means of expression, using positions that avoid pressure on abdominal incision, and using vaginal lubricant or vaginal estrogen product.	Helps client understand that return to desired and satisfying sexual activity can be possible. It may be of help to the client/partner to learn that there is abundant evidence in the medical literature supporting favorable sexual outcomes from hysterectomy given time for recovery. Note: Some studies have shown that many women experience improvement in their sex lives after hysterectomy (e.g., increased sexual activity, increased frequency and intensity of orgasm, reduced abdominal pain, reduced pain with intercourse) (Bradford & Meston, 2007; Flory et al, 2006; Landa, 2013).

(continues on page 672)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss expected physical sensations or discomforts and changes in response, as appropriate to the individual.	Vaginal pain may be significant following vaginal procedure, or sensory loss may occur because of surgical trauma. Research data show a trend toward more problems with lubrication, arousal, and altered genital sensation after total hysterectomy as compared to vaginal hysterectomy. Altered hormone levels and loss of sensation of rhythmic contractions of the uterus during orgasm can impair sexual satisfaction for some women (ACOG, 2015). Note: Many women experience few negative effects because fear of pregnancy is gone, and relief from symptoms often improves sexual pleasure.

**Collaborative**

Refer to counselor or sex therapist as needed.

May need additional assistance to promote a satisfactory outcome.

## NURSING DIAGNOSIS: Grieving

### May Be Related To

Loss of significant object (e.g., parts and processes of body/perceived sexual role or identity)

### Possibly Evidenced By

Alteration in activity level, sleep pattern; detachment; disorganization

Finding meaning in a loss

Guilt about feeling relieved

### Desired Outcomes/Evaluation Criteria—Client Will

#### Grief Resolution NOC

Acknowledge impact or effect of the grieving process; verbalize reality of perceived loss.

Report sense of acceptance and hope for future.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Grief Work Facilitation NIC</b> <i>Independent</i> Provide open environment in which client feels free to discuss realistic feelings and concerns without confrontation.	Therapeutic communication skills, such as active listening, silence, being available, and acceptance, provide opportunity and encouragement for the client to talk freely and deal with the perceived loss. Provides opportunity for reflection aiding resolution and acceptance.
Discuss client's perceptions of self, related to anticipated changes and her specific lifestyle.	Research supports the idea that hysterectomy is physiologically and psychologically stressful for a woman, even when she desires the procedure. The prospect of hysterectomy is said to engender more stress than other comparable surgeries. Cultural beliefs may result in delaying needed surgery, increasing risk of complications and negatively impacting recovery (Armeli, 2015). Although preoperative instruction and interaction are often performed at the community level, the postoperative care providers can convey interest and concern and make opportunities for support, teaching, and correction of misconceptions, such as loss of femininity and sexuality, weight gain, and menopausal body changes.
Determine client's perception and meaning of current and past losses. Note cultural factors and expectations.	Affects client's response and needs to be acknowledged in planning care. Perceptions and way of expressing self may be result of cultural expectations.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess emotional stress client is experiencing.	Being aware of what this operation means to client helps avoid inadvertent casualness or excessive concern by care providers. Note: Women who have hysterectomies are at risk for some degree of depression, associated with abrupt hormonal changes and grieving the loss of body part and function. But in women in young childbearing years, depression can also be associated with the fact of never being able to bear children (or be pregnant again), as well as the premature onset of menopause.
Encourage client to vent feelings appropriately, identifying meaning of loss.	Depending on the reason for the surgery (e.g., cancer or long-term, heavy bleeding), the client may be frightened or relieved. She may mourn the loss of ability to fulfill her reproductive role whether or not she has borne children. She may also worry about her wholeness as a woman or have heard stories about problems others have had with the procedure.
Assist family/SO to cope with client's responses.	Family may not share client's perspective and be intolerant, not recognizing needs of client.
Identify and problem-solve solutions to existing physical responses—eating, sleeping, activity levels, and sexual desire.	May need additional assistance to deal with the physical aspects of the potential for grieving.
Note withdrawn behavior, negative self-talk, and overconcern with actual or perceived changes.	May indicate difficulty in working through the grief process and need for additional interventions or support.
Discuss healthy ways of dealing with difficult situation.	Provides opportunity to look toward the future and incorporate perceived loss into lifestyle.
<b>Collaborative</b> Refer to other resources for counseling, spiritual or pastoral care, and psychotherapy, as indicated.	May need additional help to prevent development of dysfunctional grieving and help client move toward a positive future.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

**May Be Related To**

Insufficient information; insufficient knowledge of resources  
Misinformation presented by others

**Possibly Evidenced By**

Insufficient knowledge  
Inaccurate follow-through of instructions; development of preventable complication

**Desired Outcomes/Evaluation Criteria—Client Will**

**Knowledge: Disease Process NOC**

Verbalize understanding of condition and potential complications.  
Identify relationship of signs and symptoms related to surgical procedure and actions to deal with them.

**Knowledge: Treatment Regimen NOC**

Verbalize understanding of therapeutic needs.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Review effects of surgical procedure and future expectations; for example, the client needs to know that she will no longer menstruate or bear children, whether surgical menopause will occur, and whether hormonal replacement will be necessary.	Provides knowledge base from which client can make informed choices.

(continues on page 674)

**ACTIONS/INTERVENTIONS (continued)**

Discuss complexity of problems anticipated during recovery, including emotional lability and expectation of feelings of depression or sadness, excessive fatigue, sleep disturbances, and urinary problems.

Discuss resumption of activity. Encourage light activities initially, with frequent rest periods, increasing activities and exercise as tolerated. Emphasize importance of individual response in recuperation.

Identify individual restrictions, such as avoiding heavy lifting and strenuous activities (such as vacuuming, straining at stool) and prolonged sitting or driving. Avoid tub baths and douching until physician authorizes.

Encourage client to report bowel dysfunction—constipation, loss of urge to defecate, severe straining, incomplete evacuation, and digital evacuation—to healthcare providers if it occurs.

Discuss dietary modifications, medicinal bulk agents, and stimulation by suppository, as indicated.

Review recommendations of resumption of sexual intercourse. (Refer to ND: risk for Sexual Dysfunction.)

Identify dietary needs, such as high-quality protein, complex carbohydrates, and additional iron. Provide information about foods to include and avoid in managing menopausal symptoms.

Review hormone replacement therapy (HRT) and route (oral, injection, patch) when used. Clarify distinction between long-term HRT use for preventive therapy and short-term use for symptom relief.

Encourage taking prescribed drug(s) routinely, for example, with meals or at bedtime. Determine when patch should be changed, wearing time altered.

Discuss potential side effects, such as weight gain, increased skin pigmentation or acne, breast tenderness, headaches, and photosensitivity.

Recommend cessation of smoking, especially when receiving estrogen therapy.

**RATIONALE (continued)**

Physical, emotional, and social factors can have a cumulative effect, which may delay recovery, especially if hysterectomy was performed because of cancer. Providing an opportunity for problem-solving may facilitate the process. Client and SO may benefit from the knowledge that a period of emotional lability is normal and expected during recovery.

Client can expect to feel fatigued when she goes home and needs to plan a gradual resumption of activities, with return to work an individual matter. Prevents excessive fatigue; conserves energy for healing and tissue regeneration.

Strenuous activity intensifies fatigue and may delay healing. Activities that increase intra-abdominal pressure can strain surgical repairs, and prolonged sitting potentiates risk of thrombus formation. Showers are permitted, but tub baths and douching may cause vaginal or incisional infections and are a safety hazard.

Constipation is a frequent symptom after hysterectomy and may be related to undiagnosed irritable bowel syndrome, which is often present preoperatively and/or associated with the particular procedure performed—vaginal hysterectomy with posterior repair.

Postsurgical bowel dysfunction may be short term or long term and may require simple home management measures or referral for medical intervention.

When sexual activity is cleared by the physician, it is best to resume activity easily and gently, expressing sexual feelings in other ways or using alternative coital positions.

Facilitates healing and tissue regeneration, helps correct anemia when present. Note: Certain vegetables, such as broccoli, cabbage, cauliflower, brussels sprouts, and turnips, may have protective action against excessive estrogen effects. Some foods and substances to avoid or limit include rich dairy products, sugar, fried foods, caffeine, alcohol, and nicotine.

Total hysterectomy with bilateral salpingo-oophorectomy results in surgically induced menopause requiring replacement hormones. Benefits of HRT, particularly estrogen, include protection against osteoporosis and the amelioration of certain postmenopausal discomforts such as sleep disturbance, hot flashes, mood disorders, problems with memory and concentration, reduced libido, and urinary symptoms. Note: Discussion of client's particular needs and concerns may be helpful if she has not decided about HRT. As the risks of estrogen therapy have been headlined in recent years, the pros and cons of HRT may be more difficult to decipher (Todd, 2016).

Establishes routine for taking drug and reduces potential for discontinuing drug because of nausea that is often an early side effect.

Development of some side effects is expected but may require problem-solving for the client to continue the hormones, such as change in dosage, change of delivery method, and use of analgesics, sunscreen, and sunglasses.

Some studies suggest an increased risk of thrombophlebitis, myocardial infarction (MI), stroke, and pulmonary emboli associated with smoking and concurrent estrogen therapy.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Inquire if client is taking or planning to take vitamins and/or herbal supplements for menopause, such as vitamin C with bioflavonoids, calcium, magnesium, selenium, evening primrose oil, black cohosh, angelica, and wild yam.	Client may express desire to use "natural hormones" and feel confused over choices. These substances are numerous and available and have been the object of media attention. They should be reviewed in terms of expected action, potential interaction, or adverse effects, depending on client's particular situation and reason for the hysterectomy.
Review incisional care, when appropriate.	Facilitates competent self-care, promoting independence.
Emphasize importance of follow-up care.	Provides opportunity to ask questions, clear up misunderstandings, and detect developing complications. Note: Client needs to discuss with the physician her particular requirements for follow-up pelvic exams with Pap smear once surgical healing has occurred. The need and rationale for these exams depend upon the client's reason for hysterectomy—benign fibroids versus cervical neoplasm.
Identify signs and symptoms requiring medical evaluation, such as fever or chills, change in character of vaginal or wound drainage, and bright red bleeding.	Early recognition and treatment of developing complications, such as infection or hemorrhage, may prevent life-threatening situations.
Identify support group and appropriate websites, as indicated.	May desire additional information or opportunity to discuss feelings or concerns with women with similar experiences.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition, and presence of complications, personal resources, and life responsibilities)

**In addition to surgical and cancer concerns (if appropriate):**

- **risk for Sexual Dysfunction**—altered body structure and function, changes in hormone levels, decreased libido, possible change in sexual response pattern, vaginal discomfort or pain (dyspareunia)
- **risk for situational low Self-Esteem**—alteration in body image; loss (e.g., perceived changes in femininity, effect on sexual relationship, inability to have children); functional impairment (e.g., changes in sexual response pattern, decreased libido)

## MASTECTOMY

### I. Purpose

- a. Removal of breast tissue due to presence of malignant or cancerous tumor changes
- b. Surgical procedures: dependent on tumor type, size, and location as well as clinical characteristics or staging
  - i. Breast-conserving therapy (may also be called lumpectomy or partial or segmental mastectomy): treatment option for some women with small, localized breast cancers. Some lymph nodes may be removed for sampling. Radiation may follow lumpectomy. Note: Studies have shown that women who undergo breast-conserving surgery followed by radiation have similar overall survival rates as those who undergo mastectomy (Breastcancer.org Staff, 2015; Hughes, 2004; Sabel, 2017).
  - ii. Mastectomy (Martin, 2017; Mayo Clinic Staff, 2016)
    1. Simple: removes the breast tissue, nipple, areola, and skin but not all the lymph nodes
    2. Modified radical: removes the entire breast—including the breast tissue, skin, areola, and nipple—and most of the axillary lymph nodes

3. Radical: removes all breast tissue along with the nipple, axillary lymph nodes, and chest wall muscles under the breast. Note: This procedure is rarely performed today, because modified radical mastectomy has proved to be equally as effective and less disfiguring.

4. Skin-sparing mastectomy: surgical technique in which the majority of the natural breast skin envelope is not surgically removed. This procedure may be an option for the surgical management of noninvasive breast cancer (or early stage cancers in some cases). If mastectomy is being performed for preventive purposes, a skin-sparing or nipple-sparing mastectomy can provide the best cosmetic result (Kwang & Sabel, 2017).

**II. Pathology**—Tumor growth originates in cells of the breast tissue occurring primarily in women, although men may also be affected.

- a. Types: Breast cancers are either **noninvasive** (in situ) remaining in original location or **invasive** (metastasized from original location). Invasive cancers are further classified into subtypes.

(continues on page 676)

- i. Ductal
  - 1. Occurs in the ducts that connect the lobes and the nipple
  - 2. May be *in situ* or invasive
  - 3. Invasive ductal carcinoma (IDC) represents 70% to 80% of all breast cancers (Cancer Treatment Centers of America [CTCA], 2017; Carlson et al, 2013).
- ii. Lobular
  - 1. Occurs in the lobes where milk is produced
  - 2. May be *in situ* or invasive
  - 3. Occurs in 7% to 10% of women (CTCA, 2017; Carlson et al, 2013)
- b. Subtype (rare) cancers include inflammatory breast cancer (IBC), HER2-receptor positive breast cancer, endocrine-sensitive breast cancer, male breast cancer, papillary carcinoma, and Paget's disease (CTCA, 2017).
- c. Clinical staging categories (American Cancer Society [ACS], 2017a)
  - i. Classification: noninvasive, invasive (infiltrating)
  - ii. T refers to the size and spread of tumor into nearby areas (e.g., skin or chest wall under breast).
  - iii. N refers to spread of cancer in lymph nodes and how many nodes are involved.
  - iv. M refers to metastasis to other parts of body (e.g., lungs or bones).

- v. Grade measured from 0 (carcinoma *in situ*), then I (1) to IV (4)
  - vi. Some stages further divided by letters of the alphabet (A, B, C, etc.)
- III. Statistics** (ACS, 2017a; 2017b; National Cancer Institute [NCI], Surveillance, Epidemiology, and End Results [SEER], 2017)
- a. Morbidity: In 2014, approximately 3,327,552 American women were living with breast cancer; an estimated 252,710 new cases of breast cancer were diagnosed in women in 2017 and 2470 in men (ACS, 2017b).
  - b. Mortality: In 2017, breast cancer was the second leading cause of death in women in the United States; an estimated 40,610 or 6.8% of all cancer deaths in women and about 460 men died of breast cancer in 2017 (ACS, 2017b).
  - c. Cost: The National Cancer Institute (NCI) projection for breast cancer care in 2016 was \$18.9 billion (NCI, 2017). A retrospective (2010 data) analysis of 8360 women reported that average costs *per patient* in the year after diagnosis were \$60,637 (stage 0), \$82,121 (stages I and II), \$129,387 (stage III), and \$134,682 (stage IV). Treatment costs were higher for patients whose cancer was more advanced at diagnosis, and the cost difference was largely driven by the cost of chemotherapy and noncancer treatments (Blumen et al, 2016).

## G L O S S A R Y

**Adenocarcinoma:** A carcinoma that originates in glandular tissue, or tissue responsible for the production and secretion of a substance. Breast ducts and lobules are examples of glandular tissues where adenocarcinomas may sometimes develop.

**Aromatase inhibitors (AIs):** Newer drugs sometimes used in women who have already gone through menopause to treat breast cancer or reduce cancer recurrence after surgery. Instead of blocking estrogen receptors, they stop a key enzyme (called aromatase) from changing other hormones into estrogen, taking away the fuel that estrogen receptor-positive breast cancers need to grow.

**Breast-conserving therapy:** Treatment of choice for most women with stage I or stage II breast cancer and usually followed with radiation therapy.

**Carcinoma:** Cancer that originates in epithelial tissue cells, which are present both in the skin (epidermis) and in the lining of internal organs. The most common type of cancer.

**Grade:** Determined by cellular differentiation; the lower the grade, the more it resembles normal breast tissue and the least likely it is to spread.

**Invasive breast cancer:** Breast cancer that extends into the surrounding breast tissue and may metastasize.

**In situ (noninvasive) breast cancer:** Breast cancer that is contained within a structure of the breast, such as a duct or lobe.

**Lumpectomy:** Removes only the breast lump and a rim of normal surrounding breast tissue.

**Lymph node surgery:** Removal of lymph node(s) to determine if breast cancer has spread to the lymph ducts or lymph nodes in the axilla. In tumors 2 cm or smaller in size, a *sentinel* procedure may be performed to remove only the node(s) deemed most likely to contain cancerous cells. In larger tumors, or if sentinel biopsy is positive, a traditional axillary lymph node dissection is performed.

**Metastasis:** Cancer that has spread to other parts of the body.

**Modified radical mastectomy:** Removal of entire breast and some axillary (underarm) lymph nodes.

**Partial or segmental mastectomy:** Removes more breast tissue than a lumpectomy—up to one-quarter of the breast—which is then called a quadrantectomy.

**Radical mastectomy:** All the muscle under the breast is removed; however, it is rarely used today because it is no more effective than the more limited forms of mastectomy.

**Simple or total mastectomy:** Entire breast is removed, but no lymph nodes from under the arm or muscle tissue from beneath the breast are removed.

**Skin-sparing mastectomy:** Removal of the entire breast, nipple, and areola, without removal of the breast skin for immediate or delayed breast reconstruction.

**Staging:** Method to classify progression of cancer in order to select treatment options and predict a prognosis.

## CARE SETTING

Client is treated at inpatient acute surgical unit (typically short stay).

## RELATED CONCERNs

Cancer, general considerations, page 945

Psychosocial aspects of care, page 835

Surgical intervention, page 873

**CLIENT ASSESSMENT DATABASE****DIAGNOSTIC DIVISION  
MAY REPORT****MAY EXHIBIT****CIRCULATION**

- Unilateral engorgement in affected arm as a result of lymph node involvement

**EGO INTEGRITY**

- Constant stressors in work or home life
- Stress and fear involving diagnosis, prognosis, and future expectations

**FOOD/FLUID**

- Loss of appetite, recent weight loss

**PAIN/DISCOMFORT**

- Pain may be reported in advanced metastatic disease but rarely occurs in early malignancy
- Discomfort or “funny feeling” in breast tissue occurs in some clients

**SAFETY**

- Nodular axillary masses
- Edema, erythema of involved skin

**SEXUALITY**

- Changes in breast symmetry or size, pitting or dimpling of breast skin, color changes such as erythema or temperature, unusual nipple discharge, itching, burning, retracted nipple
- Concerns about sexuality and intimacy
- History of early menarche younger than age 12, late menopause after age 50, late first pregnancy, such as after age 30

- Change in breast contour or symmetry
- Retraction of nipple, discharge from nipple

**TEACHING/LEARNING**

- Family history of genetically transmitted breast cancer. *Note:* Together, *BRCA1* and *BRCA2* mutations account for about 20% to 25% of hereditary breast cancers and about 5% to 10% of all breast cancers (ACS, 2017c; Campeau et al, 2008).
- Previous unilateral breast cancer, endometrial cancer, or ovarian cancer
- History of prolonged hormone replacement therapy, radiation, or multiple breast biopsies or procedures

**DISCHARGE PLAN CONSIDERATIONS**

- May need assistance with treatments and rehabilitation, decisions, self-care activities, and homemaker or maintenance tasks

► Refer to section at end of plan for postdischarge considerations.

## DIAGNOSTIC STUDIES

TEST WHY IT IS DONE	WHAT IT TELLS ME
<ul style="list-style-type: none"> <li>• <b>Mammography:</b> Uses x-ray to visualize internal structure of the breast.</li> </ul>	Screening imaging test capable of detecting nonpalpable cancers, macrocalcifications, or tumors in early stages of development. <i>Note:</i> Diagnostic mammography allows a possible abnormality on screening images to be examined more closely.
<ul style="list-style-type: none"> <li>• <b>Diagnostic mammography:</b> A type of mammography in which more x-ray pictures of the breast are taken from different angles.</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Digital mammography:</b> Creates computer images, rather than images on film, which can be manipulated and transmitted for further review.</li> </ul>	Complements findings of mammograms. Distinguishes fluid-filled cysts from solid tumors. <i>Note:</i> Has been found to be more effective than regular mammography for women under 50, with dense breasts, or premenopausal or in early menopause.
<ul style="list-style-type: none"> <li>• <b>Ultrasound:</b> Uses sound waves to produce images for both screening and diagnostic staging.</li> </ul>	Noninvasive imaging test that may be done after mammogram has identified an area of concern to determine if a lump is solid or is filled with fluid (a cyst).
<ul style="list-style-type: none"> <li>• <b>Magnetic resonance imaging (MRI):</b> Creates images that capture multiple cross-sectional pictures using a computer to generate detailed two- and three-dimensional images.</li> </ul>	Performed when more information is needed than a mammogram, ultrasound, or clinical breast exam can provide. Ductal cancer in situ is usually better detected with an MRI than with a mammography.
<ul style="list-style-type: none"> <li>• <b>Biopsies:</b> Removal of a sample of suspicious tissue for examination by a pathologist.</li> </ul>	Biopsy determines whether a mass is benign or malignant.
<ul style="list-style-type: none"> <li>• <b>Fine-needle aspiration biopsy:</b> A fine, hollow needle is inserted into a lump or lesion and cells are withdrawn for evaluation.</li> </ul>	This is usually performed when a fluid-filled mass is detected.
<ul style="list-style-type: none"> <li>• <b>Core-needle biopsy:</b> A hollow needle is used to take several rice- or grain-sized cores of tissue.</li> </ul>	With this type of biopsy, breast tissue can be evaluated.
<ul style="list-style-type: none"> <li>• <b>Ultrasound-guided core-needle biopsy:</b> Core-needle biopsy that uses ultrasound to produce precise images of structures within the body.</li> </ul>	May be used in place of fine-needle biopsy or surgical biopsy to verify diagnosis.
<ul style="list-style-type: none"> <li>• <b>Stereotactic biopsy:</b> A special mammography machine uses x-rays to guide biopsy equipment to the site of the imaging abnormality. A core needle is then used to obtain a large tissue sample, or a vacuum-assisted device (VAD) is used to collect multiple tissue samples during one needle insertion.</li> </ul>	A lump or calcifications deep inside the breast (as seen on mammography or ultrasound), or an abnormality too small to feel, can be biopsied using this technique.
<ul style="list-style-type: none"> <li>• <b>Surgical biopsy:</b> All or part of the suspicious tissues may be removed by surgery for cytological examination.</li> </ul>	Total removal of the tissue is called an excisional biopsy, whereas partial removal is called an incisional biopsy.
<ul style="list-style-type: none"> <li>• <b>Sentinel node biopsy:</b> Surgeon removes only one axillary lymph node (or a cluster of two or three) nearest the breast to determine presence of cancerous cells.</li> </ul>	The lymph ducts of the breast drain to one (sentinel) lymph node (or a cluster of two or three nodes) filtering fluid draining away from the breast. If cancer cells are traveling in the lymph system, the sentinel node is more likely than the others to contain them. If the first node is benign, it is likely that all other nodes are the same, thereby limiting the need to remove additional nodes and reducing the potential for lymphedema (Mayo Clinic Staff, 2017).
<ul style="list-style-type: none"> <li>• <b>Gene assays</b></li> </ul>	Genetic research is revealing that genes (in addition to <i>BRCA1</i> and <i>BRCA2</i> ) have some association with breast cancers (not listed here). For example, the Food and Drug Administration (FDA) has recently approved a diagnostic test that detects mutations in 324 genes and two genomic signatures in many solid tumor types, including breast cancer and ovarian cancer (CTCA, n.d.; Wagnine, 2017).
<ul style="list-style-type: none"> <li>• <b>Human epidermal growth factor receptor 2 (HER2) tumor test:</b> A growth-promoting protein.</li> </ul>	Cancer cells with too many copies of this gene tend to grow and spread more aggressively than do other breast cancers. Approximately 20% of women with breast cancer have HER2-positive tumors (Blahd, 2016).

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li>• <b>BRCA1 and BRCA2:</b> Normal genes that are associated with familial breast cancer when inherited in mutated state.</li> </ul>	<p>These tests may be performed on young women with more than one family member who has developed breast cancer at an early age. According to recent estimates, 55% to 65% of women who inherit a harmful <i>BRCA1</i> mutation and around 45% of women who inherit a harmful <i>BRCA2</i> mutation will develop breast cancer by age 70 years (Chen &amp; Parmigiani, 2007; NCI, 2015). Note: <i>BRCA2</i> (and, to a lesser extent, <i>BRCA1</i>) is also associated with male breast cancer (NCI, 2015).</p>

## NURSING PRIORITIES

1. Assist client and significant other (SO) in dealing with stress of situation and prognosis.
2. Prevent complications.
3. Establish individualized rehabilitation program.
4. Provide information about disease process, procedure, prognosis, and treatment needs.

## DISCHARGE GOALS

1. Situation being dealt with realistically.
2. Complications prevented or minimized.
3. Exercise regimen implemented.
4. Disease process, surgical procedure, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

## PREOPERATIVE AND POSTOPERATIVE

### NURSING DIAGNOSIS: Anxiety [specify level]

#### May Be Related To

Situational crisis; threat to current status  
Major change (e.g., change in self-concept/body image; scarring/loss of body part, change in sexual attractiveness)  
Threat of death (e.g., extent of disease, uncertainty of prognosis)

#### Possibly Evidenced By

Behavioral—worried about change in life event, restlessness  
Affective—apprehensiveness; helplessness, feeling of inadequacy; fear; self-focused  
Physiological—increase in tension  
Sympathetic—changes in vital signs

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Anxiety Level NOC

Demonstrate appropriate range of feelings regarding possibility of death or increasing hope related to prognosis.  
Acknowledge acceptance of health status.

##### Anxiety Self-Control NOC

Communicate thoughts and feelings utilizing available support systems such as family, spiritual leaders, and other resources.

Demonstrate coping behaviors that reduce anxiety.

## ACTIONS/INTERVENTIONS

## RATIONALE

### Anxiety Reduction NIC

#### Independent

Ascertain what information client has about diagnosis, expected surgical intervention, and future therapies. Note presence of denial or extreme anxiety.

Provides knowledge base for the nurse to enable reinforcement of needed information, helps identify client with high anxiety or a low capacity for information processing and need for special attention. Note: Denial may be useful as a coping method initially; however, extreme anxiety needs to be dealt with immediately.

Explain purpose and preparation for diagnostic tests or procedures. Ascertain what client understands about diagnostics that have already been performed.

Promotes clear understanding of procedures and what is happening, increases feelings of control, and lessens anxiety and fear of the unknown.

(continues on page 680)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide an atmosphere of concern and anticipatory guidance and privacy for client and family.	Facilitates therapeutic communication and expression of underlying unresolved issues. Privacy is needed to encourage open discussion related to feelings of anticipated loss and other concerns.
Active-listen. Encourage questions and provide time for expression of fears.	Provides opportunity to identify concerns, clarify misconceptions, and offer emotional support.
Offer relaxation techniques such as back massage, guided imagery, and use of touch, if culturally acceptable.	May help in reducing anxiety and fear.
Explore previously used effective coping mechanisms as perceived by the client.	Reinforces effective coping mechanisms can be used for coping in a new situation.
Explore spiritual support as a resource.	Provides calmness and peace in times of uncertainty.
Discuss role of rehabilitation after surgery and use of community resources.	Promotes support systems in place in the rehabilitation process as an essential component of therapy intended to meet physical, social, emotional, and vocational needs so that client can achieve the best possible level of physical and emotional functioning.

### \*\*\*POSTOPERATIVE

#### NURSING DIAGNOSIS: **impaired Tissue Integrity**

##### May Be Related To

Surgical procedure (e.g., surgical removal of skin and tissue; interruption of lymphatics)  
Impaired circulation, alteration in sensation

Excessive fluid volume (edema, changes in skin elasticity)  
Chemical irritants (e.g., drainage)

##### Possibly Evidenced By

Damaged/destroyed tissues; acute pain

##### Desired Outcomes/Evaluation Criteria—Client Will

##### Wound Healing: Primary Intention NOC

Achieve timely wound healing free of purulent drainage or erythema.

##### Knowledge: Treatment Procedures NOC

Verbalize understanding of treatment plan to promote wound healing.

Demonstrate wound care techniques that facilitate increased tissue granulation at incision site.

Demonstrate behaviors that prevent complications.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Incision Site Care NIC</b>	
<i>Independent</i>	
Assess dressings and note amount and characteristics of drainage (if any).	Use of dressings depends on the extent of surgery and the type of wound closure. Pressure dressings are usually applied initially and are reinforced, not changed. Drainage occurs because of the trauma of the procedure and manipulation of the numerous blood vessels and lymphatics in the area. Normally, surgically inserted drains should allow dressings to be dry.
Provide drain care, instructing client/family in the process, as indicated.	The Jackson-Pratt (JP) drain is most commonly used for mastectomies to maintain negative pressure in the wound and is easily managed. Simple mastectomies use one drain, whereas more complex procedures, such as those involving removal of lymph nodes, may require several drains. Drains are usually removed around the third day or when drainage ceases, possibly after client is discharged.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor temperature.	Early recognition of developing infection enables rapid institution of treatment.
Maintain elevated head of bed position when client is supine or on unaffected side in immediate postoperative period.	Assists with drainage of accumulated fluids through use of gravity.
Evaluate operative side arm for edema. Note client reports of discomfort (e.g., aching, feelings of heaviness or tightness).	A small amount of swelling in the arm is normal for the first 4 to 6 weeks after breast cancer surgery. However, lymphedema can occur, especially in client who, after undergoing axillary lymphadenectomy, receives radiation therapy. Note: Within this population, 10% to 40% develop some degree of upper extremity lymphedema within the first 3 years after mastectomy (Rossy & Scheinfeld, 2017; Smith & McCaulley, 2014).
Elevate hand/arm on pillows while reclining early in postoperative period. Avoid letting arm hang down or resting on hard surface for long period.	These measures can decrease congestion in arm by directing lymph into the circulatory and lymphatic system.
Avoid measuring blood pressure (BP), injecting medications, or blood draws or inserting intravenous (IV) lines in affected arm, where possible.	Increases potential of constriction, infection, and lymphedema on affected side.
Encourage wearing of nonconstrictive clothing. Advise client to avoid wearing wristwatch or other tight jewelry on affected arm/hand.	Avoiding constriction can minimize formation of lymphedema and reduce risk of skin/tissue damage.
<b>Collaborative</b>	
Maintain integrity of elastic bandages or custom-fitted, pressure-gradient elastic sleeve, as prescribed.	Gentle continuous compression promotes venous return and decreases risk or effects of edema formation.
Refer to physical and occupational therapist and lymphedema clinic or specialist.	Various therapies may be needed over time (e.g., complete decongestive therapy, manual lymph drainage measures, compression bandaging and garments, exercise and skin care, and education for self-care) (Stout-Gergich et al, 2008).

## NURSING DIAGNOSIS: acute Pain

### May Be Related To

Physical injury agents (e.g., surgical procedure; tissue trauma, interruption of nerves, dissection of muscles)

### Possibly Evidenced By

Self-report of intensity and characteristics of pain using standardized rating scale  
Guarding and protective behaviors  
Self-focused

### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Level NOC

Express reduction in pain or discomfort.  
Appear relaxed and able to sleep or rest appropriately.

#### Pain Control NOC

Identify factors that aggravate or relieve pain.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<b>Independent</b>	
Assess reports of pain and sensory alterations, noting location, duration, and intensity (0 to 10 [or similar] scale). Note reports of stiffness, swelling, and numbness or burning in chest, shoulder, and affected arm. Identify verbal and nonverbal cues.	Examines the degree of discomfort and verifies the need for analgesia and evaluates its effectiveness. The amount of tissue, muscle, and lymphatic system removed can affect the amount of pain experienced. The need to elevate arm, the size of dressings, and the presence of drains all affect client's ability to relax and rest or sleep effectively.

(continues on page 682)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Explain the causes of pain to the client.	Provides understanding of sensory alterations. Destruction of nerves in axillary region causes numbness in upper arm and scapular region, which may be more intolerable than surgical pain. Pain in chest wall can occur from muscle tension, be affected by extremes in heat and cold, and continue for several months.
Acknowledge the presence of phantom breast sensations.	Provides reassurance that sensations are not imaginary and that relief can be obtained.
Provide basic comfort and diversional activities. Encourage early ambulation and use of relaxation techniques, guided imagery, and Therapeutic Touch.	Promotes relaxation, refocuses attention away from the discomfort, and may enhance coping abilities.
Provide opportunities for uninterrupted sleep.	Relieves fatigue, increasing coping ability.
Splint or support chest during coughing and deep-breathing exercises.	Facilitates participation in activity without undue discomfort.
Provide appropriate pain medication on a regular schedule before pain is severe and before activities are scheduled.	Maintains comfort level and permits client to exercise arm and to ambulate without pain hindering efforts.
Provide accurate information related to patient-controlled analgesia (PCA) or opioids to reduce fear of addiction.	Reduces fear, augmenting appropriate pain relief, to enhance mobility and coping abilities.
Discuss previous successful methods of coping with pain.	Provides pain-relieving methods to employ based on past experiences.

**Collaborative**

Administer PCA (patient-controlled analgesia), opioids, or nonopioids, as indicated.

Provides relief from discomfort or pain and facilitates rest and participation in postoperative therapy.

### NURSING DIAGNOSIS: risk for situational low Self-Esteem

#### Possibly Evidenced By

Physical illness

Alteration in body image (e.g., surgical change in structure or body contour)

Behavior inconsistent with values; unrealistic self-expectations

[Fear of rejection or reaction by others]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Self-Esteem NOC

Distinguish between self-perceptions and societal stigmas.

Identify strategies to cope with self-acceptance in present situation.

Verbalize progress toward acceptance of self.

Participate in setting realistic goals involving the postoperative therapy program.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Esteem Enhancement NIC</b>	
<b>Independent</b>	
Provide active listening when surgical dressings are removed.	Provides emotional support and client safety.
Assess for grief, depression, and ineffective coping.	Common reactions that need to be recognized immediately for timely intervention, as indicated. Grief may resurface when subsequent procedures are done, such as fitting for prosthesis or reconstructive procedure if postponed.
Validate client's feelings and address any misinformation that is revealed.	Encourages client to express feelings and provides opportunity to give or reinforce information.
Encourage questions about current situation and future expectations.	Loss of the breast causes many reactions, including feeling disfigured, fear of viewing scar, and fear of partner's reaction to change in body. Loss of body part, disfigurement, and perceived loss of sexual desirability engender grieving process that needs to be supported and dealt with so that client can make plans for the future.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Identify role concerns as woman, wife, mother, career woman, and so forth.	Explores possible alteration in client's self-perception.
Provide positive reinforcement for gains and improvement and participation in self-care and treatment program.	Encourages continuation of healthy behaviors.
Review possibilities for reconstructive surgery and/or prosthetic augmentation.	If feasible, reconstruction may be performed to provide a less disfiguring or "near-normal" cosmetic result. Variations in skin flap may be done for facilitation of reconstructive procedure, which may be performed at the same time as mastectomy. The associated emotional boost may help the client through the more complex surgical recovery process and adjunctive therapies. Note: Several studies have shown an increase in breast reconstruction for mastectomy. From 2009 to 2014, the rate of breast reconstruction for mastectomy increased by 62%. Increases occurred for all age groups but disproportionately so for women aged 65 years and older (Miller et al, 2017).
Identify concerns of client and SO regarding sexual dysfunction in order to provide acceptable practices for self and SO. Encourage communication of needs and fears of both partners.	Negative responses actually reflect SO's concern about hurting client, fear of cancer or death, or inability to look at operative area.
Discuss and identify support groups, as appropriate.	Provides a place to exchange concerns and feelings with others who have had a similar experience and identifies ways SO can facilitate client's recovery.

**Collaborative**

Provide temporary soft prosthesis, if indicated.	Prosthesis of nylon and Dacron fluff may be worn in bra indefinitely or until incision heals if reconstructive surgery is not performed at the time of mastectomy. This may promote social acceptance and allow client to feel more comfortable about body image at the time of discharge.
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**NURSING DIAGNOSIS:** **risk for impaired physical Mobility****Possibly Evidenced By**

Decrease in range of shoulder motion; decrease in gross motor skills  
Pain, discomfort  
Decrease in muscle mass/strength; joint stiffness; postural instability

**Desired Outcomes/Evaluation Criteria—Client Will****Motivation NOC**

Display willingness to participate in therapy.  
Demonstrate techniques that enable resumption of activities.

**Coordinated Movement NOC**

Demonstrate increased muscle strength of affected body parts.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Exercise Therapy: Muscle Control NIC</b>	
<b>Independent</b>	
Note factors affecting current situation (e.g., extent of surgery, preexisting medical condition, severity of breast cancer, age of client).	Identifies potential impairments and determines types of interventions to provide for client's safety.
Evaluate client reports of various discomforts and note presence/degree of functional issues.	The most common symptoms after the mastectomy are muscle aches, swelling, limited range of motion in the upper extremity.

(continues on page 684)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Perform passive ROM, such as flexion and extension of elbow, pronation and supination of wrist, and clenching and extending fingers, as soon as possible.	Early postoperative exercises are usually started in the first 24 hours to prevent joint stiffness that can further limit movement and mobility.
Advance exercise, as indicated, for example, active extension of arm and rotation of shoulder while lying in bed, pendulum swings, rope turning, and elevating arms to touch fingertips behind head.	Helps prevent shoulder joint stiffness and maintains muscle tone of the shoulders and arm.
Progress to hand climbing or walking fingers up wall, clasping hands behind head, and full abduction exercises as soon as client can manage.	Because this group of exercises can cause excessive tension on the incision, they are usually delayed until healing process is well established.
Encourage client to use affected arm for personal hygiene: feeding, combing hair, and washing face.	Increases circulation, minimizes edema, and maintains strength and function of the arm and hand.
Evaluate degree of exercise-related pain and changes in joint mobility. Measure upper arm and forearm if edema develops.	Monitors progression and resolution of complications. May need to postpone increasing exercises and wait until further healing occurs.
Assist with ambulation as needed, and encourage correct posture.	Client may feel unbalanced and need assistance until accustomed to change. Keeping back straight prevents shoulder from moving forward, avoiding permanent limitation in movement and posture.
Instruct client to report loss of upper body strength, inability to maintain balance, or gait disturbances.	Although not common, there is a possibility of changes in balance and movement in the postsurgery period after radical mastectomy. These may be result of the loss of a large mass of tissues with millions of peripheral receptors and irritation of the peripheral nerves. In such cases, the central nervous system receives completely different information and it may confuse motor cortex (especially in older women).

#### **Collaborative**

Administer medications, as indicated, for example:

Analgesics	Pain management before exercise may help client to participate optimally.
Refer to physical and occupational therapist or specialist as needed.	Provides an individualized exercise and rehabilitation program if client is having difficulty adjusting to physical changes or is debilitated.

#### **NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

##### **May Be Related To**

Insufficient information; lack of exposure or recall

Information misinterpretation

Insufficient knowledge of resources

##### **Possibly Evidenced By**

Insufficient knowledge

Inaccurate follow-through of instructions or performance of procedure

Development of preventable complications

##### **Desired Outcomes/Evaluation Criteria—Client Will**

###### **Knowledge: Acute Illness Care NOC**

Verbalize understanding of disease process and potential complications.

Perform necessary procedures correctly and explain reasons for actions.

Initiate necessary lifestyle changes and participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i>	
Review disease process, surgical procedure, and future expectations.	Provides knowledge base from which client can make informed choices, including participation in radiation and/or chemotherapy programs. (Refer to CP: Cancer.)
Review and have client demonstrate care of drains and wound sites.	Shorter hospital stays may result in discharge with drains in place, requiring more complex care by client and caregivers. Drains will be removed when the drainage fluid is 30 mL or less for 24 hr.
Encourage continuation of exercises, increasing program as healing progresses, for at least 1 year.	Good muscle tone enhances development of collateral lymphatic channels, reduces the tightening of scar tissue, and maintains muscle strength and function.
Emphasize necessity for well-balanced, nutritious meals, and adequate fluid intake.	Provides optimal nutrition and maintains circulating volume to enhance tissue regeneration and the healing process.
Suggest alternating schedule of frequent rest and activity periods.	Prevents or limits fatigue, promotes healing, and enhances feelings of general well-being.
Discuss potential for lymphedema in affected arm and signs to watch for (e.g., feeling of fullness or tightness, aching or pain, weakness, swollen fingers). Instruct client to report these symptoms immediately to physician.	Lymphedema may occur from weeks to years especially after radical mastectomy.
Suggest gentle massage of healed incision with emollients.	Stimulates circulation, promotes elasticity of skin, and reduces discomfort associated with phantom breast sensations.
Recommend use of sexual positions that avoid pressure on chest wall. Encourage alternative forms of sexual expression such as cuddling or touching during initial healing process and while operative area is still tender.	Promotes feelings of femininity and sense of ability to resume sexual contact.
Encourage regular self-examination of remaining breast when mastectomy is unilateral. Determine recommended schedule for mammography.	Identifies changes in breast tissue indicative of recurrent or new tumor development.
Emphasize importance of regular medical follow-up.	Other treatment may be required as adjunctive therapy, such as radiation. Client may also have immediate or delayed breast reconstruction requiring ongoing evaluation.
Identify signs and symptoms requiring medical evaluation: breast or arm red, warm, and swollen; edema and purulent wound drainage; and fever or chills.	Lymphangitis can occur as a result of infection, causing lymphedema.
Address additional concerns as indicated—ongoing therapies and expected and/or adverse side effects.	Depending on the type of cancer that required the mastectomy, the client may have ongoing cancer therapies (e.g., chemotherapy, radiotherapy), selective estrogen modulators (e.g., tamoxifen [Soltamox] and raloxifene [Evista]), or aromatase inhibitors (e.g., letrozole [Femara], anastrozole [Arimidex]) to treat cancer or prevent recurrence.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

**In addition to surgical and cancer concerns:**

- **impaired Tissue Integrity**—altered circulation, sensation; tissue removal/destruction, radiation; drainage
- **situational low Self-Esteem**—physical illness, loss, disturbed body image (e.g., disfiguring surgical procedure, concern about sexual attractiveness)
- **Self-Care deficit (specify)**—weakness, fatigue, neuromuscular impairment, pain, muscular impairment

# CHAPTER 10

## Men's Health

### BENIGN PROSTATIC HYPERPLASIA (BPH)

#### I. Pathophysiology

- a. Overgrowth of normal, nonmalignant cells that causes progressive enlargement of the prostate gland, resulting in bladder outlet obstruction with urinary retention, leakage, and frequency (Deters et al, 2017).
- b. The enlarged gland contributes to the overall lower urinary tract symptoms (LUTS) complex via at least two routes: (1) direct bladder outlet obstruction (BOO) from enlarged tissue (static component) and (2) from increased smooth muscle tone and resistance within the enlarged gland (dynamic component) (American Urological Association [AUA], 2014).
- c. Additional complications: bladder wall trabeculation, detrusor muscle enlargement, narrowing of urethra, incontinence, and acute or chronic renal failure (Springhouse, 2005).

#### II. Classification (AUA, 2014; Deters et al, 2017)

- a. The severity of BPH can be determined with the International Prostate Symptom Score (IPSS)/American Urological Association Symptom Index (AUA-SI) plus a disease-specific quality-of-life (QOL) question.
- b. Questions and subsequent scoring focus on degree of incomplete emptying, frequency, intermittency, urgency,

weak stream, straining, nocturia, as well as impact on quality of life.

- i. Score of 0 to 7: mildly symptomatic
- ii. Score of 8 to 19: moderately symptomatic
- iii. Score of 20 to 35: severely symptomatic

#### III. Etiology

- a. Cause is unknown, although testosterone and other hormones may affect growth.
- b. Microscopically characterized as a hyperplastic process with the number of cells in the gland increasing with age.

#### IV. Statistics

- a. Morbidity: BPH is the most common disorder of the prostate gland. About half of all men between the ages of 51 and 60 have BPH. Up to 90% of men over age 80 have BPH (Urology Care Foundation, 2015). An estimated 15 million men in the United States have symptoms related to benign enlargement (Egan, 2016).
- b. Mortality: generally related to renal failure, infection, and complications of surgery.
- c. Cost: The direct cost of BPH treatment (drugs, procedures, imaging, and office visits [based on 2005 data]) was estimated to be \$4 billion annually (Saigal & Joyce, 2005; Vuichoud & Loughlin, 2015).

#### G L O S S A R Y

**Benign prostatic enlargement:** Term used when there is prostate gland enlargement and is usually a presumptive diagnosis based on the size of the prostate.

**Benign prostatic hyperplasia (BPH) [also called benign prostatic hypertrophy]:** Histologic diagnosis characterized by proliferation of the cellular elements of the prostate.

**Benign prostatic obstruction (BPO):** Term used when obstruction has been proven by pressure flow studies or is highly suspected from flow rates and if the gland is enlarged.

**Bladder outlet obstruction (BOO):** Generic term for all forms of obstruction to the bladder outlet (e.g., urethral stricture).

**Bladder wall trabeculation:** Characterized by thick wall and hypertrophied muscle bundles; typically seen in instances of longstanding obstruction.

**Dysuria:** Painful, difficult urination.

**LUTS (Lower urinary tract symptoms):** Storage and/or voiding disturbances common in aging men. LUTS may be due to structural or functional abnormalities in one or more parts of the lower urinary tract that comprises the bladder, bladder neck, prostate, distal sphincter mechanism, and urethra. Not all men with BPH have LUTS, and likewise, not all men with LUTS have BPH. Note: LUTS may also result from abnormalities of the peripheral and/or central nervous systems that provide neural control to the lower urinary tract (AUA, 2014; Deters et al, 2017).

**Prostate Health Index (phi):** Test that helps distinguish between prostate cancer and benign disease and improves the specificity of prostate cancer detection in the PSA range of 2 to 10 ng/mL (Nalley, 2017).

**Prostatitis:** Inflammation of the prostate gland.

**CARE SETTINGS**

Client is treated at the community level, with more acute care provided during outpatient procedures.

**RELATED CONCERNS**

Acute kidney injury, page 595  
Prostatectomy, page 694  
Psychosocial aspects of care, page 835

**CLIENT ASSESSMENT DATABASE****DIAGNOSTIC DIVISION  
MAY REPORT****MAY EXHIBIT****CIRCULATION**

- Elevated blood pressure (BP)

**ELIMINATION**

- Feeling need to urinate urgently, sensation of imminent loss of urine without control
- Hesitancy or straining in initiating voiding, having to stand at or sit on the toilet for some time prior to producing a urinary stream
- Decreased force or caliber of urinary stream, intermittent flow, dribbling
- Usually voiding only small amounts of urine with each episode, sensation of incomplete emptying
- Need to urinate frequently during the day or night (nocturia), resulting in interrupted sleep
- Dysuria, hematuria
- Chronic constipation, resulting from protrusion of prostate into rectum

**FOOD/FLUID**

- Anorexia, nausea, vomiting
- Recent weight loss

**PAIN/DISCOMFORT**

- Suprapubic, flank, or back pain; sharp, intense, with acute prostatitis
- Low back pain

**SAFETY**

- Fever

**SEXUALITY**

- Concerns about effects of condition or therapy on sexual abilities
- Fear of incontinence or dribbling during intimacy
- Decrease in force of ejaculatory contractions
- Enlarged, tender prostate

**TEACHING/LEARNING**

- Family history of cancer, hypertension, kidney disease
- Use of antihypertensive or antidepressant medications, over-the-counter (OTC) cold and allergy medications containing sympathomimetics, urinary antibiotics or antibacterial agents
- Use of nutrients or herbal supplements for self-treatment of BPH and urinary flow—saw palmetto, pygeum, pumpkin seed oil, or soy products

**DISCHARGE PLAN CONSIDERATIONS**

- May need assistance with management of therapy—indwelling catheter

► Refer to section at end of plan for postdischarge considerations.

## DIAGNOSTIC STUDIES

### TEST

### WHY IT IS DONE

### WHAT IT TELLS ME

#### BLOOD TESTS

- **Prostate-specific antigen (PSA):** Substance manufactured solely by prostate gland cells. An elevated reading indicates an abnormal condition of the prostate gland, either benign or malignant.

Serum PSA reflects the amount of glandular epithelium, which in turn reflects prostate size. As prostate size increases with increasing age, the PSA concentration also rises; it increases at a faster rate in elderly men. As a result, different normal reference ranges may be appropriate based upon a man's age. Anything that irritates the prostate (e.g., prostatitis, prostate biopsy, recent sexual activity) will cause the PSA to rise, at least temporarily (Schmitz, 2017). Note: Using PSA numbers for screening for prostate cancer remains controversial but is still done. Although BPH does not cause prostate cancer, men at risk for BPH are also at risk for this disease (Deters et al, 2017).

#### URINE TESTS

- **Urinalysis:** Laboratory examination of urine for red blood cells (RBCs) and WBCs or presence of infection or excessive protein.
- **Postvoid residual (PVR):** Volume of urine remaining in bladder immediately after voiding.

Yellow, dark brown, dark or bright red (bloody) in color; appearance may be cloudy, pH of 7 or greater suggests infection; and bacteria, WBCs, and RBCs may be present microscopically.

Determines the severity of urinary retention; may be done by catheterization or by transabdominal ultrasound (bladder scan).

#### OTHER DIAGNOSTIC STUDIES

- **Ultrasound (abdominal, renal):** Diagnostic imaging technique utilizing reflected high-frequency sound waves to delineate, measure, or examine internal body structures.
  - **Transrectal prostatic ultrasound (TRUS):** Examination where a fingerlike probe is placed in the rectum and ultrasound pictures are made of the prostate.
  - **Digital rectal exam (DRE):** Test performed by inserting gloved finger into rectum to detect prostate abnormalities.
  - **Uroflowmetry:** Measures urine amount and flow rate via a collection device and scale. The equipment creates a graph that shows changes in flow rate from second to second, measuring peak flow rate and how long it took to get there.
  - **Urography:** Series of x-rays of the kidney, ureters, and bladder after injection of a contrast dye into a vein.
  - **Cystourethrography:** Allows visualization of the bladder and urethra on x-ray, using radiopaque contrast material injected through the urethra.
  - **Cystourethroscopy:** Direct visualization of the bladder and urethra by means of a flexible fiber-optic scope.
- Useful for helping to determine bladder and prostate size and the degree of kidney enlargement (if any) in patients with urinary retention or signs of renal insufficiency. Generally not indicated for the initial evaluation of uncomplicated lower urinary tract symptoms.
- Measures size of prostate and amount of residual urine, locates lesions unrelated to BPH. For client with elevated PSA levels, a TRUS-guided biopsy may be indicated.
- Prostate size and contour can be assessed, nodules evaluated, and areas of suspected malignancy detected; also helps determine pelvic floor tone and fluctuance, such as in prostate abscess, and pain and sensitivity of gland can be assessed.
- Results of this test will be abnormal if the bladder muscle is weak or urine flow is obstructed. Helps distinguish poor bladder contractility (detrusor underactivity) from BOO caused by prostate hyperplasia.
- Shows any blockage in the urinary tract causing delayed emptying of bladder, urinary retention, or presence of prostatic enlargement.
- May be used instead of intravenous pyelogram (IVP) to visualize bladder and urethra because it uses localized, rather than systemic, radiopaque contrast media.
- May be done in selected individuals. Shows degree of prostatic enlargement and bladder wall changes associated with bladder trabeculation.

**NURSING PRIORITIES**

1. Relieve acute urinary retention.
2. Promote comfort.
3. Prevent complications.
4. Assist client to deal with psychosocial concerns.
5. Provide information about disease process, prognosis, and treatment needs.

**DISCHARGE GOALS**

1. Voiding pattern normalized.
2. Pain or discomfort relieved.
3. Complications prevented or minimized.
4. Situation being dealt with realistically.
5. Disease process, prognosis, and therapeutic regimen understood.
6. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS:** [acute/chronic] urinary Retention**May Be Related To**

High urethral pressure; strong sphincter; blockage in urinary tract

**Possibly Evidenced By**

Sensation of bladder fullness; dribbling of urine; dysuria  
Small or frequent voiding  
Bladder distention; residual urine

**Desired Outcomes/Evaluation Criteria—Client Will****Urinary Elimination NIC**

Void in sufficient amounts with no palpable bladder distention.  
Demonstrate postvoid residuals of less than 50 mL, with absence of dribbling or overflow.

**ACTIONS/INTERVENTIONS****RATIONALE****Urinary Retention Care NIC***Independent*

Encourage client to void every 2 to 4 hours and when urge is noted.

May minimize urinary retention and overdistention of the bladder.

Ask client about stress incontinence when moving, sneezing, coughing, laughing, or lifting objects.

High urethral pressure inhibits bladder emptying or can inhibit voiding until abdominal pressure increases enough for urine to be involuntarily lost.

Observe urinary stream, noting size and force.

Useful in evaluating degree of obstruction and choice of intervention.

Have client document time and amount of each voiding.

Urinary retention increases pressure within the ureters and kidneys, which may cause renal insufficiency. Any deficit in blood flow to the kidney impairs its ability to filter and concentrate substances.

Note diminished urinary output. Measure specific gravity, as indicated.

A distended bladder can be felt in the suprapubic area.

Percuss and palpate suprapubic area.

Increased circulating fluid maintains renal perfusion and flushes kidneys, bladder, and ureters of sediment and bacteria. Note: Fluids may be restricted to prevent bladder distention if severe obstruction is present or until adequate urinary flow is reestablished.

Encourage oral fluids, if indicated.

Loss of kidney function results in decreased fluid elimination and accumulation of toxic wastes.

Monitor vital signs closely. Observe for hypertension, peripheral or dependent edema, and changes in mental status. Weigh daily. Maintain accurate intake and output (I&O).

Reduces risk of ascending infection.

Provide and encourage meticulous catheter and perineal care.

Promotes muscle relaxation, decreases edema, and may enhance voiding effort.

Recommend sitz bath, as indicated.

Medications have long been used as a first-line therapy for clients with mild to moderate symptoms.

**Collaborative**  
Administer medications, as indicated, for example:

(continues on page 690)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
5-alpha-reductase inhibitors (5-ARIs), such as dutasteride (Avodart); finasteride (Proscar)	Reduces the size of the prostate and decreases symptoms if taken long term; however, side effects, such as decreased libido and ejaculatory dysfunction, may influence client's choice for long-term use. Studies indicate that combination therapy with 5-ARI plus alpha blocker may be superior to taking either drug class alone for prevention of BPH progression (AUA, 2017).
Alpha-adrenergic antagonists, such as alfuzosin (Uro-Xatral), terazosin (Hytrin), doxazosin (Cardura), and tamsulosin (Flomax)	These agents block effects of postganglionic synapses that affect smooth muscle and exocrine glands. This action can decrease adverse urinary tract symptoms and increase urinary flow.
Phosphodiesterase-5 enzyme inhibitors, such as tadalafil (Cialis)	Bring about smooth muscle relaxation in the lower urinary tract, thus improving the symptoms of BPH (Deters et al, 2017).
Antibiotics and antibacterials	Given to combat infection. May be used prophylactically.
Catheterize for residual urine and leave indwelling catheter, as indicated.	Relieves and prevents urinary retention and rules out presence of ureteral stricture. Coudé catheter may be required because the curved tip eases passage of the tube around the enlarged prostate. Note: Bladder decompression should be done with caution to observe for signs of adverse reaction, such as hematuria due to rupture of blood vessels in the mucosa of the overdistended bladder and syncope due to excessive autonomic stimulation.
Monitor laboratory studies, such as the following:	
Blood urea nitrogen (BUN), creatinine (Cr), and electrolytes	Prostatic enlargement with obstruction eventually causes dilation of upper urinary tract, ureters, and kidneys, potentially impairing kidney function and leading to uremia.
Urinalysis and culture	Urinary stasis potentiates bacterial growth, increasing risk of urinary tract infection (UTI).
Prepare for and assist with urinary drainage, such as emergency cystostomy.	May be indicated to drain bladder during acute episode with azotemia or when surgery is contraindicated because of client's health status.
Prepare for minimally invasive therapies, such as:	
Heat therapies, such as laser treatment to destroy prostate tissue: transurethral microwave thermotherapy (TUMT), Cortherm, Prostatron, and transurethral needle ablation (TUNA)	These therapies rely on heat to cause destruction of prostatic tissue. Treatment is often completed in a one-time procedure carried out in the physician's office. Long-term outcomes are variable in terms of adequately treating urinary tract symptoms.
Prostatic urethral lift (PUL) implant	Treatment involves insertion of permanent implants into the prostate to retract the lobes away from the prostatic urethra. Note: A recent study comparing effectiveness of PUL with other procedures for BPH revealed that at 5 years, 86% of men did not require another procedure for BPH. The same study reported that for thermally based procedures, the 5-year retreatment rate ranges from 20% to 50%, and the annual retreatment rate for TURP is 1% to 2% (Bankhead, 2013; Krader, 2017).
Prepare for surgery as indicated.	Transurethral resection of the prostate (TURP) is the standard treatment for BOO secondary to BPH. Open prostatectomy is reserved for client with very large prostate ( $>75$ g) or with concomitant bladder stones or who cannot be positioned for transurethral surgery (Deters et al, 2017).

**NURSING DIAGNOSIS:** acute Pain**May Be Related To**

Physical injury agents—[mucosal irritation (e.g., bladder distention/urinary retention; urinary infection)]

**Possibly Evidenced By**

Self-report of pain intensity and characteristics using a standardized rating scale  
Guarding and protective behavior  
Expressive behaviors (e.g., restlessness, irritability)  
Self-focus/narrowed focus

**Desired Outcomes/Evaluation Criteria—Client Will****Pain Level NOC**

Report pain relieved or controlled.  
Appear relaxed.  
Be able to sleep and rest appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<i>Independent</i>	
Assess pain, noting location, intensity (0 to 10 or similar coded scale), characteristics, and duration.	Provides information to aid in determining choice and effectiveness of interventions.
Provide comfort measures, such as back rub, helping client assume position of comfort. Suggest use of relaxation and deep-breathing exercises and diversional activities.	Promotes relaxation, refocuses attention, and may enhance coping abilities.
Encourage use of sitz baths and warm soaks to perineum.	Helps relax the smooth muscle in the prostate, easing the constriction of the urethra and bladder neck and increasing blood circulation to the pelvic region.
Ascertain that client is taking medications for BPH as prescribed. Document and discuss with physician if medication changes may be needed in medication regimen.	Client should be constant in taking prostate medications as prescribed to reduce swelling, improve urine flow, and prevent or treat urinary retention. The client should also avoid medications known to be associated with urinary retention (e.g., those that contain decongestants).
<i>Collaborative</i>	
Insert catheter and attach to straight drainage, as indicated. Maintain indwelling catheter when needed.	Draining bladder reduces acute bladder tension and irritability. Indwelling catheter may be needed in the short term for acute urinary retention or may be required long term for chronic retention.
Administer medications, as indicated, for example:	
Opioids, such as meperidine (Demerol)	Given to relieve severe pain; provide physical and mental relaxation.
Antibacterials, such as methenamine hippurate (Hiprex)	Reduces bacteria present in urinary tract and those introduced by drainage system.
Antispasmodics and bladder sedatives, such as flavoxate (Urispas) and oxybutynin (Ditropan)	Relieves bladder irritability.

**NURSING DIAGNOSIS:** risk for deficient Fluid Volume**Possibly Evidenced By**

Failure of regulatory mechanism (e.g., postobstructive diuresis from rapid drainage of a chronically overdistended bladder)

**Desired Outcomes/Evaluation Criteria—Client Will****Fluid Balance NOC**

Maintain adequate hydration as evidenced by stable vital signs, palpable peripheral pulses, adequate capillary refill, and moist mucous membranes.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Management</b> <b>NIC</b>	
<i>Independent</i>	
Monitor output carefully. Note outputs of 100 to 200 mL/hr.	Rapid or sustained diuresis could cause client's total fluid volume to become depleted and limits sodium reabsorption in renal tubules.
Encourage increased oral intake based on individual needs.	Client may have restricted oral intake in an attempt to control urinary symptoms, reducing homeostatic reserves and increasing risk of dehydration and hypovolemia.
Monitor BP and pulse. Evaluate capillary refill and oral mucous membranes.	Enables early detection of and intervention for systemic hypovolemia.
Promote bedrest with head elevated.	Decreases cardiac workload, facilitating circulatory homeostasis.
<i>Collaborative</i>	
Monitor electrolyte levels, especially sodium.	As fluid is pulled from extracellular spaces, sodium may follow the shift, causing hyponatremia.
Administer intravenous (IV) fluids—hypertonic saline as needed.	Replaces fluid and sodium losses to prevent or correct hypovolemia following outpatient procedures.

### NURSING DIAGNOSIS: Anxiety [specify level]

#### May Be Related To

Stressors/threat to current status (change in health status; threat to self-concept; threat to role function [e.g., concern about sexual ability])

#### Possibly Evidenced By

Increase in tension, apprehensiveness, uncertainty  
Worried about change in life event

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Anxiety Self-Control

Appear relaxed and report anxiety is reduced to a manageable level.  
Verbalize accurate knowledge of the situation.  
Demonstrate problem-solving skills.  
Uses resources/support systems effectively.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction</b> <b>NIC</b>	
<i>Independent</i>	
Be available to client. Establish trusting relationship with client and significant other (SO).	Demonstrates concern and willingness to help. Encourages discussion of sensitive subjects.
Provide information about specific procedures and tests and what to expect afterward, such as catheter, bloody urine, and bladder irritation. Be aware of how much information client wants.	Helps client understand purpose of what is being done and reduces concerns associated with the unknown, including fear of cancer. However, overload of information is not helpful and may increase anxiety.
Maintain matter-of-fact attitude in doing procedures and dealing with client. Protect client's privacy.	Communicates acceptance and eases client's embarrassment.
Encourage client and SO to verbalize concerns and feelings.	Defines the problem, providing opportunity to answer questions, clarify misconceptions, and problem-solve solutions.
Reinforce previous information client has been given.	Allows client to deal with reality and strengthens trust in caregivers and information presented.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**
**May Be Related To**

Insufficient information; insufficient interest in learning; misinformation presented by others  
Insufficient knowledge of resources

**Possibly Evidenced By**

Insufficient knowledge  
Inappropriate behaviors—apathetic, withdrawn  
Inaccurate follow-through of instruction or performance on a test or procedure  
Development of preventable complications

**Desired Outcomes/Evaluation Criteria—Client Will****Knowledge: Disease Process NOC**

Verbalize understanding of disease process, prognosis, and potential complications.  
Identify relationship of signs and symptoms to the disease process.  
Initiate necessary lifestyle or behavior changes.

**Knowledge: Treatment Regimen NOC**

Verbalize understanding of therapeutic needs.  
Participate in treatment regimen.  
Perform necessary procedures correctly.

**ACTIONS/INTERVENTIONS****RATIONALE****Teaching: Disease Process NIC***Independent*

Review disease process and client expectations.

Provides knowledge base from which client can make informed therapy choices. Note: "Watchful waiting" is one of the options in client with early BPH with no symptoms of urinary retention. Client should understand that this includes ongoing periodic evaluation for change.

Encourage verbalization of fears, feelings, and concerns.

Helping client work through feelings can be vital to rehabilitation.

Give information that the condition is not sexually transmitted.

May be an unspoken fear.

Review drug therapy, use of herbal products, and diet, such as increasing intake of fruits and soybeans.

Some clients may prefer to treat with complementary therapy because of decreased occurrence and lessened severity of side effects, such as impotence. Note: Nutrients known to inhibit prostate enlargement include zinc, soy protein, essential fatty acids, flaxseed, and lycopene. Herbal supplements that client may use include saw palmetto, pygeum, stinging nettle, and pumpkin seed oil. Note: A recent study found no difference in efficacy or side effects between saw palmetto and a placebo, indicating a need for further research as to benefit versus variability of potency or purity of botanical products (Martin, 2016).

Review usual medication regimen.

Medications known to be associated with urinary obstruction symptoms (e.g., tricyclic antidepressants, first-generation antihistamines, anticholinergic agents, diuretics, narcotics, and decongestants) may require dose adjustment or change to a different drug.

Encourage reading of labels and discuss concerns with over-the-counter (OTC) drugs.

Many OTC medications for upper respiratory symptom relief can increase urinary retention. Client with BPH should avoid these medications.

Recommend avoiding spicy foods, coffee, alcohol, long automobile rides, and rapid intake of fluids.

May cause prostatic irritation with resulting congestion. Sudden increase in urinary flow can cause bladder distention and loss of bladder tone, resulting in episodes of acute urinary retention.

(continues on page 694)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Address sexual concerns—during acute episodes of prostatitis, intercourse should be avoided but may be helpful in treatment of chronic condition.	Sexual activity can increase pain during acute episodes but may serve as massaging agent in presence of chronic disease. Note: Medications, such as finasteride (Proscar), are known to interfere with libido and erections. Alternatives include terazosin (Hytrin), doxazosin mesylate (Cardura), and tamsulosin (Flomax), which do not affect testosterone levels.
Provide information about sexual anatomy and function as it relates to prostatic enlargement. Encourage questions and promote a dialogue about concerns.	Having information about anatomy involved helps client understand the implications of proposed treatments because they might affect sexual performance.
Review signs and symptoms requiring medical evaluation—cloudy, odorous urine; diminished urinary output; inability to void; and presence of fever or chills.	Prompt interventions may prevent more serious complications.
Discuss necessity of notifying other healthcare providers of diagnosis.	Reduces risk of inappropriate therapy, such as the use of decongestants, anticholinergics, and antidepressants, which can increase urinary retention and may precipitate an acute episode.
Reinforce importance of medical follow-up for at least 6 months to 1 year, including rectal examination and urinalysis.	Recurrence of hyperplasia and infection caused by same or different organisms is not uncommon and requires changes in therapeutic regimen to prevent serious complications.
Discuss personal safety issues and potential environmental changes.	Recent research reports increased risk of falls in the presence of moderate to severe BPH associated with urgency, nocturia, and straining to void, with fall risk increasing with age and symptom severity (Parsons, 2010).

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **[acute/chronic] urinary Retention**—blockage [loss of bladder tone, decompensation of detrusor musculature]
- **risk for Infection**—urinary stasis, invasive procedure (periodic catheterization)
- **risk for ineffective Health Management**—perceived barriers

## PROSTATECTOMY

Prostatectomy includes a number of surgical procedures to remove part or all of the prostate gland and can be performed in several ways depending on the condition involved and the recommended treatment approach. When medical and minimally invasive options for benign prostatic hyperplasia (BPH) have been unsuccessful, more invasive treatment options may be considered, such as transurethral resection of the prostate (TURP) or open prostatectomy.

**Simple prostatectomy** removes part of the prostate and is generally recommended for men with severe urinary symptoms and very enlarged prostate gland (BPH) rather than cancer and can be performed open or robotically.

Prostatectomy for localized prostate cancer is often a **radical procedure**, removing not only the prostate but also surrounding lymph nodes and/or other structures. Prostatectomy may be used alone or in conjunction with chemotherapy, radiation, and hormone therapy. Transurethral procedures may be performed before open prostatectomy when urinary retention is occurring because of obstruction.

### I. Indications

- a. Benign prostatic hyperplasia (BPH)—related complications
  - i. Urinary retention
  - ii. Frequent urinary tract infections
  - iii. Bladder stones secondary to bladder outlet obstruction
  - iv. Recurrent gross hematuria
  - v. Kidney damage from longstanding blockage
  - vi. Failure to respond to medical or minimally invasive treatments
- b. Prostate cancer

### II. Procedures (AUA, 2014; Khera et al, 2015; Mayo Clinic Staff, 2017)

- a. Minimally invasive prostatectomy
  - i. Transurethral microwave thermotherapy (TUMT)
  - ii. Transurethral needle ablation (TUNA) using low-level frequency thermal energy
  - iii. Laser ablation: includes transurethral holmium laser ablation of the prostate (HoLAP), transurethral laser enucleation of the prostate (HoLEP), and holmium laser resection of the prostate (HoLRP)

- iv. Transurethral vaporization of the prostate (TUVP)
- v. Transurethral resection of the prostate (TURP)
  - 1. Most common procedure for the long-term treatment of BPH in client with moderate to severe lower urinary tract symptoms (LUTS) and/or where significantly bothered by these symptoms
  - 2. Obstructive prostatic tissue of the medial lobe surrounding the urethra is removed by means of a cystoscope introduced through the urethra.
- b. Open surgical approaches performed when the prostate is overly enlarged (greater than 75 g), the bladder has been damaged, or when there are complicating factors, such as cancer
  - i. Robot assisted—nerve sparing, uses a laparoscope, and several incisions are made in the abdomen
  - ii. Suprapubic prostatectomy—Obstructing prostatic tissue is removed through a low midline incision made through the bladder.
  - iii. Retropubic prostatectomy—Hypertrophied prostatic tissue mass located high in the pelvic region is removed through a low abdominal incision without opening the bladder.
  - iv. Perineal prostatectomy—Large prostatic masses low in the pelvic area are removed through an incision between the scrotum and the rectum.

### III. Statistics

- a. Morbidity: In 2010, 138,000 prostatectomy (for any diagnosis) procedures were performed in short-stay hospitals in the United States (Centers for Disease Control and Prevention [CDC], 2016). The most commonly performed procedures are prostatectomy and TURP, although numerous other less invasive procedures are on the rise (El-Hakim, 2010).
- b. Mortality: Prostatectomy is a relatively low-risk procedure (mortality stated as 0% or less than 1% and usually associated with cardiovascular disease) (Guilli et al, n.d.). The current 5-year survival rate for prostate cancer (stage dependent) is 98.6%, despite the fact that it was estimated that 26,730 would die of it in 2017 (National Cancer Institute, Surveillance, Epidemiology, and End Results Program [SEER], 2014).
- c. Cost: In 2017, the direct costs for treatment of prostate cancer totaled \$14.3 billion (NCI, 2018). A study of 1499 men who underwent robotic prostatectomy and 2565 men who had retropubic prostatectomy between 2008 and 2011 in Maryland reported that during that study period, the cost of a robotic prostatectomy averaged \$14,000 compared with \$10,100 for retropubic prostatectomy (Bankhead, 2012).

### GLOSSARY

**Continuous bladder irrigation (CBI):** Constant flow of normal saline or another bladder irrigant through a three-way urinary catheter to keep the catheter patent.

**Hematuria:** Blood in the urine.

**Kegel exercises:** Pelvic muscle exercises intended to improve pelvic muscle tone and prevent urine leakage.

**Retropubic:** Behind the pubic bone.

**Suprapubic:** Above the pubic bone.

**Transurethral resection of the prostate (TURP)**

**syndrome:** Rare complication directly related to this procedure. During the surgery, excess fluid collects in the body, reducing the concentration of sodium in the bloodstream. Common symptoms include nausea, vomiting, and confusion.

**Urinary retention:** Inability to empty bladder.

### CARE SETTING

Client is treated in short-stay inpatient acute surgical unit.

### RELATED CONCERNs

Benign prostatic hyperplasia (BPH), page 686  
 Cancer, page 945  
 Psychosocial aspects of care, page 835  
 Surgical intervention, page 873

### CLIENT ASSESSMENT DATABASE

Refer to CP: Benign Prostatic Hyperplasia (BPH) for assessment data.

#### DIAGNOSTIC DIVISION MAY REPORT

#### DISCHARGE PLAN CONSIDERATIONS

- Dependent upon type of procedure, needs may be minimal or client may require assistance with self-care needs, transportation, medical supplies, and home maintenance

► Refer to section at end of plan for postdischarge.

#### MAY EXHIBIT

## NURSING PRIORITIES

1. Maintain homeostasis and hemodynamic stability.
2. Promote comfort.
3. Prevent complications.
4. Provide information about surgical procedure, prognosis, treatment, and rehabilitation needs.

## DISCHARGE GOALS

1. Urinary flow restored or enhanced.
2. Pain relieved or controlled.
3. Complications prevented or minimized.
4. Procedure, prognosis, therapeutic regimen, and rehabilitation needs understood.
5. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: **impaired urinary Elimination**

#### May Be Related To

Anatomic obstruction (e.g., blood clots, edema, trauma, surgical procedure)

#### Possibly Evidenced By

Frequency, urgency, hesitancy, dysuria

Incontinence; retention

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Urinary Elimination NOC

Void normal amounts without retention.

Demonstrate behaviors to regain bladder and urinary control.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Urinary Elimination Management NIC</b> <i>Independent</i>	
Assess urine output and catheter drainage system, especially during bladder irrigation after TURP.	Retention can occur because of edema of the surgical area, blood clots, and bladder spasms.
Assist client to assume normal position to void; for example, stand and walk to bathroom at frequent intervals after catheter is removed.	Encourages passage of urine and promotes sense of normality.
Record time, amount of voiding, and size of stream after catheter is removed. Note reports of bladder fullness, inability to void, and incontinence.	The catheter is usually removed 2 to 5 days after surgery, but voiding may continue to be a problem for some time because of urethral edema and loss of bladder tone. Urinary incontinence (associated with sphincter insufficiency and bladder dysfunction) is a common complication following prostate surgery and persists for varying lengths of time. Note: A review of two randomized trials of incontinent men postsurgery compared one-to-one sessions with a physical therapist to standard care and lifestyle advice only. High rates of incontinence persisted in both groups after 12 months. Pelvic floor muscle training after prostate surgery is unlikely to be effective (Glazner et al, 2011).
Encourage client to void when urge is noted but not more than every 2 to 4 hours per protocol.	Voiding with urge can reduce risk of urinary retention. However, limiting voids to every 4 hours, if tolerated, can increase bladder tone and aids in bladder retraining.
Encourage fluid intake to 2000 to 2500 mL as tolerated and if not contraindicated by cardiac or kidney disease. Limit evening fluids once catheter is removed.	Maintains adequate hydration and renal perfusion for urinary flow. “Scheduling” fluid intake reduces need to void during the night.
Instruct client in perineal exercises, trying to repeatedly stop and start urine stream several times a day.	Although not always successful in men after prostatectomy, exercise should be initiated to regain bladder sphincter control, in effort to minimize incontinence over time (Robinson, 2016; Sobol, 2016).
Advise client that “dribbling” is to be expected after catheter is removed and should resolve as recuperation progresses. Provide and instruct in use of continence pads when indicated.	Information can help client deal with and manage the problem.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b>	
Maintain continuous bladder irrigation (CBI), as indicated, in early postoperative period.	Flushes bladder of blood clots and debris to maintain patency of the catheter and urinary flow.
Measure residual volumes via suprapubic catheter, if present, or with Doppler ultrasound.	Monitors effectiveness of bladder emptying. Residuals of more than 50 mL suggest need for continuation of catheter until bladder tone improves.

NURSING DIAGNOSIS: <b>risk for Bleeding</b>
<b>Possibly Evidenced By</b>
Treatment-related side effects (e.g., surgery—vascular nature of surgical area)
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>
<b>Blood Loss Severity NOC</b>
Display no signs of active bleeding.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bleeding Precautions NIC</b>	
<b>Independent</b>	
Monitor intake and output (I&O).	Indicator of fluid balance and replacement needs. With bladder irrigations, monitoring is essential for estimating blood loss and accurately assessing urine output. Note: Following release of urinary tract obstruction, marked diuresis may occur during initial recovery period.
Monitor vital signs, noting increased pulse and respiration, decreased blood pressure (BP), diaphoresis, pallor, delayed capillary refill, and dry mucous membranes.	If these symptoms are present, client may be hypovolemic due to overt or hidden hemorrhage. Hypovolemia requires prompt intervention to prevent impending shock. Note: Hypertension, bradycardia, and nausea or vomiting suggest TURP syndrome, requiring immediate medical intervention. TURP syndrome occurs because of fluid overload and hyponatremia associated with the use of large amounts of irrigation fluids flushing the bladder during surgery. If this solution is low in sodium, and the body absorbs too much of the fluid, the sodium level in the entire body can fall rapidly. Symptoms can occur within minutes to around 24 hours after surgery and can range from mild to life-threatening (Whitlock, 2017).
Investigate restlessness, confusion, and changes in behavior.	May reflect decreased cerebral perfusion (hypovolemia) or indicate cerebral edema from excessive solution absorbed into the venous sinusoids during TURP procedure (TURP syndrome).
Inspect dressings and wound drains. Weigh dressings, if indicated. Note hematoma formation.	Signs of persistent bleeding may be evident or sequestered within tissues of the perineum.
Encourage increased fluid intake, preferably water, to 2000 to 2500 mL/d unless contraindicated by medical condition.	Helps maintain circulating fluid volume.

<b>Bleeding Reduction NIC</b>	
Anchor urethral catheter and avoid excessive manipulation.	After TURP, the client will have special catheter in place that allows traction on the prostatic fossa to minimize bleeding. The catheter also allows irrigation of the bladder. Displacement of the catheter may cause bleeding. With bladder distention, clot formation may cause plugging of the catheter.

(continues on page 698)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Observe urethral and suprapubic catheter drainage, noting excessive or continued bleeding.	Bleeding is not unusual during first 24 hours for all but the perineal approach. Continued or heavy bleeding or recurrence of active bleeding requires medical evaluation and intervention.
Evaluate color, consistency of urine, for example:	
Bright red with bright red clots	Usually indicates arterial bleeding and requires aggressive therapy.
Dark burgundy with dark clots and increased viscosity	Suggests venous source, which is the most common type of bleeding and usually subsides on its own.
Bleeding with absence of clots	May indicate blood dyscrasias or systemic clotting problems.
Avoid taking rectal temperatures and use of rectal tubes or enemas.	May result in referred irritation to prostatic bed and increased pressure on prostatic capsule with risk of bleeding.
<b>Collaborative</b>	
Monitor laboratory studies, as indicated, such as:	
Hemoglobin/hematocrit (Hgb/Hct) and RBCs	Useful in evaluating blood losses and replacement needs.
Coagulation studies and platelet count	May indicate developing complications that can potentiate bleeding or clotting.
Serum sodium	Monitors for presence of hyponatremia.
Administer intravenous (IV) therapy or blood products, as indicated.	May need additional fluids, if oral intake inadequate, or blood products, if losses are excessive.
Maintain traction on indwelling catheter; tape catheter to inner thigh.	Traction on the 30-mL balloon positioned in the prostatic urethral fossa creates pressure on the arterial supply of the prostatic capsule to help prevent or control bleeding.
Release traction within 4 to 5 hours. Document period of application and release of traction, if used.	Prolonged traction may cause permanent trauma and problems with urinary control.
Administer stool softeners or laxatives, as indicated.	Prevention of constipation and straining for stool reduces risk of rectal-perineal bleeding.

## NURSING DIAGNOSIS: **risk for Infection**

### Possibly Evidenced By

Alteration in skin/tissue integrity—traumatized tissue, surgical incision, drains  
Invasive procedures (e.g., instrumentation during surgery, indwelling catheter, frequent bladder irrigation)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Wound Healing: Primary Intention NOC

Experience no signs of infection.  
Achieve timely healing.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<b>Independent</b>	
Maintain sterile catheter system; provide regular catheter and urinary meatus care with soap and water, applying antibiotic ointment around catheter site per protocol.	Prevents introduction of bacteria and resultant infection.
Ambulate with drainage bag dependent.	Avoids backward reflux of urine, which may introduce bacteria into the bladder.
Monitor vital signs, noting low-grade fever, chills, rapid pulse and respiration, restlessness, irritability, and disorientation.	Client who has had TURP is at increased risk for surgical and septic shock related to instrumentation.
Observe drainage from wounds around suprapubic catheter.	Presence of drains and suprapubic incision increases risk of infection, as indicated by erythema or purulent drainage.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Change suprapubic/retropubic and perineal incision dressings frequently, cleaning and drying skin thoroughly each time.	Wet dressings cause skin irritation and provide medium for bacterial growth, increasing risk of wound infection.
Use ostomy-type skin barriers.	Provides protection for surrounding skin, preventing excoriation and reducing risk of infection.
<b>Collaborative</b> Administer antibiotics, as indicated.	May be given prophylactically because of increased risk of infection with prostatectomy.

NURSING DIAGNOSIS: acute Pain
<b>May Be Related To</b> Physical injury agents (e.g., operative procedure; irritation of bladder mucosa; reflex muscle spasm)
<b>Possibly Evidenced By</b> Self-report of pain intensity and characteristics using a standardized rating scale Guarding and protective behaviors Expressive behaviors—restlessness, irritability Self-focus Changes in vital signs
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>
<p><b>Pain Level NOC</b> Report pain is relieved or controlled. Appear relaxed and sleep and rest appropriately.</p> <p><b>Pain Control NOC</b> Demonstrate use of relaxation skills and diversional activities, as indicated, for individual situation.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<b>Independent</b>	
Assess pain, noting location, intensity (0 to 10 or similar coded scale), and characteristics.	Changes in pain reports may indicate developing complications requiring further evaluation and intervention. Note: Sharp, intermittent pain with urge to void and passage of urine around catheter suggests bladder spasms, which tend to be more severe with suprapubic or TURP approaches and usually decrease within 48 hours.
Maintain patency of catheter and drainage system. Keep tubing free of kinks and clots.	Maintaining a properly functioning catheter and drainage system decreases risk of bladder distention and spasm.
Promote intake of up to 3000 mL/d, as tolerated.	Decreases irritation by maintaining a constant flow of fluid over the bladder mucosa.
Give client accurate information about catheter, drainage, bladder spasms, and potential for voiding difficulties.	Allays anxiety and promotes cooperation with necessary procedures. Note: Depending on the degree of preoperative urge incontinence, postoperative urge incontinence may be present for weeks or months.
Provide comfort measures, such as position changes, back rub, Therapeutic Touch, and diversional activities. Encourage use of relaxation techniques, including deep-breathing exercises, visualization, and guided imagery.	Reduces muscle tension, refocuses attention, and may enhance coping abilities.
<b>Collaborative</b>	
Administer antispasmodics, such as:	
Oxybutynin (Ditropan), flavoxate (Urispas), B&O suppositories	Relaxes smooth muscle to provide relief of spasms and associated pain.
Propantheline bromide (Pro-Banthine)	Relieves bladder spasms by anticholinergic action. Usually discontinued 24 to 48 hours before anticipated removal of catheter to promote normal bladder contraction.

## NURSING DIAGNOSIS: risk for Sexual Dysfunction

### Possibly Evidenced By

Perceived sexual limitation; undesired change in sexual function  
Situational crisis—incontinence/leakage of urine, involvement of genital area  
Vulnerability (e.g., change in health status, threat to self-concept)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Sexual Functioning NOC

Report understanding of sexual function and alterations that may occur following surgery.  
Discuss concerns about possible changes in body image and sexual functioning with partner/significant other (SO).  
Demonstrate problem-solving skills regarding solutions to difficulties that occur.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Sexual Counseling NIC</b> <i>Independent</i> Provide openings for client and SO to talk about concerns of incontinence and sexual functioning.	May have anxieties about the effects of surgery and may be hesitant about asking necessary questions. Anxiety may have affected ability to access information given previously.
Discuss basic anatomy. Be honest in answers to client's questions.	The nerve plexus that controls erection runs posteriorly to the prostate through the capsule. In procedures that do not involve the prostatic capsule, impotence and sterility are usually not consequences. Surgical procedure may not provide a permanent cure, and hypertrophy may recur.
Give accurate information about expectation of return of sexual function.	Physiological impotence occurs when the perineal nerves are cut during radical procedures; with other approaches, sexual activity can usually be resumed within weeks. If erectile dysfunction persists after healing is complete, client may want to pursue options to restore function—use of medications such as sildenafil citrate (Viagra). Note: Coincident erectile dysfunction and bladder neck contracture have been reported postoperatively in approximately 2% to 3% of patients following suprapubic prostatectomy (Khera et al, 2015).
Discuss retrograde ejaculation if transurethral or suprapubic approach is used.	Seminal fluid goes into the bladder and is excreted with the urine. This does not interfere with sexual functioning but will decrease fertility and cause urine to be cloudy. Note: Retrograde ejaculation has been reported in up to 80% to 90% of patients after surgery (Khera et al, 2015).
Instruct in perineal and pelvic floor exercises and interruption of urinary stream exercises.	Tightening pelvic floor muscles prior to standing, coughing, and sneezing promotes regaining bladder and, perhaps, erectile function.
<i>Collaborative</i> Refer to sexual counselor as indicated.	Persistent or unresolved problems may require professional intervention.

## NURSING DIAGNOSIS: deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs

### May Be Related To

Insufficient information or knowledge of resources; insufficient interests in learning; misinformation presented by others

### Possibly Evidenced By

Insufficient knowledge  
Inaccurate follow-through of instruction; development of preventable complications

<b>NURSING DIAGNOSIS:</b>	<b>deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs</b> (continued)
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Knowledge: Disease Process NOC</b> Verbalize understanding of surgical procedure and potential complications. Initiate necessary lifestyle changes.	
<b>Knowledge: Treatment Regimen NOC</b> Verbalize understanding of therapeutic needs. Correctly perform necessary procedures and explain reasons for actions. Participate in therapeutic regimen.	

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Review implications of procedure and future expectations.	Provides knowledge base from which client can make informed choices.
Emphasize necessity of good nutrition; encourage inclusion of fruits and increased fiber in diet.	Promotes healing and prevents constipation, reducing risk of postoperative bleeding.
Advise client to avoid or limit intake of caffeine, citrus juices, carbonated beverages, and spicy foods for first few weeks after surgery.	Acidic substances can lower urine pH, thereby aggravating dysuria.
Discuss initial activity restrictions, such as avoidance of heavy lifting, strenuous exercise, prolonged sitting, long car trips, and climbing more than two flights of stairs at a time.	Increased abdominal pressure and straining places stress on the bladder and prostate, potentiating risk of bleeding.
Encourage continuation of perineal exercises.	Facilitates urinary control and alleviation of incontinence.
Instruct in urinary catheter care if present. Identify source for supplies and support.	Promotes independence and competent self-care. Catheter may be in place only on day of surgery when laser procedure is done or for days to weeks with other procedures.
Instruct client to avoid tub baths after discharge.	Decreases the possibility of introduction of bacteria or undue tension on incision.
Review signs and symptoms requiring medical evaluation: erythema, purulent drainage from wound sites; inability to urinate, changes in character or amount of urine, presence of urgency or frequency; and heavy clots or bright red bleeding, fever, or chills.	Prompt intervention may prevent serious complications. Note: Urine may appear cloudy for several weeks until postoperative healing occurs and may appear cloudy after intercourse because of retrograde ejaculation.
Provide written information to client and SO regarding recovery expectations and home management, as indicated, regarding pain, incision care, and catheter-related problems and care.	Anxiety related to hospitalization, procedure performed, and associated diagnosis, fatigue, and postoperative pain often makes it difficult for client to absorb necessary self-care information.
Emphasize importance of follow-up care—evaluation by primary healthcare provider, urologist or oncologist, and laboratory studies.	Monitoring and follow-up can reduce incidence of unaddressed complications. Persistent incontinence and other postoperative issues will require additional evaluation and treatment.
Provide information on available community resources, such as home-health services, medical equipment supply company, housekeeping, and support persons.	Can be helpful in assisting client and SO in coping with challenges they are faced with following prostatectomy, whatever the reason for procedure—BPH, cancer, incontinence, and so forth.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition, presence of complications, personal resources, and life responsibilities)

**In addition to surgical and cancer concerns:**

- **impaired urinary Elimination**—loss of bladder tone, possible discharge with catheter in place
- **Sexual Dysfunction**—situational crises (e.g., leakage of urine), altered body function (e.g., erectile dysfunction)

# Orthopedic Disorders

## FRACTURES

### I. Pathophysiology

- a. Discontinuity or break in a bone
  - b. May be associated with serious injury to nerves, blood vessels, muscles, and/or organs
- II. Etiology (Buckley & Page, 2016)**
- a. Common causes: Trauma, such as car crashes, falls, natural disasters, blunt force, and penetrating force. **P** Fractures are a common childhood injury and account for between 8% and 12% of all pediatric injuries (Flaherty et al, 2014; Rennie et al, 2007). Common mechanisms of injury in children with growth plate fractures include motor vehicle crashes (including pedestrians and cyclists), sports-related injuries, and falls.
  - b. Osteoporosis, which leaves bones thinned and weakened. Fractures of the spine, hip, or wrist are the most common types in persons with osteoporosis.
  - c. Repetitive stress, often associated with athletics (e.g., result of increasing amount or intensity of an activity too rapidly, improper equipment; increased physical stress, such as substantial increase in exercise time)
  - d. Bone tumors, can be malignant or benign
  - e. Infections, such as osteomyelitis; may be acute or chronic
  - f. The energy (high vs low) and velocity (speed) and direction of injury dictate the type and severity of fractures.

**III. Classifications (American Academy of Orthopedic Surgeons [AAOS], 2012; Walsh, 2011)**

- a. Location in the bone (e.g., proximal, midshaft, distal, through a joint)
- b. Types: (1) closed (also called simple) or open (formerly called compound), (2) complete (through the entire bone), (3) incomplete (the fracture does not go all the way through the bone), and (4) comminuted (broken into three or more parts [multifragmentary], where there is no contact between proximal and distal bone fragments).
- c. Fracture patterns: (1) spiral (from rotational force), (2) greenstick (one side of bone is broken and the other only bent), (3) oblique (angled fracture line), (4) transverse (horizontal fracture line), and (5) dislocated (fracture causes dislocation of part of joint, e.g., elbow, cervical vertebrae). **P** Note: Spiral fractures are common in toddlers from relatively minor trauma and can occur in older children from skiing and contact sports; greenstick

fractures occur most often during infancy and childhood when bones are soft.

- d. Open fractures are further classified as (Gustilo et al, 1990)
  - i) Type I (low-energy, simple fracture with wound opening less than 1 cm)
  - ii) Type II (also considered a low-energy injury, minimally contaminated, and without major soft-tissue damage or defect; with wound size greater than 1 cm)
  - iii) Type III (wound is longer than 1 cm; the mechanism often involves high-energy trauma, resulting in a severely unstable fracture with varying degrees of fragmentation and significant soft tissue disruption). Type III is further divided into subtypes:
    - (a) IIIA: Wound has enough healthy soft tissue to cover bone without need for skin graft coverage.
    - (b) IIIB: Disruption of soft tissues is extensive enough that skin grafting is necessary to cover bone; wound may be contaminated; multiple debridement procedures may be needed.
    - (c) IIIC: Open fracture is associated with vascular and neurologic injuries and requires vascular and plastic surgery.
- e. **P** The types of fractures typically occurring to children are Salter-Harris fractures, distal radius fractures (torus fractures and greenstick fractures), clavicular fractures, tibial shaft fractures, and radial head subluxation or nursemaid elbow. Salter-Harris classification: used for children and identifies where fracture is located relative to the growth plate: S = straight across; A = above growth plate; L = lower or below; T = through; ER = erasure of growth plate (crushed).

**IV. Phases of healing (Buckley & Page, 2016; Frost, 1989)**

- a. Reactive phase
  - i. Fracture and inflammatory phase: Bone fracture is an injury and thus incites an inflammatory response, which peaks 24 hr following the injury and is complete by the first week. Soon after fracture (3 to 5 days), the blood vessels constrict, stopping any further bleeding. During this stage, cellular signaling mechanisms work through chemotaxis and an inflammatory mechanism to attract the cells necessary to initiate the healing response.

- ii. Granulation tissue formation: Within 7 days, the body forms granulation tissue between the fracture fragments. This phase lasts about 2 weeks.
- b. Reparative phase
  - i. Callus formation: Cell proliferation and differentiation begin to produce osteoblasts and chondroblasts in the granulation tissue, synthesizing the extracellular organic matrices of woven bone and cartilage. Then the newly formed bone is mineralized. This stage requires 4 to 16 weeks, depending on the type and location of the fracture.
  - ii. Lamellar bone deposition: The meshlike callus of woven bone is replaced by a hard, rigid form of connective tissue (lamellar bone). Eventually, the woven bone and cartilage are replaced by trabecular bone (dense, hard, and slightly elastic connective tissue in which the fibers are impregnated with a form of calcium phosphate), restoring most of the bone's original strength. **P Pediatric fractures heal more quickly than adult fractures due to children's growth potential and a thicker, more active periosteum.**
- c. Remodeling phase
  - i. Trabecular bone is replaced by compact bone, remodeling to original bone contour.
  - ii. The final two stages can take several years in adults. **P Younger children have greater and more rapid remodeling potential.**

## V. Statistics

- a. Morbidity: In 2010, 671,000 Americans had open reduction for fractures listed on hospital discharge. **P Of those, 94,000 were under the age of 15 (Centers for Disease Control and Prevention [CDC], 2010).** The National Hospital Ambulatory Medical Care Survey for 2013 reported that fractures accounted for 3,300,831 visits to the emergency department in 2013.
- b. Mortality: Dependent upon multiple factors, including the specific bone affected, severity of fracture, associated soft tissue and organ involvement, age of individual, and presence of comorbidities. *Note:* Currently available mortality studies are associated with hip fractures (many related to the aging population and rising incidence of osteoporosis). Kim et al reported overall mortality rate of hip fractures as 15% to 20%, yet in older persons, this can increase to 36% over the year following hip fracture (Davenport, 2016; Kim et al, 2008).
- c. Cost: Because of the wide variety of fractures and treatment types and healthcare settings, no general figures are available about fractures. Figures are available regarding some very specific conditions and associated direct costs. For example, the estimated annual cost of hip fractures in 2009 in the United States ranged from \$10.3 to \$15.2 billion (LaBlanc et al, 2014). For a client without health insurance, surgical treatment of a broken leg typically costs \$17,000 to \$35,000, not including the surgeon's fee.

## G L O S S A R Y

- Buckle fracture:** Compression failure of bone that usually occurs at the junction of the metaphysis and the diaphysis. Commonly seen in distal radius.
- Closed fracture:** Fracture does not extend through the skin.
- Closed reduction:** Nonsurgical method for reduction and stabilization of fracture through a wide range of interventions, such as simple braces or aluminum splints, plaster or fiberglass casts, metal braces, and/or traction devices.
- Comminuted fracture:** Bone fragments into three or more pieces.
- Compartment syndrome:** Excessive swelling in the tissues associated with a fracture or crush injury to a limb, which elevates tissue pressure, resulting in decreased arteriovascular pressure and impaired tissue perfusion.
- Complete fracture:** Fracture line involves entire cross section of the bone, and bone fragments are usually displaced.
- Compression fracture:** Collapsing of bone usually involves vertebra of the thoracic or lumbar spine and is often seen in elderly people as a result of osteoporosis but may also occur traumatically.
- Crepitation:** Grating sound heard with movement of ends of fractured bones.
- Fragility fracture:** Fractures secondary to osteoporosis.
- Incomplete or greenstick fracture:** Involves only a portion of the cross section of the bone; one side breaks and the other usually just bends.
- Obligate fracture:** Break occurs diagonally.
- Open fracture:** Bone fragments extend through the muscle and skin and are potentially infected.

**Open reduction:** Surgical method for stabilization of a fracture using rods, pins, screws, and plates.

**Pathological fracture:** Fracture occurs in diseased bone—such as in cancer and osteoporosis—with no (spontaneous) or only minimal trauma.

**P Pediatric long bones:** Three main regions: epiphysis—each end of a long bone with associated joint cartilage; physis [growth plate]—cartilage cells that create solid bone with growth; and metaphysis—wide area below the physis, closest to the diaphysis/shaft.

**Periosteum:** Membrane that lines the outer surface of all bones, except at the joints of long bones, and serves as the attachment mechanism for muscles and tendons.

**P Physeal fractures:** Growth plate (physeal) fractures are defined as disruptions in the cartilaginous physis of long bones that may or may not involve epiphyseal or metaphyseal bone (Jones et al, 2017). There are two growth plates in immature long bones: the **horizontal** growth plate (physis) and the **spherical** growth plate (enables epiphyseal growth) (Rabin, 2017).

**P Plastic deformation:** The bone is angulated beyond its elastic limit, but the energy is insufficient to produce a fracture. No fracture line is visible radiographically. Unique to children. Most commonly seen in the ulna, occasionally in the fibula.

**Remodeling:** Stage in which fracture healing is completed (i.e., bone is restored to its original shape, structure, and mechanical strength). Remodeling of the bone occurs slowly over months to years.

(continues on page 704)

## G L O S S A R Y (continued)

**P** **Salter-Harris fracture:** Common fracture that occurs in growth plate in children. There are five types of Salter-Harris growth plate fractures. *Note:* An estimated 75% of all physeal fractures are type 2 and the most common physeal fracture in children (Rabin, 2017; Wound Care Society, 2016).

**Simple fracture:** Bone breaks into two pieces.

**Spiral fracture:** Break follows a helical line along and around the bone; commonly associated with a twisting motion.

**Stress fracture:** Hairline fracture due to overuse or repeated microtrauma, such as those seen in gymnasts, runners, and tennis or basketball players, as well as those who participate in marching bands or drill teams.

**Transverse fracture:** Break occurs in a straight line across the bone.

## CARE SETTING

Many fractures are managed at the community level. Although many of the interventions listed here are appropriate for this population, this plan of care addresses more complicated injuries encountered on an inpatient acute medical-surgical unit. *Note:* Definitive treatment of fractures may be delayed until life-threatening injuries, such as lung contusions, brain injury, or hemodynamic instability, have been stabilized

## RELATED CONCERNS

Craniocerebral trauma—acute care and rehabilitation, page 226

Pediatric considerations, page 993

Pneumonia, page 147

Psychosocial aspects of care, page 835

Acute kidney injury (acute renal failure), page 595

Spinal cord injury (acute care and rehabilitative phase), page 288

Surgical intervention, page 873

Venous thromboembolism (VTE) disease including deep vein thrombosis (DVT) and pulmonary embolism (PE), page 120

## CLIENT ASSESSMENT DATABASE

Symptoms of fracture depend on the site, severity, type, and amount of damage to other structures.

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Weakness
- Fatigue
- Gait and/or mobility problems

### MAY EXHIBIT

- Restriction or loss of function of affected part—may be immediate, because of the fracture, or develop secondarily from tissue swelling, pain
- Weakness of affected extremity
- Range-of-motion (ROM) deficits
- Discrepancy in limb length

#### CIRCULATION

- Hypertension—occasionally seen as a response to acute pain or anxiety, or hypotension from severe blood loss
- Tachycardia—stress response, hypovolemia
- Pulse diminished or absent distal to injury in extremity
- Pallor of affected part
- Tissue swelling
- Bruising or hematoma mass at site of injury

#### ELIMINATION

- Hematuria
- Changes in output—acute renal failure (ARF) with major skeletal muscle damage

**MAY REPORT (continued)****MAY EXHIBIT (continued)****NEUROSENSORY**

- Loss of or impaired motion or sensation
- Muscle spasms worsening over time
- Numbness or tingling (paresthesias)

**PAIN/DISCOMFORT**

- Sudden severe pain at time of injury—may be localized to the area of tissue or skeletal damage and then become more diffuse; however, can diminish on immobilization
- Absence of pain—suggests nerve damage
- Muscle-aching pain
- Muscle spasms or cramping following immobilization

**SAFETY**

- Use of alcohol or other drugs
- Circumstances of incident may not support type of injury incurred—may be suggestive of abuse

**TEACHING/LEARNING**

- Use of multiple medications—prescribed and/or over-the-counter (OTC) with interactive effects

**DISCHARGE PLAN CONSIDERATIONS**

- May require temporary assistance with transportation, self-care activities, and homemaker or maintenance tasks
- May require additional therapy or rehabilitation postdischarge
- Possible placement in assisted living or extended-care facility for a period of time

► Refer to section at end of plan for postdischarge considerations.

- Local musculoskeletal deformities—abnormal angulation, posture changes, shortening of limbs, rotation, or crepitus
- Giving way or collapse, locking of joints, dislocations
- Muscle spasms
- Visible weakness or loss of function

- Guarding or distraction behaviors
- Restlessness, irritability, moaning, crying
- Self-focus

- Skin lacerations
- Tissue avulsion
- Bleeding
- Color changes of skin
- Presence of risk factors for falling—age, osteoporosis, dementia, arthritis, other chronic conditions; preexisting unrecognized fracture

**DIAGNOSTIC STUDIES****TEST****WHY IT IS DONE**

- **Radiographic examinations:** First-line tool to determine location and extent of fractures/trauma and bone alignment.
- **Bone scans, tomograms, computed tomography (CT), and magnetic resonance imaging (MRI) scans:** Used to visualize changes of structure within the body and bone alignment. May be preferred diagnostic tool because of superior ability to image some types of injuries.
- **Bone densitometry:** Photons from a single- or dual-emitting source are used to measure comparative density of the spine, femur, or distal radius. These are then compared with normal values for a large patient population based on sex and age.

**WHAT IT TELLS ME**

May reveal preexisting and yet undiagnosed fracture(s).

These are used to visualize fractures, bleeding, and soft tissue damage; they differentiate between stress or trauma fractures and bone neoplasms.

Procedure may be done if fracture is suspected or known to be associated with osteoporosis. Note: Osteoporosis is often underrecognized and undertreated, and clients with fragility fractures secondary to osteoporosis are at risk of recurrent fracture (Inderjeeth et al, 2006).

(continues on page 706)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li><b>Arteriograms:</b> X-rays that use contrast media to evaluate arterial blood flow.</li><li><b>Complete blood count (CBC):</b> Battery of screening tests, which typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; white blood cell (WBC) count and differential.</li><li><b>Urine creatinine (Cr) clearance:</b> Measures filtering ability of the kidneys.</li><li><b>Coagulation profile:</b> Tests that measure blood coagulation. There are many types of coagulation tests, some of which are general and tell only whether a person's blood is clotting normally. Other tests can identify which element within the blood is causing abnormal clotting.</li></ul>	May reveal vascular damage.  Hct may be increased, reflecting hemoconcentration or dehydration, or Hct may be decreased, signifying hemorrhage at the fracture site or at distant organs in multiple trauma. Increased WBC count is a normal stress response after trauma.  Muscle trauma increases Cr load for renal clearance; decreased renal perfusion or impaired renal function also elevates Cr. Alterations may occur because of blood loss, multiple transfusions, or liver injury.

### NURSING PRIORITIES

1. Prevent further bone/tissue injury.
2. Alleviate pain.
3. Prevent complications.
4. Provide information about condition, prognosis, and treatment needs.

### DISCHARGE GOALS

1. Fracture stabilized.
2. Pain controlled.
3. Complications prevented or minimized.
4. Condition, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: risk for Injury [additional]

#### Possibly Evidenced By

Physical (e.g., loss of skeletal integrity [fractures]; movement of bone fragments)

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Bone Healing NOC

Maintain stabilization and alignment of fracture(s).  
Display callus formation/beginning union at fracture site as appropriate.

##### Risk Control NOC

Demonstrate body mechanics that promote stability at fracture site.

### ACTIONS/INTERVENTIONS

### RATIONALE

#### Positioning NIC

##### Independent

Ascertain type of fracture injury and medical treatment planned if surgery is not indicated.

Nonoperative (closed) therapy consists of immobilization through splinting, casting (fiberglass or plaster of Paris), or traction apparatus (skin and skeletal traction). Closed reduction is performed initially for any fracture that is displaced, shortened, or angulated. This is achieved by applying force (traction) to the long axis of the injured bone (usually femur) and then reversing the mechanism of injury/fracture. Note: With the advancement of orthopedic implant technology and operative techniques, traction is rarely used for definitive fracture/dislocation management (Buckley & Page, 2016).

Maintain bedrest or limb rest as indicated. Provide support of joints above and below fracture site, especially when moving and turning.

Provides stability, reducing possibility of disturbing alignment and aggravating muscle spasms, which enhances healing.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Cast Care: Wet (if cast is made of plaster of Paris) NIC</b> Support fracture site with pillows or folded blankets. Maintain neutral position of affected part with sandbags, splints, trochanter roll, or footboard.	Prevents unnecessary movement and disruption of alignment. Proper placement of pillows also can prevent pressure deformities in the drying cast.
Use the palms of the hands, not the fingertips, when touching the wet cast.	Fingertips can dent the cast before it is dry.
Obtain sufficient personnel for turning. Avoid using abduction bar for turning client with spica cast.	Hip, body, or multiple casts can be extremely heavy and cumbersome. Failure to properly support limbs in casts may cause damage to cast or injury to client and staff.
<b>Traction/Immobilization Care NIC</b> Evaluate splinted extremity for edema resolution.	Cocaptation splint (e.g., Jones-Sugar tong) may be used to provide immobilization of fracture while excessive tissue swelling is present. As edema subsides, readjustment of splint or application of fiberglass or plaster cast may be required for continued alignment of stable fracture.
Maintain position and integrity of traction apparatus, when used.	Traction is a less frequently used modality than in times past <b>P</b> but may still be used in some instances of femur fracture in children and older adults or clients with multitrauma who are not current candidates for surgery. Traction permits pull on the long axis of the fractured bone and overcomes muscle tension and shortening to facilitate alignment and union. Skeletal traction using pins, wires, or tongs permits use of greater weight for traction pull than can be applied to skin tissues.
Assess integrity of external fixator device.	<b>P</b> External fixation has evolved from being used primarily as a last-resort fixation method to becoming a mainstream technique used to treat a great many bone and soft tissue pathologies in both adults and children. This device provides stabilization and rigid support for fractured bone without use of ropes, pulleys, or weights, thus allowing for greater client mobility and comfort and facilitating wound care.
<b>Collaborative</b> Review follow-up or serial x-rays.	Provides visual evidence of proper alignment or beginning callus formation and healing process to determine level of activity and need for changes in, or additions to, the therapy plan.
Prepare client for surgery where indicated.	Surgical procedures may include open reduction and internal fixation (ORIF); flexible or rigid intramedullary nailing; insertion of plates, screws, and pins. Treatments are variable and dependent on the type, location, and severity of fracture and other internal injuries.
Initiate and maintain bone rehabilitation—early ambulation, weight-bearing activities, soft tissue massage, or electrical stimulation if used.	Promotes bone growth and healing.
<b>NURSING DIAGNOSIS:</b> <b>acute Pain</b> <b>May Be Related To</b> Physical injury agents [e.g., muscle spasms, movement of bone fragments, soft tissue injury, traction/immobility device] <b>Possibly Evidenced By</b> Self-report of intensity and characterizes of pain using standardized pain scale/instrument Self-focused/narrowed focus; facial expression of pain Guarding/protective behavior Changes in vital signs	(continues on page 708)

**NURSING DIAGNOSIS:** **acute Pain** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Pain Level NOC**

Report pain is relieved or controlled.

Display relaxed manner, able to participate in activities, and sleep and rest appropriately.

**Pain Control NOC**

Demonstrate use of relaxation skills and diversional activities, as indicated for individual situation.

**ACTIONS/INTERVENTIONS****RATIONALE****Pain Management: Acute NIC***Independent*

Maintain immobilization of affected part by means of bedrest, cast, splint, and traction. (Refer to ND: risk for Injury [additional].)

Relieves pain and prevents bone displacement/extension of tissue injury.

Elevate and support injured extremity.

Promotes venous return, decreases edema, and may reduce pain.

Avoid use of plastic sheets/pillows under limbs in cast.

Can increase discomfort by enhancing heat production in the drying cast.

Elevate bed covers and keep linens off toes.

Maintains body warmth without discomfort due to pressure of bedclothes on affected parts.

Evaluate and document reports of pain or discomfort, noting location and characteristics, including intensity (0 to 10, or similar age appropriate coded scale), relieving, and aggravating factors. Note nonverbal pain cues, such as changes in vital signs and emotions or behavior. Listen to reports of family member/significant other (SO) regarding client's pain.

Influences choice of, and monitors effectiveness of, interventions. Many factors, including level of anxiety, may affect perception of and reaction to pain. Note: Absence of pain expression does not necessarily mean lack of pain.

Encourage client to discuss problems related to injury.

Helps alleviate anxiety. Client may feel need to relive the accident experience.

Explain procedures before beginning them.

Allows client to prepare mentally for activity and to participate in controlling level of discomfort.

Medicate before care activities. Let client know it is important to request medication before pain becomes severe.

Promotes muscle relaxation and enhances participation.

Perform and supervise passive or active ROM exercises.

Maintains strength and mobility of unaffected muscles and facilitates resolution of inflammation in injured tissues.

Provide alternative comfort measures, for example, massage, back rub, or position changes.

Improves general circulation; reduces areas of local pressure and muscle fatigue.

Provide emotional support and encourage use of stress management techniques—progressive relaxation, deep-breathing exercises, and visualization or guided imagery; provide Therapeutic Touch.

Refocuses attention, promotes sense of control, and may enhance coping abilities in the management of the stress of traumatic injury and pain, which is likely to persist for an extended period.

Identify diversional activities appropriate for client's age, physical abilities, and personal preferences.

Prevents boredom, reduces muscle tension, and can increase muscle strength; may also enhance coping abilities.

Investigate any reports of unusual or sudden pain or deep, progressive, and poorly localized pain unrelieved by analgesics.

May signal developing complications, such as infection, tissue ischemia, or compartment syndrome. (Refer to ND: risk for peripheral Neurovascular Dysfunction, following.)

*Collaborative*

Apply cold or ice pack first 24 to 72 hours and as necessary per facility policy or protocol.

Reduces edema and hematoma formation; decreases pain sensation. Note: Length of application depends on degree of client comfort and whether the skin is carefully protected.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications, as indicated: opioid and nonopioid analgesics, such as morphine, meperidine (Demerol), or hydrocodone (Vicodin); injectable and oral nonsteroidal anti-inflammatory drugs (NSAIDs), such as ketorolac (Toradol) or ibuprofen (Motrin); and/or muscle relaxants, such as cyclobenzaprine (Flexeril) or carisoprodol (Soma).	Given to reduce pain and/or muscle spasms.
Maintain continuous intravenous (IV) or patient-controlled analgesia (PCA) using peripheral, epidural, or intrathecal routes of administration. Maintain safe and effective infusions and equipment.	Optimal pain management is essential to permit early mobilization and physical therapy and to maintain adequate blood level of analgesia, preventing fluctuations in pain relief with associated muscle tension or spasms.

NURSING DIAGNOSIS:	risk for peripheral Neurovascular Dysfunction
<b>Possibly Evidenced By</b>	
Fractures; trauma; orthopedic surgery; immobilization Vascular obstruction Mechanical compression (e.g., cast, dressing)	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Tissue Perfusion: Peripheral NOC</b>	Maintain function as evidenced by absence of pallor and palpable pulses, movement, and sensation (CMS) within normal range for individual.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Circulatory Precautions NIC</b>	
<i>Independent</i>	
Assess client's risk for development of venous thromboembolism (VTE) and acute compartment syndrome (ACS).	Any client with severe fractures or multiple fractures, especially of long bones (femur), is at risk for VTE (including deep vein thrombosis [DVT] and pulmonary embolus [PE], particularly if long-term bedrest is required). Clients with fractures of tibia or femur can be at risk for ACS if they have sustained severe tissue injury that resulted in significant bleeding into a closed compartment, compressed blood vessels such as might occur with a crush injury, or surgery to repair blood vessels with subsequent reperfusion to a compartment. ACS can also be a complication of circumferential dressings, splints, or casts that are applied too tightly (Walsh, 2011; Wedro, 2016).
Remove jewelry from affected limb immediately.	May restrict circulation when edema occurs.
Evaluate presence and quality of peripheral pulse distal to injury via palpation or Doppler. Compare with uninjured limb.	Decreased or absent pulse may reflect vascular injury and necessitates immediate medical evaluation of circulatory status. Be aware that occasionally a pulse may be palpated even though circulation is blocked by a soft clot through which pulsations may be felt. In addition, perfusion through larger arteries may continue after increased compartment pressure has collapsed the arteriole and venule circulation in the muscle.
Assess capillary return, skin color, and warmth distal to the fracture.	Return of color should be rapid (3–5 seconds in adults—time slows with age, and  <2 seconds in infants/children). White, cool skin indicates arterial impairment. Cyanosis suggests venous impairment. Note: Peripheral pulses, capillary refill, skin color, and sensation may be normal even in the presence of compartment syndrome because superficial circulation is usually not compromised.

(continues on page 710)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor vital signs. Note signs of general pallor or cyanosis, cool skin, and changes in mentation.	Inadequate circulating volume compromises systemic tissue perfusion.
Test stools and gastric aspirant for occult blood. Note continued bleeding at trauma or injection site(s) and oozing from mucous membranes.	Increased incidence of gastric bleeding accompanies fractures and trauma and may be related to stress or occasionally reflects a clotting disorder requiring further evaluation.
<b>Circulatory Care: Arterial [or] Venous Insufficiency NIC</b> Maintain elevation of injured extremity(ies) unless contraindicated by confirmed presence of compartment syndrome.	Promotes venous drainage and decreases edema. Note: In presence of increased compartment pressure, elevation of the extremity actually impedes arterial flow, decreasing perfusion. Casts or circumferential dressings can also cause arterial venous insufficiency.
Assess entire length of injured extremity for swelling and edema formation. Measure injured extremity and compare with uninjured extremity. Note appearance and spread of hematoma.	Increasing circumference of injured extremity may suggest general tissue swelling or edema but may also reflect hemorrhage. Note: A 1-inch increase in an adult thigh can equal approximately 1 unit of sequestered blood.
Note reports of pain extreme for type of injury or increasing pain on passive movement of extremity, development of paresthesia, muscle tension or tenderness with erythema, and change in pulse quality distal to injury. Do not elevate extremity. Report symptoms to physician at once.	Continued bleeding or edema formation within a muscle enclosed by tight fascia can result in impaired blood flow and ischemic myositis or compartment syndrome, necessitating emergency interventions to relieve pressure and restore circulation.
Investigate sudden signs of limb ischemia, such as decreased skin temperature, pallor, and increased pain.	Fracture dislocations of joints, especially the knee, may cause damage to adjacent arteries, with resulting loss of distal blood flow.
Encourage client to routinely exercise digits or joints distal to injury. Ambulate as soon as possible.	Enhances circulation and reduces pooling of blood, especially in the lower extremities.
Investigate tenderness, swelling, redness, or tissue pain on dorsiflexion of foot (positive Homans' sign).	There is an increased potential for thrombophlebitis and pulmonary emboli in clients who have been immobile for several days. Note: The absence of a positive Homans' sign is not a reliable indicator in many people. Refer to CP: Venous Thromboembolism (VTE) Disease including Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE), as indicated.
Perform neurovascular assessments, noting changes in motor and sensory function. Ask client to localize pain or discomfort.	Impaired feeling, numbness, tingling, and increased or diffuse pain occur when circulation to nerves is inadequate or nerves are damaged.
Test sensation of peroneal nerve by pinch or pinprick in the dorsal web between the first and second toe, and assess ability to dorsiflex toes, if indicated.	Length and position of peroneal nerve increase risk of its injury in the presence of leg fracture, edema, or compartment syndrome or because of malposition of traction apparatus.
<b>Cast Care: Maintenance NIC</b> Assess tissues around cast edges for rough places and pressure points. Investigate reports of "burning sensation" under cast.	These factors may be the cause of or be indicative of tissue pressure or ischemia, leading to breakdown and necrosis.
Monitor position and location of supporting ring of splints or sling.	Traction apparatus can cause pressure on vessels and nerves, particularly in the axilla and groin, resulting in ischemia and possible permanent nerve damage.
<b>Circulatory Care: Arterial [or] Venous Insufficiency NIC Collaborative</b> Apply ice bags around fracture site for short periods of time on an intermittent basis for 24 to 72 hours.	Reduces edema and hematoma formation, which could impair circulation. Note: Length of application of cold therapy is usually 20 to 30 minutes at a time.
Monitor Hgb/Hct and coagulation studies, such as pro-thrombin time (PT).	Assists in calculation of blood loss and needs and effectiveness of replacement therapy. Coagulation deficits may occur secondary to major trauma, in presence of fat emboli, or during anticoagulant therapy.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer IV fluids and blood products as needed.	Maintains circulating volume, enhancing tissue perfusion.
Administer medications, as indicated: low-molecular-weight heparin or heparinoids, such as enoxaparin (Lovenox), dalteparin (Fragmin), or fondaparinux (Arixtra), if indicated.	Anticoagulants may be given prophylactically to reduce threat of deep venous thrombus.
Apply antiembolic hose or sequential pressure hose or compression boots, as indicated.	Decreases venous pooling and may enhance venous return, thereby reducing risk of thrombus formation.
Split or bivalve cast as needed. Be sure to cut through wadding down to the skin.	May be done on an emergency basis to relieve restriction and improve impaired circulation resulting from compression and edema formation in injured extremity. The wadding under the cast may also be restrictive.
Refer for and monitor intracompartmental pressures as appropriate.	Diagnosis of compartment syndrome is typically performed with client under light or local anesthesia and measured by means of slit catheter or side-ported catheter. Compartment pressure must be interpreted within the context of the overall clinical picture. However, some practitioners believe that absolute pressure measurement of 30 mm Hg in the compartment should be the “critical pressure” for recommending fasciotomy (Jagminas, 2017).
Prepare for surgical intervention, such as fasciotomy, as indicated.	Failure to relieve pressure or correct compartment syndrome within 4 to 6 hours of onset can result in severe contractures, loss of function, and disfigurement of extremity distal to injury, possibly necessitating amputation.

### NURSING DIAGNOSIS: risk for impaired Gas Exchange

#### Possibly Evidenced By

Ventilation-perfusion imbalance (e.g., altered blood flow, blood or fat emboli)  
Alveolar and capillary membrane changes (e.g., interstitial congestion, pulmonary edema)

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status: Gas Exchange NOC

Maintain adequate respiratory function, as evidenced by absence of dyspnea or cyanosis; respiratory rate and arterial blood gases (ABGs) are within client's normal range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b> <i>Independent</i> Monitor respiratory rate and effort. Note stridor, use of accessory muscles, retractions, and development of central cyanosis.	Tachypnea, dyspnea, and changes in mentation are early signs of respiratory insufficiency and may be the only indicator of developing pulmonary emboli in the early stage. Remaining signs and symptoms reflect advanced respiratory distress and impending failure.
Auscultate breath sounds, noting development of unequal, hyperresonant sounds; also note presence of crackles, rhonchi, or wheezes and inspiratory crowing or croupy sounds.	Changes in or presence of adventitious breath sounds reflect developing respiratory complications—atelectasis, pneumonia, emboli, or acute respiratory distress syndrome (ARDS). Note: Early fixation of long-bone fractures (within 24 hours of injury) can reduce client's risk of developing ARDS (Walsh, 2011). Inspiratory crowing reflects upper airway edema and is suggestive of fat emboli as a reason for ARDS. Note: Fat embolus syndrome (FES) should be suspected in client with long-bone fractures who develops hypoxia, fever, bilateral pulmonary infiltrates, and a rash (Bulauitan & Gupta, 2017).

(continues on page 712)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct and assist with deep-breathing and coughing exercises. Reposition frequently.	Promotes alveolar ventilation and perfusion. Repositioning promotes drainage of secretions and decreases congestion in dependent lung areas.
Note increasing restlessness, confusion, lethargy, or stupor.	Impaired gas exchange or presence of pulmonary emboli can cause deterioration in client's level of consciousness as hypoxemia and acidosis develop.
Observe sputum for signs of blood.	Hemoptysis may occur with pulmonary emboli.
Inspect skin for petechiae above nipple line, in axilla, spreading to abdomen or trunk, buccal mucosa and hard palate, and conjunctival sacs and retina.	This is the most characteristic sign of fat emboli, which may appear within 2 to 3 days after injury.
<b>Collaborative</b>	
Instruct in, and encourage regular use of, incentive spirometry.	Maximizes ventilation and minimizes atelectasis.
Administer supplemental oxygen, if indicated.	Increases available O <sub>2</sub> for optimal tissue oxygenation.
Monitor laboratory studies, such as the following:	
Pulse oximetry or serial ABGs	Identifies situations in which oxygen desaturation is occurring and reveals complications such as impaired gas exchange and developing respiratory failure.
Hgb, calcium, erythrocyte sedimentation rate (ESR), serum lipase, fat screen, and platelets, as appropriate	Anemia, hypocalcemia, elevated ESR and lipase levels; fat globules in blood, urine, or sputum; and decreased platelet count (thrombocytopenia) are often associated with fat emboli.
Administer medications, as indicated, for example:	
Low-molecular-weight heparin or heparinoids, such as enoxaparin (Lovenox), dalteparin (Fragmin), or fondaparinux (Arixtra)	Used for prevention of thromboembolic phenomena, including deep vein thrombosis and pulmonary emboli.
Corticosteroids	Steroids have been used with some success to prevent and treat fat embolus.

## NURSING DIAGNOSIS: **impaired physical Mobility**

### May Be Related To

Alteration in bone structure integrity; neuromuscular, musculoskeletal, or sensory-perceptual impairment  
Decrease in muscle mass, strength, or control; disuse  
Pain; reluctance to initiate movement  
Prescribed movement restrictions—limb immobilization

### Possibly Evidenced By

Discomfort  
Decrease in range of motion; slowed movement; alteration in gait

### Desired Outcomes/Evaluation Criteria—Client Will

#### Skeletal Function NOC

Maintain position of function.  
Maintain or increase strength and function of affected and compensatory body part.

#### Mobility NOC

Regain and maintain mobility at the highest possible level.  
Demonstrate techniques that enable resumption of activities, especially activities of daily living (ADLs).

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bedrest Care NIC</b>	
<b>Independent</b>	
Assess degree of immobility produced by injury and/or treatment and note client's perception of immobility.	Client may be restricted by self-view or self-perception out of proportion with actual physical limitations, requiring information and interventions to promote progress toward wellness.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage participation in diversional or recreational activities. Maintain stimulating environment—computer/tablet, TV, music, personal possessions, clock, calendar, and visits from family and friends.	Provides opportunity for release of energy, refocuses attention, enhances client's sense of self-control and self-worth, and aids in reducing social isolation.
Instruct client in active, or assist with passive, ROM exercises of affected and unaffected extremities.	Increases blood flow to muscles and bone to improve muscle tone, maintain joint mobility, and prevent contractures, atrophy, and calcium resorption from disuse.
Encourage use of isometric exercises, starting with the unaffected limb.	Isometrics contract muscles without bending joints or moving limbs and help maintain muscle strength and mass. Note: These exercises are contraindicated while acute bleeding or edema is present.
Provide footboard, wrist splints, and trochanter or hand rolls, as appropriate.	Useful in maintaining functional position of extremities, hands, or feet and preventing complications such as contractures or footdrop.
Instruct in, and encourage use of, trapeze and "post position" for lower limb fractures.	Facilitates movement during hygiene, skin care, and linen changes; reduces discomfort of remaining flat in bed. "Post position" involves placing the uninjured foot flat on the bed with the knee bent while grasping the trapeze and lifting the body off the bed.
Assist with and encourage self-care activities such as bathing, shaving, and oral hygiene.	Improves muscle strength and circulation, enhances client control in situation, and promotes self-directed wellness.
Assist with mobility by means of wheelchair, walker, crutches, and/or canes as soon as possible. Instruct in safe use of mobility aids.	Early mobility reduces complications of bedrest, such as phlebitis, and promotes healing and normalization of organ function. Learning the correct way to use aids is important to maintain optimal mobility and client safety.
Monitor blood pressure (BP) with resumption of activity. Note reports of dizziness.	Postural hypotension is a common problem following prolonged bedrest and may require specific interventions, such as tilt table with gradual elevation to upright position.
Reposition periodically and encourage coughing and deep-breathing exercises.	Prevents or reduces incidence of skin and respiratory complications—decubitus ulcer, atelectasis, or pneumonia.
Auscultate bowel sounds. Monitor elimination habits and provide for regular bowel routine. Place on bedside commode, if feasible. Provide privacy.	Bedrest, use of analgesics, and changes in dietary habits can slow peristalsis and produce constipation. Nursing measures that facilitate elimination may prevent or limit complications.
Evaluate client's prior bowel habits.	Provides baseline for comparison with postsurgical concerns. The long-term use of opioids for pain and limited mobility causes constipation in orthopedic clients. Constipation is a major issue and needs immediate and ongoing attention.
Encourage increased fluid intake of 2000 to 3000 mL/d within cardiac tolerance, including acid-ash juices such as cranberry.	Keeps the body well hydrated, decreasing risk of urinary infection and stone formation, and helps to prevent constipation.
Provide diet high in proteins, carbohydrates, vitamins, and minerals, limiting protein content until after first bowel movement.	In the presence of musculoskeletal injuries, early good feeding is needed as nutrients required for healing are rapidly depleted. This can have a profound effect on muscle mass, tone, and strength. Note: Protein foods increase contents in small bowel, resulting in gas formation and constipation. Therefore, gastrointestinal (GI) function should be fully restored before protein foods are increased.
Increase the amount of roughage and fiber in the diet. Limit gas-forming foods.	Adding bulk to stool helps prevent constipation. Gas-forming foods may cause abdominal distention, especially in the presence of decreased intestinal motility.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Consult with physical or occupational therapist and/or rehabilitation specialist.	Useful in creating aggressive individualized activity or exercise program. Client may require long-term assistance with movement, strengthening, and weight-bearing activities as well as use of adjuncts, for example, walkers, crutches, canes; elevated toilet seats; pickup sticks or reachers; special eating utensils; and help for women with actions such as hooking a brassiere.
Refer to dietitian or nutrition team, as indicated.	The client with fractures, especially when associated with trauma, may have special nutritional considerations; for example, he or she may need enteral or parenteral feedings to maximize healing of tissues and bones.
Initiate bowel program—stool softeners, enemas, or laxatives, as indicated.	Important to promote regular bowel evacuation and prevent constipation.
Refer to psychiatric clinical nurse specialist or therapist, as indicated.	Client/SO may require more intensive treatment to deal with reality of current condition, prognosis, prolonged immobility, and perceived loss of control.

### NURSING DIAGNOSIS: risk for impaired Tissue Integrity/Pressure Ulcer

#### Possibly Evidenced By

Decrease in mobility; pressure over bony prominence  
Alteration in sensation, circulation  
Surface friction, shearing forces  
Incontinence

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Tissue Integrity: Skin & Mucous Membranes NOC

Verbalize relief of discomfort.  
Demonstrate behaviors or techniques to prevent skin breakdown and facilitate healing, as indicated.  
Achieve timely wound or lesion healing, if present.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Skin Surveillance NIC</b> <b>Independent</b> Examine the skin for open wounds, foreign bodies, rashes, bleeding, discoloration, duskiness, and/or blanching.	Provides information regarding skin circulation and problems that may be caused by application and/or restriction of cast, splint, or traction apparatus, or edema formation that may require further medical intervention.
Provide specialty beds and therapeutic foam mattress (e.g., Geomatts™) as indicated.	Used for clients with a high risk of skin breakdown or in whom long-term immobility is expected.
Massage skin and with emollient lotion. Keep bed linens dry and free of wrinkles. Place water pads or other padding under elbows and heels/float heels, as indicated.	Reduces pressure on susceptible areas and risk of abrasions or skin breakdown.
Reposition frequently. Encourage use of trapeze, if possible. Establish/adhere to regular turning schedule when client not able to turn independently.	Lessens constant pressure on same areas and minimizes risk of skin breakdown. Use of trapeze may reduce risk of abrasions to elbows and heels.
<b>Cast Care: Wet NIC</b> Plaster cast application and skin care: Cleanse skin with soap and water, rubbing gently with alcohol and/or dust with small amount of powder, per facility protocol.	Provides a dry, clean area for cast application.
Cut a length of stockinette to cover the area and extend several inches beyond the cast.	Useful for padding bony prominences, finishing cast edges, and protecting the skin.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Use palm of hand to apply, hold, or move cast and support on pillows after application; avoid using fingertips to hold cast.	Prevents indentations or flattening over bony prominences, such as back of heels, and weight-bearing areas, which would cause abrasions or tissue trauma. An improperly shaped or dried cast is irritating to the underlying skin and may lead to circulatory impairment. Fingertips may dent the cast when it is wet.
Trim excess plaster from edges of cast as soon as casting is completed.	Uneven plaster is irritating to the skin and may result in abrasions.
Promote cast drying by removing bed linen, exposing to circulating air.	Prevents skin breakdown caused by prolonged moisture trapped under cast.
Observe for potential pressure areas, especially at the edges of and under the splint/cast.	Pressure can cause ulcerations, necrosis, and/or nerve palsies. These problems may be painless when nerve damage is present.
Pad or petal tape the edges of the cast with waterproof tape or moleskin.	Provides an effective barrier to cast flaking and moisture. Helps prevent breakdown of cast material at edges and reduces skin irritation and excoriation.
Cleanse excess plaster from skin while still wet, if possible.	Dry plaster may flake into completed cast and cause skin irritation/damage.
Protect cast and skin in perineal area, providing frequent perineal care.	Prevents tissue breakdown and infection by fecal contamination.
Instruct client/SO to avoid inserting objects inside casts.	"Scratching an itch" may cause tissue injury.
Massage the skin around the cast edges with alcohol.	Has a drying effect, which toughens the skin. Creams and lotions are not recommended because excessive oils can seal cast perimeter, not allowing the cast to "breathe." Powders are not recommended because of potential for excessive accumulation inside the cast.

**Pressure Ulcer Prevention NIC****Collaborative**

Provide foam mattress, sheepskins, flotation pads, or air mattress, as indicated.

Because of immobilization of body parts, bony prominences other than those affected by the casting may suffer from decreased circulation.

Prepare for/assist with cast splitting (e.g., monovalve, bivalve), or cut a window in cast, as indicated.

Cutting or hinging the cast allows the release of pressure and provides access for wound and skin care.

**NURSING DIAGNOSIS: risk for Infection****Possibly Evidenced By**

Alteration in skin/tissue integrity, invasive procedures [skeletal traction]

Increased environmental exposure to pathogens

**Desired Outcomes/Evaluation Criteria—Client Will****Infection Severity NOC**

Achieve timely wound healing, be free of purulent drainage or erythema, and be afebrile.

**ACTIONS/INTERVENTIONS****RATIONALE****Infection Protection NIC****Independent**

Inspect the skin for preexisting irritation or breaks in continuity.

Pins or wires should not be inserted through skin infections, rashes, or abrasions—may lead to bone infection.

Assess pin sites and skin areas, noting reports of increased pain or burning sensation, or presence of edema, erythema, foul odor, or drainage.

May indicate onset of local infection or tissue necrosis, which can lead to osteomyelitis.

(continues on page 716)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide sterile pin and wound care according to protocol, and exercise meticulous handwashing.	May prevent cross-contamination and possibility of infection.
Instruct client not to touch the insertion sites.	Minimizes risk of contamination.
Line perineal cast edges with plastic wrap.	Damp, soiled casts can promote growth of bacteria.
Observe wounds for formation of bullae, crepitation, bronze discoloration of skin, and frothy or fruity-smelling drainage.	Signs suggestive of gas gangrene infection.
Assess muscle tone, reflexes, and ability to speak.	Muscle rigidity, tonic spasms of jaw muscles, and dysphagia reflect development of tetanus.
Monitor vital signs. Note presence of chills, fever, and malaise and any changes in mentation.	Hypotension and confusion may be seen with gas gangrene; tachycardia, chills, and fever reflect developing sepsis.
Investigate abrupt onset of pain or limitation of movement and localized inflammation, in injured extremity, along with fever, chills, fatigue, lethargy, or irritability.	May indicate development of osteomyelitis. Note: Post-traumatic osteomyelitis more commonly affects adults and typically occurs in the tibia. The major organism is <i>Staphylococcus aureus</i> . Infections with an open fracture often must be treated with a combination of antimicrobial agents and surgery (Kishner et al, 2016).
Institute prescribed isolation procedures.	Presence of purulent drainage requires wound and linen precautions to prevent cross-contamination.
<b>Collaborative</b>	
Monitor laboratory/diagnostic studies, for example:	
CBC	Anemia may be noted with osteomyelitis; leukocytosis is usually present with infective processes.
ESR, C-reactive protein (CRP)	Elevated in osteomyelitis.
Cultures and sensitivity of wound, serum, and/or bone	Identifies infective organism and effective antimicrobial agent(s).
MRI, CT scans	Detects abnormalities such as necrotic bone and soft tissue involvement indicative of osteomyelitis and is useful in gauging the success of therapy (Kishner et al, 2016).
Administer medications, as indicated, for example:	
IV/topical antibiotics	Broad-spectrum antibiotics may be used prophylactically or may be geared toward a specific microorganism.
Tetanus toxoid prophylaxis	May be given to client who is not current with immunization or who is at high risk because of wound type (e.g., puncture wounds, significant devitalized tissue, or contact with soil or manure likely to harbor tetanus organisms—outdoors, rural areas, or the work environment).
Provide wound or bone irrigations, and apply warm, moist soaks, as indicated.	Local debridement and cleansing of wounds reduce microorganisms and incidence of systemic infection. Continuous antimicrobial drip into bone may be necessary to treat osteomyelitis, especially if blood supply to bone is compromised.
Assist with procedures such as incision and drainage, placement of drains, and hyperbaric oxygen therapy.	Numerous procedures may be carried out in treatment of local infections, osteomyelitis, and gas gangrene.
Prepare for surgery, as indicated.	Sequestrectomy, removal of necrotic bone, is necessary to facilitate healing and prevent extension of infectious process.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

**May Be Related To**

Insufficient information; insufficient knowledge of resources  
Misinformation presented by others

<b>NURSING DIAGNOSIS:</b> <b>deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs</b> (continued)	
<b>Possibly Evidenced By</b>	
Insufficient knowledge Inaccurate follow-through of instructions Development of preventable complications	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Knowledge: Treatment Regimen NOC</b>	
Verbalize understanding of condition, prognosis, and potential complications. Participate in learning process, and utilize available resources. Perform necessary procedures correctly and explain reasons for actions.	
<b>ACTIONS/INTERVENTIONS</b>	
<b>Teaching: Disease Process NIC</b>	
<i>Independent</i>	
Review pathology, prognosis, and future expectations.	Provides knowledge base from which client can make informed choices. Note: Internal fixation devices can ultimately compromise the bone's strength, and intra-medullary nails or rods and plates may be removed at a future date.
Provide accurate and relevant information regarding current and future needs.	Client can incorporate information into self-care plans, while minimizing difficulties associated with change.
<b>Cast care when client with new fracture is discharged to self-care</b>	
Discuss care of “green” or wet cast.	Promotes proper curing to prevent cast deformities and associated misalignment or skin irritation. Note: Placing a “cooling” cast directly on rubber or plastic pillows traps heat and increases drying time.
Suggest the use of a blow-dryer to dry small areas of dampened cast.	Cautious use can hasten drying.
Demonstrate use of plastic bags to cover plaster cast during wet weather or while bathing. Clean soiled cast with a slightly dampened cloth and some scouring powder.	Protects from moisture, which softens the plaster and weakens the cast. Note: Fiberglass casts are being used more frequently. They also need to be thoroughly dried if they get wet to avoid developing mold.
Recommend use of loose-fitting or adaptive clothing.	Facilitates dressing and grooming activities.
Suggest ways to cover toes if appropriate, for example, using stockinette or soft socks.	Helps maintain warmth and protect from injury.
List activities that the client can perform independently and those that require assistance.	Organizes activities around need and who is available to provide help.
Identify signs and symptoms requiring medical evaluation, for example, severe pain, fever or chills, or foul odors; changes in sensation, swelling, burning, numbness, tingling, skin discoloration, paralysis, or white/cool toes or fingertips; and warm spots, soft areas, or cracks in the cast.	Prompt intervention may reduce severity of complications such as infection or impaired circulation. Note: Some darkening of the skin reflecting vascular congestion may occur normally when walking on the casted extremity or using casted arm; however, this should resolve with rest and elevation.
Discuss post cast-removal instructions:	
Elevate the extremity, as needed.	Swelling and edema tend to recur briefly after cast removal.
Instruct client to continue activities and exercises as prescribed.	Reduces stiffness and improves strength and function of affected extremity.
Inform client that the skin under the cast is commonly mottled and covered with scales or crusts of dead skin.	It will be several weeks before normal appearance returns.
Instruct to wash skin gently with soap and water and lubricate with a protective emollient.	New skin is extremely tender because it has been protected beneath a cast.

(continues on page 718)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Inform client that muscles may appear flabby and atrophied (less muscle mass); recommend supporting the joint above and below the affected part and the use of mobility aids—elastic bandages, splints, braces, crutches, walkers, or canes.	Muscle strength will be reduced and new or different aches and pains may occur secondary to loss of support.
<b>For client discharged with external fixator</b>	
Review proper pin or wound care.	Reduces risk of bone and tissue trauma and infection, which can progress to osteomyelitis.
Emphasize the importance of not adjusting clamps or nuts of an external fixator device.	Tampering may alter compression and misalign fracture.
Recommend cleaning external fixator device regularly.	Keeping device free of contaminants reduces risk of infection.
<b>Miscellaneous interventions for optimal healing</b>	
Discuss dietary needs.	A balanced diet adequate in quality protein and rich in calcium promotes healing and general well-being.
Review individual drug regimen, as appropriate.	Proper use of pain medication and antiplatelet agents can reduce risk of complications.
Reinforce methods of mobility and ambulation aids/devices when indicated and any necessary support services (e.g., handicap transportation van for appointments).	Most fractures require casts, splints, or braces during the healing process, affecting client's mobility and independence. Further damage and delay in healing could occur secondary to failure to follow physician orders or improper use of ambulatory devices.
Identify available community services, such as a rehabilitation team, durable medical equipment providers, home nursing care or homemaker services, social services, vocational counselor.	Provides assistance to meet individual needs and support independence. Promotes optimal self-care and recovery.
Emphasize importance of clinical and therapy follow-up appointments.	Fracture healing may take as long as a year for completion, and client cooperation with the medical regimen facilitates proper union of bone. Physical therapy and occupational therapy may be indicated for exercises to maintain or strengthen muscles and improve function.
Discuss plan for future prophylactic antibiotic use.	When hardware, such as pins, screws, and plates, is implanted, it provides a place for infection to develop. If there are procedures that open the GI tract to the bloodstream, such as dental procedures or a colonoscopy, antibiotics should be given.

#### POTENTIAL CONSIDERATIONS following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

##### In addition to surgical considerations:

- **risk for Trauma**—balancing difficulties, weakness, reduced muscle coordination, history of previous trauma
- **impaired physical Mobility**—neuromuscular skeletal impairment, pain/discomfort, prescribed movement restrictions (limb immobilization)
- **Self-Care deficit**—musculoskeletal impairment, decreased strength/endurance, pain
- **risk for Infection**—inadequate primary defenses: broken skin, traumatized tissues, environmental exposure, invasive procedures, skeletal traction

## AMPUTATION

I. **Pathophysiology**—partial or complete detachment of body part with residual extremity covered with well-vascularized muscle and skin, although reattachment surgery may be possible for fingers, hands, and arms

- a. Primarily two types of amputations
  - i. Open or provisional: requires subsequent revisions
  - ii. Closed or flap: All surgical revision is performed and the wound closed in one procedure.

- b. Amputation levels (Kalapatapu, 2017): the level of the amputation is dictated by the extent of the disease, healing potential of the stump, and rehabilitation potential of the client. Although preservation of limb length is desirable, removal of all nonviable and infected tissue is a higher priority.
  - i. Lower-extremity amputation: partial foot or toe, below knee (BKA), above knee (AKA), hip disarticulation or hemipelvectomy, and bilateral lower-limb loss. A variety of foot amputations are available that can salvage the client's ability to ambulate with orthotic modifications, including mid- and hindfoot amputation, transmetatarsal amputation, and digit amputation.
  - ii. Upper-extremity amputation: partial hand or finger, below elbow, above elbow, shoulder disarticulation or forequarter, and bilateral upper-limb loss
  - c. Two basic types of prosthetic designs are used: exoskeletal and endoskeletal (see Glossary).

## II. Etiology

- a. Varied causes (Ertl et al, 2016; Kalapatapu, 2017; Kishner & Laborde, 2015)
  - i. Unsalvageable extremity due to critical limb ischemia in person with vascular disease. Main causes are vascular disease (54%) (including diabetes and peripheral arterial disease), trauma (45%), and cancer (less than 2%) (Ziegler-Graham et al, 2008).
  - ii. Trauma resulting in mangled extremity or failed attempt at limb salvage. Examples include direct limb transection or a severe open fracture with an associated unreconstructable neurovascular injury (often associated with motor vehicle crashes or industrial accidents),

- battlefield wounds. *Note:* Between 2001 and 2016, about 1650 U.S. troops lost hands, arms, legs, or feet in current combat locales (Montgomery, 2017).
- iii. Malignant bone tumors
- iv. Infections with extensive soft tissue or bony destruction, such as osteomyelitis, gangrene
- v. Congenital disorders: approximately 5% of cases
- b. Lower-extremity amputations are performed much more frequently than upper-extremity amputations.
- c. Upper-extremity amputations generally result from trauma caused by industrial accidents.

## III. Statistics

- a. Morbidity: In 2017, nearly 2 million persons were living with the loss of a limb with numbers of new amputations (includes all types) widely ranging from 30,000 to 70,000 in the United States each year (Ertl et al, 2016; Kishner & Laborde, 2015; Statistics Brain, 2016). Retrospective studies have shown that the rate of leg and foot amputations among U.S. adults 40 years or older with diagnosed diabetes declined by 65% between 1996 and 2008 (Li et al, 2012; Salcido, 2015).
- b. Mortality: The most common causes of death following amputation for peripheral artery disease (PAD) are cardiac complications, sepsis, and pneumonia (Kalapatapu, 2017). In 2013, among 186,338 older people with identified PAD who underwent major lower-extremity (LE) amputation, the mortality rate was 13.5% at 30 days, 48.3% at 1 year, and 70.9% at 3 years (Jones et al, 2013).
- c. Costs: Hospital costs associated with amputation totaled more than \$8.3 billion based on 2009 data (Amputee Coalition, 2017).

## GLOSSARY

**Complete amputation:** Total detachment of appendage or limb from the body.

**Endoskeletal prosthetic:** Aluminum, titanium, and other tubular materials form the inner structure, providing strength; external shape is removable, usually composed of foam or skin-simulating material.

**Exoskeletal prosthetic:** Outer plastic laminated skin with wood or urethane foam interiors where the strength is provided by the outer layer.

**Neuromas:** Painful proliferation of nerve fibers at the proximal end of a severed nerve.

**Partial amputation:** Some soft tissue remains attached to the body.

**Prosthetic:** An artificial substitute or replacement of a part of the body, such as a tooth, heart valve, a joint (e.g., hip, a knee), or a limb—the leg, arm, which is designed for functional and/or cosmetic reasons.

**Residual limb:** Remaining portion of the amputated limb (once referred to as the stump).

## CARE SETTING

Client is treated in inpatient acute surgical unit and subacute or rehabilitation unit.

## RELATED CONCERNS

Cancer, general considerations, page 945

Diabetes mellitus and diabetic ketoacidosis, page 454

Psychosocial aspects of care, page 835

Surgical intervention, page 873

## CLIENT ASSESSMENT DATABASE

Data depend on underlying reason for surgical procedure, for example, severe trauma, peripheral vascular/arterial occlusive disease, diabetic neuropathy, osteomyelitis, and cancer.

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<b>ACTIVITY/REST</b> <ul style="list-style-type: none"><li>• Actual or anticipated limitations imposed by condition or amputation</li></ul>	
<b>CIRCULATION</b>	<ul style="list-style-type: none"><li>• Presence of edema</li><li>• Absent or diminished pulses in affected limb or digits</li></ul>
<b>EGO INTEGRITY</b> <ul style="list-style-type: none"><li>• Concern about negative effects or anticipated changes in lifestyle, financial situation, reactions of others</li><li>• Feelings of helplessness, powerlessness</li></ul>	<ul style="list-style-type: none"><li>• Anxiety, apprehension</li><li>• Irritability</li><li>• Anger, frustration</li><li>• False cheerfulness</li><li>• Withdrawal, grief</li></ul>
<b>NEUROSENSORY</b> <ul style="list-style-type: none"><li>• Loss of sensation in affected area</li><li>• Phantom pain</li></ul>	
<b>SAFETY</b> <ul style="list-style-type: none"><li>• Loss of ability to walk; altered gait</li><li>• History of falls, traumatic injuries, risky behavior, or work environment resulting in injury</li></ul>	<ul style="list-style-type: none"><li>• Necrotic or gangrenous area</li><li>• Nonhealing wound</li><li>• Local infection</li><li>• Altered gait; increased risk for falls</li></ul>
<b>SEXUALITY</b> <ul style="list-style-type: none"><li>• Concern about intimate relationships</li></ul>	
<b>SOCIAL INTERACTION</b> <ul style="list-style-type: none"><li>• Problems related to illness or condition</li><li>• Concern about role function</li><li>• Concern about reaction of others</li></ul>	
<b>TEACHING/LEARNING</b>	
<b>DISCHARGE PLAN CONSIDERATIONS</b> <ul style="list-style-type: none"><li>• May require assistance with wound care and supplies, adaptation to prosthesis or other ambulatory devices, transportation, homemaker or maintenance tasks, and possibly self-care activities and vocational retraining</li></ul>	
► Refer to section at end of plan for postdischarge considerations.	

## DIAGNOSTIC STUDIES

Studies depend on the underlying condition necessitating amputation and are used to determine the appropriate level for amputation.

TEST WHY IT IS DONE	WHAT IT TELLS ME
• <b>X-rays:</b> Used to visualize pathology and the extent of involvement.	Identify skeletal abnormalities, trauma, or mass or tumor.
• <b>Computed tomography (CT) scan:</b> Used to visualize changes of structure within the body and bone alignment.	Identifies soft tissue and bone destruction, neoplastic lesions, osteomyelitis, and hematoma formation.
• <b>Angiography and blood flow studies:</b> Evaluates circulation and tissue perfusion.	Helps predict potential for tissue healing after amputation.
• <b>Doppler ultrasound, laser Doppler flowmetry:</b> Performed to assess and measure blood flow.	Determines adequacy of skin microcirculation and helps predict tissue or muscle viability and primary wound healing.
• <b>Transcutaneous oxygen pressure:</b> Maps out areas of greater and lesser perfusion in the involved extremity.	Helps determine lowest level at which to perform amputation for maximum preservation of limb length and successful healing.
• <b>Thermography:</b> Measures temperature differences in an ischemic limb at two sites—the skin and the center of the bone.	The lower the difference is between the two readings, the greater the chances will be for healing.
• <b>C-reactive protein (CRP):</b> Inflammatory marker as indicator of infection.	Important if osteomyelitis or sepsis is suspected or known factor in considering amputation. A level greater than 8 mg/L indicates significant infection.
• <b>White blood cell (WBC) count/differential:</b> Assesses body's ability to respond to and eliminate infection.	Elevation and "shift to left" suggest infectious process.
• <b>Biopsy:</b> Determines presence of pathology and treatment needs or options.	Confirms diagnosis of benign or malignant mass.

## NURSING PRIORITIES

1. Alleviate pain.
2. Prevent complications.
3. Promote mobility and functional abilities.
4. Support psychological and physiological adjustment.
5. Provide information about surgical procedure, prognosis, and treatment needs.

## DISCHARGE GOALS

1. Pain relieved or controlled.
2. Complications prevented or minimized.
3. Mobility and function regained or compensated for.
4. Dealing with current situation realistically.
5. Surgical procedure, prognosis, and therapeutic regimen understood.
6. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: acute Pain

#### May Be Related To

Physical injury agent (e.g., tissue and nerve trauma)  
[Psychological (e.g., impact of loss of body part, stress, anxiety)]

#### Possibly Evidenced By

Self-report of intensity and characteristics of pain using standardized scale/instrument  
Guarding/protective behavior  
Narrowed focus  
Changes in vital signs

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Level NOC

Report pain is relieved or controlled.  
Appear relaxed and able to rest and sleep appropriately.  
Verbalize understanding of phantom pain and methods to provide relief.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b> <i>Independent</i>	
Document location and intensity of pain (0 to 10, or similar coded scale) as well as quality and aggravating factors. Investigate changes in pain characteristics—numbness and tingling.	Aids in evaluating need for and effectiveness of interventions. Changes may indicate developing complications, such as necrosis or infection.
Elevate affected part by raising foot of bed slightly or using a pillow or sling for upper-limb amputation.	Lessens edema formation by enhancing venous return; reduces muscle fatigue and skin or tissue pressure. Note: After initial 24 hours and in absence of edema, residual limb may be extended and kept flat.
Provide or promote general comfort measures (e.g., frequent turning, back rub) and diversional activities. Encourage use of stress management techniques, such as deep-breathing exercises, visualization and guided imagery, and Therapeutic Touch.	Nonpharmacological measures can refocus attention, promote relaxation, may enhance coping abilities, and may decrease occurrence of phantom-limb pain.
Investigate reports of progressive or poorly localized pain unrelieved by analgesics.	May indicate developing compartment syndrome, especially following traumatic injury. (Refer to CP: Fractures; ND: risk for peripheral Neurovascular Dysfunction.)
Acknowledge reality of residual limb pain and phantom pain and that various modalities will be tried for pain relief.	Residual limb pain (RLP, also known as stump pain) is believed to come from injuries to bone, muscle, nerve, and skin at the amputation site (Ertl et al, 2016; Hsu & Cohen, 2013). Stump pain is typically described as a sharp, burning, electrical-like, or "skin-sensitive" pain localized to a superficial incision, or be perceived deep in the residual limb, or can sometimes encompass the whole residual limb. Similar to phantom pain, stump pain can persist for years (Ehde et al, 2000). In contrast, phantom limb pain (PLP) is thought to originate in the part of the brain that controlled the limb before it was amputated. PLP is a painful or unpleasant sensation in the distribution of the lost body part and may be due to complete or partial interruption of afferent nerve impulses. PLP varies in character from sharp, shooting, or electrical-like to dull, squeezing, and cramping. It can be localized to the entire limb or just one region of the missing limb. PLP typically occurs within the first 6 months after loss of a limb, but it can persist for years (Hsu & Cohen, 2013).
<b>Collaborative</b>	
Administer medications, as indicated, such as the following:	Treatment of postamputation pain (PAP) involves a multimodal approach that includes injections, pharmacotherapy, complementary and alternative therapies, surgery, and prevention.
Opioid analgesics, for example, morphine sulfate (Astramorph, MS Contin), fentanyl patch; combination agents: oxycodone with acetaminophen (Percocet); injected/infused NMDA antagonists (e.g., ketamine [Ketalar], memantine [Namenda]; calcitonin [Miacalcin]); anti-depressants (e.g., amitriptyline [Elavil], nortriptyline [Pamelor]); anticonvulsants (e.g., gabapentin [Neurontin], pregabalin [Lyrica]); and anti-inflammatory agents (e.g., ibuprofen [Motrin])	Many medications and routes of administration may be used. In acute PAP, opioid analgesics are the mainstay of pain management to reduce pain and muscle spasm. When first- and second-line drugs (e.g., opioids, anticonvulsants, or antidepressants) fail to provide satisfactory analgesia, third-line drugs such as ketamine and calcitonin may provide a suitable option. However, all of these drugs have shown mixed results in relieving RLP or PLP pain in studies (Amputee Coalition of America & U.S. Army Amputee Patient Care Program, 2014; Fudin, 2009; Hickman, 2013). Note: Some studies have shown that botulinum toxin resulted in a statistically significant improvement in RLP at 1 month and was sustained over the 6-month study period (Wu et al, 2012).
Instruct in, and monitor use of, patient-controlled analgesia (PCA).	PCA provides for continuous and timely drug administration, preventing fluctuations in pain level and muscle tension and spasms associated with surgical procedures.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Refer to interdisciplinary providers as appropriate—pain management specialist, physical therapist, prosthetist, orthopedic surgeon, and neurosurgeon.	A multidisciplinary approach is required, and many therapy modalities may be needed both in the acute and the long-term management of pain.
Discuss and monitor use of transcutaneous electrical nerve stimulation (TENS) of the residual limb.	TENS may help to treat phantom limb pain in some people, especially in combination with medications for neuropathic pain.

### NURSING DIAGNOSIS: risk for ineffective peripheral Tissue Perfusion

#### Possibly Evidenced By

Diabetes mellitus; trauma [peripheral vascular disease; hypovolemia; tissue edema/hematoma formation]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Tissue Perfusion: Peripheral NOC

Maintain adequate tissue perfusion as evidenced by palpable peripheral pulses; warm, dry skin; and timely wound healing.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Circulatory Precautions NIC</b>	
<b>Independent</b>	
Monitor vital signs. Palpate peripheral pulses, noting strength and equality.	General indicators of circulatory status and adequacy of perfusion.
Perform periodic neurovascular assessments—sensation, movement, pulse, skin color, and temperature.	Amputation wound healing is a concern because most are performed for compromised circulation, for example, with peripheral vascular disease (PWD) or damaged soft tissue resulting from trauma (Ertl et al, 2016). Postoperative tissue edema, hematoma formation, or restrictive dressings may impair circulation to residual limb, resulting in tissue necrosis.
Note type of dressing used—soft, soft with pressure wrap, semirigid, graduated pressure stump shrinker.	Postoperative dressing varies, each with its advantages and disadvantages. For example, a soft dressing does not control edema and may not shape stump well to prepare for prosthesis. Adding a pressure wrap distributes pressure but requires measures to avoid possible circulatory impairment and contracture. Semirigid dressings (e.g., plaster splint, Unna paste bandage) or rigid dressings allow for decreased edema and immediate postoperative prosthesis with early ambulation but limit access to the wound (Virani et al, 2015).
Inspect dressings and drainage device, noting amount and characteristics of drainage, especially in client receiving antithrombotic therapy, including DVT prophylaxis.	Continued blood loss may indicate need for additional fluid replacement and evaluation for coagulation defect or surgical intervention to ligate bleeder, hematoma evacuation, or revision of stump.
Support residual limb at all times, and avoid placing limb in dependent position when client is seated. Encourage and assist with early ambulation.	Prevents dependent edema formation and associated circulatory stasis with its potential local and systemic complications.
Investigate reports of persistent or unusual pain in operative site.	Hematoma can form in muscle pocket under the flap, compromising circulation and intensifying pain.
Evaluate nonoperated lower limb and residual limb for redness, tenderness, or stump hematoma.	There is an increased incidence of thrombus formation in amputee with preexisting peripheral vascular disease or diabetic changes. However, it also appears that deep vein thrombosis (DVT) is associated with traumatic amputations. For example, a recent study found a 59% incidence of DVT in clients with combat-related injuries requiring major amputation (Hannon et al, 2016).

(continues on page 724)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b>	
Administer intravenous (IV) fluids and blood products as indicated.	Maintains circulating volume to maximize tissue perfusion.
Apply antiembolic or sequential compression hose to nonoperated leg, as appropriate.	Enhances venous return, reducing venous pooling and risk of thrombophlebitis.
Administer anticoagulant(s), as indicated.	May be useful in preventing thrombus formation without increasing risk of postoperative bleeding or hematoma formation.
Monitor laboratory studies, for example:	
Hemoglobin/hematocrit (Hgb/Hct)	Indicators of hypovolemia, or dehydration, which can impair tissue perfusion.
Prothrombin time (PT)/activated partial thromboplastin time (aPTT)	Evaluates need for, and effectiveness of, anticoagulant therapy and identifies developing complications.

## NURSING DIAGNOSIS: risk for Infection

### Possibly Evidenced By

Alteration in skin integrity, traumatized tissue; invasive procedures; malnutrition  
Chronic illness (e.g., diabetes mellitus, PAD, malignancy)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Wound Healing: Primary Intention NOC

Achieve timely wound healing, be free of purulent drainage or erythema, and be afebrile.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Wound Care NIC</b>	
<b>Independent</b>	
Evaluate client's risk for infection.	The client's risk is closely associated with preoperative conditions. For example, amputation may have been performed because of prior infection (e.g., associated with diabetes, pressure, or traumatic injuries). Other risk factors include client's age and general health, environmental conditions, and lifestyle issues (e.g., smoking, drug use). However, postoperatively the client remains at high risk for new or recurrent infections, which can impede stump (and other) tissue healing and impact quality of life. Note: Wound infection rates widely, but a range of 13% to 40% (following major lower extremity amputation) was reported in one study. This is most likely because lower-extremity amputation is often associated with open, infected wounds classified as contaminated at the time of surgery (Kalapatapu, 2017).
Maintain strict hand hygiene measures, using soap and water or antibacterial soaps, before and after client care and after glove removal.	Hand hygiene remains the cornerstone of infection prevention and control in healthcare and community settings.
Maintain aseptic technique when changing dressings and caring for wound.	Minimizes opportunity for introduction of bacteria.
Inspect wound (noting redness and excess warmth) and dressings daily or per prescription; note characteristics of drainage, particularly in client with unexplained fever or reporting excessive stump pain.	Early detection of developing infection provides opportunity for timely intervention and prevention of more serious complications such as osteomyelitis.
Maintain patency and routinely empty drainage device.	Hemovac and Jackson-Pratt drains facilitate removal of drainage, promoting wound healing and reducing risk of infection.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Cover dressing with plastic when using the bedpan if incontinent.	Reduces risk of contamination in high-level, lower-limb amputation.
Expose residual limb to air and wash with mild soap and water after dressings are discontinued.	Maintains cleanliness, minimizes skin contaminants, and promotes healing of tender, fragile skin.
Monitor vital signs.	Temperature elevation and tachycardia may reflect developing sepsis.
<b>Collaborative</b>	
Obtain wound and drainage cultures and sensitivities, as appropriate.	Identifies presence of infection, specific organisms, and appropriate therapy.
Administer antibiotics, as indicated.	Wide-spectrum antibiotics may be used prophylactically, or antibiotic therapy may be geared toward specific organisms.
Monitor serum glucose levels, administer antidiabetic medications as appropriate.	Hyperglycemia can promote growth of bacteria and delay healing.

## NURSING DIAGNOSIS: impaired physical Mobility

### May Be Related To

Alteration in bone structure integrity; neuromuscular, musculoskeletal or sensory-perceptual impairment (e.g., loss of a limb—particularly a lower extremity)  
Decrease in muscle strength, mass; physical deconditioning; prescribed movement restrictions  
Pain, pharmaceutical agent  
Insufficient knowledge of mobility strategies; insufficient environmental support

### Possibly Evidenced By

Limited range of motion; difficulty turning; slowed/uncoordinated movement  
Postural instability; alteration in gait  
Discomfort

### Desired Outcomes/Evaluation Criteria—Client Will

#### Coordinated Movement NOC

Increase strength and function of affected and compensatory body parts.  
Move about environment safely.

#### Knowledge: Body Mechanics NOC

Verbalize understanding of individual situation and safety measures.  
Demonstrate techniques and behaviors that enable resumption of activities.  
Maintain position of function as evidenced by absence of contractures.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Amputation Care NIC</b>	
<b>Independent</b>	
Provide residual limb care on a routine basis; for example, inspect the area, clean and dry it thoroughly, and rewrap the residual limb with elastic bandage or air splint. Conversely, apply a “stump shrinker” or heavy stockinette sock for “delayed” prosthesis.	Provides opportunity to evaluate healing and note complications unless covered by immediate prosthesis. Wrapping residual limb controls edema and helps form residual limb into conical shape to facilitate fitting of prosthesis. Note: Air splint may be preferred because it permits visual inspection of the wound.
Measure circumference periodically.	Measurement is done to estimate shrinkage to ensure proper fit of sock and prosthesis.
Rewrap residual limb immediately with an elastic bandage; elevate if “immediate or early” cast is accidentally dislodged. Prepare for reapplication of cast.	Edema will occur rapidly, thus delaying rehabilitation.
Assist with specified range-of-motion (ROM) exercises for both the affected and unaffected limbs, beginning early in postoperative stage.	Prevents contracture deformities, which can develop rapidly and could delay prosthesis usage.

(continues on page 726)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage active and isometric exercises for upper torso and unaffected limbs.	Increases muscle strength to facilitate transfers and ambulation and promotes mobility and more normal lifestyle.
Provide trochanter rolls, as indicated.	Prevents external rotation of lower-limb residual limb.
Instruct client to lie in prone position, as tolerated, at least twice a day with pillow under abdomen and lower-extremity residual limb.	Strengthens extensor muscles and prevents flexion contracture of the hip, which can begin to develop within 24 hours of sustained malpositioning.
Caution against keeping pillow under lower-extremity residual limb or allowing BKA limb to hang dependently over side of bed or chair.	Use of pillows can cause permanent flexion contracture of hip; a dependent position of residual limb impairs venous return and may increase edema formation.
Demonstrate/assist with transfer techniques and use of mobility aids such as a trapeze, crutches, or a walker.	Facilitates self-care and client's independence. Proper transfer techniques prevent shearing abrasions/dermal injury related to "scooting."
Assist with ambulation with timing based on client's specific needs and prosthesis implemented:	Today, prosthetics are available for almost every body part and for just about every condition. Timing is completely individual. Note: Current researchers are working out how to best match prosthetic components with the needs of amputees and investigating different care strategies for residual limbs after surgery. These strategies may improve understanding of wound care in general and could ultimately reduce the need for amputations. Already, wound healing that used to take weeks or even months can now occur much faster (VA Research and Development Program, n.d.).
Immediate postoperative fitting	Reduces potential for injury. Ambulation after lower-limb amputation depends on timing of prosthesis placement.
Early postoperative fitting	A rigid dressing is applied to the residual limb and a pylon and artificial foot are attached. Weight-bearing begins within 24 to 48 hours. Weight-bearing normally does not occur until 10 to 30 days postoperatively.
Delayed fitting	More common in areas that do not have facilities available for immediate or early application of prosthesis or when the condition of the residual limb and/or client precludes these choices.
Help client continue preoperative muscle exercises as able or when allowed out of bed; for example, the client should perform abdomen-tightening exercises and knee bends, hop on foot, and stand on toes while holding on to chair for balance.	Contributes to gaining improved sense of balance and strengthens compensatory body parts.
Instruct client in residual limb-conditioning exercises, for example, pushing the residual limb against a pillow initially, then progressing to harder surface.	Hardens the residual limb by toughening the skin and altering feedback of resected nerves to facilitate use of prosthesis.
<b>Collaborative</b> Refer to rehabilitation team, for example, physical and occupational therapy and prosthetic specialists.	Provides for creation of exercise and activity program to meet individual needs and strengths and identifies mobility functional aids to promote independence. Early use of a temporary prosthesis promotes activity and enhances general well-being and a positive outlook. Note: Vocational counseling and/or retraining also may be indicated.
Provide foam or flotation mattress.	Reduces pressure on skin and tissues that can impair circulation, potentiating risk of tissue ischemia and breakdown.

## NURSING DIAGNOSIS: Grieving

### May Be Related To

Loss of significant object (e.g., body part, change in functional abilities, professional/family role, perception of self)

**NURSING DIAGNOSIS:** **Grieving** (continued)**Possibly Evidenced By**

Anger; psychological distress; detachment  
Finding meaning in a loss; personal growth

**Desired Outcomes/Evaluation Criteria—Client Will****Grief Resolution NOC**

Begin to show adaptation and verbalize acceptance of self in situation (amputee).  
Recognize and incorporate changes into self-concept in accurate manner without negating self-esteem.  
Develop realistic plans for adapting to new role or role modifications.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Grief Work Facilitation NIC</b>	
<b>Independent</b>	
Assess and consider client's preparation for and view of amputation.	Research shows that amputation poses serious threats to client's psychological and psychosocial adjustment. Client who views amputation as life-saving or reconstructive may be able to more quickly accept the new self. Client with sudden traumatic amputation or who considers amputation to be the result of failure in other treatments is at greater risk for disturbances in self-concept and complicated grieving.
Encourage expression of fears, negative feelings, and grief over loss of body part.	Venting emotions helps client begin to deal with the fact and reality of life without a limb.
Reinforce preoperative information, including type and location of amputation, type of prosthetic fitting if appropriate (i.e., immediate, delayed), and expected postoperative course, including pain control and rehabilitation.	Provides opportunity for client to question and assimilate information and begin to deal with changes in body image and function, which can facilitate postoperative recovery.
Assess degree of support available to client.	Sufficient support by significant other (SO) and friends can facilitate rehabilitation process and grief resolution.
Discuss client's perceptions of self, related to change, and how client sees self in usual lifestyle and role functioning.	Aids in defining concerns in relation to previous lifestyle and facilitates problem-solving. For example, client likely fears loss of independence, ability to work or express sexuality, and may experience role and/or relationship changes.
Ascertain individual strengths and identify previous positive coping behaviors.	Helpful to build on strengths that are already available for client to use in dealing with current situation.
Encourage participation in activities of daily living (ADLs). Provide opportunities to view and care for residual limb, using the moment to point out positive signs of healing.	Promotes independence and enhances feelings of self-worth. Although integration of residual limb into body image can take months or even years, looking at the residual limb and hearing positive comments made in a normal, matter-of-fact manner can help client with this acceptance.
Encourage or provide for a visit by another amputee, especially one who is successfully rehabilitating.	A peer who has been through a similar experience serves as a role model and can provide validity to comments and hope for recovery and a positive future.
Provide open environment for client to discuss concerns about sexuality.	Promotes sharing of beliefs and values about sensitive subject and identifies misconceptions or myths that may interfere with adjustment to situation.
Note withdrawn behavior, negative self-talk, use of denial, depression, or overconcern with actual or perceived changes.	Identifies stage of grief and may indicate need for more intensive interventions. Note: Studies show that posttraumatic stress disorder (PTSD) develops in 20% to 22% of people who have amputations associated with combat or accidental injury (Kalapatapu, 2017).
<b>Collaborative</b>	
Discuss availability of various resources, for example, psychiatric or sexual counseling, a prosthetist, or a physical or occupational therapist.	May need assistance and long-term support to facilitate optimal adaptation and establish a "new" normal for future.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs****May Be Related To**

Insufficient information/knowledge of resources, or interest in learning  
Misinformation presented by others

**Possibly Evidenced By**

Insufficient knowledge  
Inaccurate follow-through of instructions  
Development of preventable complications

**Desired Outcomes/Evaluation Criteria—Client Will****Knowledge: Disease Process NOC**

Verbalize understanding of condition, disease process, and potential complications.

**Knowledge: Treatment Regimen NOC**

Verbalize understanding of therapeutic needs.  
Correctly perform necessary procedures and explain reasons for the actions.  
Initiate necessary lifestyle changes and participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Amputation Care NIC</b> <i>Independent</i> Review disease process, surgical procedure, and future expectations.	Provides knowledge base from which client can make informed choices.
Instruct in dressing and wound care, inspection of residual limb using mirror to visualize all areas, skin massage, and appropriate wrapping of the residual limb.	Promotes competent self-care, facilitates healing and fitting of prosthesis, and reduces potential for complications.
Discuss general residual limb care, for example:  Wash daily with mild soap and water; rinse and pat dry. Do this daily or more often if client sweats a lot or is treating a rash or infection.	Hygiene of residual limb is critical because most of the time it is enclosed in the socket or liner of the prosthesis, rendering it more prone to skin breakdown and infection.
Massage the residual limb after dressings are discontinued and suture line is healed.	Massage softens the scar and prevents adherence to the bone, decreases tenderness, and stimulates circulation.
Avoid the use of alcohol-based lotions or use of powders.	Although a small amount of lotion may be indicated if skin is dry, emollients and creams soften skin and may cause maceration when prosthesis is worn. Powder may cake, potentiating skin irritation.
Wear only properly fitted, clean, wrinkle-free limb sock.	Residual limb may continue to shrink for up to 2 years, and an improperly fitting sock or one that is mended or dirty can cause skin irritation or breakdown.
Use clean cotton T-shirt under harness for upper-limb prosthesis.	Absorbs perspiration; prevents skin irritation from harness.
Review common problems and appropriate actions.	Problems can occur even when client is taking precautions, for example, the development of a red, sore area that does not resolve when prosthesis is off or a blister caused by pressure between socket liner and skin. These problems need early medical follow-up if home interventions are not effective.
Emphasize importance of well-balanced diet and adequate fluid intake.	Provides needed nutrients for tissue regeneration and healing, aids in maintaining circulating volume and normal organ function, and aids in maintenance of proper weight. Note: Weight changes affect fit of prosthesis.
Recommend cessation of smoking. Offer referral resources for cessation programs.	Smoking potentiates peripheral vasoconstriction, impairing circulation and tissue oxygenation.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review and demonstrate care of prosthetic device. Stress importance of routine maintenance and periodic refitting.	Ensures proper fit and alignment, reduces risk of complications, and prolongs life of prosthesis.
Encourage continuation of postoperative exercise program.	Enhances circulation, healing, and function of affected part, facilitating adaptation to prosthetic device.
Identify techniques to manage phantom sensation and phantom pain. (Refer to ND: acute Pain.)	Persistent and/or recurring pain requires long-term management, with multiple strategies and modalities, including desensitization therapy, intermittent compression, medications, TENS, and nerve blocks. Note: Electrical stimulation offers a short-term rerouting or stimulation of different nerve pathways, thus reducing the activity of the usual pain patterns.
Encourage taking care of whole self: body, mind, and spirit. Emphasize socialization, stress management, relaxation training, or counseling.	Various techniques may be implemented, such as relaxation breathing, exercises, visualization, or biofeedback to reduce muscle tension and enhance client's control of situation and coping abilities.
Identify signs and symptoms requiring medical evaluation—edema, erythema, increased or odorous drainage from incision, changes in sensation, movement, skin color, and persistent phantom pain.	Prompt intervention may prevent serious complications and/or loss of function. Note: Chronic phantom limb pain may indicate neuroma, requiring surgical resection.
Identify community and rehabilitation support, such as a certified prosthetist-orthotist, amputee groups, home-care and homemaker services, as needed.	Facilitates transfer to home, supports independence, and enhances coping.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

**In addition to considerations in surgical intervention plan of care:**

- **impaired physical Mobility**—decreased muscle mass/strength; musculoskeletal impairment; deconditioning; decreased endurance
- **risk for physical Trauma**—balancing difficulties, muscle weakness, reduced muscle coordination, lack of safety precautions, hazards associated with use of assistive devices
- **disturbed Body Image**—loss of body part, change in functional abilities
- **Self-Care deficit/impaired Home Maintenance (dependent on location of amputation)**—musculoskeletal impairment, decreased strength/endurance, pain, depression

## TOTAL JOINT REPLACEMENT

### I. Purpose

- a. Definitive treatment for advanced, irreversibly damaged joints with loss of function and unremitting pain
- b. Common conditions: degenerative osteoarthritis (OA) and rheumatoid arthritis (RA); selected fractures, such as with hip and femoral neck; joint instability; congenital hip disorders; avascular necrosis

### II. Procedures

- a. Performed on any joint except the spine, with hip and knee replacements the most common procedures
- b. Prosthesis may be metallic, polyethylene, ceramic, or a combination
- c. Implanted with methylmethacrylate cement or may be a porous, coated implant that encourages bony ingrowth

### III. Statistics

- a. Morbidity: The 2016 report from the American Joint Replacement Registry (AJRR) shows a total of 161,040

procedures for 2015 (AJRR, 2016). According to a study published in 2014, 4.7 million had undergone total knee replacement, and 2.5 million total hip replacement (Mayo Clinic Staff, 2014).

- b. Mortality: Rate is low. Studies reviewed by Bone and Joint Research and published by the National Center for Biotechnical Information (NCBI, National Institutes of Health [NIH], 2014) suggest that total hip replacement may cause a short-term increased risk of mortality—0.30% at 30 days and 0.65% at 90 days (NCBI, NIH, 2014).
- c. Cost: A recent study of **average hospital costs** for a typical total knee arthroplasty (TKA) in the United States was \$31,124, and the average price of a total hip arthroplasty (THA) was \$30,124, although wide variations occurred across geographic regions (Blue Cross Blue Shield Blue Health Intelligence, 2015).

## G L O S S A R Y

**Arthroplasty:** Reconstruction or replacement of a diseased or damaged joint.

**Cemented joint replacement (cemented joint arthroplasty):** Procedure in which bone cement or polymethylmethacrylate (PMMA) is used to fix the prosthesis in place in the joint.

**Hemiarthroplasty:** Replacement of only the femoral head.

**Ingrowth, or cementless, joint replacement (ingrowth, or cementless, arthroplasty):** Procedure that does not involve bone cement to fix the prosthesis in place; an

anatomic or press fit with bone ingrowth into the surface of the prosthesis leads to a stable fixation.

**Primary joint replacement:** Initial surgical procedure.

**Revision:** Second or succeeding procedures to correct loose, unstable hardware or address return of pain in the joint.

**THA:** Total hip arthroplasty, also called total hip replacement (THR).

**TJR:** Total joint replacement.

**TKA:** Total knee arthroplasty, also called total knee replacement (TKR).

## CARE SETTING

Client is treated in an inpatient acute surgical unit and subacute or rehabilitation unit.

## RELATED CONCERNS

Fractures, page 702  
Psychosocial aspects of care, page 835  
Rheumatoid arthritis (RA), page 824  
Sepsis and septic shock, page 772  
Surgical intervention, page 873  
Venous thromboembolism (VTE) disease including deep vein thrombosis (DVT) and pulmonary embolism (PE), page 120

## CLIENT ASSESSMENT DATABASE

### DIAGNOSTIC DIVISION

#### MAY REPORT

#### MAY EXHIBIT

### ACTIVITY/REST

- Generalized muscle weakness
- Fatigue
- Nighttime pain; interruption of sleep, delayed falling asleep, or awakened by pain
- Does not feel well rested
- History of occupation or participation in sports activities that wear on a particular joint
- Inability to participate in occupational and/or recreational activities at desired level

- Decreased muscle strength and tone

### HYGIENE

- Difficulty performing activities of daily living (ADLs)
- Use of special equipment and/or mobility devices
- Need for assistance with some or all activities

### NEUROSENSORY

- Soft tissue swelling, nodules
- Muscle spasm, stiffness
- Joint deformities

### PAIN/DISCOMFORT

- Persistent disabling pain
- Pain—dull, aching, persistent in affected joint(s)
- Pain worsened by movement
- Difficulty walking due to pain
- Stiffness in joints, which is worse in the morning or after a period of inactivity

- Decreased range of motion (ROM) of affected joints
- Gait disturbances—effort to compensate for joint pain
- Guarding affected area
- Positioning to ease pain
- Self-focused

**MAY REPORT (continued)****MAY EXHIBIT (continued)****SAFETY**

- Traumatic injury and/or fractures affecting the joint
- History of inflammatory, debilitating arthritis—RA or osteoarthritis
- Congenital deformities

- Changes in gait
- Falls

**TEACHING/LEARNING**

- Current medication use—anti-inflammatories, analgesics, opioids, steroids, hormone replacement therapy (HRT), bone resorption inhibitor (e.g., denosumab [Prolia]), calcium supplements

**DISCHARGE PLAN CONSIDERATIONS**

- May need assistance with transportation, self-care activities, and homemaker or maintenance tasks
- Possible placement in rehabilitation or extended-care facility for continued therapy and assistance

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****TEST****WHY IT IS DONE****WHAT IT TELLS ME**

- **X-rays:** Visualize and evaluate skeletal changes or damage, determine treatment options, and guide orthopedic surgery.
- **Bone scan, computed tomography (CT) scans, magnetic resonance imaging (MRI):** Nuclear scans to assess status of bones and joints.

May reveal destruction of articular cartilage, bony demineralization, fractures, soft tissue swelling, narrowing of joint space, joint subluxations, or deformity.

Determines extent of degeneration and rules out malignancy or infectious process.

**NURSING PRIORITIES**

1. Alleviate pain.
2. Prevent complications.
3. Promote optimal mobility.
4. Provide information about diagnosis, prognosis, and treatment needs.

**DISCHARGE GOALS**

1. Mobility increased.
2. Complications prevented or minimized.
3. Pain relieved or controlled.
4. Diagnosis, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS: acute Pain****May Be Related To**

Physical injury agents (e.g., surgical procedure, muscle spasms, preexisting chronic joint diseases)

**Possibly Evidenced By**

Self-report of intensity and characteristics of pain using standardized scale/instrument  
 Expressive behavior (e.g., restlessness, irritability)  
 Guarding behavior; protective behavior  
 Narrowed focus, self-focused  
 Changes in vital signs

(continues on page 732)

**NURSING DIAGNOSIS:** **acute Pain** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Pain Level NOC**

Report pain relieved or controlled.

Appear relaxed, able to rest or sleep appropriately.

**Pain Control NOC**

Demonstrate use of relaxation skills and diversional activities, as indicated by individual situation.

**ACTIONS/INTERVENTIONS****RATIONALE****Pain Management: Acute NIC****Independent**

Perform comprehensive assessment of pain, noting intensity (0 to 10, or similar coded scale), duration, and location. Determine if pain is at operative or different site, associated with ROM or weight-bearing, associated with vascular compromise or fever.

Maintain prescribed position of operated extremity.

Provide comfort measures—frequent repositioning, back rub—and diversional activities. Encourage stress management techniques, such as progressive relaxation, guided imagery, visualization, and meditation. Provide Therapeutic Touch, as appropriate.

Medicate on a round-the-clock schedule initially and well before activities or therapies if receiving prn dosing.

Investigate reports of sudden, severe joint pain with muscle spasms and changes in joint mobility, or sudden, severe chest pain with dyspnea and restlessness.

**Collaborative**

Collaborate in pain management plan as indicated, such as:

Opioids—use of patient-controlled analgesia (PCA) and/or targeted analgesia, such as epidural infusion or continuous femoral blockade (**initiated** perioperatively), along with intravenous NSAIDs such as ketorolac (Toradol)

Oral analgesics such as **opioid and nonopioid** analgesics (e.g., oxycodone [OxyContin], morphine sulfate extended-release capsules [Kadian, Avinza]); **anti-inflammatory drugs** (e.g., ibuprofen [Motrin], diclofenac [Voltaren]); **acetaminophen alone or in combination with opioids** (e.g., oxycodone and acetaminophen [Percocet], hydrocodone and acetaminophen [Vicodin]); **gabapentinoids** (e.g., gabapentin [Neurotin]; pregabalin [Lyrica])

Provides information on which to base and monitor effectiveness of interventions.

Reduces muscle spasm and undue tension on new prosthesis and surrounding tissues.

Reduces muscle tension, refocuses attention, promotes sense of control, and may enhance coping abilities in the management of discomfort or pain, which can persist for an extended period.

Total joint replacement (TJR) surgeries are known to be accompanied by moderate to severe pain from the reconstruction. Pain management is often complicated by client's age, comorbidities, and general deconditioned status before surgery. Effectively managing postoperative pain is essential for helping client achieve the best possible functional outcome (Rasul & Wright, 2016).

Early recognition of developing problems, such as dislocation of prosthesis or blood or fat pulmonary emboli, provides opportunity for prompt intervention and prevention of more serious complications.

Combination of different analgesics and techniques that act by different mechanisms (known as multimodal analgesia [MMA]) results in improved analgesic effect with lower adverse effects than with a single analgesic agent (Gregory et al., 2017; Hogg et al., 2014).

Relieves surgical pain and reduces muscle tension and spasm, which contribute to overall discomfort. Opioid infusion (including epidural) may be given during the first 24 to 48 hours for knee replacement or for breakthrough pain following hip replacement. Note: Use of ketorolac (Toradol) or other NSAID is contraindicated when client is receiving enoxaparin (Lovenox) therapy.

Optimal pain relief seems to result from combining a variety of medications. Each agent acts by a different mechanism and at a different site in the nervous system, thus providing maximal pain relief while minimizing adverse effects of any single agent (Wuhrman & Cooney, 2011).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Apply and maintain ice packs, as indicated.	Cold therapy is considered part of a three-point approach to postoperative care: (1) pain medication, (2) elevation, and (3) icing. Studies support that cooling reduces bleeding and tissue edema in surgical area and lessens complications associated with excessive swelling, bruising, and inflammation. Note: Some clinicians recommend daily use of cold therapy as long as any pain remains (may be days or weeks).
Refer for/assist mobilization, such as early ambulation, transfers, gait training and other physical therapy modalities, or continuous passive motion (CPM) device (for knee joint) when used.	Improves circulation and range of motion of affected joint and muscles and can relieve muscle spasms related to disuse.

NURSING DIAGNOSIS: risk for Bleeding
<b>Possibly Evidenced By</b>
Trauma Treatment regimen (e.g., surgery, medications) Insufficient knowledge of bleeding precautions [e.g., during use of anticoagulant therapy]
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>
<b>Blood Loss Severity NOC</b> Be free of active bleeding or excessive blood loss as evidenced by stable vital signs, usual mentation, absence of skin pallor, and adequate urinary output.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bleeding Precautions NIC</b>	
<b>Independent</b>	
Monitor vital signs, including pulse and blood pressure and urinary output.	Tachycardia, falling blood pressure (BP), and low urinary output may reflect hypovolemia due to blood loss.
Assess skin color and moisture. Note changes in mentation or delay in return of usual mentation after recovery from anesthesia.	May reflect effects of anemia and hypoxemia from blood loss.
Monitor amount and characteristics of drainage on dressings and from suction device (e.g., Hemovac, Jackson-Pratt drain) when used. Note swelling in operative area.	May indicate excessive bleeding or hematoma formation, which can potentiate neurovascular compromise. Note: Drain is usually discontinued the second postoperative day (Shiel, 2017).
<b>Collaborative</b>	
Monitor laboratory studies, such as: Hemoglobin (Hgb), hematocrit (Hct)	Many clients will not require blood transfusions during or after joint replacement surgery due to improved surgical techniques. Those who do need transfusion may have low blood counts prior to surgery. Blood transfusion may be needed if blood loss would negatively affect cardiopulmonary status in the immediate postoperative period.
Administer IV fluids and donor or autologous blood transfusions, as needed.	Restores circulating volume to maintain perfusion. Note: Current management of postoperative anemia in elective TJR (when preoperative anemia is diagnosed) includes infusion of client's own red blood cells (autologous donation) donated and banked at least a month out from the procedure or use of the hormone erythropoietin (EPO) to increase red blood count. When an anemic client has considerable perioperative blood loss, salvaged blood collected from operative site during first 6 hours following procedure may be reinfused per protocol. Research continues on this practice to determine benefit vs risk (Jackson, 2010).

## NURSING DIAGNOSIS: risk for Infection

### Possibly Evidenced By

Alteration in skin integrity; invasive procedures (exposure of joint, implantation of foreign body)  
Decrease in hemoglobin, immunosuppression—long-term corticosteroid use

### Desired Outcomes/Evaluation Criteria—Client Will

#### Infection Severity NOC

Achieve timely wound healing, be free of purulent drainage or erythema, and be afebrile.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<i>Independent</i>	
Identify client's particular risk for developing surgical site (or other) infection.	Hip and knee replacements are the most frequently performed of all total joint surgeries and are most often done in people between the ages of 55 and 80. While age is not, in itself, a limiting factor for surgery, older clients are more likely to have comorbidities (e.g., diabetes, existing infections, malnutrition, anemia), which can impact postoperative healing. Note: Literature review shows that the leading cause of 30-day unplanned readmission after total knee arthroplasty (TKA) is deep or superficial surgical site infection (SSI) (12.1% for knee; 23.5% for hip) (Lovett-Carter et al, 2018).
Model and promote hand hygiene by staff and client.	Reduces risk of cross-contamination.
Use strict aseptic or clean technique, as indicated, to reinforce or change dressings and when handling drains. Instruct client not to touch or scratch incision.	Prevents contamination and risk of wound infection, which could require removal of prosthesis.
Maintain patency of drainage devices (e.g., Hemovac, Jackson-Pratt) when present. Note characteristics of wound drainage.	Drains reduce risk of infection by preventing accumulation of blood and secretions (medium for bacterial growth) in the joint space. Purulent, odorous drainage is indicative of infection, and continuous drainage from incision may reflect developing skin tract, which can potentiate infectious process.
Assess skin and incision color, temperature, and integrity; note presence of erythema, inflammation, and loss of wound approximation.	Provides information about status of healing process and alerts staff to early signs of surgical site infection.
Investigate reports of increased incisional pain and changes in characteristics of pain.	Deep, dull, aching pain in operative area may indicate developing infection in joint. Note: Infection can be devastating because once infection sets in, joint may not be salvageable and prosthetic loss may occur.
Monitor temperature. Note presence of chills.	Although temperature elevations are common in early postoperative phase, elevations occurring 5 or more days postoperatively and/or presence of chills usually require intervention to prevent more serious complications, such as sepsis, osteomyelitis, tissue necrosis, and prosthetic failure.
Encourage fluid intake coupled with a high-protein diet.	Maintains fluid and nutritional balance to support tissue perfusion and provide nutrients necessary for cellular regeneration and tissue healing.
<i>Collaborative</i>	
Maintain reverse or protective isolation, if appropriate.	May be done initially to reduce contact with sources of possible infection, especially in an elderly, immunosuppressed, or diabetic client.
Administer antibiotics, as indicated.	Used prophylactically in the operating room and for the first 24 hours to prevent infection. Late infections may require intravenous (IV) antibiotic treatments for several weeks, in an effort to save the prosthetic joint.

**NURSING DIAGNOSIS:** risk for peripheral Neurovascular Dysfunction**Possibly Evidenced By**

Orthopedic surgery; immobilization; mechanical compression (e.g., dressing, brace)  
Vascular obstruction

**Desired Outcomes/Evaluation Criteria—Client Will****Tissue Perfusion: Peripheral NOC**

Maintain function as evidenced by sensation and movement within normal limits for individual situation.  
Demonstrate adequate tissue perfusion as evidenced by palpable pulses, brisk capillary refill, warm or dry skin, and normal color.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Circulatory Care: Arterial [or] Venous Insufficiency NIC</b>	
<i>Independent</i>	
Palpate pulses. Evaluate capillary refill and skin color and temperature. Compare with unoperated limb.	Diminished or absent pulses, delayed capillary refill time, pallor, blanching, cyanosis, and coldness of skin reflect diminished circulation or perfusion. Comparison with unoperated limb provides clues as to whether neurovascular problem is localized or generalized.
Assess motion and sensation of operated extremity.	Increasing pain, numbness or tingling, and/or inability to perform expected movements (such as ankle-flexing) suggest nerve injury, compromised circulation, or dislocation of prosthesis, requiring immediate intervention.
Test sensation of peroneal nerve by pinch or pinprick in the dorsal web between first and second toe, and assess ability to dorsiflex toes after hip or knee replacement.	Position and length of peroneal nerve increase risk of direct injury or compression by tissue edema or hematoma.
Ensure that stabilizing devices (such as abduction pillow or splint device) are in correct position and are not exerting undue pressure on skin and underlying tissue. Avoid use of pillow or bed knee catch under knees.	Reduces risk of pressure on underlying nerves or compromised circulation to extremities.
Evaluate for calf tenderness, tension, and redness.	Although clinical signs are often not reliable in this population, surveillance should be carried out. Early identification of thrombus development and intervention may prevent embolus formation.
Encourage regular “foot pumps” throughout day.	Pushing the foot down, pointing toes, and pulling toes up toward the ceiling causes the calf to tighten and assists venous return to prevent blood pooling and reduce risk of deep vein thrombosis (DVT).
<i>Collaborative</i>	
Monitor laboratory studies, such as:	
Coagulation studies	Evaluates presence and degree of alteration in clotting mechanisms and effects of anticoagulant or antiplatelet agents when used.
Administer medications, as indicated, for example, low-molecular-weight heparins, enoxaparin (Lovenox), or fondaparinux (Arixtra).	Anticoagulants or antiplatelet agents may be used routinely to reduce risk of thrombophlebitis and pulmonary emboli. Note: Without prophylaxis, the incidence of DVT after total knee replacement (TKR) is 50% to 84%, and after total hip replacement (THR), 47% to 64%. With use of anticoagulation therapy, the incidence is reduced 22% to 57% after TKR and 6% to 24% after THR (Rasul & Wright, 2016).
Maintain intermittent compression stocking or foot/ankle compression boots (e.g., PlexiPulse™) when used.	Promotes venous return and prevents venous stasis, reducing risk of thrombus formation.

## NURSING DIAGNOSIS: impaired physical Mobility

### May Be Related To

Musculoskeletal impairment; joint stiffness; prescribed movement restrictions  
Pain; pharmaceutical agent  
Decrease in endurance; physical deconditioning  
Insufficient environmental support (e.g., physical, social, mobility aids)

### Possibly Evidenced By

Discomfort [reluctance/unwillingness to move]  
Limited range of motion; alteration in gait; difficulty turning  
Slowed or spastic movement

### Desired Outcomes/Evaluation Criteria—Client Will

#### Mobility NOC

Display increased strength, ROM, and function of affected joint and limb.

#### Ambulation NOC

Ambulate with assistance/assistive device as needed.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Positioning NIC</b> <i>Independent</i> Maintain affected joint in prescribed position and body in alignment when in bed. Medicate around the clock, or sufficient time before procedures and activities, so that client is able to participate. Turn on unoperated side using adequate number of personnel and maintaining operated extremity in prescribed alignment. Support position with pillows and wedges. Demonstrate and assist with transfer techniques and use of mobility aids, such as a trapeze, walker, crutches, or canes. Determine upper body strength and need for equipment to assist with ADLs, as appropriate. Involve in exercise program. Inspect skin; observe for reddened areas. Keep linens dry and wrinkle-free. Massage skin routinely. Protect operative heel, elevating whole length of leg with pillow and placing heel in offloading device if burning sensation reported or area reddened.	Provides for stabilization of prosthesis and reduces risk of injury during recovery from effects of anesthesia. Adequate analgesia is a priority to decrease pain, reduce muscle tension and spasm, and facilitate participation in therapy. Prevents dislocation of hip prosthesis and prolonged skin and tissue pressure, reducing risk of tissue ischemia and breakdown. Facilitates self-care and client's independence. Proper transfer techniques prevent shearing abrasions of skin and falls. Replacement of lower-extremity joint requires increased use of upper extremities for transfer, ADLs, and desired activities as well as use of ambulation devices. Prevents skin irritation or breakdown.
<b>Exercise Therapy: Joint Mobility NIC</b> Perform or assist with ROM to unoperated joints. Promote participation in rehabilitative exercise program, such as the following:  Total hip: Quadriceps and gluteal muscle setting, isometrics, leg lifts, dorsiflexion, and plantar flexion (ankle pumps) of the foot Total knee: Quadriceps setting, gluteal contraction, flexion and extension exercises, and isometrics	Client with degenerative joint disease can quickly lose function in unoperated joints during periods of restricted activity.  Contralateral joint may be nearly as painful as the surgical joint and may require careful and consistent treatment to maximize mobility. Strengthens muscle groups, increasing muscle tone and mass; stimulates circulation; and prevents decubitus ulcers.
Observe appropriate limitations based on specific joint; for example, avoid marked flexion or rotation of hip and flexion or hyperextension of leg; adhere to weight-bearing restrictions; and wear knee immobilizer, as indicated.	Active use of the joint may be painful but will not injure the joint. Continuous passive motion exercise may be initiated on the knee joint postoperatively, although its use is dependent on the particular surgeon and on the individual's needs.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Investigate sudden increase in pain and shortening of limb as well as changes in skin color, temperature, and sensation.	May be indicative of slippage of prosthesis or other complication, requiring medical evaluation and intervention (not typical in immediate postoperative period). Joint stress is to be avoided at all times during stabilization period to prevent dislocation of new prosthesis.
Encourage participation in ADLs.	Enhances self-esteem and promotes sense of control and independence.
Provide positive reinforcement for efforts.	Promotes a positive attitude and encourages involvement in therapy.
<b>Collaborative</b> Collaborate with physical and occupational therapists and rehabilitation specialist.	Client will require individualized activity and exercise program, ongoing assistance with movement, strengthening, and weight-bearing activities for an extended period of time, as well as use of adjuncts, such as walkers, crutches, canes, elevated toilet seat, pickup sticks, and so on.
Provide foam or flotation mattress.	Reduces skin and tissue pressure; limits feelings of fatigue and general discomfort.

### NURSING DIAGNOSIS: risk for Constipation

#### Possibly Evidenced By

[Effects of medications—anesthesia, opiate analgesics; decreased physical activity]  
 Insufficient fiber or fluid intake; inadequate dietary habits  
 Decrease in gastrointestinal (GI) motility  
 Recent environmental changes

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Bowel Elimination NOC

Regain/maintain usual pattern of bowel functioning.  
 Demonstrate behaviors to prevent problem.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bowel Management NIC</b> <i>Independent</i>	
Identify individual risk factors. Determine current situation and possible impact on bowel function—surgery, new and chronic use of medications affecting intestinal functioning, age, or weakness.	Constipation is one of the most frequent complaints following surgery and during rehabilitation. If left untreated, constipation can lead to nausea and vomiting, bowel obstruction, or even sepsis, especially in the elderly.
Auscultate abdomen for presence, location, and characteristics of bowel sounds.	Reflects activity of GI tract.
Determine usual elimination pattern or frequency, characteristics of stool—color, consistency, amount—manner of constipation, and use of laxatives.	Provides baseline for comparison, promotes recognition of changes, and helps to establish a preventative plan.
Evaluate usual dietary and fluid intake; compare with current intake.	Client's usual diet and fluid intake may be marginal at best in promoting healthy bowel functioning, especially when combined with current postsurgical status.
Promote increased fluid intake, including water and high-fiber fruit juices; offer warm stimulating fluids, such as coffee, tea, and hot water.	Prevents dehydration and decreases reabsorption of water from the bowel, promoting softer stool and facilitating passage of stool.
Encourage early ambulation and exercise within client's limitation of activity. Assist with early mobility.	To stimulate and optimize GI function.
Provide privacy and routinely scheduled time for defecation based on usual pattern, as appropriate (e.g., bedside commode or toilet with elevated seat, after breakfast).	To facilitate return of normalcy in toileting routine.

(continues on page 738)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Consult with dietitian or nutritionist, as indicated.	Helpful in providing a diet with balanced fiber and bulk that client can continue after discharge to improve consistency of stool and facilitate its passage.
Implement bowel program: administer routine stool softeners (e.g., docusate [Colace]); stool stimulants (e.g., bisacodyl [Dulcolax]), polyethylene glycol (Miralax); sennosides (e.g., Senokot, Ex-lax); bulk-forming agents (e.g., polycarbophil [FiberCon]), psyllium (Metamucil); saline laxatives (e.g., magnesium citrate) and enemas, as indicated.	Used to prevent or treat constipation.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

**Risk Factors May Include**

Insufficient information; insufficient knowledge of resources  
Misinformation presented by others

**Possibly Evidenced By**

Insufficient knowledge  
Inaccurate follow-through of instructions  
Development of preventable complication

**Desired Outcomes/Evaluation Criteria—Client Will**

**Knowledge: Treatment Regimen NOC**

Verbalize understanding of surgical procedure and prognosis.  
Perform necessary procedures correctly, and explain reasons for the actions.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Review disease process, surgical procedure, and future expectations.	Provides knowledge base from which client can make informed choices. The majority of total joint surgeries are elective, and preoperative education is done in some form in the surgeon's office or in the admitting facility. Postsurgical review of process and expectations may be needed or desired.
Encourage alternating rest periods with activity.	Conserves energy for healing and prevents undue fatigue, which can increase risk of injury or fall.
Emphasize importance of continuing prescribed exercise and rehabilitation program—crutch or cane walking, weight-bearing exercises, stationary bicycling, hydrotherapy, swimming.	Increases muscle strength and joint mobility. Most clients will be involved in formal outpatient rehabilitation, home-care programs, or be followed in extended-care facilities by physical therapists. Note: Client with cemented joint replacement can weight-bear as tolerated (WBAT) unless the operative procedure involved a soft tissue repair or internal fixation of bone (following fracture). Client with cementless joint replacement is put on partial weight-bearing (PWB) or toe-touch weight-bearing (TTWB) for several weeks to allow maximum bony ingrowth to take place. A knee immobilizer sometimes is worn after total knee replacement until quadriceps strength is regained (Iverson, 2012; Rasul & Wright, 2016).
Review activity limitations, depending on joint replaced: for hip or knee—sitting for long periods or in low chair or toilet seat, recliner; jogging, jumping, excessive bending, lifting, twisting, or crossing legs.	Prevents undue stress on implant. Long-term restrictions depend on individual situation and physician protocol.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss need for safe environment in home, including removing scatter rugs and unnecessary furniture, and use of assistive devices, such as hand rails in tub and toilet, raised toilet seat, and cane for long walks.	Reduces risk of falls and excessive stress on joints.
Review and have client or caregiver demonstrate incisional or wound care, as indicated.	Promotes independence in self-care, reducing risk of complications.
Identify signs and symptoms requiring medical evaluation: fever or chills, incisional inflammation, unusual wound drainage, pain in calf or upper thigh, or development of sore throat or dental infections.	Bacterial infections require prompt treatment to prevent progression to osteomyelitis in the operative area and prosthesis failure, which could occur at any time, even years later.
Review drug regimen, for example, anticoagulants or antibiotics prior to invasive procedures (e.g., tooth extraction).	Prophylactic therapy may be necessary for a prolonged period after discharge to limit risk of thromboemboli and infection. Procedures known to release bacteria into the bloodstream can lead to infection, osteomyelitis, and prosthesis failure.
Identify bleeding precautions—for example, use of soft toothbrush, electric razor, avoidance of trauma, or forceful blowing of nose—and necessity of routine laboratory follow-up.	Reduces risk of therapy-induced bleeding or hemorrhage.
Encourage intake of balanced diet, including roughage and adequate fluids.	Enhances healing and feeling of general well-being. Promotes bowel and bladder function during period of altered activity.
Discuss continuation of supplemental calcium and vitamin D, hormone replacement, bisphosphonates, and the like as indicated.	Promotes bone health in clients with decreased bone density or who are at risk for osteoporosis.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

**In addition to considerations in surgical intervention plan of care:**

- **risk for Falls**—postoperative conditions, impaired physical mobility, decreased lower extremity strength, impaired balance, use of assistive devices
- **risk for Constipation**—insufficient physical activity, decreased motility of gastrointestinal tract, insufficient fiber/fluid intake, side effects of medications
- **Self-Care deficit**—musculoskeletal impairment, weakness, fatigue, pain
- **Impaired Home Maintenance**—impaired functioning, inadequate support systems, unfamiliarity with neighborhood resources

# Integumentary Disorders

## BURNS: THERMAL, CHEMICAL, AND ELECTRICAL—ACUTE AND CONVALESCENT PHASES

**I. Pathophysiology**—local and systemic response affecting skin and/or other tissues depending on cause of burn injury and physiological response (Hettiaratchy & Dziewulski, 2004; Vorstenbosch & Buschel, 2017)

a. Local responses

- i. Coagulation: occurs at the point of maximum damage, causing irreversible tissue loss due to coagulation of the constituent proteins
- ii. Stasis: area characterized by decreased tissue perfusion that is potentially salvageable unless additional insults, such as prolonged hypotension, infection, or edema, occur, converting this zone into an area of complete tissue loss
- iii. Hyperemia: Outermost area has increased tissue perfusion, and tissue will recover unless severe sepsis or prolonged hypoperfusion occurs.

b. Systemic response—Cytokines and other inflammatory mediators are released at the site of burn injuries with total body surface area (TBSA) of 30% or greater.

- i. Cardiovascular: Increased capillary permeability leads to shift of intravascular proteins and fluids into the interstitial space, followed by vasoconstriction and decreased myocardial contractility; combined with fluid loss from the burn wound, systemic hypotension and organ hypoperfusion occur.
- ii. Respiratory: Bronchoconstriction occurs in response to inflammatory mediators, which, in severe inhalation injury, can cause acute respiratory distress syndrome (ARDS).
- iii. Metabolic: Rate increases up to three times the baseline rate, resulting in breakdown of muscle tissue.
- iv. Immunological: Immune suppression response occurs.

**II. Classification**—by burn wound and depth

- a. Superficial partial-thickness (first-degree) burns: affect only the epidermis; skin is often warm and dry, and wounds appear bright pink to red with minimal edema and fine blisters, if present
- b. Moderate partial-thickness (second-degree) burns: include the epidermis and dermis; wounds appear red to pink with moderate edema and blisters that may be intact or draining
- c. Deep partial-thickness (second-degree) burns: extend into the deep dermis; wounds are drier than moderate partial-

thickness burns and appear pale pink to pale ivory, with moderate edema and blisters

- d. Full-thickness (third-degree) burns: include all layers of skin and subcutaneous fat and may involve the muscle, nerves, and blood supply; wounds have a dry, leathery texture and appearance varies from white to cherry-red to brown or black, with blistering uncommon; absence of pain in the center, but the edges of the burn wound may have heightened sensation
- e. Full-thickness, subdermal (fourth-degree) burns: involve all skin layers as well as muscle, organ tissue, and bone, with charring. Fourth-degree burns result from prolonged exposure to the usual causes of third-degree burns.

**III. Types**

- a. Thermal: most common type of burn: occurs because of contact with hot substances, including flame, hot liquids, hot solid objects, steam, friction, or exposure to extremely cold objects (e.g., snow, nitrogen, dry ice). Flame burns are often associated with smoke/inhalation injury. *Note:* It is reported that 5% to 10% of all combat injuries include burns, often of the hands and head (Renz & Cancio, 2012).

**P** The majority of burn injuries in children are scald injuries resulting from hot liquids, occurring most commonly in children aged 0 to 4 years (Toon et al, 2011). At later ages, a large number of heat sources (e.g., hot surface, liquid scald, grease scald, radiation, chemicals) cause burn injury in children (Peck, 2017; Vorstenbosch & Buschel, 2017). Burns in older children and teenagers, especially boys, are often associated with risk-taking behaviors, such as careless use of flammable substances and fireworks (Dowshen, 2017).

- b. Chemical: contact with a caustic substance (acid or alkaline); degree of injury dependent on type and content as well as concentration and temperature of injuring agent. Although injuries do occur at home, the risk of sustaining a chemical burn is much greater in the workplace, especially in businesses and manufacturing plants that use large quantities of chemicals (Davis, 2017).

- c. Electrical: Current travels through the body along the pathway of least resistance (i.e., nerves offer the least resistance and bones the greatest resistance), generating heat in proportion to resistance offered; degree of injury

- dependent on type/voltage of current with underlying injury more severe than visible injury. Electrical injuries are responsible for 3% to 5% of all burn unit admissions and **P** cause 2% to 3% of emergency department burn visits in the pediatric population (Cushing & Wright, 2017).
- d. Radiation: These burns do not present as typical burns but rather dermatitis. Symptoms of radiation dermatitis include hair loss, dry or wet peeling skin (desquamation), decreased sweating, edema, ulcerations, bleeding, and skin cell death. Radiation burns are caused by exposure to ionizing radiation, most commonly overexposure to ultraviolet rays—UVA and UVG (e.g., the sun, sunlamps, tanning booths) or high exposure to x-rays, including radiotherapy (e.g., cancer therapy). The radiation types of greatest concern are thermal radiation, radiofrequency energy, ultraviolet light, and ionizing radiation. Refer to CP: Cancer: general considerations for related assessments.
  - e. Inhalation: Inhalation burns can occur concurrently with thermal (flame) or chemical burns, are complications of those burns. Inhalation injury is more common in adults and can present as an isolated injury or in combination with surface area burns. Initially, the heat generated during combustion can cause significant thermal injury to the upper airway, requiring aggressive early airway intervention. For example, manufacturing methamphetamine can cause both thermal and chemically associated inhalation injuries.
  - f. Risk factors: substance abuse, careless smoking, cultural practices, socioeconomic status (e.g., overcrowded living conditions, insufficient parental supervision of children, lack of safety precautions), and violence, including abuse and neglect, such as with those aged 4 years and under or those aged 65 years and older. **P** Note: Severe burns are reported in an estimated 10% of all children suffering physical abuse (Maguire et al, 2008).

#### IV. Statistics

- a. Morbidity: 486,000 burn injuries require medical attention in the United States annually. In 2016, there were approximately 40,000 burn-related hospitalizations in the United States, 30,000 of which were at specialized burn centers (American Burn Association [ABA], 2016). In 2016, the ABA reported a 96.8% survival rate in clients discharged from burn care centers.
- b. Mortality: In 2010, the National Institutes of Health (NIH) reported that the number of burn fatalities in the United States had declined dramatically, to about 3800 a year (NIH, 2010). The use of smoke detectors has significantly reduced the severity of burn injuries (estimated 80% reduction in mortality) (Vorstenbosch & Buschel, 2017). A direct but inverse relationship exists between age and survival for any burn size. While the mortality of a 40% TBSA burn in a 20-year-old is approximately 8%, the mortality of this same injury in someone older than 70 years is 94% (Vorstenbosch & Buschel, 2017). **P** In children, a burn size of 60% TBSA (and probable inhalation injury) was associated with a higher incidence of multiorgan failure, infections, sepsis, and death (Kraft et al, 2012). Respiratory failure and sepsis were found to be leading causes of death in severely burned children, with acute lung injury (ALI) and respiratory distress syndrome (ARDS) accounting for 40% to 50% of all deaths (Williams et al, 2009).
- c. Cost: Hospitalizations for burn survivors represent only 1% of all injuries in the United States, but direct costs of treatment are reportedly more than \$10.4 billion per year (Mater, 2015), at roughly \$24,000 per person hospital stay (Agency for Healthcare Research and Quality, 2015), with another \$3.3 billion spent in outpatient burn care (Paradigm Outcomes, 2013).

#### G L O S S A R Y

**The American Burn Association (ABA) criteria for burn center care (for adults):** (1) partial-thickness burns greater than 10% total body surface area (TBSA); (2) burns that involve the face, hands, feet, genitalia, perineum, or major joints; (3) third-degree burns in any age group; (4) electrical and chemical burns; (5) inhalation injury; (6) burn injury in individual with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality; (7) patient with burns and concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality (additional criteria can apply for children, as well as other situations (ABA, n.d.).

**Catabolism:** Breaking down of muscle tissue.

**Dermis:** Inner layer of skin, which contains blood and lymph vessels, hair follicles, and glands.

**Epidermis:** Outermost layer of skin, made up of flat, scalelike cells called squamous cells.

**Total body surface area (TBSA):** The “rule of nines” estimates the extent of TBSA involved in a burn injury to guide treatment. Major anatomic areas of the body are divided into percentages: in adults, 9% for the head and neck, 9% for each upper extremity, 18% to each of the anterior and posterior portions of the trunk, 18% to each lower extremity, and 1% to the perineum and genitalia. The client’s palm area represents approximately 1% of TBSA and can be helpful in calculating scattered areas of involvement. **P** In an infant, 18% for the head and neck, 9% for each upper extremity, 18% to each of the anterior and posterior portions of the trunk, 14% to each lower extremity, 1% to the perineum and genitalia, and palm area approximately 1%.

## CARE SETTING

Client with burns is admitted to a hospital or burn center for acute care and, during the rehabilitation phase, may be cared for in a subacute or rehabilitation unit.

## RELATED CONCERNS

Disaster considerations, page 980  
Fluid and electrolyte imbalances (see *DavisPlus*)  
Metabolic acidosis—primary base bicarbonate deficiency (see *DavisPlus*)  
Pediatric considerations, page 993  
Psychosocial aspects of care, page 835  
Respiratory acidosis (primary carbonic acid excess) (see *DavisPlus*)  
Sepsis/septic shock, page 772  
Surgical intervention, page 873  
Total nutritional support: parenteral and enteral feeding, page 525  
Upper gastrointestinal bleeding, page 340

## CLIENT ASSESSMENT DATABASE

Data depend on type, severity, and body surface area of burn(s), as well as the stage (i.e., acute or rehabilitation).

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- Decreased strength, endurance
- Limited range of motion (ROM) of involved areas
- Altered muscle mass and tone

#### CIRCULATION

(with burn injury of more than 20% TBSA)

- Hypotension (shock)
- Peripheral pulses diminished distal to extremity injury; generalized peripheral vasoconstriction with loss of pulses, mottling of skin, and coolness (electrical shock)
- Tachycardia (shock, anxiety, pain)
- Dysrhythmias (electrical injury; electrolyte imbalances)
- Tissue edema formation (all burns)

#### EGO INTEGRITY

- Feeling scared, self-conscious, conspicuous, angry, embarrassed, different
- Concerns about family, job, finances, disfigurement

- Anxiety, irritability
- Crying, depression
- Hostility, aggressive behavior
- Denial, withdrawal

#### ELIMINATION

- Urinary output decreased or absent during emergent phase; color may be pink from damaged red blood cells (RBCs) or reddish-black if myoglobin present, indicating deep-muscle damage
- Diuresis—after capillary leak sealed and fluids mobilized back into circulation
- Bowel sounds decreased or absent, especially in cutaneous burns of more than 20% TBSA, because stress reduces gastric motility, peristalsis

#### FOOD/FLUID

- Anorexia, nausea, vomiting
- Weight loss

- Generalized tissue edema—swelling is rapid and may be extreme in early hours after injury

**MAY REPORT (continued)****NEUROSENSORY**

- Mixed areas of numbness, tingling, burning pain
- Changes in vision, decreased visual acuity (electrical shock)

**MAY EXHIBIT (continued)**

- Changes in orientation, affect, behavior
- Decreased deep tendon reflexes (DTRs), reflexes, and sensation in injured extremities
- Seizure activity (electrical injury)
- Paralysis (electrical injury to nerve pathways)
- Corneal lacerations, retinal damage (electrical shock)
- Rupture of tympanic membrane (electrical shock)

**PAIN/DISCOMFORT**

- Pain varies—first-degree burns are extremely sensitive to touch, pressure, air movement, and temperature changes.
- Second-degree moderate-thickness burns are very painful, whereas pain response in second-degree deep-thickness burns is dependent on intactness of nerve endings.
- Third-degree burns: Traditional teaching is that full-thickness burns are painless due to the cutaneous nerve endings being destroyed. However, in a recent study, 75% of individuals with full-thickness burns reported pain. The authors suggest that even in full-thickness injury, there are still some intact nerve endings (Singer et al, 2015).

**RESPIRATION**

- History of confinement in a closed space during a fire; prolonged exposure to flames or strong chemicals (possibility of inhalation injury)

- Guarding behavior, protective positioning
- Expressive behavior, such as restlessness, moaning, crying
- Self-focusing; facial mask
- Changes in blood pressure (BP), pulse, respiratory rate

**SAFETY**

- History of previous burns or other injuries
- Engaging in risky behavior—substance abuse, sporting activities during thunderstorm, working near high power lines
- Lack of safety practices; for example, no smoke detector, smoking in bed, wearing loose-fitting clothing around open flame, improper use or storage of caustic chemicals
- Sensory impairments limiting detection of heat or cold
- Episodes of violence or abuse

- Facial burns, hoarseness, wheezy cough, soot in the nose or mouth, flecks of carbon in the sputum, lip edema, drooling or inability to swallow oral secretions, and cyanosis (indicative of inhalation injury) (Culleiton & Simko, 2013)
- Breath sounds—crackles (pulmonary edema), stridor (laryngeal edema), profuse airway secretions, wheezing (rhonchi)
- Thoracic excursion may be limited in presence of circumferential chest burns.

**SKIN**

- **General:** Exact depth of tissue destruction may not be evident for 3 to 5 days because of the process of microvascular thrombosis in some wounds; unburned skin areas may be cool, clammy, and pale, with slow capillary refill in the presence of decreased cardiac output as a result of fluid loss or shock state.
- **Flame injury:** There may be areas of mixed depth of injury because of varied intensity of heat produced by burning clothing; singed nasal hairs; dry, red mucosa of nose and mouth; blisters on posterior pharynx, circumoral and/or circumnasal edema.
- **Chemical injury:** Wound appearance varies according to causative agent; skin may be yellowish-brown with soft leather-like texture; blisters, ulcers, necrosis, or thick eschar. *Note:* Injuries are generally deeper than they appear cutaneously, and tissue destruction can continue for up to 72 hours after injury.
- **Electrical injury:** The external cutaneous injury is usually much less than the underlying necrosis; appearance of wounds varies and may include entry and exit (explosive) wounds of current, arc burns from current moving in close proximity to body, and thermal burns due to ignition of clothing.
- **Other:** Presence of fractures, dislocations (concurrent falls, motor vehicle accident; tetanic muscle contractions due to electrical shock)

(continues on page 744)

**TEACHING/LEARNING**

- Use of sedatives, alcohol, tobacco, and street drugs
- Cultural beliefs and practices

**DISCHARGE PLAN CONSIDERATIONS**

- May require assistance with treatments, wound care and supplies, self-care activities, homemaker and maintenance tasks, transportation, finances, and vocational counseling
- Changes in physical layout of home or living facility other than home during prolonged rehabilitation

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****WHY IT IS DONE****WHAT IT TELLS ME****BLOOD TESTS**

- **Complete blood count (CBC):** Battery of screening tests, which typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count morphology, indices, and distribution width index; platelet count and size; white blood cell (WBC) count and differential.
  - **Arterial blood gases (ABGs) and pulse oximetry:** Describe the assessment of arterial blood levels of oxygen ( $\text{PaO}_2$ ) and carbon dioxide ( $\text{PaCO}_2$ ). Typically, blood pH (acidity) is measured simultaneously with ABGs.
  - **Carboxyhemoglobin (COHgb):** Compound that is formed when inhaled carbon monoxide combines with Hgb, binding more tightly than oxygen and rendering the Hgb incapable of transporting oxygen.
  - **Serum electrolytes:** Substance that will dissociate into ions in solution and acquire the capacity to conduct electricity. Electrolytes include sodium, potassium, chloride, calcium, and phosphate.
  - **Serum glucose:** Simple sugar that is a major energy source for all cellular and bodily functions.
  - **Albumin, globulin, and albumin/globulin ratio:** Albumin and globulin make up most of the protein within the body and are measured in the total protein of the blood and other body fluids. Albumin proteins are normally higher than globulin and are expressed in ratio.
  - **Blood urea nitrogen (BUN) and creatinine (Cr):** BUN and Cr are waste products in the blood from the breakdown of protein and are filtered by the kidneys.
- Initial increased Hct suggests hemoconcentration due to fluid shift or loss. Later, Hct and RBCs may be decreased because of heat damage to vascular endothelium. WBCs may be elevated due to inflammatory response to injury.
- Baseline is especially important with suspicion of inhalation injury. Reduced  $\text{PaO}_2$  and increased  $\text{PaCO}_2$  may be seen with carbon monoxide poisoning. Acidosis may occur because of reduced renal function and loss of compensatory respiratory mechanisms.
- Elevated percentage reflects the extent to which normal transport of oxygen has been negatively affected. Elevation of more than 10% indicates inhalation injury in a nonsmoker. Toxic exposure with levels greater than 40% to 50% can result in loss of consciousness, seizures, coma, and death (70%) (Lafferty et al, 2017).
- Potassium level may be initially elevated because of injured tissues, RBC destruction, and decreased renal function; hypokalemia can occur when diuresis starts; and magnesium level may be decreased. Sodium level may initially be decreased with body water losses; hypernatremia can occur later as renal conservation occurs.
- Elevation reflects stress response; hypoglycemia can occur due to decreased glycogen stores.
- Albumin/globulin ratio may be reversed because of loss of protein in edema fluid.
- Elevation reflects decreased renal perfusion or function; however, the level of Cr can become elevated because of tissue injury.

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<b>URINE TESTS</b>	
• <b>Urinalysis:</b> Screening test to evaluate renal function and detect substances or cellular material reflecting injury.	Presence of albumin, Hgb, and myoglobin indicates deep-tissue damage and protein loss—especially seen with serious electrical burns. Reddish-black color of urine indicates presence of myoglobin.
<b>ASSOCIATED TESTS</b>	
• <b>Photographs of burns:</b> Documents burn wound at time of admission.	Provides baseline to evaluate healing process.
• <b>Laser Doppler:</b> Measures microvascular blood flow in dermis.	Useful in predicting the depth of burn wounds and the potential for early excision and grafting of burn wounds.
• <b>Magnetic resonance imaging (MRI) scan:</b> Scan that uses magnetic fields to produce two- or three-dimensional images of organs inside the body.	Detects tissue edema—a manifestation of cell membrane damage that begins to accumulate minutes after electrical injury from increased vascular permeability and extravasation of intracellular contents.
• <b>Wound cultures:</b> Drainage or material from burn area is grown in the laboratory on nutrient-enriched media to identify presence of microorganisms such as bacteria or fungi.	May be obtained for baseline data and repeated periodically to evaluate for wound infection and/or effectiveness of antimicrobial therapies.
• <b>Chest x-ray:</b> Evaluates organs and structures within the chest for symptoms of disease.	May appear normal in early postburn period even with inhalation injury; however, a true inhalation injury presents as infiltrates, often progressing to whiteout on x-ray.
• <b>Upper airway endoscopy and fiber-optic bronchoscopy—also known as direct or indirect laryngoscopy:</b> Direct visualization of upper airways by means of either a rigid or a flexible bronchoscope.	Useful in diagnosing extent of inhalation injury in the high-risk client; findings can include edema, hemorrhage, and/or ulceration of upper respiratory tract.
• <b>Pulmonary function studies—forced expiratory volume (<math>FEV_1</math>) and peak flow volume loop:</b> Evaluates respiratory status.	Provides noninvasive assessment of effects and extent of inhalation injury. Airway obstruction causes a decrease in $FEV_1$ and peak flow. <i>Note:</i> Full resolution of pulmonary function abnormalities may take several months.
• <b>Ventilation-perfusion lung scan:</b> Uses inhaled and injected radioisotopes to measure breathing and circulation in all areas of the lungs.	May be done to determine extent of inhalation injury.
• <b>Electrocardiogram (ECG):</b> Record of the electrical activity of the heart, providing important information concerning the spread of electricity to the different parts of the heart.	Signs of myocardial ischemia and dysrhythmias may occur with electrical burns.
• <b>Cardiac enzymes (e.g., creatinine phosphokinase-muscle band [CPK-MB] isoenzyme):</b> A group of enzymes normally found in heart tissue and released into the bloodstream in increased concentration when the heart muscle is damaged.	Myocardial infarction (MI) can be a complication of electrical injury or postinjury resuscitation, causing elevation of cardiac enzymes. <i>Note:</i> Skeletal muscle cells contain as much as 20% to 25% CK-MB fraction, suggesting that elevation of this enzyme may reflect skeletal rather than myocardial damage (Vande Ven & Podda, 2017).

## NURSING PRIORITIES

1. Maintain patent airway and respiratory function.
2. Restore hemodynamic stability and circulating volume.
3. Alleviate pain.
4. Prevent complications.
5. Provide emotional support for client and significant other (SO).
6. Provide information about condition, prognosis, and treatment.

## DISCHARGE GOALS

1. Homeostasis achieved.
2. Pain controlled or reduced.
3. Complications prevented or minimized.
4. Current situation dealt with realistically.
5. Condition, prognosis, and therapeutic regimen understood.
6. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS:** **risk for ineffective Airway Clearance****Possibly Evidenced By**

Exposure to smoke

Airway spasm, excessive mucous; retained secretions, exudates in the alveoli

**Desired Outcomes/Evaluation Criteria—Client Will****Respiratory Status NOC**

Demonstrate clear breath sounds; respiratory rate within normal range; and be free of dyspnea and cyanosis.

Display oxygen saturation within normal range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b> <i>Independent</i> Obtain history of burn exposure. Note presence of preexisting respiratory conditions and any history of smoking.	Causative burn injury agent (e.g., flames, chemicals), duration of exposure, and whether exposed in closed or open space predict probability of inhalation injury. Type of material burned, such as wood, plastic, or wool, suggests type of toxic gas exposure. Preexisting conditions increase the risk of respiratory complications.
Assess gag and swallow reflexes; note upper airway burns, drooling, inability to swallow, hoarseness, and wheezy cough.	Suggestive of inhalation injury, which may develop over several days.
Monitor respiratory rate, rhythm, and depth, and measure pulse oximetry regularly. Note presence of pallor or cyanosis and carbonaceous or pink-tinged sputum.	Tachypnea, use of accessory muscles, decreasing oxygen level, pallor or cyanosis, and changes in sputum if client is coughing suggest developing respiratory distress and need for medical intervention.
Auscultate lungs, noting stridor, wheezing, crackles, diminished breath sounds, and brassy cough.	Airway obstruction and respiratory distress can occur very quickly or may be delayed, for example, up to 3 days after burn.
Note presence of pallor or cherry-red color of unburned skin.	Suggests presence of hypoxemia or carbon monoxide requiring additional evaluation and prompt intervention.
Investigate changes in behavior and mentation, such as restlessness, agitation, and confusion.	Although often related to pain, changes in consciousness may reflect developing, worsening hypoxia or effects of inhaled toxins, especially carbon monoxide.
Monitor 24-hour fluid balance, noting variations or changes.	Fluid shifts or excess fluid replacement increase risk of pulmonary edema. Note: Inhalation injury increases fluid demands as much as 35% or more because of edema and fluid shifts.
<b>Airway Management NIC</b> Elevate head of bed (if trauma condition allows). Avoid use of pillow under head, as indicated.	Promotes optimal lung expansion and respiratory function. When head and neck burns are present, a pillow can inhibit respiration, cause necrosis of burned ear cartilage, and promote neck contractures.
Encourage coughing, deep-breathing exercises, and frequent position changes.	Promotes lung expansion, mobilization, and drainage of secretions.
Suction, if necessary, with extreme care, maintaining sterile technique.	Helps maintain clear airway but should be done cautiously because of mucosal edema and inflammation. Sterile technique reduces risk of infection.
Promote voice rest, but assess ability to speak and/or swallow oral secretions periodically.	Increasing hoarseness or decreased ability to swallow suggests increasing tracheal edema and may indicate need for prompt intubation.
<b>Collaborative</b> Administer humidified oxygen via appropriate route, for example, a face mask.	Oxygen corrects hypoxemia and acidosis. Humidity decreases drying of respiratory tract and reduces viscosity of sputum.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor serial ABGs.	Baseline is essential for further assessment of respiratory status and as a guide to treatment. $\text{PaO}_2$ less than 50, $\text{PaCO}_2$ greater than 50, and decreasing pH reflect smoke inhalation and developing pneumonia or acute respiratory distress syndrome (ARDS). Note: Pulse oximetry can be monitored continuously while respirations/oxygenation are compromised.
Monitor carboxyhemoglobin (COHgb) levels, if indicated.	Client with inhalation injury may be monitored for elevated carbon monoxide levels, although not all clients with inhalation injury show elevated COHgb. Note: Neurologic abnormalities and a history of loss of consciousness are the primary clinical features used to define severe CO toxicity. Note: Hyperbaric oxygenation therapy (HOT) may be considered in client with COHgb levels >25%, who is unconsciousness or has other neurologic findings, cardiovascular dysfunction, pulmonary edema, or severe metabolic acidosis (Lafferty et al, 2017).
Review serial chest x-rays.	Changes reflecting atelectasis or pulmonary edema may not occur for 2 to 3 days after burn injury.
Provide or assist with chest physiotherapy and incentive spirometry, as indicated.	Chest physiotherapy drains dependent areas of the lung, and incentive spirometry may be done to improve lung expansion, thereby promoting respiratory function and reducing atelectasis. Note: Bronchoscopy may be done to remove endotracheal debris.
Prepare for, or assist with, intubation or tracheostomy and mechanical ventilation, as indicated.	Intubation and mechanical support is required when airway edema or circumferential burn injury interferes with respiratory function and oxygenation. If client develops signs of respiratory failure or ARDS, mechanical ventilation and intensive respiratory care are required. (Refer to CP: Respiratory Failure/Ventilatory Assistance.)

### NURSING DIAGNOSIS: risk for deficient Fluid Volume

#### Possibly Evidenced By

Fluid loss through abnormal routes—burn wounds; hemorrhagic losses  
Factors influencing fluid needs—hypermetabolic state  
Deviations affecting fluid intake

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Fluid Balance NOC

Demonstrate adequate fluid balance as evidenced by appropriate urinary output with normal specific gravity, stable vital signs, and moist mucous membranes.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Shock Prevention NIC</b> <i>Independent</i> Monitor vital signs and central venous pressure (CVP). Note capillary refill and strength of peripheral pulses.	Serves as a guide to fluid replacement needs and assesses cardiovascular response to fluid loss and fluid shifts. Note: The metabolic rate increases proportionally with burn size. A 15% to 20% TBSA burn injury initiates a catabolic response, including impaired immunity and accentuating fluid shifts. The burned client will initially have a low cardiac index and be extremely vasodilated (causing drop in blood pressure), then will go into a hyperdynamic state with tachycardia and increased cardiac output (Gauglitz & Williams, 2017).

(continues on page 748)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor urinary output and specific gravity. Observe urine color and Hematest, as indicated.	Generally, fluid replacement should be titrated to ensure average urinary output of 30 to 50 mL/hr in the adult. Urine can appear red to black due to muscle destruction causing release of myoglobin.
Estimate wound drainage and insensible losses.	Increased capillary permeability, protein shifts, inflammatory process, and evaporative losses greatly affect circulating volume and urinary output, especially during initial 24 to 72 hours after burn injury.
Maintain cumulative record of amount and types of fluid intake.	During fluid resuscitation, there is fine line between adequate resuscitation and one that is associated with the deleterious effects of fluid overload.
Weigh daily.	Fluid replacement formulas partly depend on admission weight and subsequent changes. A 15% to 20% weight gain can be anticipated in the first 72 hours during fluid replacement, with return to preburn weight approximately 10 days after burn.
Measure circumference of burned extremities, as indicated.	May be helpful in estimating extent of edema and fluid shifts affecting circulating volume and urinary output.
Investigate changes in mentation.	Deterioration in the level of consciousness may indicate inadequate circulating volume and reduced cerebral perfusion.
Observe for gastric distention, hematemesis, and tarry stools. Hematest nasogastric (NG) drainage and stools periodically.	Stress (Curling's) ulcer occurs in up to half of all severely burned clients and can occur as early as the first week. Clients with burns more than 20% of TBSA are at risk for mucosal bleeding in the gastrointestinal (GI) tract during the acute phase because of decreased splanchnic blood flow and reflex paralytic ileus.
<b>Collaborative</b>	
Insert and maintain indwelling urinary catheter.	Allows for close observation of renal function and prevents urinary retention. Retention of urine with its by-products of tissue cell destruction can lead to renal dysfunction and infection.
Insert/maintain large-bore intravenous (IV) catheter(s).	Accommodates rapid infusion of fluids.
Administer calculated IV replacement of fluids, electrolytes, plasma, and albumin.	Fluid resuscitation replaces lost fluids and electrolytes and helps prevent complications, such as shock and acute tubular necrosis (ATN). Replacement formulas vary, such as Brooke, Evans, or Parkland, but all are based on extent of burn injury, body weight, and amount of urinary output. Note: Once initial fluid resuscitation has been accomplished (usually with lactated Ringer's solution), a steady rate of fluid administration is preferred to boluses, which may increase interstitial fluid shifts and cardiopulmonary congestion. <b>P</b> The rate of fluid administration should be titrated to maintain a urine output of 0.5 mL/kg/h in older children (>50 kg). In small children, fluid should be maintained to produce urine output of approximately 1 mL/kg/h (Oliver, 2017).
Monitor laboratory studies, such as Hgb/Hct, electrolytes, and urine sodium.	Identifies blood loss, RBC destruction, and fluid and electrolyte replacement needs. Urine sodium less than 10 mEq/L suggests inadequate fluid resuscitation. Note: During first 24 hours after burn, hemoconcentration is common because of fluid shifts into the interstitial space.
Administer medications, as indicated, such as the following:	
Diuretics, for example, mannitol (Osmotrol)	May be indicated to enhance urinary output and clear tubules of debris to prevent necrosis if acute renal failure (ARF) is present.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Potassium	Although hyperkalemia often occurs during first 24 to 48 hours due to tissue destruction, subsequent replacement may be necessary because of large urinary losses.
Antacids, for example, calcium carbonate (Titrалac) and magaldrate (Riopan) and histamine inhibitors, for example, cimetidine (Tagamet) and ranitidine (Zantac)	Antacids may reduce gastric acidity; histamine inhibitors decrease production of hydrochloric acid to reduce risk of gastric irritation or bleeding.
Add electrolytes to water used for wound debridement, as indicated.	Washing solution that approximates tissue fluids may minimize osmotic fluid shifts.

## NURSING DIAGNOSIS: acute Pain

### May Be Related To

Physical injury agents (e.g., destruction of skin and tissues, edema formation, wound debridement)

### Possibly Evidenced By

Self-report of intensity and characteristics of pain using standardized pain scale/instrument  
Expressive behavior (e.g., irritability, restlessness, crying)  
Narrowed focus; facial expression of pain—grimacing  
Guarding behavior  
Changes in vital signs

### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Level NOC

Report pain reduced or controlled.  
Display relaxed facial expressions and body posture.

#### Pain Control NOC

Participate in activities and sleep and rest appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b>	
<b>Independent</b>	

Be aware of types of pain that can occur with burns during the acute phase and with burn injury treatment:

- (1) *Acute pain* short-term intense pain that typically happens during a procedure like dressing changes or physical therapy; (2) *breakthrough pain* comes and goes despite pain medications, often due to wound healing, contractures, or repositioning; (3) *background pain* is burn-associated pain that is almost always present but is of lower intensity than the acute pain experienced during wound procedures; (4) *neuropathic pain* is caused by damage to and/or regeneration of nerve endings in the skin (Connor-Ballard, 2009; Drug Therapy Perspectives, 2001; Wiechman & Mason, 2016).

Assess client's pain, ongoing, noting location/character and intensity (using a standardized coding scale [e.g., numbers, pictures; pain thermometer]).

Identifying what client is experiencing at the moment helps in anticipating type of pain management needed at any given time. For example: Following the initial burn injury, there is a massive stimulation of nerve endings in the damaged skin, which is painful regardless of burn depth (inflammatory reactions causing extreme sensitivity to painful stimuli [*hyperalgesia*]). Manipulation of the hyperalgesic areas in the course of wound care exacerbates pain.

Pain is the common experience of all clients with burns—regardless of the cause, size, or depth of the burn—and the pain they experience can be among the worst known. Changes in location, character, and intensity of pain may indicate developing complications (e.g., limb ischemia) or herald improvement and return of nerve function and sensation. **P** Children with burn injuries, regardless of the severity of the burn, are often anxious and fearful in addition to being in physical pain, and each of these factors can exacerbate the other (Granger et al, 2009). Concerning analgesia needs in the burned child, Stafford and Curran stated “pediatric burns often require more

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**ACTIONS/INTERVENTIONS (continued)****RATIONALE (continued)**

Note nonverbal indicators of pain (e.g., changes in vital signs, grimacing, inconsolable crying, restlessness, trembling, or withdrawal from verbal communication or touch), especially in client who is unable to verbalize.	frequent and larger doses than typically recommended. It is not uncommon to repeat full doses until adequate pain control is achieved" (Stafford & Curran, 2010).
Cover wounds as soon as possible unless open-air exposure burn care method required.	Client (adult or child) may not be able to verbalize pain or pain characteristics due to age, developmental level, loss of consciousness or other cognitive issues, and/or type and severity of injuries.
Elevate burned extremities periodically.	Temperature changes and air movement can cause great pain to exposed nerve endings.
Wrap digits and extremities in position of function, avoiding flexed position of affected joints, using splints and footboards as necessary.	Elevation may be required initially to reduce edema formation; thereafter, changes in position and elevation reduce discomfort and risk of joint contractures.
Change position frequently and assist with active and passive range-of-motion (ROM) exercises, as indicated.	Position of function reduces deformities and contractures and promotes comfort. Although flexed position of injured joints may feel more comfortable, it can lead to flexion contractures.
Maintain comfortable environmental temperature; provide heat lamps and heat-retaining body coverings.	Movement and exercise reduce joint stiffness and muscle fatigue, but type of exercise depends on location and extent of injury.
Provide adequate pain medication and adjunctive medications, such as antianxiety drugs, before, during, or after a procedure, such as dressing changes and debridement.	Temperature regulation may be lost with major burns. External heat sources may be necessary to prevent chilling.
Encourage expression of feelings about pain.	The procedure may stimulate remaining nerve fibers, resulting in greater pain than was evident during the procedure. In some cases, conscious sedation for procedural pain may be needed to reduce severe physical and emotional distress associated with painful procedures.
Involve client in determining schedule for activities, treatments, and drug administration.	Verbalization allows outlet for emotions and may enhance coping mechanisms.
Explain procedures and provide frequent information as appropriate, especially during wound debridement.	Enhances client's sense of control and strengthens coping mechanisms.
Provide basic comfort measures—being present, gentle touch or massage, and frequent position changes.	Knowing what to expect provides opportunity for client to prepare self and enhances sense of control. Showing empathy and support can help alleviate pain and promote relaxation. Note: Burn injury and wound care often induces acute stress disorder, which heightens the pain experience. <b>P</b> Studies have shown that about 90% of both adults and children with burn injuries report at least one symptom of acute stress disorder right after the traumatic event, but only about 30% develop posttraumatic stress disorder (PTSD) (Gianoni-Pastor et al, 2016).
Instruct in and encourage use of stress management techniques, such as progressive relaxation, deep breathing, guided imagery, and visualization.	Promotes relaxation and reduces muscle tension and general fatigue. <b>P</b> Note: Studies on both adults and adolescents found that massaging burn injuries during the remodeling stage (after the acute stage of wound debridement) significantly reduced itching, as well as pain and anxiety (Field et al, 2000; Parlak Gurol et al, 2010).
Provide diversional activities appropriate for age and condition.	Refocuses attention, promotes relaxation, and enhances sense of control, which may enhance analgesia and/or reduce pharmacological dependency.
Promote uninterrupted sleep periods.	Helps refocus attention, lessening concentration on pain experience.
	Sleep deprivation can increase perception of pain and reduce coping abilities.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<p><b>Collaborative</b></p> <p>Administer analgesics (opioid and nonopioid) as indicated, such as morphine, fentanyl (Sublimaze, Ultiva), alfentanil (Alfenta), ketamine (Ketalar), hydrocodone (Vicodin, Hycodan), or oxycodone (OxyContin, Percocet)</p>	The burned client may require around-the-clock medication and dose titration. IV method is often used initially to maximize drug effect. Concerns of client addiction or doubts regarding degree of pain experienced are not valid during emergent and acute phases of care, but opioids should be decreased as soon as feasible and alternative methods for pain relief initiated. Note: Research is ongoing in search of new technologies for the nonpharmacologic management of severe pain, which may positively impact burn-related pain. For example, in a recent small investigational study, the use of virtual reality (VR) technology was found to be superior to standard controlled distraction therapy for the management of pain in hospitalized individuals (Tashjian et al, 2017).
<p>Provide and instruct in use of patient-controlled analgesia (PCA).</p>	PCA provides for timely drug administration, preventing fluctuations in intensity of pain, often at lower total dosage than would be given by conventional methods.

<p><b>NURSING DIAGNOSIS:</b> <b>risk for Infection</b></p> <p><b>Possibly Evidenced By</b> Alteration in skin integrity [destruction of skin barrier, traumatized tissues] Environmental exposure; invasive procedures Decreased in hemoglobin, leukopenia; suppressed inflammatory response</p> <p><b>Desired Outcomes/Evaluation Criteria—Client Will</b></p> <p><b>Burn Healing NOC</b> Achieve timely wound healing free of purulent exudate and be afebrile.</p>
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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Infection Protection NIC</b></p> <p><i>Independent</i></p> <p>Be aware of client at high risk for development of infection.</p>	Infection is the most common cause of morbidity and mortality in the burn-injured population, with almost 61% of deaths being caused by infection (Fonseca & Hespenthal, 2016).
<p>Examine wounds daily; document and report changes in appearance, odor, or quantity of drainage.</p>	Identifies presence of granulation tissue indicating healing and provides for early detection of burn-wound infection. Infection in a partial-thickness burn may cause conversion of burn to full-thickness injury. Note: Early signs may not be obvious (changes are primarily in numbers of bacteria colonization in the wound). Cellulitis manifests as erythema, induration, warmth, and tenderness in the tissue surrounding the burn wound and, occasionally, the development of sepsis (Fonseca & Hespenthal, 2016).
<p>Emphasize and model good handwashing technique for all individuals coming in contact with client.</p>	Prevents cross-contamination from one wound area to another and reduces risk of healthcare-acquired infection.
<p>Implement appropriate isolation techniques, as indicated.</p>	Dependent on type and extent of wounds and the choice of wound treatment (e.g., open versus closed); isolation may range from simple wound and skin to complete or reverse to reduce risk of cross-contamination and exposure to multiple bacterial flora.
<p>Use gowns, gloves, masks, and strict aseptic technique during direct wound care and provide sterile or freshly laundered bed linens and gowns.</p>	Prevents exposure to infectious organisms.

(continues on page 752)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor and limit visitors, if necessary. Explain isolation procedure to visitors, if used. Supervise visitor adherence to protocol as indicated.	Prevents cross-contamination from visitors. Concern for risk of infection should be balanced against client's need for family support and socialization.
<b>Wound Care: Burns NIC</b> Shave/clip all hair from around burned areas, (where indicated) to include a 1-inch border (excluding eyebrows). Shave facial hair (men) and shampoo head daily.	Hair is a good medium for bacterial growth; however, eyebrows act as a protective barrier for the eyes. Regular shampooing decreases bacterial fallout into burned areas.
Examine unburned areas, such as groin, neck creases, and mucous membranes, and note onset of vaginal discharge in women.	Opportunistic infections (e.g., yeast) frequently occur because of depression of the immune system and/or proliferation of normal body flora during systemic antibiotic therapy.
Provide special care for eyes, for example, use eye covers and tear formulas as appropriate.	Eyes may be swollen shut and/or become infected by drainage from surrounding burns. If lids are burned, eye covers may be needed to prevent corneal damage.
Prevent skin-to-skin surface contact—wrap each burned finger or toe separately; do not allow burned ear to touch scalp.	Prevents adherence to the surface that it may be touching and encourages proper healing. Note: Ear cartilage has limited circulation and is prone to pressure necrosis.
Monitor vital signs for fever and increased respiratory rate and depth in association with changes in sensorium, presence of diarrhea, decreased platelet count, and hyperglycemia with glycosuria.	Indicators of sepsis—often occurring with full-thickness burn—requiring prompt evaluation and intervention. Note: Changes in sensorium, bowel habits, and respiratory rate usually precede fever and alteration of laboratory studies.
<b>Collaborative</b> Remove dressings and cleanse burned areas in a hydrotherapy or whirlpool tub or in a shower stall with handheld showerhead. Maintain temperature of water at 100°F (37.8°C). Wash areas with a mild cleansing agent or surgical soap.	Water softens and aids in removal of dressings, slough layer of dead skin or tissue, and dry scabs or eschar. Sources vary as to whether bath or shower is best. Bath has advantage of water providing support for exercising extremities but may promote cross-contamination of wounds. Showering enhances wound inspection and prevents contamination from floating debris.
Excise and cover burn wounds quickly.	Early excision is known to reduce scarring and risk of infection, thereby facilitating healing.
Debride necrotic and loose tissue, including ruptured blisters, with scissors and forceps. Do not disturb intact blisters if they are smaller than 1 to 2 cm, do not interfere with joint function, and do not appear infected.	Promotes healing and prevents autocontamination. Small, intact blisters help protect skin and increase rate of reepithelialization unless the burn injury is the result of chemicals, in which case fluid contained in blisters may continue to cause tissue destruction.
Photograph wound initially and at periodic intervals.	Provides baseline and documentation of healing process.
<b>Infection Protection NIC</b> Maintain aseptic technique when inserting invasive lines and tubes (e.g., Foley catheter). Remove invasive devices as early as possible.	Reduces access for healthcare-acquired infections related to invasive procedures and devices. Note: The clinical signs of sepsis in the burned client are subtle and are easily missed until septic shock is present. Client with burns has lost the primary barrier to infectious invasion (skin). In addition, the client with extensive burns develops a profound hypermetabolic response that heightens the risk for sepsis and multiple-organ dysfunction syndrome (MODS) as long as the wounds are open (Greenhalgh, 2017).
Administer topical antimicrobial agents, as indicated, for example:	The following agents help control bacterial growth and prevent drying of wound, which can cause further tissue destruction (Fonsesca & Hospenthal, 2016).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Chlorhexidine (Hibiclens) topical wash	Effective, safe, and reliable against gram-positive and gram-negative organisms, facultative anaerobes (grows with or without oxygen), aerobes (requires oxygen for growth), and yeast.
Silver sulfadiazine (Silvadene, Flammazine)	Still the most common topical antibiotic used in burn care, Silvadene is useful in the prevention of infections from second- or third-degree burns. It has bactericidal activity against many gram-positive and gram-negative bacteria, including yeast.
Mafenide (Sulfamylon) solution or mafenide HCl cream	Antibiotic of choice with confirmed invasive burn wound infection that does not respond to Silvadene. Useful against gram-negative and gram-positive organisms and some fungal species. The solution is painless; however, the cream causes burning or pain on application and for 30 minutes thereafter. Can cause rash and is contraindicated in metabolic acidosis.
Silver-coated dressings (e.g., Acticoat, Aquacel Ag)	Nonadherent antimicrobial dressings that stay on the wound for up to 7 days, delivering a low concentration of nanocrystalline silver, with the added benefit of reduced pain with application or removal. Available in knitted flexible fabric useful for circumferential burn care (Fong et al, 2005).
Silver nitrate	Effective against <i>Staphylococcus aureus</i> , <i>Escherichia coli</i> , and <i>Pseudomonas aeruginosa</i> but has poor eschar penetration, is painful, and may cause electrolyte imbalance. Dressings must be constantly saturated. Product stains skin and other surfaces black.
Poloxamer 188 (Primaderm)	This gel is effective against gram-positive organisms, does not interfere with reepithelialization, and is generally used for tar and asphalt-based residues, other imbedded materials, and for superficial and facial burns.
Hydrogels, such as Aquasite sheet dressings	Useful for partial- and full-thickness burns, in rehydrating dry wound beds, and promoting autolytic debridement. Because of the moisture provided to the wound from the hydrogel dressing, healing phases (e.g., removal of dead tissue, granulation, and epidermis repair) are simplified. In addition, the cool sensation provided by the hydrogel to the wound offers relief from pain.
Administer other medications, as appropriate, for example:	
Subeschar clysis or systemic antibiotics	Systemic antibiotics are given to control general infections identified by culture and sensitivity. Subeschar clysis has been found effective against pathogens in granulated tissues at the line of demarcation between viable and nonviable tissue, reducing risk of sepsis.
Tetanus toxoid or clostridial antitoxin, as appropriate.	Tissue destruction and altered defense mechanisms increase risk of developing tetanus or gas gangrene, especially in deep burns such as those caused by electricity.
Place IV and invasive lines in nonburned area.	Decreased risk of infection at insertion site with possibility of progression to septicemia.
Obtain routine cultures and sensitivities of wounds and drainage.	Allows early recognition and specific treatment of wound infection.
Assist with excisional biopsies when infection is suspected.	Bacteria can colonize the wound surface without invading the underlying tissue; therefore, biopsies may be obtained for diagnosing infection.

## NURSING DIAGNOSIS: risk for peripheral Neurovascular Dysfunction

### Possibly Evidenced By

Burn injury; immobilization  
Trauma; fractures  
Mechanical compression (e.g., circumferential burns/edema of extremities)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Tissue Perfusion: Peripheral NOC

Maintain palpable peripheral pulses of equal quality and strength; good capillary refill, free of numbness or paresthesia.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Circulatory Care: Venous [or] Arterial NIC</b>	
<b>Independent</b>	
Assess color, sensation, movement, capillary refill, and peripheral pulses via Doppler on extremities with circumferential burns.	Edema formation can readily compress blood vessels, thereby impeding circulation and increasing venous stasis and edema.
Compare findings between limbs if burn is unilateral.	Comparisons with unaffected limbs aid in differentiating localized versus systemic problems (e.g., hypovolemia and decreased cardiac output).
Elevate affected extremities, as appropriate. Remove jewelry or arm band. Avoid taping around a burned extremity or digit.	Promotes systemic circulation and venous return and may reduce edema or other deleterious effects of constriction of edematous tissues. Note: Prolonged elevation can impair arterial perfusion if BP falls or tissue pressures rise excessively.
Obtain BP in unburned extremity when possible. Remove BP cuff after each reading, as indicated.	If BP readings must be obtained on an injured extremity, leaving the cuff in place may increase edema formation, reduce perfusion, and convert partial-thickness burn to a more serious injury.
Investigate reports of deep, throbbing ache and numbness.	Indicators of decreased perfusion and/or increased pressure within enclosed space, such as may occur with a circumferential burn of an extremity (compartment syndrome).
Encourage active ROM exercises of unaffected body parts.	Promotes local and systemic circulation.
Investigate irregular pulses.	Cardiac dysrhythmias can occur as a result of electrolyte shifts, electrical injury, or release of myocardial depressant factor, compromising cardiac output and tissue perfusion.
<b>Collaborative</b>	
Maintain fluid replacement per protocol. (Refer to ND: risk for deficient Fluid Volume.)	Maximizes circulating volume and tissue perfusion.
Monitor electrolytes, especially sodium, potassium, and calcium. Administer replacement therapy, as indicated.	Losses or shifts of these electrolytes affect cellular membrane potential and excitability, thereby altering myocardial conductivity, potentiating risk of dysrhythmias, and reducing cardiac output and tissue perfusion.
Avoid use of intramuscular (IM) and subcutaneous (SC) injections.	Altered tissue perfusion and edema formation impair drug absorption. Injections into potential donor sites may render them unusable because of hematoma formation.
Measure intracompartmental pressures as indicated. (Refer to CP: Fractures; ND: risk for peripheral Neurovascular Dysfunction.)	Ischemic myositis may develop because of decreased perfusion.
Assist with or prepare for escharotomy or fasciotomy, as indicated.	Enhances circulation by relieving constriction caused by rigid, nonviable tissue (eschar) or edema formation.

**NURSING DIAGNOSIS:** **imbalanced Nutrition: less than body requirements****May Be Related To**

Inability to ingest food [to meet needs] (e.g., hypermetabolic state; protein catabolism)

**Possibly Evidenced By**

Bodyweight 20% or more below ideal weight range; insufficient muscle tone

Food intake less than recommended daily allowance; insufficient interest in food; food aversion; satiety immediately after ingesting food

[Development of negative nitrogen balance]

**Desired Outcomes/Evaluation Criteria—Client Will****Nutritional Status NOC**

Demonstrate nutritional intake adequate to meet metabolic needs as evidenced by stable weight and muscle mass measurements, positive nitrogen balance, and tissue regeneration.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Therapy NIC</b>	
<b>Independent</b>	
Auscultate bowel sounds, noting hypoactive or absent sounds.	Ileus is often associated with postburn period but usually subsides within 36 to 48 hours, at which time oral or enteral feedings can be initiated.
Determine food and calorie count. Weigh daily. Reassess percentage of open body surface area and wounds weekly.	Appropriate guides to proper caloric intake include 25 kcal/kg body weight, plus 40 kcal per percentage of TBSA burn in the adult. As burn wound heals, energy needs are reevaluated to calculate prescribed dietary formulas and appropriate adjustments are made.
Monitor muscle mass and subcutaneous fat, as indicated.	Indirect calorimetry, if available, may be useful in more accurately estimating body reserves and losses and effectiveness of therapy.
Provide small, frequent meals and snacks.	Helps prevent gastric distention or discomfort and may enhance intake.
Encourage client to view diet as a treatment and to make food and beverage choices high in calories and protein.	Calories and proteins are needed to meet metabolic needs and promote wound healing.
Ascertain food likes and dislikes. Encourage SO to bring food from home, as appropriate.	Provides client/SO sense of control; enhances participation in care and may improve intake.
Encourage client to sit up for meals and visit with others.	Sitting helps prevent aspiration and aids in proper digestion of food. Socialization promotes relaxation and may enhance intake.
Provide oral hygiene before meals.	Clean mouth and clear palate enhances taste and helps promote a good appetite.
Perform fingerstick glucose and urine testing, as indicated.	Monitors for development of hyperglycemia related to hormonal changes and demands or use of hyperalimentation to meet caloric needs.
<b>Collaborative</b>	
Refer to dietitian or nutritional support team.	Useful in establishing individual nutritional needs based on weight and body surface area of injury and identifying appropriate routes. Note: Hypermetabolic state can increase caloric needs as much as 50% to 60% higher than normal proportional to the severity of injury (Rousseau et al, 2013).
Provide diet high in calories and protein with trace elements and vitamin supplements.	Calories approximating 25 kcal/kg/d, protein up to 2 g/kg/d, and vitamins are needed to meet increased metabolic needs, maintain weight, and encourage tissue regeneration. Energy from fat should be <35% of total energy during early acute phase to minimize the susceptibility to infection. Micronutrients that might be required include zinc, copper and selenium, as well as vitamins B <sub>1</sub> , C, D, and E (Rousseau et al, 2013).

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Insert and maintain small feeding tube for enteral feedings and supplements, if needed.	Provides continuous or supplemental feedings when client is unable to consume total daily calorie requirements orally. Note: Research supports use of early intragastric feedings as soon after admission as possible because delayed enteral feeding longer than 18 hours postinjury results in a high rate of gastroparesis and need for IV nutrition. Continuous tube feeding during the night increases calorie intake without decreasing appetite and oral intake during the day.
Administer parenteral nutritional solutions containing vitamins and minerals, as indicated.	If enteral feeding is not possible, total parenteral nutrition (TPN) may be initiated to meet metabolic needs in the presence of severe burn complications or esophageal or gastric injuries. (Refer to CP: Total Nutritional Support: Parenteral/Enteral Feeding.)
Monitor laboratory studies, such as serum albumin or prealbumin, glucose, electrolytes, magnesium, BUN/Cr, calcium, inorganic phosphorus, transaminase, and triglycerides.	Indicators of nutritional needs and adequacy of diet and therapy.
Administer insulin, as indicated.	Elevated serum glucose levels may develop because of stress response to injury, high caloric intake, and pancreatic fatigue.

### NURSING DIAGNOSIS: impaired physical Mobility

#### May Be Related To

Pain; anxiety  
Decreased muscle strength; joint stiffness [contractures]  
Reluctance to initiate movement; prescribed movement restrictions, limb immobilization  
Decrease in endurance

#### Possibly Evidenced By

Decrease in range of motion; decrease in fine motor skills  
Difficulty turning  
Alteration in gait; postural instability

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Immobility Consequences: Physiological NOC

Maintain position of function as evidenced by absence of contractures.  
Maintain or increase strength and function of affected and/or compensatory body part.

##### Self-Care: Activities of Daily Living (ADLs) NOC

Demonstrate techniques and behaviors that enable resumption of activities.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bedrest Care NIC</b> <i>Independent</i>	Aids in identifying potential issues (e.g., loss of body part or function, contractures) and points toward rehabilitation measures needed immediately to minimize deformities.
Maintain proper body alignment with supports, splints, specialty mattress, and so on. Ascertain that splints and supports are correct in type, size, and placement. Inspect all splints regularly for evidence of poor fit or pressure injury.	Promotes functional positioning of body and extremities to limit development/severity of contractures.
Note circulation, motion, and sensation of digits frequently.	Edema may compromise circulation to extremities, potentiating tissue necrosis and development of contractures.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Initiate the rehabilitative phase on admission.	To attain the goal of optimal long-term function, rehabilitation must begin at the outset of burn care. Treatment goals and strategies vary, depending on the client's burn (and other injuries), stage of burn treatment, age, and comorbidities.
Perform/assist with ROM exercises consistently, initially passive, progressing to active.	In the seriously ill burned client, goals are to limit loss of range of motion (ROM), reduce edema, and prevent contractures.
Medicate for pain before activity or exercises.	Reduces pain and tissue stiffness and tension, enabling client to be more active and facilitating therapy.
Schedule treatments and care activities to provide periods of uninterrupted rest.	Increases client's strength and tolerance for activity.
Encourage family/SO support and assistance with ROM exercises.	Enables family/SO to be active in client care and provides more constant and consistent therapy.
<b>Self-Care Assistance NIC</b>	
Incorporate ADLs with physical therapy, hydrotherapy, and nursing care.	Combining activities produces improved results by enhancing effects of each.
Encourage client participation in all activities as individually able.	Promotes independence, enhances self-esteem, and facilitates recovery process.
Instruct and assist with mobility aids, such as a cane, walker, or crutches, as appropriate.	Promotes safe ambulation.
<b>Bed Rest Care NIC</b>	
<i>Collaborative</i>	
Collaborate with rehabilitation, physical, and occupational therapists.	Normally members of the burn team, these specialists provide integrated activity and exercise programs and specific assistive devices based on individual needs.
Provide foam or flotation mattress or kinetic therapy bed, as indicated.	Prevents prolonged pressure on tissues, reducing potential for tissue ischemia, necrosis, and decubitus ulcer formation.
Maintain pressure garment when used.	Hypertrophic scarring can develop around grafted areas or at the site of deep partial-thickness wounds. Pressure dressings minimize scar tissue by keeping it flat, soft, and pliable, enhancing movement.

### NURSING DIAGNOSIS: impaired Skin Integrity [grafts/donor site]

#### May Be Related To

[Burn injury]

#### Possibly Evidenced By

Disruption of skin surface/layers

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Burn Healing NOC

Demonstrate tissue granulation.

Achieve timely healing of burn wounds.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Skin Care: Graft/Donor Site NIC</b>	
<i>Independent</i>	
<b>Preoperative</b>	
Assess and document size, color, depth of wound, noting necrotic tissue and condition of surrounding skin.	Provides baseline information about need for skin grafting and possible clues about circulation in area to support graft.

(continues on page 758)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide appropriate burn care and infection control measures. (Refer to ND: risk for Infection.)	Prepares tissues for grafting and reduces risk of infection and graft failure.
<b>Collaborative</b> Administer topical wound debridement ointment, as indicated, for example, enzymatic products—collagenase ointment (Santyl) and papain (Accuzyme).	Early debridement of burn eschar is beneficial to wound healing, and some treatment centers suggest use of these products to promote healing. However, despite theoretical advantage, enzymatic debridement results have been highly variable.
<b>Independent</b> <b>Postoperative</b>	
Elevate grafted area, if possible and appropriate.	Reduces swelling and limits risk of graft separation.
Maintain desired position and immobility of area when indicated.	Movement of tissue under graft can dislodge it, interfering with optimal healing.
Maintain dressings (mesh, petroleum, nonadhesive) over newly grafted area and/or donor site, as indicated.	Areas may be covered by translucent, nonreactive surface material between graft and outer dressing to eliminate shearing of new epithelium to protect healing tissue. The donor site is usually covered for 4 to 24 hours, then bulky dressings are removed and fine mesh gauze is left in place.
Keep skin free from pressure.	Promotes circulation and prevents ischemia, necrosis, and graft failure.
Evaluate color of grafted and donor site(s); note signs of healing.	Evaluates effectiveness of circulation and identifies developing complications.
<b>Collaborative</b> Maintain prescribed wound covering (skin substitutes) as indicated, for example: <b>alginates</b> (e.g., Aquacel, Coloplast), <b>antimicrobials</b> (e.g., Acticoat, Silverlon), <b>collagens</b> (e.g., Fibracol, Puracol), <b>hydrocolloids</b> (e.g., Duoderm, Granuflex, Tegaderm), <b>hydrogels</b> (e.g., Dermagel, Silva-Sorb, Skintegrity), and <b>polyurethane foams</b> (e.g., Allevyn, Lyofoam) (Rowan et al, 2015).	The selection of an appropriate dressing depends on several factors (e.g., depth of burn, condition of the wound bed, wound location, desired moisture retention and drainage, required frequency of dressing changes, and cost). While many factors must be considered in dressing selection, the goals in selecting the most appropriate dressing should include (1) providing protection from contamination (bacterial or otherwise) and from physical damage, (2) allowing gas exchange and moisture retention, and (3) providing comfort to enhance functional recovery (Broussard & Powers, 2013).
Human fibroblast-derived temporary skin substitute (TransCyte)	Useful for eschar-free, partial-thickness burns awaiting autografts because it can remain in place for longer periods of time and is permeable to topical antimicrobial agents.
Prepare for/assist with surgical grafting or biological dressings, such as the following:	
Homograft (allograft)	Skin grafts obtained from living persons or cadavers are used as a temporary covering for extensive burns until individual's own skin is ready for grafting (test graft) to cover excised wounds immediately after escharotomy or to protect granulation tissue.
Heterograft (xenograft, porcine)	Skin grafts may be carried out with animal skin for the same purposes as homografts or to cover meshed autografts.
Cultured epithelial autograft (CEA) (e.g., Epicel)	Skin graft obtained from uninjured part of client's own skin and prepared in a laboratory. Note: While CEA can provide coverage of a large surface area defect using a small amount of donor tissue, this type of skin substitute has been associated with high rates of infection and graft loss, confirming the importance of the dermal layer in skin grafting. Cultured skin substitute (CSS) is composed of a CEA combined with a cultured autologous dermal layer; therefore, it addresses both the dermal and epidermal skin layers.

**NURSING DIAGNOSIS:** **risk for Post-Trauma Syndrome**
**Possibly Evidenced By**

Perceives event as traumatic; serious injury to self  
Survivor role  
Duration of traumatic event; exposure to disaster

**Desired Outcomes/Evaluation Criteria—Client Will**
**Personal Resiliency NOC**

Identify healthy ways to deal with feelings.  
Verbalize absence of severe anxiety, or reduced anxiety or fear when memories occur.  
Demonstrate ability to deal with emotional reactions in an individually appropriate manner.  
Demonstrate effective problem-solving skills.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Crisis Intervention NIC</b>	
<i>Independent</i>	
Assess meaning of loss or change to client and SO, including future expectations and impact of cultural and religious beliefs.	Traumatic episode results in sudden, unanticipated changes, creating feelings of grief over actual or perceived losses. This necessitates support to work through to optimal resolution.
Acknowledge and accept expression of feelings of frustration, dependency, anger, grief, and hostility. Note withdrawn behavior and use of denial.	Acceptance of these feelings as a normal response to what has occurred facilitates resolution. It is not helpful or possible to push client before he or she is ready to deal with the situation. Denial may be prolonged and be an adaptive mechanism because client is not ready to cope with personal problems.
Provide frequent explanations and information about care procedures. Repeat information as needed or desired.	Knowing what to expect usually reduces anxiety, clarifies misconceptions, and promotes cooperation. Note: Because of the shock of the initial trauma, many people do not recall information provided during that time.
Demonstrate willingness to listen and talk to client when free of painful procedures.	Helps client and SO know that support is available and that healthcare provider is interested in the person, not just care of the burn.
Involve client and SO in decision-making process whenever possible. Provide time for questioning and repetition of proposed treatments.	Promotes sense of control and cooperation, decreasing feelings of helplessness or hopelessness.
Assess mental status, including mood and affect, comprehension of events, and content of thoughts, such as illusions or manifestations of terror or panic.	Initially, client may use denial and repression to reduce and filter information that might be overwhelming. Some clients display calm manner and alert mental status, representing dissociation from reality, which is also a protective mechanism.
Provide constant and consistent orientation. Explain to client what happened. Provide opportunity for questions and give open and honest answers.	Helps client stay in touch with surroundings and reality. Adjustment to the impact of the trauma and grief over losses and disfigurement can easily lead to clinical depression, psychosis, and PTSD. Compassionate statements reflecting the reality of the situation can help client and SO acknowledge the reality and begin to deal with what has happened.
Investigate changes in mentation and presence of hypervigilance, hallucinations, sleep disturbances (e.g., nightmares), agitation or apathy, disorientation, and labile affect, all of which may vary from moment to moment.	Indicators of acute stress response or delirium state in which client is literally fighting for life. Although cause can be psychologically based, pathological life-threatening causes, such as shock, sepsis, or hypoxia, must be ruled out.
Set limits on maladaptive behavior (e.g., manipulative or aggressive). Maintain nonjudgmental attitude while giving care, and help client identify positive behaviors that will aid in recovery.	Client and SO tend to deal with this crisis in the same way in which they have dealt with problems in the past. Staff may find it difficult and frustrating to handle behavior that is disrupting and not helpful to recuperation but should realize that the behavior is usually directed toward the situation and not the care provider.

(continues on page 760)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage client to talk about the burn circumstances when ready.	Client may need to tell the story of what happened over and over to make some sense out of a terrifying situation.
Identify previous methods of coping with and handling stressful situations.	Past successful behavior can be used to assist in dealing with the present situation.
Create a restful environment; use guided imagery and relaxation exercises.	Clients experience severe anxiety associated with burn trauma and treatment. These interventions are soothing and helpful for positive outcomes.
Assist the family to express their feelings of grief and guilt.	The family may initially be most concerned about client's dying and/or feel guilty, believing that in some way they could have prevented the incident.
Be empathetic and nonjudgmental in dealing with client and family.	Family relationships are disrupted; financial, lifestyle, and role changes make this a difficult time for those involved with client, and they may react in many different ways.
Encourage family/SO to visit and discuss family happenings. Remind client of past and future events.	Maintains contact with a familiar reality, creating a sense of attachment and continuity of life.
<b>Collaborative</b>	
Involve entire burn team in care from admission to discharge, including social worker and psychiatric resources.	Provides a wide support system and promotes continuity of care and coordination of activities.
Administer mild sedation, as indicated, for example, lorazepam (Ativan), alprazolam (Xanax).	Antianxiety medications may be necessary for a short period of time until client is more physically stable and internal locus of control is regained.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs.**

**May Be Related To**

Insufficient information; insufficient knowledge of resources  
Misinformation presented by others  
Alteration in cognitive function/memory; insufficient interest in learning

**Possibly Evidenced By**

Insufficient knowledge  
Inaccurate follow-through of instructions; development of preventable complications  
Inappropriate behavior

**Desired Outcomes/Evaluation Criteria—Client Will**

**Knowledge: Disease Process NOC**

Verbalize understanding of condition, prognosis, and potential complications.

**Knowledge: Treatment Regimen NOC**

Verbalize understanding of therapeutic needs and treatment plan(s).  
Correctly perform necessary procedures and explain reasons for actions.  
Initiate necessary lifestyle changes and participate in treatment and rehabilitation regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b>	
<b>Independent</b>	
Review condition, prognosis, and future expectations.	Provides knowledge base from which client can make informed choices.
Discuss client's expectations of returning home, to work, and to normal activities. Role-play social situations of concern to client.	Client frequently has a difficult and prolonged adjustment after discharge. Problems, such as sleep disturbances, nightmares, reliving the accident, difficulty with resumption of social interactions or intimacy and sexual activity, and emotional lability, often occur and can interfere with successful adjustment to resuming normal life.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review and have client and SO demonstrate proper burn, skin graft, and wound care techniques. Identify appropriate sources for outpatient care and supplies.	Promotes competent self-care after discharge, enhancing independence.
Discuss skin care, such as scar massage and use of perfume-free moisturizers (e.g., Vaseline Intensive Care, Eucerin), sunscreens, and anti-itching medications (e.g., diphenhydramine [Benadryl], hydroxyzine [Atarax]).	Itching, blistering, and sensitivity of healing wounds and graft sites can be expected for an extended time, and injury can occur because of the lack of natural lubrication and fragility of the new tissue. Note: Sunblock may be required for life because of potential for hyperpigmentation.
Explain scarring process and necessity for and proper use of silicone gel sheeting, static splint, or pressure garments when used.	Helps minimize and treat hypertrophic scarring and contracture formation. Consistent use of the pressure garment over a long period can reduce the need for reconstructive surgery to release contractures and remove scars. <b>P</b> Note: Remind parent that child wearing pressure garment should be evaluated periodically for proper fit due to growth.
Recommend contact with survivor support person or group for client and SO, such as Survivors Offering Assistance in Recovery (SOAR). Give information about how SO can be helpful to client.	Provides a connection with a supporter who has experienced a burn injury. Talking with someone who has been directly impacted by a burn or by tissue injury can be reassuring, because he or she has had similar experiences and is familiar with what lies ahead.
Encourage continuation of prescribed exercise program and scheduled rest periods.	Maintains mobility, reduces complications, and prevents fatigue, facilitating recovery process.
Identify specific limitations of activity as individually appropriate.	Imposed restrictions depend on the severity and location of the injury and the stage of healing.
Emphasize importance of sustained intake of high-protein and high-calorie meals and snacks.	Optimal nutrition enhances tissue regeneration and general feeling of well-being. Note: Client often needs to increase caloric intake to meet calorie and protein needs for healing.
Review medications, including purpose, dosage, route, and expected or reportable side effects.	Reiteration allows opportunity for client to ask questions and be sure understanding is accurate.
Advise client and SO of potential for exhaustion, boredom, emotional lability, and adjustment problems. Provide information about possibility of discussion as well as interaction with appropriate professional counselors.	Provides perspective to some of the problems that client/SO may encounter and aids awareness that assistance is available when necessary.
Identify signs and symptoms requiring medical evaluation— inflammation, increase or changes in wound drainage, fever, chills, changes in pain characteristics, or loss of mobility or function.	Early detection of developing complications (e.g., infection, delayed healing) may prevent progression to more serious or life-threatening situations.
Emphasize necessity and importance of follow-up care and rehabilitation program including physical/occupational therapy and vocational counseling.	Long-term support with continual reevaluation and changes in therapy is required to regain and maintain independence and achieve optimal recovery.
Provide phone number for contact person.	Provides easy access to treatment team to reinforce teaching, clarify misconceptions, and reduce potential for complications.
Identify community resources, such as skin and wound care professionals and crisis centers, recovery groups, and mental health, American Red Cross, visiting nurse, Ambli-Cab, and homemaker service.	Facilitates transition to home, provides assistance with meeting individual needs, and supports independence.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **ineffective Coping**—situational crisis, severe/chronic pain; inadequate level of confidence in ability to cope
- **disturbed Body Image**—alteration in body structure, function; fear of rejection by others

(continues on page 762)

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities) (continued)

- **risk for Disuse Syndrome**—severe pain, prescribed immobilization or restrictive therapies
- **risk for situational low Self-Esteem**—functional impairment; loss; disturbed body image
- **ineffective Health Management**—complexity of therapeutic regimen; economic difficulties; added demands made on individual/family; social support deficits
- **Post-Trauma Syndrome**—events outside the range of usual human experience; serious injury to self

## WOUND CARE: COMPLICATED OR CHRONIC

**I. Pathophysiology**—destruction of various layers of the integument as the result of purposeful action (surgical procedure), disease processes, impaired circulation, or incidental trauma (pressure, shearing forces)

**II. Types of Wounds**

- a. Surgical: These are surgical wounds that failed to heal or have dehisced.
- b. Traumatic: unintentional or intentional
- c. Foot ulcers: Most often occurs in diabetics and are associated with polyneuropathy and injury. It is estimated that 2% to 5% of persons with diabetes will develop foot ulcers each year (Maydick & Acee, 2016; Rowe, 2017).  
*Note:* These wounds may be classified with Meggit-Wagner Ulcer Classification (grades 0–5) (see Glossary below).
- d. Leg ulcers: Venous stasis causes about 80% of lower-extremity ulcers (Kolluri, 2014) but are also associated with peripheral arterial disease (PAD) and sickle cell disease.
- e. Pressure ulcers/injury (also called decubitus ulcers): occur because of prolonged ischemia-producing external pressure, usually to a soft tissue region overlying a bony prominence. Shearing forces, exposure to constant moisture, and heat buildup also are major contributing factors.
- f. Irritant dermatitis: urinary or fecal incontinence, leaking tubes or drains
- g. SCALE (see Glossary) ulcers: develop most commonly on sacrum or coccyx as skin fails as a part of the dying process and blood is shunted away from the skin to vital organs.

**III. Etiology** (Baley, 2013; Daley & Bhat, 2017; Kolluri, 2014; Rowe, 2017)

- a. Neuropathy, such as occurs with diabetes, spinal cord injury, cerebral palsy, Hansen's disease
- b. Ischemia associated with atherosclerosis, microangiopathy (such as occurs with diabetes), arterial or venous insufficiency, any form of peripheral vascular disease
- c. Infection: potentiates collagen lysis; bacterial contamination, a susceptible host and wound environment is required
- d. Peripheral edema: due to elevated venous pressure such as occurs with varicose veins or deep vein thrombosis (DVT); cardiopulmonary conditions (e.g., congestive heart failure); untreated lymphedema
- e. Direct pressure, such as occurs with immobility, paralysis, poor mobility occurring due to advanced age, dementia, or terminal illness
- f. Medical device-related pressure injuries result from the use of devices designed and applied for diagnostic or therapeu-

tic purposes.  **Note:** Medical devices are associated with 50% of pressure ulcers in pediatric clients (Freundlich, 2017).

- g. Miscellaneous direct or associated causes: connective tissue disorders, vasculitis, arteriovenous malformations, pharmacological agents (e.g., corticosteroids, hydroxyurea), neoplasms/malignancy, radiation, osteomyelitis, poor nutritional status, smoking

**IV. Staging** (Redefined by National Pressure Ulcer Advisory Panel [NPUAP], 2016)

- a. Stage I: intact skin, nonblanchable redness in localized area (may be difficult to detect in dark-skinned person)
- b. Stage II: partial-thickness loss of skin with exposed dermis. The wound bed is viable, pink or red, moist, and may also present as an intact or ruptured serum-filled blister.
- c. Stage III: full-thickness skin loss. Adipose is visible in the ulcer; granulation tissue and epibole (see Glossary) are often present. Slough and/or eschar may be visible. Undermining and tunneling may occur.
- d. Stage IV: full-thickness skin and tissue loss, with exposed fascia, muscle, or bone in ulcer. Slough and/or eschar may be visible. Epibole, undermining, and/or tunneling often occur.
- e. Unstageable: full-thickness tissue loss in which the base of the ulcer is covered in the wound bed. Full-thickness skin and tissue loss in which the extent of tissue damage within the ulcer cannot be confirmed because it is obscured by slough or eschar. If slough or eschar is removed, a stage 3 or stage 4 pressure injury will be revealed.
- f. Deep tissue pressure injury (DTPI): intact or nonintact skin with localized area of persistent nonblanchable deep red, maroon, or purple discoloration or epidermal separation revealing a dark wound bed or blood-filled blister. Pain and temperature change often precede skin color changes.

**V. Statistics**

- a. Morbidity: Infection is the most common major complication of pressure injuries. Chronic wounds have a significant impact on health and quality of life, causing pain, loss of function and mobility, depression, distress and anxiety, embarrassment and social isolation, financial burden, prolonged hospital stays, and chronic morbidity (Järbrink et al, 2016; MacDonald, 2009).
- b. Mortality: A study published in 2008 (using 2006 data) reported that in-hospital mortality was higher for pressure ulcer-related hospitalizations than hospitalizations for other diagnoses (and especially among those with a *secondary* diagnosis of pressure ulcers). In-hospital death

## G L O S S A R Y

- Approximated:** Wound edges to a surgical incision are either sutured or stapled so that edges touch, forming a thin line.
- Dehisced:** A break in the continuity of the surgical wound.
- Deep tissue injury:** Persistent localized area of nonblanchable deep red, maroon, or purple discoloration of skin that is either intact or a blood-filled blister. This injury results from intense and/or prolonged pressure and shear forces at the bone-muscle interface. *Note:* This term is not used to describe vascular, traumatic, neuropathic, or dermatologic conditions (Freundlich, 2017).
- Epibole (rolled wound edges):** Results when the upper epidermal cells roll down over the lower epidermal cells and migrate down the sides of the wound instead of across the wound. The body thinks the wound is healed, causing cessation of the healing process.
- Eschar:** Hard crust or scab that forms over the wound, is typically dark brown or black, and must be removed in order for wound to begin healing.
- Meggitt-Wagner Ulcer Classification:** A specific classification system for diabetic foot ulcers; however, it does not capture the depth of the wound (grade 0: preulceration lesion, healed ulcer, or presence of bony deformity; grade 1: superficial ulcer; grade 2: ulcer penetrates through subcutaneous tissue and may have exposed bone, tendon, muscle, etc.; grade 3: presence of osteitis, abscess, or osteomyelitis; grade 4: gangrene of a digit; grade 5: gangrene of the foot).
- Medical device-related pressure injury:** Results from the use of devices designed and applied for diagnostic or therapeutic purposes. The pressure injury generally conforms to the pattern or shape of the device. The injury should be staged using the staging system.
- Mucosal membrane pressure injury:** Found on mucous membranes with a history of a medical device in use at the location of the injury (e.g., nasogastric tube, endotracheal [ET] tube, splints, braces). Due to the anatomy of the tissue, these ulcers cannot be staged.
- Necrosis (or necrotic tissue):** Death of cells, usually within a localized area of the body, as from an interruption of the blood supply to that part.

## CARE SETTINGS

All care settings.

individual patient care ranges from \$20,900 to \$151,700 per pressure ulcer (AHRQ, 2014). A recent study of diabetics with and without diabetic foot ulcers (DFUs) revealed that DFUs impose a substantial burden on public and private payers, ranging from \$9 to \$13 billion *in addition* to the costs associated with diabetes itself (Rice et al, 2014).

**Negative pressure wound therapy (NPWT):** A sealed, air-tight vacuum wound-care system using foam dressings with the application of negative pressure in order to drain exudates and promote blood flow to the wound to enhance healing.

**Peripheral arterial disease:** Systemic form of atherosclerosis causing restrictive blood flow.

**Periwound:** Tissue immediately surrounding the wound.

**Polyneuropathy:** Functional disturbance or pathological changes to the nervous system that may include several systems (motor, sensory, autonomic) typically affecting the lower limbs.

**Pressure injury (also known as pressure ulcer/formerly decubitus ulcer):** Redefined in 2016 as localized damage to skin and underlying soft tissue usually over a bony prominence or related to a medical or other device. The injury occurs as a result of intense and/or prolonged pressure or pressure in combination with shear (NPUAP, 2016).

**SCALE (Skin Changes At Life's End) ulcers:** Term used to describe wounds that appear in terminal clients shortly before death. These ulcers usually develop on the sacrum or coccyx, develop rapidly (sometimes in hours), and are characteristically pear, butterfly, or horseshoe shaped. The shunting of blood (away from the skin and toward the vital organs) results in the skin not receiving inadequate nutrient and oxygen, leading to waste tissue death. *Note:* The Kennedy Terminal Ulcer is a subset of SCALE (WOUNDS Staff, 2009). Treatment is focused on comfort rather than healing.

**Shear:** Normal mechanical force with physiological effects, although it is unclear how it causes tissue damage and is difficult to measure. Change in position or posture is likely to cause shear both externally (friction) and internally.

**Slough:** Necrotic tissue that is separating from the wound bed or surrounding tissue. This tissue can be yellow, tan, gray, brown, or green.

**Venous stasis:** Impaired venous blood flow.

## RELATED CONCERNS

\*\*\*\*In addition to any care plan concerning chronic conditions, surgery, trauma, immobility:

Surgical intervention, page 873

Total nutritional support: parenteral/enteral feeding, page 525

## CLIENT ASSESSMENT DATABASE

Data depend on type, severity, and body surface area involved.

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- Bedrest/wheelchair-bound, immobile, or with limited ability to reposition self
- Decreased strength and/or range of motion (affected extremity)

- Requires assistance for turning, repositioning, weight shifts

#### CIRCULATION

- Diminished or absent dorsalis pedis or posterior tibial pulse (if foot ulcer present)
- Dependent rubor, pallor on elevation, and loss of hair on the foot or toes (may be present in leg and foot ulcers)
- Capillary refill greater than 3 seconds
- Edema of lower extremities

#### ELIMINATION

- Diarrhea, urinary incontinence (may be impacting sacral area skin)

#### NEUROSENSORY

- Paresthesias

#### PAIN/DISCOMFORT

- Pain from the condition causing the wound may or may not be present or be persistent, even at rest, and chronic. Pain present during dressing changes may be acute and associated with activities of debridement.

- Grimacing, withdrawal
- Guarding of affected area
- Emotional responses

#### SAFETY

- Elevated temperature; fever
- Skin ulcerations, wounds
- Foul-smelling drainage, spontaneously bleeding wound bed; increased levels of wound exudate; surrounding cellulitis

#### TEACHING/LEARNING

- History of smoking

#### DISCHARGE PLAN CONSIDERATIONS

- May require assistance with treatments, wound care and supplies, self-care activities, homemaker and maintenance tasks, transportation, finances, and vocational counseling

### DIAGNOSTIC STUDIES

#### TEST

#### WHY IT IS DONE

#### WHAT IT TELLS ME

#### BLOOD TESTS

- **Complete blood count (CBC):** Evaluates numbers and characteristics of blood cells, including red and white blood cells, hemoglobin, hematocrit, and platelets.

Leukocytosis, anemia, and thrombocytopenia are commonly found.

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li><b>Serum protein, albumin, prealbumin, and transferrin levels:</b> Measures types and efficiency of plasma proteins. Used to detect protein-calorie malnutrition.</li> <li><b>Wound cultures:</b> Specimens obtained from wound bed exudates are cultured to detect a wound infection and to determine which specific bacteria are present.</li> </ul>	<p>May be done to evaluate the client's nutritional status in the setting of nonhealing wounds.</p> <p>May be done to determine the appropriate antimicrobial therapy.</p>
<p><b>ASSOCIATED DIAGNOSTIC STUDIES</b></p> <ul style="list-style-type: none"> <li><b>Vascular studies (e.g., plethysmography, pulse-volume recordings [PVRs]), Doppler Ankle Brachial Pressure Index (ABPI)</b></li> <li><b>Vascular ultrasonography:</b> Noninvasive procedure that uses ultrasound technology to provide information about the anatomy, physiology, and pathology of both the superficial and the deep venous systems.</li> <li><b>Wound biopsy:</b> Piece of viable wound tissue obtained with scalpel or punch biopsy instrument and submitted for microscopic examination.</li> </ul>	<p>May be done to evaluate hemodynamic significance of arterial occlusive disease. <i>Note:</i> Doppler ABPI may be indicated if pulse is not palpable or to assess the appropriateness of high or modified compression bandaging for venous ulcers.</p> <p>May be indicated to evaluate for vessel disease or deep venous occlusion.</p> <p>Recommended in the case of refractory, nonhealing ulcers or when wounds present with atypical signs. <i>Note:</i> A recent study showed that approximately 10% of wounds are atypical (not originating from vascular insufficiency, neuropathy, or prolonged pressure) and are the result of infection, metabolic disorders, neoplasms, and inflammatory processes (Tang et al, 2012).</p>

## NURSING PRIORITIES

- Promote healing.
- Alleviate pain.
- Prevent complications.
- Provide information about wound, treatment, and potential complications.

## DISCHARGE GOALS

- Wound healing progressing toward resolution.
- Pain controlled or reduced.
- Complications prevented or minimized.
- Plan in place to meet discharge needs.

## NURSING DIAGNOSIS: Impaired Skin/Tissue Integrity

### May Be Related To

Mechanical factors (e.g., shearing forces, pressure, restraint)  
 Imbalanced nutritional state (e.g., obesity, emaciation); pressure over bony prominence  
 Excessive/insufficient fluid volume [presence of edema]  
 Moisture, excretions, secretions  
 Impaired circulation (e.g., medical conditions affecting circulation and immune functioning such as diabetes, peripheral neuropathy, peripheral arterial disease and venous insufficiency); alteration in sensation; peripheral neuropathy  
 Extremes of age; impaired mobility

### Possibly Evidenced By

Alteration in skin integrity, damaged/destroyed tissue (e.g., skin layers, subcutaneous tissues)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Wound Healing: Secondary Intention NOC

Be free of signs of infection or other complications.  
 Display progressive improvement/healing of lesions, wounds, or pressure sores.

#### Self-Management: Chronic Disease NOC

Maintain optimal physical well-being.  
 Participate in prevention measures and treatment program.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Wound Care: Nonhealing NIC</b> <i>Independent</i> Review client factors that may delay or inhibit healing.	Client's ability to heal is affected by underlying conditions (e.g., diabetes, poor systemic circulation, or peripheral vascular disease [PVD], malnutrition/protein deficiency); persistent inflammation; use of certain medications (e.g., systemic steroids, immunosuppressive drugs, antimetabolite chemotherapy). Note: Chronic wounds (those with stalled healing or failure to heal) are more prevalent in older adults and are attributed to aged skin and comorbidities, such as neuropathy, arterial compromise, edema, and unrelieved pressure (in addition to factors listed above).
Determine client's age and developmental level. Note presence of compromised mobility, sensation, vision, hearing, or speech.	Factors that affect client's ability to provide for own safety needs (e.g., diabetic with impaired vision cannot satisfactorily examine own feet) or participate in care of skin/tissue wounds.
Assess nutritional status and potential for delayed healing.	Protein-calorie malnutrition and deficiencies of vitamins A, C, and zinc impair normal wound-healing mechanisms (Daley & Bhat, 2017).
Review medication regimen.	Identifies medications that may impair healing (e.g., corticosteroids).
Perform routine skin inspection(s), describing observed changes. Note skin color, turgor.	Provides information about client's general nutrition and hydration status.
Ascertain if wound is acute (e.g., injury from surgery, trauma, new pressure area) or chronic (e.g., venous or arterial insufficiency, longstanding diabetic foot ulcer).	Clarifies intervention needs and priorities.
Assess, monitor, and document wound history and physical examination (using facility protocols and tools and/or using a mnemonic [MEASURE]) (see below) if helpful:	Facilitates determination of healing and if appropriate dressing modality is being used. Note: Documentation of a detailed assessment such as MEASURE or TIME ( <u>tissue</u> , <u>i</u> nflammation or infection, <u>m</u> oisture, <u>e</u> dges of wound) is a legal requirement from both an organizational and professional standards perspective (Ayello et al, 2011; Keast et al, 2004).
M = measure (once/week or per protocol)	Accurate measurement of the wound provides data of wound progress. Note: Keast et al suggest measuring size—longest length with the widest width—at right angles. Recent measuring innovations include tracing grid, digital planimetry, handheld scanner (works by measuring changes in moisture under the skin) (Stephenson, 2015).
E = exudate	Describes amount (none, scant, moderate, or heavy) and characteristics—serous, sanguineous, pustular, or combinations.
A = appearance	Describes appearance of wound bed, slough, and tissue: for example, base: necrotic (black), fibrin (firm yellow), slough (soft yellow), or granulation tissue (pink and healthy vs red and friable = easy bleeding, unhealthy).
S = suffering	Describes pain client is experiencing from underlying condition as well as that which is occurring due to dressing changes and debridement.
U = undermining	It is suggested to measure in centimeters and use hands of clock (e.g., 2 o'clock, 6 o'clock) to document direction of undermining.
E = edge	Describes perimeter tissue (e.g., macerated, normal).
Note odors emitted from skin, wound, or dressings.	May provide information about presence of inflammation in deep tissues or wound infection.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
When performing dressing changes and cleansing wound beds:	
Gently remove tape or old dressing in the direction of hair growth.	Decreases pain during removal of dressing and prevents damage to periwound skin.
Cleanse wound as needed with normal saline or prescribed solution and gently pat dry with gauze sponge.	Removal of necrotic debris facilitates removal of exudate, contaminated or infected tissue and promotes healing.
Apply wound dressing product according to manufacturer's directions.	Using the product correctly will facilitate wound healing and limit/prevent disruption of the periwound skin.
Loosely fill wound cavity with designated product (gauze sponge, alginate), if appropriate for the wound environment.	Tightly packing the wound cavity results in slow wound healing.
<b>Collaborative</b>	
Review laboratory results, for example, hemoglobin (Hgb)/hematocrit (Hct), blood glucose, albumin/proteins, and so on.	These studies may reveal concerns related to underlying conditions (e.g., anemia, systemic hypoxia, diabetes, malnutrition) affecting healing.
Select wound dressing that is appropriate to the wound environment:	There is no one-size fits-all treatment for wound care. Treatments are entirely dependent on underlying condition(s), type, reason for wound healing failure, and characteristics of wound. Some potential treatments are as follows (Daley & Bhat, 2017; Wound Care Center Staff, n.d.):
Wet-to-dry	This coverage requires wet-to-damp dressings, which support autolytic <b>debridement</b> , absorb exudate, and protect surrounding normal skin. Note: In many settings, wet-to-dry dressings are being discarded in favor of more recent forms of debridement (Dale & Wright, 2011).
Hydrocolloid (e.g., DuoDerm, IntraSite)	Useful in providing hydration to dry wound bed and are impermeable to moisture and bacteria and oxygen.
Polyvinyl film (e.g., Op-Site, Tegaderm)	Wounds that are neither dry nor highly exudative may be covered with a polyvinyl film dressing.
Absorptive dressings (e.g., alginate [Kaltostat, Curasorb], impregnated gauze dressings [Mesalt]); hydrofiber (AquaCel, AquaCel-AG)	Wounds (especially deep wounds) with excessive drainage require absorptive dressings.
Foam and other compression dressings (e.g., Biatain, Tegaderm roll, Profore)	Various compression systems are available utilizing with multiple layers, each providing specific benefits for aiding in the wound-healing process. The first layer goes directly on the wound, with subsequent layers providing padding, dressing, and light compression (Wound Care Center Staff, n.d.).
Negative pressure wound therapy (NPWT), also called vacuum-assisted therapy.	A sealed wound-care system that has been found to be useful in the treatment of diabetic ulcers, large chronic wounds, and acute complicated wounds. NPWT removes edema fluid from the wound through suction, resulting in increased blood flow to the wound and greater cell proliferation. A benefit of fluid removal is reduction in bacterial colonization of the wound, reducing the risk of wound infection, and enhancing the formation of granulation tissue (Wound Care Center Staff, n.d.).

### NURSING DIAGNOSIS: acute/chronic Pain

#### May Be Related To

Physical injury agent—tissue destruction  
Chemical injury agents—excretions, secretions

(continues on page 768)

**NURSING DIAGNOSIS:** **acute/chronic Pain** (continued)**Possibly Evidenced By**

Self-report of intensity and characteristics of pain using standardized scale/instrument  
Guarding behavior; positioning to ease pain  
Expressive behavior—restlessness  
Changes in vital signs (acute)

**Outcomes/Evaluation Criteria—Client Will****Pain Level NOC**

Verbalize relief and/or control of pain or discomfort.  
Appear relaxed; able to sleep/rest appropriately.

**Pain Control NOC**

Engage in use of nonpharmacological relief techniques such as relaxation skills and diversional activities.

**ACTIONS/INTERVENTIONS****RATIONALE****Pain Management: Acute/Chronic NIC****Independent**

Assess pain, noting location, characteristics, and intensity (using an age-appropriate numerical [or similar] coded scale).

Helps evaluate degree of discomfort and effectiveness of analgesia or may reveal developing complications.

Determine the impact of the pain experience on quality of life.

Pain can be debilitating, causing inactivity, loss of work and/or enjoyment of life, weight loss or gain, sleep difficulties, depression, and changes in role and social functioning.

Ensure client receives attentive and adequate analgesic care. Anticipate pain with dressing changes or debridement and medicate accordingly.

Helps to relieve the discomfort. Note: Recent research has focused on pain that a client with chronic wound experiences at other times than with dressing changes. Several studies have indicated that more than 80% of people with a chronic wound reported pain at all times, with half of them rating the pain at moderate to worst pain possible (Nemeth et al, 2004).

Provide anticipatory guidance.

Client should be informed about interventions (e.g., debridement) that can increase pain and participate in decisions about type and timing of analgesia.

Instruct in/encourage use of nonpharmacologic techniques such as relaxation, guided imagery, and visualization. Provide diversional activities.

Helps client refocus attention and promotes coping during debridement or dressing changes, reducing pain and discomfort.

**Collaborative**

Administer medication, such as opioids and nonopioid analgesics, NSAIDs; antidepressants (e.g., amitriptyline [Elavil]) and anticonvulsants (e.g., carbamazepine [Tegretol]); local anesthetics (e.g., foam dressing with local release of ibuprofen); and so on. Utilize patient-controlled analgesia (PCA), as indicated.

Relieves pain, enhances comfort, and promotes rest. Note: Numerous agents have been found to relieve the various components of chronic pain. For example, nociceptive (deep tissue) pain may respond best to opioids and NSAIDs, while neuropathic pain (due to nerve damage) may respond better to antidepressants and anticonvulsants (Woo et al, 2008).

Apply topical analgesic, as appropriate.

May be used to decrease pain with the removal of some dressings, such as the foam used in negative wound pressure therapy.

Implement complementary therapies where indicated, such as nerve stimulation and acupuncture.

May be useful in long-term management of neuropathic pain and encourage growth of healthy tissue.

Assist client/family in developing positive coping strategies. Encourage use of/refer to personal and community resources (e.g., assistive equipment, financial resources, home-health providers, and respite services).

Utilization of available resources to facilitate staying active even when modified activities are required, living a healthy lifestyle, encouraging client/SO to exercise own control in situation, and developing short- and long-term plans for long-term care can promote general well-being and enhance quality of life.

**NURSING DIAGNOSIS:** risk for Infection**Risk Factors May Include**

Alteration in skin integrity—broken skin, traumatized tissue  
Decrease in hemoglobin; leukopenia; suppressed inflammatory response  
Chronic illness—diabetes mellitus, obesity; malnutrition

**Desired Outcomes/Evaluation Criteria—Client Will****Infection Severity NOC**

Achieve wound healing; be free of purulent exudate or other signs of wound infection.  
Verbalize understanding of individual causative or risk factors and ways to prevent complications.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<i>Independent</i>	
Inspect condition of any surgical incision or other wound. Note risk factors for occurrence of infection.	Any wound is at risk for infection, but certain conditions can increase that risk, such as complicated surgical or contaminated traumatic wound, comorbidities (e.g., diabetes, vascular insufficiency, obesity), vulnerable age, immunosuppression, and malnutrition, placing the client at high risk for delayed healing or nonhealing of wounds.
Adhere to facility infection control policy regarding hand hygiene and prevention of cross-contamination.	Standardized practice to prevent infection.
Maintain aseptic or clean technique as is appropriate during dressing changes. Dispose of biologic waste as required.	Promotes wound healing and reduces risk of healthcare-associated infections.
Monitor for systemic and localized signs and symptoms of infection.	Early detection of infection allows for timely treatment and prevention of further complications.
<i>Collaborative</i>	
Monitor lab studies, such as absolute granulocyte count (AGC), WBC, and differential count.	Measures the number and vitality of infection-fighting white blood cells.
Collaborate in treatment of underlying condition(s), systemic or local infections, and wound treatment plan.	Underlying condition(s) such as diabetes, peripheral vascular disease, and heart failure will be ongoing. Improvement in those conditions can (or may) improve wound healing. Having those conditions (while potentially implicated in the development of wounds) does not necessarily cause wound infections. However, systemic infections, as well as local wound infections, require treatment (e.g., surgical debridement of infected wound, systemic antibiotics for sepsis) (Daley & Bhat, 2017).

**NURSING DIAGNOSIS:** imbalanced Nutrition: less than body requirements**May Be Related To**

Insufficient dietary intake [biological factors (e.g., disease condition; increased metabolic demands for healing)]

**Possibly Evidenced By**

Food intake less than recommended daily allowance; food aversion

Weight loss with adequate food intake

Insufficient muscle tone

[Abnormal laboratory studies (e.g., decreased albumin, total proteins; electrolyte imbalances)]

**Desired Outcomes/Evaluation Criteria—Client Will****Nutritional Status: Energy NOC**

Demonstrate progress in tissue healing; free of infection.  
Display improved muscle tone and general endurance.

**Nutritional Status: Biochemical Measures NOC**

Display normalization of laboratory values.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Therapy NIC</b>	
<b>Independent</b>	
Note age, body build, general strength, activity, and current health conditions (e.g., long-term immobilization, chronic diseases) and treatments.	Helps determine nutritional needs.
Weigh client and observe for emaciation, multiple bony prominences, absence of subcutaneous fat and muscle wasting, loss of hair, fissuring of nails, gum bleeding with brushing, and so on.	May indicate protein-energy malnutrition, especially in the setting of nonhealing wounds.
Evaluate total daily food and fluid intake.	May reveal possible cause of malnutrition and changes that could be made to assist client in receiving needed nourishment for wound healing.
Encourage foods high in protein. Offer protein-rich snacks, fluids between meals throughout the day, especially if client eats small amounts at each meal.	The client will require protein intake of 1.2 to 1.5 g/kg/d (adjusted for individual) for adequate wound healing to occur (Daley & Bhat, 2017; Posthauer, 2016). Adequate fluid intake is required to prevent dehydration due to increased protein intake.
Offer high-calorie supplemental nutrition drinks, preferred food/beverage at appropriate texture. Liberalize restrictive diets as possible.	May be helpful in helping client overcome anorexia and food aversion in order to improve client's potential for wound healing.
<b>Collaborative</b>	
Assist in nutritional status assessment (e.g., Mini Nutritional Assessment [MNA], the Malnutrition Universal Screening Tool [MUST] or similar tools), as indicated.	May be used to evaluate client's current status and predict nutritional needs.
Review laboratory studies (e.g., serum albumin/prealbumin, transferrin, amino acid profile, total lymphocyte count, iron stores, nitrogen balance studies, glucose, liver function tests, electrolytes).	Evaluates client's current nutritional status and response to nutritional interventions. Note: Serum prealbumin is sensitive for relatively acute malnutrition because its half-life is 2 to 3 days (vs 21 d for albumin). A serum prealbumin level of less than 10 g/dL suggests severe protein-calorie malnutrition.
Collaborate in treatment of underlying conditions and factors.	Improving client's nutritional status is often multifaceted, especially if client is debilitated over long period of time. Treating infection, anemia, systemic hypotension, and hypoxemia; correcting poor glucose control in diabetic or nausea associated with cancer therapies; or discontinuing medications that decrease appetite may help client regain ability to heal.
Consult registered dietitian or nutritionist, as indicated.	Aids in constructing dietary prescription with optimal amounts of protein, carbohydrates, fats, and calories within client's eating style, needs, and abilities that facilitates wound healing.
Administer vitamin and/or mineral supplements, liquid protein supplements, enteral or parenteral feedings, as needed.	Replacements needed depend on evidence of a deficiency that is impeding wound healing.

## NURSING DIAGNOSIS: risk for ineffective Health Management

### Possibly Evidenced By

Difficulty with prescribed regimen; failure to include treatment regimen in daily living  
Insufficient knowledge of therapeutic regimen; inadequate cues to action  
Perceived seriousness of condition; excessive demands

### Desired Outcomes/Evaluation Criteria—Client Will

#### Knowledge: Treatment Regimen NOC

Verbalize understanding of condition and treatment needs.  
Demonstrate behaviors to maintain therapeutic regimen.  
Identify and use available resources.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Wound Care: Nonhealing NIC</b> <i>Independent</i>	
Assess complexity of client's care needs, noting whether more than one condition is present at the same time.	These factors affect view of self-care. Client may be overwhelmed, in denial, depressed, or have complications exacerbating care needs.
Ascertain client's knowledge and understanding of condition and treatment needs.	Provides baseline for planning care so that learning may begin where client is in relation to condition and current therapeutic regimen.
Identify individual perceptions and expectations of treatment plan.	May reveal misinformation, unrealistic expectations, or other factors that may interfere with client's willingness or ability to follow therapeutic regimen.
Review wound care procedures (e.g., expected tasks and how to perform them); evaluate degree of difficulty for client:	May reveal factors that could interfere with success of self-care.
Maintaining clean technique during dressing changes	Promotes wound healing and reduces risk of infections.
Monitoring for localized signs of infection	Early detection of infection allows for prompt treatment and prevention of further complications.
Signs and symptoms to report to healthcare provider	Provides mechanism for early intervention if complications are occurring or to identify if client is being overwhelmed by complexity of treatment needs.
Refraining from smoking (refer for support, counseling as desired)	Smoking has been shown to decrease cutaneous blood flow by as much as 40%, which produces ischemia and impairs healing (Rayner, 2006).
Eating nutritious foods, staying well hydrated, and taking prescribed medications	All of these measures are needed to promote wound healing and general health.
Accept client's/SOs evaluation of client's strengths and limitations, and ability to cope and/or adapt to situation.	Client may minimize own strengths or have lack of confidence in abilities, which could be reversed with assistance and positive feedback from others.
Note availability and use of resources for assistance. Provide written information and contact numbers and encourage client/SO to seek out resources.	Client/SO may not have, be aware of, or know how to access available resources.
Mobilize support systems, including family/SO, and make appropriate referrals (e.g., wound-care specialists, social services, home-care services, medical supplies, financial assistance, and counseling).	Success of self-care may depend on support systems to reduce stress in dealing with complex and long-term needs.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **ineffective Coping**—situational crises, vulnerability
- **risk for Infection**—broken skin, traumatized tissue; malnutrition; chronic disease
- **risk for disturbed Body Image**—surgery/trauma; treatment regimen

# Systemic Infections and Immunological Disorders

## SEPSIS/SEPTIC SHOCK

**I. Definition**—Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection (Singer et al, 2016). *Note:* Over the past two decades, sepsis has been redefined for clinical care several times (1991, 2001, 2016). This definition reflects the most recent work published by the Third International Consensus Definitions for Sepsis and Septic Shock.

The current definition of *sepsis* replaces the term *severe sepsis* under previous definitions, as it encompasses clinical findings of severe sepsis (Sekel, 2017).

Systemic inflammatory response syndrome (SIRS) criteria were also removed from the sepsis definition in recognition of its lack of specificity (Singer et al, 2016). (See Glossary below.)

### II. Pathophysiology (Angus et al, 2016; Sekel, 2017)

- a. Sepsis is the presence of a systemic inflammatory response to documented or presumed infection, which may progress along a continuum.
- b. Septic shock is a subset of sepsis in which profound circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone. It produces an inability to maintain adequate tissue perfusion and oxygenation, ultimately causing cellular, and then organ system, dysfunction.
- c. Septic shock is accompanied by profound hypotension persisting despite adequate fluid resuscitation and requiring use of vasopressors to maintain mean arterial pressure (MAP ≥65 mm Hg).

### III. Etiology (Centers for Disease Control and Prevention [CDC], n.d.; Kalil & Bailey, 2017)

- a. Multiple microorganisms associated with sepsis
  - i. Bacteria, fungi, viruses, or rickettsiae
  - ii. Common pathogens: *Streptococcus pneumoniae* or *Staphylococcus aureus*, *Candida*, *Salmonella*, *Escherichia coli*, *Legionella*, *Klebsiella*, *Pseudomonas*
- b. Common origin of infections
  - i. Lungs: pneumonia and other pulmonary infections
  - ii. Abdomen: appendicitis, bowel problems (perforated diverticuli), infection of the abdominal cavity, and gallbladder or liver infections
  - iii. Skin: wounds or cellulitis; punctures, such as from intravenous (IV) lines, intravascular devices, or catheters inserted into the body to administer or drain fluids

- iv. Pelvic and genitourinary: urinary tract: kidneys or bladder (glomerulonephritis, pyelonephritis, cystitis), prostatic obstruction; reproductive organs
- v. Bone and soft tissue infections
- vi. Cardiac infection: more common in clients with history of injection drug use
- c. At-risk populations and risk conditions: Anyone can get an infection, and almost any infection can lead to sepsis. However, certain people are at increased risk for developing sepsis: (1) adults older than 65; (2) people with chronic medical conditions (e.g., diabetes, lung disease, cancer, human immunodeficiency virus [HIV] infection; chronic liver and end-stage kidney disease); (3) those with recent trauma, burns, or major surgeries; (4) people with immunosuppression and immunosuppressive therapies, as well as organ and bone marrow transplants; (5) those with indwelling invasive devices (e.g., central venous catheters, arterial catheters, prosthetic devices, urinary and dialysis catheters, feeding tubes); (6) local infection sites (e.g., abscesses, urinary tract infections, or foreign bodies); and (7) children younger than 1 (*not the focus of this care plan*) (CDC, 2017f; Kilburn et al, 2013).
- d. Risk-prone environments: In **healthcare settings**, sepsis is not restricted to hospitals but also can occur in outpatient and extended-care facilities. In the **community**, sepsis can occur because of unsanitary and/or crowded living conditions, pollution, poor nutrition, immunosuppression, chronic health conditions, improper use of antibiotics, and antibiotic resistance.

### IV. Statistics

- a. Morbidity: A recent Centers for Disease Control and Prevention (CDC) study (2016a) showed that more than 1.5 million people in the United States get sepsis and that 7 in 10 patients who had sepsis had recently used healthcare services or had chronic conditions that required medical care. Sepsis is the sixth most common reason for hospital admission in the United States, and patients with sepsis are more likely to have longer hospital stays with higher costs—along with higher rates of discharge to long-term care—than any other discharge diagnosis (Novosad et al, 2016).
- b. Mortality: The CDC (2016) says that about 250,000 Americans die annually of sepsis and further asserts that

one in three who die in a hospital had sepsis. A study published in the *Morbidity and Mortality Weekly Report (MMWR)* examined varying estimates of sepsis mortality and found that between 1999 and 2014, the annual number of all reported sepsis-related deaths increased 31%, between 1999 and 2014 (CDC, 2016a).

- c. Cost: A study published in 2016 by the Healthcare Cost and Utilization Project (HCUP) rated septicemia as number 1 among the 20 costliest conditions treated in U.S. hospitals in 2013 at almost \$24 billion, accounting for 6.2% of aggregate hospital costs. In the same year, Medicare was billed more than \$14.5 billion of that \$24 billion total.

## G L O S S A R Y

- Anaerobic infection:** An infection caused by bacteria, called anaerobes, which cannot grow in the presence of oxygen.
- Bacteremia:** The presence of live bacteria in the blood-stream. Bacteremia is similar in some respects to viremia (the presence of a virus in the blood), parasitemia (the presence of a parasite in the blood), or fungemia (presence of a fungus in the blood).
- Body substance isolation (BSI):** Practice of isolating all body substances—blood, urine, feces, sputum, tears, and so on.
- Cytokines:** Protein chemical messengers involved in the inflammatory process, usually from white blood cells (WBCs).
- Disseminated intravascular coagulation (DIC):** Hyper-stimulation of coagulation pathways results in diffuse activation and consumption of coagulation factors, leading to generalized bleeding.
- Endotoxins:** Potentially toxic, natural compounds found inside pathogens such as bacteria.
- Infection:** Inflammatory response to invasion of host tissue by microorganisms.
- Multiple organ dysfunction syndrome (MODS):** Organ dysfunction leading to organ failure with inability to maintain homeostasis.
- The qSOFA score (also known as quickSOFA):** Bedside prompt (i.e., S = sepsis related; O = organ; F = failure; A = assessment) that may identify infected individuals outside the intensive care unit with suspected infection who are at greater risk for a poor outcome. It uses three

criteria, assigning one point each for (1) low blood pressure (systolic blood pressure [SBP]  $\leq$  100 mm Hg), (2) high respiratory rate ( $\geq$  22 breaths per minute), or (3) altered mentation (Glasgow coma scale  $<$  15). The presence of two or more criteria is associated with a poor outcome (qSOFA.org, n.d.).

**Systemic inflammatory response syndrome (SIRS):**

While some patients with infections may fit the SIRS criteria, SIRS may also occur in multiple noninfectious disease states such as trauma, burns, surgery, or pancreatitis (Kaukonen et al, 2015). Although the SIRS criteria have been removed from the current sepsis definition (Singer et al, 2016), they remain useful for the identification of infection and can be used to help broadly identify or screen potential patients at risk for sepsis (Vincent et al, 2016). We are listing them in this edition as some practitioners may still use them in assessing clinical and laboratory findings (i.e., infection with release of endo- or exotoxins activating the inflammatory cascade—local release of cytokines into the circulation in attempt to restore homeostasis; **and** failure of mechanisms leading to a destructive response with loss of circulatory integrity; **and** criteria [two or more]—fever higher than  $100.4^{\circ}\text{F}/38^{\circ}\text{C}$  or lower than  $96^{\circ}\text{F}/36^{\circ}\text{C}$ ; heart rate greater than 90 beats per minute; respiration greater than 20/min or  $\text{PaCO}_2$  less than 32 mm Torr; WBC count greater than  $12,000/\mu\text{L}$ , less than  $4000/\mu\text{L}$ , or greater than 10% of bands or immature cells [Doenges et al, 2014]).

## CARE SETTING

\*\*\*\*Although severely ill individuals will likely receive care in the intensive care unit (ICU), this plan primarily addresses care on an inpatient acute medical-surgical unit. Nursing care in this setting may be assessment and monitoring of the at-risk client with an existing infection.

## RELATED CONCERNS

Acquired immunodeficiency syndrome (AIDS), page 800  
Acute lung injury/acute respiratory distress syndrome, page 177  
Chronic obstructive pulmonary disease (COPD) and asthma, page 132

Disaster considerations, page 980

Fluid and electrolyte imbalances (see *DavisPlus*)

Metabolic acidosis—primary base bicarbonate deficiency, see (*DavisPlus*)

Peritonitis, page 389

Pneumonia, page 147

Psychosocial aspects of care, page 835

Pulmonary tuberculosis (TB), page 204

Acute kidney injury (acute renal failure), page 595

Surgical intervention, page 873

Total nutritional support: parenteral/enteral feeding, page 525

Respiratory failure/ventilatory assistance page 187

Wound care: complicated or chronic, page 762

## CLIENT ASSESSMENT DATABASE

Data depend on the type, location, and duration of the infective process and organ involvement.

### DIAGNOSTIC DIVISION MAY REPORT

### MAY EXHIBIT

#### ACTIVITY/REST

- Fatigue
- Malaise

- Mental status changes—confusion; delirium
- Respiration and heart rate increased with activity or at rest

#### CIRCULATION

- Blood pressure (BP) may be normal, slightly low to normal range—as long as cardiac output remains elevated
- Profound hypotension (late-stage sign)
- Peripheral pulses bounding, rapid (hyperdynamic phase), weak, thready, or easily obliterated
- Heart rate elevated (greater than 90); extreme tachycardia may be present, unless blunted by beta blockers or other medications (in septic shock)
- Heart sounds may include development of  $S_3$
- Dysrhythmias suggest myocardial dysfunction and effects of acidosis and electrolyte imbalance
- Skin warm, dry, flushed (vasodilation) or pale, cold, clammy, mottled (vasoconstriction)

#### ELIMINATION

- Urinary frequency, urgency (current or recent urinary tract infection)
- Diarrhea

- Oliguria, anuria

#### FOOD/FLUID

- Loss of appetite, nausea, vomiting

- Weight loss
- Diminished or absent bowel sounds
- Extremity and generalized edema

#### NEUROSENSORY

- Headache
- Dizziness, fainting

- Restlessness, apprehension, confusion
- Disorientation, delirium, or coma

#### PAIN/DISCOMFORT

- Abdominal tenderness, localized pain or discomfort
- Headache, sinus pain
- Pelvic or flank pain
- Localized limb pain or tenderness

- Tachypnea (respiratory alkalosis) with decreased respiratory depth
- Dyspnea, rapid labored respirations
- Cough—may be productive if pneumonia is source

#### RESPIRATION

- History of recent or current infection, viral illness, cancer therapies, use of corticosteroids, or other immunosuppressant medications
- Presence of invasive lines or catheters

- Temperature usually elevated (greater than 100.4°F [38°C]) but may be normal in elderly or compromised client; may occasionally be lower than normal (less than 96.8°F [36°C])
- Shaking chills
- Poor or delayed wound healing, purulent drainage, or localized erythema
- Petechiae
- Oozing or bleeding from invasive line sites, wounds, and mucous membranes (late sign)

**MAY REPORT (continued)****MAY EXHIBIT (continued)****SEXUALITY**

- Recent childbirth or abortion
- Vaginal or urethral discharge

- Maceration of vulva or purulent vaginal drainage

**TEACHING/LEARNING**

- Chronic, debilitating health problems—liver, renal, cardiac disease; cancer; diabetes mellitus (DM); alcoholism
- History of splenectomy
- Recent surgery or invasive procedures, traumatic wounds
- Antibiotic use—recent or long term

**DISCHARGE PLAN CONSIDERATIONS**

- May require assistance with wound care and supplies, treatments, self-care, and homemaker tasks

♦ Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES**

TEST	WHY IT IS DONE	WHAT IT TELLS ME
<b>BLOOD TESTS</b>		
• <i>Complete blood count (CBC)</i> :	Battery of screening tests, which typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; WBC count and differential, which includes neutrophils, lymphocytes, monocytes, eosinophils, and basophils.	Hct may be elevated in hypovolemic states because of hemoconcentration. Leukopenia, decreased WBCs, occurs early and may be followed by a rebound leukocytosis reflecting rapid production of immature WBCs. Neutrophils may be elevated or depressed. Platelets may be elevated initially as an acute-phase reactant but are decreased in later stages.
• <i>Serum electrolytes</i> :	Substances that will dissociate into ions in solution and acquire the capacity to conduct electricity. Common electrolytes include sodium, potassium, chloride, calcium, and phosphate.	Various imbalances may occur because of acidosis, fluid shifts, and altered renal function.
• <i>Biomarkers, such as acute-phase reactants</i>		Literature review indicates that many biomarkers can be used in sepsis, but none has sufficient specificity or sensitivity to be routinely employed in clinical practice. procalcitonin (PCT) and C-reactive protein (CRP) have been most widely used, but even these have limited abilities to distinguish sepsis from other inflammatory conditions or to predict outcome (Clancy et al, 2012). PCT levels rise with severity of illness but also decrease rapidly in client who is responding favorably to treatment (Kaplan, 2017).
• <i>Procalcitonin (PCT)</i> :	Peptide precursor to calcitonin.	Decreased platelet levels (thrombocytopenia) can occur because of platelet aggregation.
• <i>Clotting studies:</i>	• <i>Platelets</i> : Platelets play an important role in blood coagulation and hemostasis that is often altered by sepsis.	Both PT and aPTT may be prolonged, indicating coagulopathy associated with liver ischemia, circulating toxins, or shock state.
	• <i>Prothrombin time (PT)/activated partial thromboplastin time (aPTT)</i> : Measurement of coagulation times to identify abnormalities common to sepsis and that can lead to life-threatening complications.	
	• <i>Fibrin degradation products</i> : End product of clot breakdown associated with abnormal coagulation process.	Often elevated and associated with tendency to bleed.

(continues on page 776)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li><b>Serum lactate:</b> Product of anaerobic cellular metabolism, thus reflecting inflammatory burden and tissue hypoperfusion.</li><li><b>Serum glucose:</b> Glucose is a primary energy source and necessary for cellular function.</li><li><b>Blood urea nitrogen (BUN)/creatinine (Cr):</b> Measurement of organ involvement and indicator of early stage of endotoxin shock.</li><li><b>Arterial blood gases (ABGs):</b> Measures pH level and oxygen and carbon dioxide concentrations in arterial blood.</li></ul>	Elevated levels may correlate with severity of sepsis. Note: Studies show that lactate levels correlate strongly with mortality (Kaplan, 2017). Hyperglycemia occurs in response to insulin resistance and cellular starvation. Hypoglycemia is a predictor of poor prognosis. Increased levels of BUN and Cr are associated with dehydration, renal impairment or failure, and liver dysfunction or failure.
	Early respiratory alkalosis and hypoxemia may occur. In later states, hypoxemia, respiratory acidosis, and lactic and metabolic acidosis occur because of failure of compensatory mechanisms.
	Identifies causative organism(s) and appropriate treatment options. However, clients can deteriorate to full-blown septic shock without an identifiable microbial agent.
	Presence of blood cells, protein, and bacteria in the urine suggests infection.
<b>Imaging studies</b> <ul style="list-style-type: none"><li><b>Chest and abdominal x-rays:</b> Screening procedure to help determine source of infection.</li><li><b>Abdominal ultrasound:</b> Imaging technique that uses high-frequency sound waves to create an image of organs.</li><li><b>Computed tomography (CT) scan or CAT scan:</b> X-ray procedure that uses a computer to produce a detailed picture of a cross section of the body.</li></ul>	Chest x-ray may reveal pneumonia, a common source of infection. Free air in the abdomen may suggest organ perforation caused by infection. Modality of choice when biliary tract source is suspected. Modality of choice when intra-abdominal abscess or other gastrointestinal (GI) tract disorders are suspected.

## NURSING PRIORITIES

1. Eliminate infection.
2. Support tissue perfusion or circulatory volume.
3. Prevent complications.
4. Provide information about disease process, prognosis, and treatment needs.

## DISCHARGE GOALS

1. Infection eliminated or controlled.
2. Homeostasis maintained.
3. Complications prevented or minimized.
4. Disease process, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

### NURSING DIAGNOSIS: risk for Infection [progression; opportunistic/hospital-acquired]

#### Possibly Evidenced By

Immunosuppression; suppressed inflammatory response (e.g., steroid use); leukopenia  
Stasis of body fluid; alteration in skin integrity  
Invasive procedures; [exposure to multiple healthcare workers and care settings]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Infection Severity NOC

Be free of signs of infection [or progressive infections] such as fever, purulent secretions, wound drainage, erythema, or failure to heal.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Control NIC</b>	
<b>Independent</b>	
Examine client for possible source of infection, such as sore throat, sinus pain, burning with urination, localized abdominal pain, burns, open wounds or cellulitis, presence of invasive catheters, or lines.	Respiratory tract and urinary tract infections are the most frequent causes of sepsis, followed by abdominal and soft tissue infections. The use of intravascular devices is also a well-known cause of hospital-acquired sepsis.
Ensure multidisciplinary involvement in hand hygiene. Wash hands with antibacterial soap before and after each care activity, even when gloves are used.	Hand washing and hand hygiene reduce the risk of cross-contamination. Note: Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) is most commonly transmitted via direct contact with healthcare workers who fail to wash hands between client contacts. Healthcare professionals must assume responsibility for reducing risk of infection spread by observing strict hand hygiene and other infection-reducing measures (Bosek & Shaner-McRae, 2010; Johnson et al, 2011).
Provide isolation and monitor visitors, as indicated.	Body substance isolation (BSI) should be used for all infectious clients. Wound and linen isolation and hand washing may be all that is required for draining wounds. Clients with diseases transmitted through air may also need airborne and droplet precautions. Reverse isolation and restriction of visitors may be needed to protect the immunosuppressed client.
Encourage or provide frequent position changes, deep-breathing and coughing exercises.	Good pulmonary toilet may reduce respiratory compromise.
Encourage client to cover mouth and nose with tissue when coughing or sneezing. Place in private room if indicated. Wear mask when providing direct care as indicated.	Appropriate behaviors, personal protective equipment, and isolation prevent spread of infection via airborne droplets.
Limit use of invasive devices and procedures when possible. Remove lines and devices when infection is present and replace if necessary.	Reduces number of possible entry sites for opportunistic organisms.
Inspect wounds and sites of invasive devices daily, especially parenteral nutrition lines. Document signs of local inflammation and infection and changes in character of wound drainage, sputum, or urine.	Catheter-related bloodstream infections have increased where central venous catheters are used in both acute and chronic care settings. Clinical signs, such as local inflammation or phlebitis, may provide a clue to portal of entry, type of primary infecting organism(s), and early identification of secondary infections.
Investigate reports of pain out of proportion to visible signs.	Pressure-like pain over area of cellulitis may indicate development of necrotizing fasciitis due to group A beta hemolytic streptococci (GABS), necessitating prompt intervention.
Maintain sterile technique when changing dressings, suctioning, and providing site care, such as an invasive line or a urinary catheter.	Medical asepsis prevents or limits introduction of bacteria and reduces the risk of healthcare-associated infection.
Wear gloves and gowns when caring for open wounds or anticipating direct contact with secretions or excretions.	Prevents spread of infection and cross-contamination.
Dispose of soiled dressings and other materials in double bag.	Appropriate disposal of contaminated materials reduces spread of organisms.
Note temperature trends and observe for shaking chills and profuse diaphoresis.	Fever (101°F–105°F [38.5°C–40°C]) is the result of endotoxin effect on the hypothalamus and pyrogen-released endorphins. Hypothermia lower than 96.8°F (36.8°C) is a grave sign reflecting advancing shock state, decreased tissue perfusion, and/or failure of the body's ability to mount a febrile response. Chills often precede temperature spikes in presence of generalized or new-onset infection.

(continues on page 778)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor for signs of deterioration of condition or failure to improve with therapy.	Deterioration of clinical condition or failure to improve with therapy may reflect inappropriate or inadequate antibiotic therapy or overgrowth of resistant or opportunistic organisms.
Inspect oral cavity for white plaques. Investigate reports of vaginal and perineal itching or burning.	Depression of immune system and use of antibiotics increase the risk of secondary infections, particularly yeast—thrush.
<b>Collaborative</b>	
Obtain specimens of urine, blood, sputum, wound, and invasive lines or tubes for culture and sensitivity, as indicated.	Identification of portal of entry and organism causing the infection is crucial to effective treatment based on susceptibility to specific medications.
Monitor laboratory studies, such as WBC count with neutrophils and band counts.	The normal ratio of neutrophils to total WBCs is at least 50%; however, when WBC count is markedly decreased, calculating the absolute neutrophil count is more pertinent to evaluating immune status. Likewise, an initial elevation of band cells reflects the body's attempt to mount a response to the infection, whereas a decline indicates decompensation.
Administer medications, as indicated, for example:	
Anti-infective agents: <b>broad-spectrum antibiotics</b> , such as imipenem and cilastatin (Primaxin), meropenem (Merrem), piperacillin and tazobactam (Zosyn), clindamycin (Cleocin), vancomycin (Vancocin); <b>aminoglycosides</b> , such as tobramycin (Nebcin), gentamicin (Garamycin); <b>cephalosporins</b> , such as cefepime (Maxipime); trimethoprim/sulfamethoxazole (Bactrim DS); aztreonam (Azactam); <b>fluoroquinolones</b> , such as levofloxacin (Levaquin), ciprofloxacin (Cipro); daptomycin (Cubicin), tigecycline (Tygacil) (not a complete listing)	Specific antibiotics are determined by culture and sensitivity tests, but therapy is usually initiated before obtaining results, using broad-spectrum antibiotics and/or based on most likely infecting organisms. Note: The choice of antimicrobials can be complex and should consider the patient's history (e.g., recent antibiotics received, previous infecting organisms); comorbidities (e.g., diabetes, organ failures), immune defects (e.g., HIV); probable location of current acquired infection (e.g., community or healthcare); suspected site of infection (e.g., lungs, gut, wound); and presence of invasive devices (Cunha, 2017; Schmidt & Mandel, 2017).
Antifungals, such as fluconazole (Diflucan), caspofungin (Cancidas)	Antifungal therapy may be considered in client who has already been treated with antibiotics, who is neutropenic, receiving total parenteral nutrition (TPN), or who has central venous access in place (Kaplan, 2017).
Assist with or prepare for procedures, such as removal of infected devices, incision and drainage of abscess, or debridement of infected wounds, as indicated.	Removal of infection sources promotes healing. Note: Certain conditions will not respond to standard treatment for septic shock until the source of infection is surgically removed (e.g., intra-abdominal sepsis [perforation, abscesses], mediastinitis, pancreatic abscesses, septic arthritis, infected prosthetic devices, perirectal abscess, and necrotizing fasciitis) (Kalil & Bailey, 2017).
Prepare for hyperbaric therapy, as appropriate.	Exposing wounds to high ambient oxygen tension therapy may be done to combat anaerobic infections.

## NURSING DIAGNOSIS: Hyperthermia

### May Be Related To

Illness, sepsis—[direct effect of circulating endotoxins on the hypothalamus]  
Increased metabolic rate  
Dehydration

### Possibly Evidenced By

[Increase in body temperature above normal range]  
Flushed skin; skin warm to touch; vasodilation  
Tachypnea, tachycardia

**NURSING DIAGNOSIS:** **Hyperthermia** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Thermoregulation NOC**

Demonstrate temperature within normal range and be free of chills.  
Experience no associated complications.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fever Treatment NIC</b>	
<i>Independent</i>	
Monitor client temperature—degree and pattern. Note shaking chills or profuse diaphoresis.	Temperature of 102.8°F to 106.8°F (38.9°C–41.1°C) suggests acute severe infectious disease process. Fever pattern may aid in diagnosis. Chills often precede temperature spikes. Note: Use of antipyretics alters fever patterns and may be restricted until diagnosis is established unless fever remains higher than 102.8°F (38.9°C).
Monitor environmental temperature. Limit or add bed linens, as indicated.	Room temperature and linens should be altered to maintain near-normal body temperature.
Provide tepid sponge baths. Avoid use of alcohol.	Tepid sponge baths may help reduce fever. Note: Use of ice water or alcohol may cause chills, actually elevating temperature. Alcohol can also cause skin dehydration.
<i>Collaborative</i>	
Administer antipyretics, such as acetylsalicylic acid (ASA) (aspirin) or acetaminophen (Tylenol).	Antipyretics reduce fever by its central action on the hypothalamus; fever should be controlled in clients who are neutropenic or asplenic. However, fever may be beneficial in limiting growth of organisms and enhancing auto-destruction of infected cells.
Provide cooling blanket, or hypothermia therapy, as indicated.	Used to reduce fever, especially when higher than 104.8°F to 105.8°F (39.5°C–40°C) and when seizures or brain damage are likely to occur.

**NURSING DIAGNOSIS:** **risk for Shock****Possibly Evidenced By**

Infection; sepsis; systemic inflammatory response syndrome (SIRS)  
Relative or actual hypovolemia; hypotension

**Desired Outcomes/Evaluation Criteria—Client Will****Shock Severity: Sepsis NOC**

**Display adequate perfusion as evidenced by stable vital signs, palpable peripheral pulses, skin warm and dry, usual level of mentation, individually appropriate urinary output, and active bowel sounds.**

ACTIONS/INTERVENTIONS	RATIONALE
<b>Shock Prevention NIC</b>	
<i>Independent</i>	
Monitor trends in blood pressure (BP), especially noting progressive hypotension and widening pulse pressure.	Hypotension develops as circulating microorganisms stimulate release and activation of chemical and hormonal substances. These endotoxins initially cause peripheral vasodilation, decreased systemic vascular resistance (SVR), and relative hypovolemia. As shock progresses, cardiac output becomes severely depressed due to major alterations in contractility, preload, and/or afterload, thus producing profound hypotension.

(continues on page 780)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor heart rate and rhythm. Note dysrhythmias.	Tachycardia occurs because of sympathetic nervous system stimulation secondary to stress response and to compensate for the relative hypovolemia and hypotension. Cardiac dysrhythmias can occur because of hypoxia, acid-base and electrolyte imbalance, and/or low-flow perfusion state.
Note quality and strength of peripheral pulses.	Initially, the pulse is strong and bounding because of increased cardiac output. Pulse may become weak and thready because of sustained hypotension, decreased cardiac output, and peripheral vasoconstriction if the shock state progresses.
Assess respiratory rate, depth, and quality. Note onset of severe dyspnea.	Increased respirations occur in response to direct effects of endotoxins on the respiratory center in the brain, as well as developing hypoxia, stress, and fever. Respirations become shallow as respiratory insufficiency develops, creating risk of acute respiratory failure.
Investigate changes in sensorium—mental cloudiness, agitation, restlessness, personality changes, delirium, stupor, and coma.	Changes in mentation reflect alterations in cerebral perfusion, hypoxemia, and/or acidosis.
Assess skin for changes in color, temperature, and moisture.	Vasodilation results in the warm, dry, pink skin characteristic of hyperperfusion in hyperdynamic phase of early septic shock. If shock state progresses, compensatory vasoconstriction occurs, shunting blood to vital organs, reducing peripheral blood flow, and creating cool, clammy, pale, and dusky skin.
Record hourly urinary output and specific gravity.	Decreasing urinary output with high specific gravity indicates diminished renal perfusion related to fluid shifts and selective vasoconstriction. There may be transient polyuria during hyperdynamic phase, while cardiac output is elevated, but this may progress to oliguria.
Auscultate bowel sounds.	Reduced blood flow to the mesentery (splanchnic vasoconstriction) decreases peristalsis and may lead to paralytic ileus or possibly trigger multiple organ dysfunction syndrome (MODS).
Hematest gastric secretions and stools for occult blood.	Stress of illness and use of steroids increase risk of gastric mucosal erosion and bleeding.
Evaluate lower extremities for local tissue swelling, erythema, and positive Homans' sign.	Venous stasis, changes in the coagulation processes, and infection may result in the development of thrombosis.
Maintain sequential compression devices (SCDs), as indicated.	These are preventive measures for bedfast client to reduce lower-extremity stasis complications.
Monitor for signs of bleeding: oozing from puncture sites or suture lines, petechiae, ecchymoses, hematuria, epistaxis, hemoptysis, and hematemesis.	Coagulopathies such as DIC may occur, related to accelerated clotting in the microcirculation reflecting activation of chemical mediators, vascular insufficiency, and cell destruction, creating a life-threatening hemorrhagic situation and multiple emboli.
Note drug effects, and monitor for signs of toxicity.	Massive doses of antibiotics have potentially toxic effects in clients with compromised renal and/or hepatic function.
<b>Collaborative</b>	
Administer parenteral fluids. (Refer to ND: risk for deficient Fluid Volume, following.)	Parenteral fluid therapy helps maintain tissue perfusion and expand circulating volume.
Administer medications, as indicated, for example:	
Corticosteroids	Although steroid therapy remains controversial, low-dose steroids may be given for the potential advantages of decreasing capillary permeability, increasing renal perfusion, and inhibiting microemboli formation. Note: Studies show that in patients without shock (or with less severe septic shock), glucocorticoid therapy does not appear to be beneficial. Other studies suggest that glucocorticoid therapy is most likely to be beneficial in

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Vasoactive agents, such as norepinephrine (Levophed), dopamine (Intropin), dobutamine (Dobutamine), vasopressin (Pitressin); milrinone (Primacor) (Kalil & Bailey, 2017)	patients who have severe septic shock despite adequate fluid resuscitation and vasopressor administration (Kaufman & Mancebo, 2016).
Low-molecular-weight heparin, such as enoxaparin (Lovenox), dalteparin (Fragmin), and tinzaparin (Innohep), and unfractionated heparin	Inotropic agents and vasopressors may be needed to improve organ perfusion and to maintain blood pressure during and after fluid treatment. Note: Client needing this level of support is critically ill and will be treated in the ICU.
Histamine-2 receptor blockers, such as cimetidine (Tagamet), famotidine (Pepcid AC), nizatidine (Asid), and ranitidine (Zantac).	Low-molecular-weight heparin prevents or treats deep vein thrombosis (DVT). (Refer to CP: Venous Thromboembolism [VTE] Disease including Deep Vein Thrombosis [DVT] and Pulmonary Embolism [PE] for associated assessments and interventions.)
Monitor laboratory studies, such as ABGs and lactate levels.	Histamine receptor blockers prevent or treat stress ulcers.
Provide supplemental oxygen by appropriate route.	Circulatory collapse reduces tissue perfusion. Inadequate renal perfusion alters filtration, reabsorption, and secretion of various substances, resulting in fluid and electrolyte imbalances. ABGs and serum lactate levels indicate acid-base balance and anaerobic metabolism. Respiratory or metabolic acidosis indicates weakened compensatory mechanisms. Lactic acid accumulation is due to inadequate oxygenation and thus accumulation of anaerobic by-products or lactate.
Maintain stable body temperature, using adjunctive aids as necessary. (Refer to ND: Hyperthermia.)	Supplemental oxygen improves cellular oxygenation.
Prepare for and transfer to critical care setting, as indicated.	Temperature elevations increase metabolic and oxygen demands beyond cellular resources, hastening tissue ischemia and cellular destruction.
	Temperature elevations increase metabolic and oxygen demands beyond cellular resources, hastening tissue ischemia and cellular destruction.
	Progressive deterioration requires more aggressive therapy, including hemodynamic monitoring and vasoactive drug infusions.

### NURSING DIAGNOSIS: risk for deficient Fluid Volume

#### Possibly Evidenced By

Active fluid volume loss [e.g., hemorrhage; diarrhea, vomiting, draining wounds]  
Compromised regulatory mechanisms [relative fluid loss, e.g., massive vasodilation, capillary permeability with fluid leaks into the interstitial space (third spacing); sequestration of fluid in peritoneal cavity]  
Insufficient fluid intake [i.e., fluid resuscitation]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Hydration NOC

Maintain adequate circulatory volume as evidenced by vital signs within client's normal range, palpable peripheral pulses of good quality, and individually appropriate urinary output.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Shock Prevention NIC</b>	
<b>Independent</b>	
Measure and record urinary output and specific gravity. Note cumulative intake and output (I&O) imbalances (including insensible losses), and correlate with daily weight. Encourage oral fluids, as tolerated.	Decreasing urinary output with a high specific gravity suggests relative hypovolemia associated with vasodilation. Continued positive fluid balance with corresponding weight gain may indicate third spacing and tissue edema, suggesting need to alter fluid therapy or replacement components. Note: Excessive diarrhea may lead to a negative fluid balance.

(continues on page 782)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor BP and heart rate. Measure central venous pressure (CVP) if used.	Reduction in the circulating fluid volume reduces BP and CVP, initiating compensatory mechanisms of tachycardia to improve cardiac output and increase systemic blood pressure.
Palpate peripheral pulses.	Weak, easily obliterated pulses suggest hypovolemia.
Assess for dry mucous membranes, poor skin turgor, and thirst.	Hypovolemia and third spacing of fluid give rise to signs of dehydration.
Observe for dependent or peripheral edema in sacrum, scrotum, back, and legs.	Fluid losses from the vascular compartment into the interstitial space create tissue edema.
<b>Collaborative</b>	
Administer IV fluids, such as isotonic crystalloids ( $D_5W$ , normal saline [NS], lactated Ringer's [LR]), and colloids (albumin, fresh-frozen plasma), as indicated.	Fluid therapy is most effective early in the course of severe sepsis. The amount and rate of infusion are guided by assessment of the patient's vital signs, mentation, and cardiovascular status.
Monitor laboratory values, such as the following:	
Hct/RBC count	Evaluates changes in hydration/blood viscosity.
BUN/Cr	The BUN/Cr ratio could indicate dehydration or renal dysfunction and failure.
Monitor cardiac output, as indicated.	Cardiac output and other functional parameters, such as cardiac index, preload, afterload, contractility, and cardiac work, can be measured noninvasively using thoracic electrical bioimpedance (TEB) technique. Cardiac output determination is useful in determining therapeutic needs and effectiveness.

### NURSING DIAGNOSIS: risk for acute Confusion

#### Possibly Evidenced By

Infection; alteration in cognitive functioning; alteration in sleep-wake cycle; sensory deprivation  
Dehydration, malnutrition  
Impaired metabolic functioning (e.g., electrolyte imbalance, azotemia)  
Pharmaceutical agents—multiple medications

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Cognition NOC

Maintain usual level of consciousness and cognition.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Delirium Management NIC</b>	
<b>Independent</b>	
Note presence of factors that can contribute to confusion.	Disease process of sepsis (e.g., presence of circulating toxins, fluid and electrolyte imbalances, and fever) can contribute to confusion.
Assess mental/cognitive status, noting alertness, orientation, attention span, appropriateness of verbal responses.	Helps to identify a potential cognitive decline, possibly manifested by confusion.
Monitor temperature and note trends.	Although fever is usually present, hyperthermia can lead to confusion. It is important to determine if fever is related to the environment or to alterations in client metabolic processes.
Evaluate nutritional status.	Deficiencies of essential nutrients can affect mental status.
Note sleep/rest problems.	Sleep deprivation due to disease process or intensity of treatment interventions and environment can cause confusion.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor intake and output; offer fluids accordingly.	Dehydration and electrolyte imbalances can cause or exacerbate confusion.
Encourage deep breathing or use of incentive spirometer.	Promotes respiratory function, improving oxygenation of brain tissues, which may improve cognitive function.
<b>Collaborative</b>	
Monitor ABGs, pulse oximetry, and end-tidal CO <sub>2</sub> .	Identifies hypoxemia and hypercarbia, which may lead to altered cerebral functioning. Managing acid-base and metabolic imbalances can help minimize alterations in cerebral function.
Assist with treatment of underlying disease process.	As infection subsides, potential for confusion is reduced as well.
Administer fluids and electrolyte replacements as indicated.	Managing fluid, acid-base, and electrolyte imbalances can help minimize alterations in cerebral function.
Administer supplemental oxygen, as indicated.	Increases oxygen saturation and improves cerebral perfusion and function.
Administer nutritional support as indicated.	Increased metabolic rate associated with illness and fever can result in nutritional deficits, especially when client is too ill for oral intake and/or gastrointestinal motility is decreased.

### NURSING DIAGNOSIS: risk for impaired Gas Exchange

#### Possibly Evidenced By

Alveolar-capillary membrane changes—increased capillary permeability leading to pulmonary congestion  
Abnormal breathing pattern—effects of endotoxins on the respiratory center in the medulla resulting in hyperventilation and respiratory alkalosis; hypoventilation  
[Interference with oxygen delivery and utilization in the tissues (endotoxin-induced damage to the cells and capillaries)]

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Respiratory Status: Gas Exchange NOC

Display ABGs and respiratory rate within client's normal range, with breath sounds clear and chest x-ray clear or improving.  
Experience no dyspnea or cyanosis.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b>	
<b>Independent</b>	
Maintain client airway. Place client in position of comfort with head of bed elevated 30 to 45 degrees.	Elevating the head of bed enhances lung expansion and reduces respiratory effort.
Monitor respiratory rate and depth. Note use of accessory muscles or work of breathing.	Rapid, shallow respirations occur because of hypoxemia, stress, and circulating endotoxins. Hypoventilation and dyspnea reflect ineffective compensatory mechanisms and are indications that ventilatory support is needed.
Auscultate breath sounds. Note crackles, wheezes, and areas of decreased or absent ventilation.	Respiratory distress and the presence of adventitious sounds are indicators of pulmonary congestion, interstitial edema, and atelectasis. Note: Respiratory complications, including pneumonia and acute respiratory distress syndrome (ARDS), are prime causes of death.
Note presence of circumoral cyanosis.	Circumoral cyanosis indicates inadequate central oxygenation and hypoxemia.
Investigate alterations in sensorium: agitation, confusion, personality changes, delirium, stupor, and coma.	Cerebral function is very sensitive to decreases in oxygenation such as hypoxemia or reduced perfusion.
Note cough and purulent sputum production.	Pneumonia is a common healthcare-acquired infection that can occur by aspiration of oropharyngeal organisms or spread from other sites.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Reposition frequently. Encourage coughing and deep-breathing exercises. Suction, as indicated.	Good pulmonary toilet is necessary for reducing ventilation/perfusion imbalance and for mobilizing and facilitating removal of secretions to maximize gas exchange.
Assess and monitor client for escalating respiratory distress (e.g., respiratory rate >22, shortness of breath, change in skin color). Document and report escalation, and prepare client for transfer to intensive care as indicated.	Most clients with sepsis develop respiratory distress as a manifestation of severe sepsis or septic shock. The lung injury is characterized pathologically as diffuse alveolar damage (DAD) and ranges from acute lung injury (ALI) to moderate or severe acute respiratory distress syndrome (ARDS). These clients need intubation and mechanical ventilation for optimal respiratory support. Intubation should be considered early in the course of progressing severe sepsis. (Refer to CP: Respiratory Failure/Ventilatory Assistance.)
<b>Collaborative</b>	
Collaborate in treatment of underlying condition(s).	Treatment of existing infection (e.g., pneumonia, among others) may prevent escalation to ARDS or other pulmonary complications associated with severe sepsis.
Monitor ABGs and pulse oximetry.	Hypoxemia is related to decreased ventilation and pulmonary changes (e.g., interstitial edema, atelectasis, and pulmonary shunting) and increased oxygen demands caused by fever or infection. Respiratory acidosis (pH below 7.35 and PaCO <sub>2</sub> higher than 40 mm Hg) occurs because of hypoventilation and ventilation-perfusion imbalance. As septic condition worsens, metabolic acidosis (pH below 7.35 and HCO <sub>3</sub> less than 22–24 mEq/L) develops as a result of buildup of lactic acid from anaerobic metabolism.
Review serial chest x-rays.	Changes on x-ray reflect progression or resolution of pulmonary complications, such as infiltrates and edema.
<b>Oxygen Therapy NIC</b>	
Administer supplemental oxygen via appropriate route: nasal cannula, mask, or high-flow rebreathing mask.	Supplemental oxygen is necessary for correction of hypoxemia with failing respiratory effort or progressing acidosis. Note: Intubation and mechanical ventilation and care in ICU may be required if respiratory distress or failure develops.
Administer red blood cells (RBCs), as indicated.	May be required to improve available oxygen to treat sepsis-induced hypoperfusion.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding illness, prognosis, treatment, self-care, and discharge needs**

**May Be Related To**

Insufficient information; insufficient interest in learning; insufficient knowledge of resources  
Misinformation presented by others  
Alteration in cognitive functioning or memory

**Possibly Evidenced By**

Insufficient knowledge  
Inaccurate follow-through of instructions, development of preventable complications

**Desired Outcomes/Evaluation Criteria—Client Will**

**Knowledge: Infection Management NOC**

Verbalize understanding of disease process, prognosis, and potential complications.  
Correctly perform necessary procedures and explain reasons for the actions.  
Initiate necessary lifestyle changes.  
Verbalize understanding of therapeutic needs.  
Participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i>	
Review disease process and future expectations with client/SO, as indicated.	Open discussion regarding the disease and clinical expectations provides knowledge base from which client can make informed choices.
Review individual risk factors, mode of transmission, and portal of entry of infections.	Awareness of means of infection transmission provides opportunity to plan for and institute protective measures.
Provide information about drug therapy, interactions, side effects, and importance of adherence to regimen.	Adequate and appropriate information promotes understanding and enhances compliance with treatment or prophylaxis and reduces risk of recurrence and complications.
Discuss need for good nutrition and balanced diet.	Good nutrition is necessary for optimal healing, immune system enhancement, and general well-being.
Encourage adequate rest periods with scheduled activities.	Rest relieves fatigue (which may be present for a long time), conserves energy, and facilitates recovery.
Review necessity of personal hygiene and environmental cleanliness, proper cooking techniques, and food storage.	Personal hygiene and environmental cleanliness reduces exposure to pathogens.
Identify signs and symptoms requiring medical evaluation: persistent temperature elevation(s), tachycardia, syncope, rashes of unknown origin, unexplained fatigue, anorexia, increased thirst, and changes in bladder function.	Early recognition of developing or recurring infection allows for timely intervention and reduces risk for progression to life-threatening situation.
Emphasize importance of prophylactic immunizations and antibiotic therapy, as needed.	Prophylactic vaccines and antibiotics prevent infection, especially in high-risk groups such as those of advanced age or with chronic illness and/or a past history of infective heart disease and immunosuppression.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **risk for [recurrence/opportunistic] Infection**—stasis of body fluids, decreased hemoglobin, leukopenia, suppressed inflammatory response, use of anti-infective agents, increased environmental exposure, malnutrition
- **imbalanced Nutrition: less than body requirements**—biological factors (e.g., increased energy needs [hypermetabolic state], anorexia, continuing GI dysfunction, side effects of medication)
- **Self-Care deficit/Impaired Home Maintenance**—fatigue, pain/discomfort, inadequate support systems, unfamiliarity with neighborhood resources

## THE HIV-POSITIVE CLIENT

### I. Pathophysiology

- a. Infection by a subgroup of retroviruses with a high affinity for CD4 T lymphocytes and monocytes, with viral DNA incorporating itself into host DNA
- b. Following successful transmission of HIV, the course of subsequent infection is variable and dependent on a number of factors.
- c. Main consequence of infection is damage to the immune system.

**II. Stages**—Progression is individually variable, depending on the health of the person's immune system, on CD4 cell count and viral load in the blood, and on the exposure to infections and diseases in the environment (Health24, 2014).

#### a. Primary HIV infection or acute seroconversion stage

- i. Seroconversion usually occurs 4 to 8 weeks after person has been infected with HIV virus.
- ii. Individual may be asymptomatic or develop flu-like symptoms—low-grade fever, sore throat, swollen lymph nodes, rash, joint and muscle pain.
- iii. HIV test is positive, but immune system is usually functional.

- b. **Latency or asymptomatic stage** can last anywhere from weeks to years.
  - i. Virus is active and damaging the immune system, even though client may show no symptoms.
  - ii. Individual may be unaware of HIV status but can still transmit the infection.

(continues on page 786)

- c. **Minor symptomatic phase** usually occurs between 5 and 7 years after infection.
- Immune system is compromised.
  - Client begins to present with one or more symptoms—skin rashes; general feelings of malaise/fatigue; weight loss; mouth ulcers; fungal skin and nail infections, shingles; oral or vaginal thrush; recurrent herpes blisters on mouth or genitals; recurrent upper respiratory infections; occasional fevers.
- d. **Major symptomatic and opportunistic diseases phase (also called AIDS):** Median occurrence is 11 years after being infected.
- Viral load is very high; CD4 count is very low, thus indicating full-blown AIDS.
  - Severe immune system damage and opportunistic infections. (Refer to CP: Acquired Immunodeficiency Syndrome [AIDS] for information.)
- III. Etiology**
- Infection results from one of two similar retroviruses—HIV-1 and HIV-2—that destroy CD4 lymphocytes and impair cell-mediated immunity, thereby increasing the risk of certain infections and cancers. *Note:* Currently, HIV-1 is the predominant subtype that causes HIV/AIDS (Gompf, 2017; HIV.gov, 2017a; U.S. Department of Health and Human Services [DHHS], 2017a).
  - Mode of transmission (DHHS, 2017b; Gompf, 2017; HIV.gov, 2017a)
    - HIV is spread through contact with the blood, semen, preseminal fluid, rectal fluids, vaginal fluids, or breast milk of a person with HIV.
    - In the United States, HIV is spread mainly by having anal or vaginal sex or sharing drug injection equipment with a person who has HIV.
    - Mother-to-baby perinatal transmission and through breastfeeding: In 2016, 76% of all HIV-positive women
- (globally) received medicines to prevent HIV transmission to their babies (World Health Organization [WHO], 2016). The annual number of HIV infections through perinatal transmission has declined by more than 90% since the early 1990s (Centers for Disease Control and Prevention [CDC], 2017c).
- iv. High-risk populations—Globally, more than 11 million people were incarcerated in prisons in 2016. Overrepresented among this population are the people most vulnerable to HIV, including people who use drugs, sex workers, men who have sex with men, transgender people, and others who are most marginalized in communities (WHO, 2017).
- IV. Statistics**
- Morbidity:** In 2015, there were an estimated 36.7 million people worldwide with HIV (HIV.gov, 2017b). In the United States at the end of 2016, an estimated 1.1 million persons aged 13 and older were living with HIV infection (CDC, 2017e). In 2014, the estimated number of *new* HIV infections in the United States was 39,782, with the highest number being in the age group 25 to 29 years, and with gay and bisexual men accounting for 67% of all HIV diagnoses (CDC, 2017d).
  - Mortality:** Associated with progression to AIDS; however, research shows that if highly active antiretroviral therapy (HAART) medications are taken early and correctly, life expectancy can increase by about 30 to 40 years from what it was in the past. This increase in life expectancy has occurred in the past decade, meaning that people living with HIV/AIDS, in countries where the HAART treatment is available, can expect to live roughly two-thirds of a normal life span (Stibitch, 2017).
  - Cost:** According to the Kaiser Family Foundation (KFF), in 2016, the U.S. federal government spent a total of \$26.4 billion on HIV care (KFF, 2017).

## G L O S S A R Y

- Acquired immunodeficiency syndrome (AIDS):** Most severe stage of HIV infection.
- Acute retroviral syndrome (ACR):** Describes a group of symptoms that can resemble mononucleosis—fever, fatigue, muscle aches, loss of appetite, upset stomach, and weight loss.
- CD4:** Type of protein molecule in the blood that is present on the surface of immune cells. The HIV virus infects cells that have CD4 surface proteins and, as a result, depletes the number of T cells, B cells, natural killer cells, and monocytes in the blood. Most of the damage to the immune system is through destruction of CD4 lymphocytes.
- Electrophoresis:** Method of separating large molecules, such as DNA fragments or proteins, from a mixture of similar molecules.
- Herpes simplex virus (HSV-2):** Virus that has deleterious effects with coinfection of HIV.

**Human immunodeficiency virus (HIV):** Virus that causes a progressive disease leading to AIDS.

**Seroconversion:** Development of an antibody response to infection that is measurable in the serum.

**Sexually transmitted infections (STIs):** Group of infections that can be transferred from one person to another through sexual contact (vaginal, anal, oral); includes chlamydia, syphilis, herpes, genital warts, and gonorrhea, among others.

**T cells:** Lymphocytes that originate in the thymus gland and regulate the immune system's response to infections, including HIV; CD4 lymphocytes are a subset of T lymphocytes.

**Thrush:** Fungal infection of the mucous membranes appearing as a patchy, raised white rash or spots.

**Viral load tests:** Detects viral RNA levels as low as 50 copies.

## CARE SETTING

Client is treated in a community setting, although development of opportunistic infections may require occasional inpatient acute medical care.

## RELATED CONCERNs

Acquired immunodeficiency syndrome (AIDS), page 800  
Extended/long-term care, page 896  
Psychosocial aspects of care, page 835

## CLIENT ASSESSMENT DATABASE

Although client may be asymptomatic, refer to CP: Acquired Immunodeficiency Syndrome (AIDS) for potential signs and symptoms. Refer to section at end of plan for ongoing considerations.

DIAGNOSTIC STUDIES		
TEST	WHY IT IS DONE	WHAT IT TELLS ME
<b>BLOOD TESTS</b>		
• <b>Nucleic acid test (NAT):</b>	Looks for actual HIV virus in the blood.	This test can give either a positive/negative result or a numerical value of virus present in the blood (HIV viral load). Can usually detect virus from 33 to 90 days after exposure. It is not used for screening individuals unless they recently had a high-risk exposure or a possible exposure and with early symptoms of HIV infection (CDC, 2017e).
• <b>Rapid HIV screening tests (e.g., OraQuick Rapid HIV-1 or HIV-2 Antibody Test or home blood test kit):</b>	Oral or fingerstick blood test that screen for HIV antibodies.	These screening tests can provide negative or positive results in a short period of time. <i>Note:</i> In clinical studies by the manufacturer, OraQuick correctly identified 99.6% of people who were infected with HIV-1 (sensitivity) and 100% of people who were not infected with HIV-1 (specificity). A negative screening test may need to be repeated in a few months. A positive test must be followed up with more specific testing (U.S. Food and Drug Administration [FDA], 2015).
• <b>HIV antibody/antigen combination test/fourth-generation duo antibody/antigen test:</b>	Checks for HIV antibodies and HIV antigen (protein called p24 that's part of the virus) in the blood.	Antibodies to HIV can be detected in the blood about 2 to 4 weeks after exposure to the virus. <i>Note:</i> The fourth-generation test detects HIV antibodies as well as p24 antigens. Serum concentrations of p24 antigens are high in the first few weeks after infection; therefore, they are useful in diagnosing very early HIV infections when antibody levels are still low. A rapid HIV-1/2 Ag/Ab combo test can also tell whether an HIV infection is new or is established (HealthLabs.com, n.d.; Healthwise Staff, 2015).
• <b>Enzyme-linked immunosorbent assay (ELISA):</b>	Sensitive immunoassay that uses an enzyme linked to an antibody or antigen as a marker for the detection of a specific protein.	This test is often the first one used to detect infection with HIV because it can detect antibodies in 2 to 4 days. If antibodies to HIV are present, the test is usually repeated to confirm the diagnosis. If ELISA is negative, other tests may not be needed (Healthwise Staff, 2015).
• <b>Western blot test:</b>	Technique for identifying specific antibodies or proteins in which proteins are separated by electrophoresis.	Confirms diagnosis of HIV-1 in individuals with two positive ELISA screening tests. Results can typically be obtained in 1 to 2 weeks.
<b>VIRAL LOAD TESTS</b>		
• <b>Polymerase chain reaction (PCR):</b>	Highly sensitive technique for detecting and quantifying viral load.	Detects either the RNA of the HIV virus or the HIV DNA in white blood cells (CD4+ cells, part of the body's immune system). <i>Note:</i> The PCR test is useful to find a very recent infection, determine if an HIV infection is present when antibody test results were uncertain, and screen blood or organs for HIV before donation (Healthwise Staff, 2015).
• <b>Lymphocytes</b>		About 15% to 40% of white blood cells are lymphocytes, which (1) protect from viral infections, (2) help other cells fight infections, (3) produce antibodies, (4) fight cancers, and (5) coordinate the activities of other cells in the immune system. Lymphocytes include the CD4 and CD8 cells.

(continues on page 788)

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li><b>CD4 cells (also called T4 helper cells):</b> CD4 cells are the prime target for HIV infection and destruction.</li></ul>	A normal CD4 count is from 500 to 1400 cmmL of blood. CD4 counts decrease over time in persons who are not receiving antiretroviral therapy. At levels below 200 cells per cubic millimeter, client becomes susceptible to a wide variety of opportunistic infections.
<ul style="list-style-type: none"><li><b>CD8 cells (also called T8 or suppressor T cells):</b> White blood cells that kill cells infected with viruses.</li></ul>	The CD8 count is elevated but is not as useful a marker as the CD8 percentage, which tends to vary less between measurements.
<ul style="list-style-type: none"><li><b>CD-cell ratio:</b> CD4 divided by CD8 count.</li></ul>	A normal ratio is usually between 0.9 and 6.0. Most experts agree that once antiretroviral treatment is started, an increase in the CD-cell ratio (i.e., a rising CD4 count and a falling CD8 count) is a sign that treatment is working (POZ, 2016b).

## OTHER DIAGNOSTIC STUDIES

- Pap smear:** Detects precursor lesions that can precede the diagnosis of invasive carcinoma.
- Pelvic/genital examination:** Direct visualization of structures and mucosal membranes.
- Chest x-ray:** Procedure used to evaluate organs and structures within the chest for symptoms of disease.

Higher incidence of abnormal cells occurs in HIV-infected women.  
Identifies presence of lesions from STIs and may trigger HIV testing.  
Abnormalities suggest presence of TB, which is common with HIV infection, or other opportunistic infections.

## NURSING PRIORITIES

- Promote acceptance of reality of diagnosis and condition.
- Support incorporation of behavioral and lifestyle changes to enhance well-being.
- Provide information about disease process, prognosis, and treatment needs.
- Assist in developing plan and strategies to meet long-term medical, behavioral, and financial needs and enhancing quality of life.

## GOALS OF ONGOING CARE

- Dealing with current situation realistically.
- Participating in and appropriately managing therapeutic regimen.
- Diagnosis, prognosis, and therapeutic regimen understood.
- Plan in place to meet medical, behavioral change, and financial needs.

## NURSING DIAGNOSIS: risk-prone Health Behavior

### May Be Related To

Inadequate comprehension; low self-efficacy  
Stressors; insufficient social support; economically disadvantaged  
Negative perception of healthcare provider/recommended healthcare strategy

### Possibly Evidenced By

Minimizes or nonacceptance of health status change; failure to take action that prevents health problem  
Substance misuse

### Desired Outcomes/Evaluation Criteria—Client Will

#### Acceptance: Health Status NOC

Verbalize reality of condition.  
Demonstrate increased trust and participation in development of plan of action.  
Initiate lifestyle changes that will permit adaptation to present life situations.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Crisis Intervention NIC</b>	
<b>Independent</b>	
Evaluate client's ability to understand events and realistically appraise situation.	Provides base to develop plan of action.
Identify real barriers to adjustment.	Promotes opportunity to deal appropriately with real problems in client's individual situation.
Encourage expression of feelings, denial, shock, and fears. Listen without judgment, accepting client's expressions. Focus on positive outcomes.	It is important to convey belief in client's fears and feelings. By focusing on positive outcomes, client is encouraged to take charge of those areas in which changes can be made, such as managing medical regimen and behavior.
Challenge morbid thoughts and reframe into positive statements: "You know why the virus is going to kill me. I deserve to die for what I've done." Response: "The virus may or may not kill you. It's not smart enough to decide when you may die. The virus is 'just there.' It does not have a mind to know what you have or have not done."	Interrupts morbid thoughts and challenges client's self-deprecating ideas. As with any potentially terminal disease, this population is likely to experience depression and is at increased risk for suicide, necessitating ongoing evaluation.
Determine available resources and programs.	Identifies client needs and what comprehensive services might be available and immediately accessible. Services may include education concerning sexual myths, HIV transmission prevention, safer sex practices, and alternate methods of expressing sexuality. Interventions and education may be needed for addictive behaviors, such as the ability of injection drug user to obtain clean "works."
Assess social system as well as presence of support, perception of losses, and stressors.	Partners, friends, and families will have individual responses depending on the individual's lifestyle, knowledge of HIV transmission, and belief systems. Note: Belief systems can include values or myths, which affect how the individual approaches the disease and the outcome.
Encourage client to participate in support groups.	Long-term support is critical to dealing with and effectively coping with the reality of being HIV positive and with frequent healthcare evaluations, medical treatments, and ongoing lifestyle changes.
Educate client about drug interactions, HIV, and emotions.	Fatigue and depression can be side effects of some medications and of the infection itself. Knowledge that these effects are usually of short duration can support informed choices and cooperation and promote hope.
Encourage continued or renewed use of familiar effective coping strategies.	Client is supported and given encouragement for past effective behaviors. Positive reinforcement enhances self-esteem.
Explore use and practice of new and different coping strategies.	Using new strategies is uncomfortable in the beginning, but practice fosters self-confidence.
Help client use humor to combat stigmatization of the disease.	Humor defuses the sense of secretiveness people may place on diagnosis of, and dealing with, HIV.
Reinforce structure in daily life. Include exercise as part of routine.	Routines help the client focus. Exercise improves sense of wellness and enhances immune response.
Discuss meaning of high-risk behavior, such as unprotected sexual activity, injection drug use with shared needles, and failure to take antiretroviral medications, and address barriers to change.	Fear of disclosure, need to change usual behaviors, and the difficulty of doing so may prevent the individual from making the changes necessary to prevent transmission of disease and to manage lifestyle.
Assist client to set limits on sexually risky behaviors and explore ways client can achieve change.	Needs for love, comfort, and companionship that are met through sexual expression must be met safely through means that carry a reduced risk of HIV transmission.
Assist client to channel anger to healthy activities.	The increased energy of anger can be used to accomplish other tasks and enhance feelings of self-esteem.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Inform client about new medical advances and treatments. Discuss issues of voluntary disclosure, personal responsibility, needs of others, and federal, state, and local reporting requirements.	Promotes hope and helps client make informed decisions. Understanding responsibilities and consequences of disclosure is necessary for client to make informed decisions.
<b>Collaborative</b> Refer client to nurse practitioner or clinical nurse specialist, psychologist, or social worker knowledgeable about HIV as well as specific HIV programs and resources or appropriate research programs.	Trained professionals can help client adjust to difficult situation.

## NURSING DIAGNOSIS: Fatigue

### May Be Related To

Illness; malnutrition; physical deconditioning  
Stressors, anxiety; depression

### Possibly Evidenced By

Tiredness; lethargy; nonrestorative sleep pattern; increase in physical symptoms, rest requirements  
Insufficient energy; impaired ability to maintain usual routines or physical activity  
Ineffective role performance; alteration in concentration; disinterest in surroundings; introspection

### Desired Outcomes/Evaluation Criteria—Client Will

#### Fatigue Level NOC

Report improved sense of energy.  
Participate in desired activities at level of ability.  
Participate in recommended treatment program.

#### Energy Conservation NOC

Identify individual areas of control and engage in energy conservation techniques.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Energy Management NIC</b> <i>Independent</i> Obtain client/SO descriptions and rating (using numerical scale) of fatigue. Note presence of additional concerns (e.g., irritability, lack of concentration, relationship difficulties).	Helps to evaluate impact of fatigue on client's quality of life and identify areas that are exacerbating low energy. Note: A recent study reported that fatigue affects nearly 90% of people living with HIV and has been reported as one of the most persistent and troubling symptoms they experience. An elevated risk of fatigue may be related to hematologic and metabolic changes (direct results of HIV infection and treatment), as well as psychological and psychosocial stressors (Barroso et al, 2015).
Assess sleep patterns and other factors that may be aggravating fatigue.	Multiple factors can cause and aggravate fatigue, including sleep deprivation, emotional distress associated with diagnosis, side effects of drugs, or developing HIV-related complications.
Encourage evaluation of fatigue when antiretroviral treatment is initiated or medications have been added to regimen.	Fatigue is present in variable degrees as part of HIV infection process but is often aggravated by nutritional deficiencies and side effects of certain medications. Even though anti-HIV drugs may improve energy levels, some may also cause fatigue. Tiredness, fatigue, insomnia, and sleep disturbances are possible side effects of several anti-HIV drugs. Side effects are most common in the first few weeks after starting HIV treatment, or when protease inhibitors (PIs) are added or changed, fatigue may worsen.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss reality of client's feelings of exhaustion and identify limitations imposed by fatigue state. Advise client to maintain a fatigue diary, and note daily energy patterns—peaks and valleys.	Helpful in planning activities within tolerance levels. Clients often expect too much of themselves, believing that they should be able to do more.
Assist client to set realistic activity goals, determining individual priorities and responsibilities.	Client may need to alter priorities and delegate some responsibilities to manage fatigue and optimize performance.
Discuss energy conservation techniques, such as sitting instead of standing for activities, as appropriate.	Enables client to become aware of ways in which energy expenditure can be maximized to complete necessary tasks.
Review importance of meeting individual nutritional needs.	Adequate nutrition is needed for optimizing energy production. (Refer to ND: imbalanced Nutrition: less than body requirements, following.)
Encourage adequate rest periods during the day, routine schedule for bedtime and arising, and scheduling activities during time of best energy.	Helps client recoup energy to manage desired activities.
Instruct in stress management techniques, such as breathing exercises, visualization, and music and light therapy.	Reduction of stress factors in client's life can minimize energy output.
Identify available resources and support systems.	May require outside assistance with many things, including homemaking and maintenance activities and child care.

### NURSING DIAGNOSIS: imbalanced Nutrition: less than body requirements

#### May Be Related To

Insufficient dietary intake; inability to ingest/digest food  
Economically disadvantaged

#### Possibly Evidenced By

Weight loss; insufficient muscle tone  
Food intake less than recommended daily allowance (RDA)  
Food aversion; alteration in taste sensation; sore buccal cavity  
Insufficient information; misperceptions  
Abdominal cramping; diarrhea  
[Abnormal laboratory studies (e.g., vitamins, minerals, protein deficiency, electrolytes)]

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Nutritional Status NOC

Maintain stable weight.  
Report improved energy level.

##### Nutritional Status: Biochemical Measures NOC

Demonstrate laboratory values within normal limits.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Management NIC</b> <i>Independent</i> Determine usual weight before client was diagnosed with HIV.	Early wasting is not readily determined by normal weight-to-height charts; therefore, determining current weight in relation to prediagnosis weight is more useful. Recent unexplained or involuntary weight loss may be a factor in seeking initial medical evaluation.
Weigh regularly and establish current anthropometric measurements. Measure resting energy expenditure (REE) using indirect calorimetry.	Helps assess and monitor wasting and determine nutritional needs. Indirect calorimetry is more accurate for calculating REE than the Harris-Benedict equation, which underestimates the energy needs of these clients.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Determine client's current dietary pattern and intake and knowledge of nutrition. Use an in-depth dietary assessment tool.	Identification of these factors helps plan for individual needs. Clients with HIV infection have documented vitamin (e.g., vitamin B <sub>12</sub> , folate) and trace mineral (e.g., zinc, magnesium, selenium) deficits. Alcohol and drug abuse can interfere with adequate intake.
Assess presence and degree of nausea and vomiting.	The causes of nausea and vomiting are numerous and are associated with medications, functional changes in gastrointestinal (GI) system, and endocrine dysfunction. Note: Protracted nausea and vomiting can debilitate a client, leading to loss of lean body mass, electrolyte imbalances, and further deterioration of immune function.
Ascertain current financial status and recent and/or anticipated changes in economic status. Explore related costs of a variety of foods.	Helps in planning for meeting nutritional needs, such as purchasing low-cost foods that are nutritionally rich. Client may need referral to financial aid, such as Supplemental Nutrition Assistance Program (SNAP), to help with food stamps or obtaining meals.
Help client plan ways to maintain/improve intake. Identify lactose-free supplements, as appropriate. Provide information about nutritionally dense high-calorie, high-protein, high-vitamin, and high-mineral foods.	Having this information helps client understand importance of a well-balanced diet. Some clients may try macrobiotic and other diets, believing diarrhea is caused by lactose intolerance. Eliminating dairy products can have detrimental effects when these nutrient components are not replaced from other sources.
Emphasize importance of maintaining balanced, adequate nutritional intake and fluids rich with electrolytes, such as Gatorade, Powerade, Smart Water.	Client may be depressed and discouraged by changed health and social status and find it difficult to eat for many reasons. Knowing how important nutritionally balanced intake is to supporting the immune system and remaining healthy can motivate client to eat.
Assist client to formulate dietary plan, taking into consideration increased metabolic demands, energy needs, and hyperlipidemia.	Provides guidance and feedback while promoting sense of control, enhancing self-esteem, and possibly improving intake. HIV infection is continuously stimulating the immune system, increasing metabolic rate and nutritional needs. Note: Use of PIs is known to elevate levels of glucose and lipids—especially triglycerides and cholesterol.
Recommend eating frequent, small meals, avoiding cooking odors if bothersome, keeping room well ventilated, and removing noxious stimuli. Suggest use of spices, marinating red meat before cooking, and/or substituting other protein sources for red meat.	Reduces possible adverse stimuli or enhances palatability of food and may improve nutritional intake, which is needed to help client restore and maintain nutritional defenses.
Recommend environment conducive to eating. Emphasize importance of sharing mealtime with others. Identify someone who can join client for meals.	A quiet, relaxed, calm, unrushed setting and socialization can enhance appetite/food intake, especially when depression, neglect of self-care, and diminished appetite are present.
Explore complementary therapies and nonpharmacological interventions, such as acupressure, progressive relaxation, and guided imagery, to manage anorexia.	The goal of these interventions is to manage distressing symptoms that interfere with optimal nutritional intake.
Discuss and document nutritional side effects of medications.	Commonly used medications cause anorexia, altered taste, nausea and/or vomiting; some interfere with bone marrow production of RBCs, causing anemia. PIs increase the risk of developing diabetes. GI symptoms are common with over-the-counter (OTC) drugs, such as nonsteroidal anti-inflammatory drugs (NSAIDs), which may also contribute to anorexia.
Discuss use of <i>Lactobacillus acidophilus</i> replacement, such as LactAid dairy products, tablets, or capsules.	HIV infection changes the structure of the gut wall, resulting in a decreased lactose level. Intolerance causes abdominal cramping, malabsorption, a bloated feeling, and diarrhea. Also, antibiotics taken for prevention of opportunistic infections cause changes in normal bowel flora, contributing to diarrhea.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Consult with dietitian and nutritional support team.	Provides assistance in planning nutritionally sound diet and identifying nutritional supplements to meet individual needs. Liquid supplements (e.g., Advera) have been specifically formulated for the GI manifestations common to the HIV-positive population.
Monitor laboratory values, such as Hgb, RBCs, albumin or prealbumin, total iron-binding capacity (TIBC), potassium, and sodium.	These laboratory tests are important in monitoring the client's nutritional immune status and in identifying nutritional therapy needs. For example, anemia may require additional interventions, such as use of epoetin (Epogen or Procrit), to stimulate RBC production.
Provide medications, as indicated, for example:  Dronabinol (Marinol), megestrol (Megace), and cyproheptadine (Periactin)	Antiemetics or appetite stimulants can improve intake to prevent and correct dietary deficiencies. Note: A side effect of Megace may include impotence, necessitating change of drug as desired.
Antidiarrheal medications, such as diphenoxylate/atropine (Lomotil) and octreotide (Sandostatin)	Diarrhea may be present because of altered GI flora and side effects of anti-infective agents. Treatment can correct malabsorption and enhance oral intake.

<b>NURSING DIAGNOSIS:</b> <b>deficient Knowledge regarding disease, prognosis, treatment, self-care, and discharge needs</b>
<b>May Be Related To</b> Insufficient information; insufficient interest in learning; misinformation presented by other Alteration in cognitive functioning or memory Insufficient knowledge of resources
<b>Possibly Evidenced By</b> Insufficient knowledge Inaccurate follow-through of instructions; development of preventable complications
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>
<b>Knowledge: Chronic Disease Management NOC</b> Verbalize understanding of condition, disease process, and potential complications. Identify relationship of signs and symptoms to the disease process and correlate symptoms with causative factors. Verbalize understanding of goals of treatment. Initiate necessary lifestyle changes. Participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Learning Facilitation NIC</b> Assess emotional and intellectual ability to assimilate information and understand instructions. Respect client's need to use denial and coping techniques initially.	Initial shock and anxiety can block intake of information. Self-esteem, lifestyle, guilt, and denial of own responsibility in acquiring or transmitting disease become issues that must be dealt with. Note: Some initial denial may serve as a protective mechanism promoting more effective self-care.
Provide realistic, optimistic information during each contact with client.	Necessary to provide realistic hope because many clients have been exposed to some inaccurate information about AIDS or may have friends or lovers who have died of the disease.
Plan frequent short sessions for teaching. Include written information, as appropriate—a few pieces at each visit.	Client will likely feel overwhelmed and need time and repeated contacts to absorb information, the scope of, and the requirements for treating the infection. Written materials allow for later review and reinforcement of information presented.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Include significant other (SO) and family in discussions and conferences, as appropriate.	Provides opportunity to learn information firsthand, ask questions, and provide support for client.
<b>Teaching: Disease Process NIC</b>	
Determine current understanding and perception of diagnosis. Discuss difference between HIV-positive status and AIDS.	Provides opportunity to clarify misconceptions and myths and make informed choices. People often believe that if they are positive for the virus, they have AIDS; having accurate information about the difference can alleviate fears and allow for development of an individualized plan of care.
Identify and problem-solve potential or actual barriers to accessing healthcare services.	Transportation, distance, child care, work schedule, homelessness, poverty, and lack of insurance or finances are some of the issues that typically interfere with accessing needed primary care and prophylactic interventions.
Provide information about normal immune system response and how HIV affects it, transmission of the virus, behaviors, and factors believed to increase probability of progression. Encourage questions.	Client needs to be aware of own personal risk and risk to others to make immediate and long-range decisions and establish a basis for goal setting. Also, establishes rapport and provides opportunity to identify concerns and assimilate information.
Review signs and symptoms that could be a consequence of HIV infection—mild fever, anorexia, weight loss, fatigue, night sweats, diarrhea, dry cough, rashes, headaches, and sleep disturbances.	Client may experience an acute illness 2 to 6 weeks after becoming infected; however, it is common for infection to be subclinical, with the individual simply feeling unwell.
Discuss management strategies for persistent signs and symptoms.	Client involvement in care increases cooperation and satisfaction with care.
Identify signs and symptoms that require medical evaluation—persistent fever, increasing cough, swollen lymph glands, profound fatigue unrelieved by rest, weight loss of 10 pounds or more in less than 2 months, severe or persistent diarrhea, blurred vision, skin discoloration or rash that persists or spreads, open sores anywhere, and symptoms occurring with medication regimen.	Early recognition of progression of disease and development of opportunistic infections provides for timely intervention and may prevent situations that are more serious. Note: Most HIV-positive clients are on medication regimens (usually one to three drugs) and must adhere to the dosages and schedules, which may be difficult and/or cause side effects that tempt client to alter or discontinue them without notifying the physician.
Emphasize necessity of regular follow-up care and evaluations, including routine CD4 and HIV-RNA viral load counts, and any change in medication regimen, including time, frequency, and side effects.	Even though client may be asymptomatic, periodic evaluation may prevent development of complications, slow the progression of the disease, and assist with treatment decisions. Note: Clients who change medication dosage and/or frequency in response to side effects can create problems for medication adjustment later with increased viral load and drug resistance.
Discuss need for regular gynecological examinations.	HIV-positive women experience a high prevalence of Pap smear, vaginal, and cervical abnormalities.
Discuss family planning issues and careful selection of oral contraceptives.	Various antiretroviral drugs have differing effects on ethinyl estradiol (EE), either enhancing or decreasing protective effectiveness.
Provide preconception counseling, giving information about risk of vertical transmission and ways to reduce the possibility of perinatal transmission.	The risk of viral rebound with adverse consequences to the fetus increases in women currently receiving treatment at the time of conception. Research shows that when antiretroviral treatment is initiated early in pregnancy, the perinatal transmission rate is less than 1%.
Refer to Antiretroviral Pregnancy Registry, as appropriate.	National and international research is ongoing on the safety of highly active antiretroviral therapy (HAART) for HIV-positive pregnant woman. In 2012, new practice guidelines for antiretroviral therapy (ART) during pregnancy were federally approved in the United States. Updates in 2016 still recommend that pregnant HIV-infected women should receive a combination ART regimen regardless of plasma RNA copy numbers or CD4

**ACTIONS/INTERVENTIONS (continued)****RATIONALE (continued)****Teaching: Prescribed Medication NIC**

Discuss recommended HIV treatment (depends on multiple factors, including stage of HIV infection, client's willingness or desire to enter into/adhere to treatment), and address ways to optimize adherence to treatment plan.

Review drug therapies, including correct dosing and scheduling, side effects, monitoring tests and techniques, and adverse reactions as appropriate.

Fusion (or Entry) inhibitors (e.g., enfuvirtide [Fuzeon], maraviroc [Selzentry])

Integrase inhibitors (INSTIs) (e.g., elvitegravir [Vitekta], raltegravir [Isentress], dolutegravir [Tivicay])

HIV drug boosters (e.g., ritonavir [Norvir], cobicistat [Tybost])

Nucleoside and nucleotide reverse transcriptase inhibitors (NRTIs/NtRTIs): (e.g., emtricitabine [Emtriva], lamivudine [Epivir], zidovudine [Retrovir], didanosine [Videx EC], tenofovir [Viread], stavudine [Zerit])

Protease inhibitors (PIs) (e.g., atazanavir [Reyataz], darunavir [Prezista], fosamprenavir [Lexiva], indinavir [Crixivan])

count to prevent mother-to-child transmission of HIV and to protect their own health. The choice of regimen reflects current adult treatment guidelines, taking pregnancy-safe drug recommendations into consideration (DHSS, 2017c). A woman must be counseled prior to initiating therapy. Benefits versus risks, including effects on fetus, must be weighed, especially if regimen is started in first trimester.

HIV is a lifelong chronic disease, but it is treatable and can be controlled with medications. It is important that HIV-positive client is educated on the benefits and risks of antiretroviral (AVR) therapy. Initiating treatment is not based solely on viral load or CD4 count but rather on three major goals: (1) treating HIV before the virus has had a chance to cause serious damage to the immune system, (2) reducing risk of non-AIDS-related diseases that are becoming more common among people living with HIV (e.g., cardiovascular, kidney, and liver disorders), and (3) reducing the risk of transmitting the virus to others. Note: Viral load and CD4 count testing is used to monitor the effectiveness of therapy (POZ, n.d.).

Antiretroviral drugs are organized into five classes based on the stage of the HIV life cycle they block. Today, there are 27 individual agents and 12 fixed-dosed combination (FDC) drugs comprising two or more of different molecules. Seven of the FDCs, in fact, can be used as a single-pill, once-daily therapy, ensuring greater treatment adherence and ease of use (Myhre & Sifris, 2017; POZ, n.d.).

Fusion inhibitors stop HIV from merging with the cell membrane of certain cells of the immune system. This blocks HIV from getting into and infecting the cells. It prevents HIV from multiplying and can reduce the amount of HIV in the body (AIDSinfo, 2016).

These agents prevent HIV from integrating its genetic coding into the DNA of the infected host cell by blocking an enzyme called integrase and, by doing so, makes it impossible for HIV to replicate. Note: Current DHHS guidelines place INSTIs as preferred, first-line agents for persons newly diagnosed for HIV (Cichocki, 2017).

Drugs that can increase the plasma concentration of certain antiretroviral (AVR) agents when used in combination therapy. Allows prescriber to reduce the dosage and frequency of the ARV, while lowering the potential for drug-related side effects (Myhre & Sifris, 2016).

NRTIs block an HIV enzyme called reverse transcriptase (a protein that starts or increases the speed of a chemical reaction). By blocking reverse transcriptase, NRTIs prevent HIV from multiplying and can reduce the amount of HIV in the body.

Protease inhibitors block the activity of the protease enzyme, which HIV uses to break up large proteins into the smaller pieces required for assembly of new viral particles. When combined with NRTIs, PIs control the HIV-RNA viral load by blocking viral replication at two different target sites in the replication process. Immune function is maintained with early intervention or improved when initiated later.

(continues on page 796)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Nonnucleoside reverse transcriptase inhibitors (NNRTIs) (e.g., etravirine [Intelence], delavirdine [Rescriptor], nevirapine [Viramune], efavirenz [Sustiva])	NNRTIs bind to and block HIV reverse transcriptase (an enzyme) that HIV uses to convert its RNA into DNA (reverse transcription). This blocking prevents HIV from replicating. NNRTIs are used in combination to reduce possibility of drug resistance.
Discuss combination drugs and once-daily pills, such as elvitegravir-cobicistat + tenofovir + emtricitabine (Stribild), efavirenz + tenofovir + emtricitabine (Atripla), rilpivirine + tenofovir + emtricitabine (Complera) as indicated.	Teaching about drug regimen will be highly individualized, depending on the client's needs. Many clients may now be taking all-in-one combination pills once daily, especially when HIV has been diagnosed in early stages. Others may be on more complex regimens.
Provide information about clinical trials available, as individually appropriate.	Scientific research requires HIV-positive test subjects. Participation may provide individual with a sense of contributing to the body of knowledge or search for a cure in addition to no-cost monitoring and medications for those with limited financial resources.
Provide information about pharmaceutical company assistance programs.	Some medications are provided free or at reduced cost, based on income.
<b>Risk Identification NIC</b>	
Assess potential for inappropriate or high-risk behavior, such as continued injection drug abuse or unsafe sexual practices. Stress need to avoid use of illicit injected drugs or, if unwilling to abstain, to avoid sharing needles and to clean works with bleach solution, rinsing carefully with water.	High levels of denial, anger, or drug addiction may cause client to continue behaviors that are high risk for spread of the virus. Even moderate changes in lifestyle may reduce exposure to other infective agents that can cause additional stress to the immune system. Note: Client may intensify substance abuse as a means of denial. A sense of "not me" can contribute to continuation of risky behaviors.
Recommend exploring drug treatment resources—methadone clinics or substance abuse recovery groups or programs.	May help reduce risk of HIV transmission by reducing injection drug use when client substitutes methadone, recovers from drug use, or learns safer injection and needle use techniques.
Emphasize necessity of, and methods for, practicing safer sex at all times.	Limits spread of virus and exposure to other STIs. A person's sexual expression and identity are threatened by the discovery of the diagnosis. Therefore, many individuals with HIV will not reveal status to potential sexual partners, contributing to ongoing HIV transmission.
Discuss active changes in sexual behaviors that client can make that may satisfy sexual needs.	Learning alternative forms of expression promotes a sense of responsibility and control. Alternatives can reduce sexual tensions, promote normalcy in sexual relationships, and reduce fear or guilt related to potential transmission of HIV.
Provide information about other necessary lifestyle changes and health maintenance factors, such as:	Evidence suggests that specific dietary and lifestyle factors may slow the progression of HIV infection because they support a healthier immune system.
Avoid people with infections.	When the immune system is depressed, the person's ability to fight exposure to common communicable diseases is limited.
Exercise within ability, alternate rest periods with activity, and get adequate sleep.	Helps manage fatigue; maintains strength and sense of well-being. Exercise has also been shown to stimulate the immune system.
Eat regularly, even if appetite is reduced; try small, frequent meals and supplements and snacks high in nutritional value; and discuss ways to control nausea and vomiting and improve appetite.	Physical and psychological stressors increase metabolic needs; in addition, side effects of medication, presence of nausea or vomiting, and anorexia often limit oral intake. The result is nutritional deficits that can further impair the immune system.
Practice daily oral hygiene, use a soft toothbrush; examine mouth regularly for sores, white film, or changes in color; and have regular dental checkups every 6 months.	Poor oral hygiene and dental care can affect oral intake adversely and increase the risk of opportunistic and systemic infections.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Examine skin for rashes, bruises, and breaks in skin integrity.	May indicate developing complications and increase risk of infection.
Identify additional resources—support groups, peer counselors, mental health professionals, and case managers.	Client will experience a variety of emotional and psychological responses to the diagnosis and its consequences and may need additional assistance and periodic reinforcement to promote optimal adjustment. Note: In early stages of HIV infection, focus may be on social services (e.g., help with housing, employment, legal issues, and finances). Later, as disease progresses, the emphasis switches to medical and related community services.

NURSING DIAGNOSIS:	risk for Social Isolation
<b>Possibly Evidenced By</b>	
Illness	
Absence of support system; insufficient personal resources; withdrawal	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Social Support NOC</b>	Identify stable support system and supportive individual(s).
	Use resources for assistance, as appropriate.
<b>Loneliness Severity NOC</b>	Express sense of satisfaction with relationship(s).

ACTIONS/INTERVENTIONS	RATIONALE
<b>Support System Enhancement NIC</b>	
<i>Independent</i>	
Determine client's response to condition, feelings about self, concerns or fears about response of others, sense of ability to control situation, and sense of hope.	How the individual accepts and deals with the situation will help decide the plan of care and interventions.
Assess coping mechanisms and previous methods of dealing with life problems.	May reveal successful techniques that can be used in current situation.
Discuss concerns regarding employment and leisure involvement. Note potential problems involving finances, insurance, and housing.	Clients with this chronic, potentially terminal, illness face major problems with possible loss of employment, medical insurance, housing, and care sources if they become unable to independently care for themselves.
Identify availability and stability of support systems, including SO, immediate and extended family, and community.	This information is crucial to help client plan future care for a disease that carries a stigma and can negatively affect relationships.
Encourage contact with SO, family, and friends.	Many clients fear telling SO, family, and friends for fear of rejection, and some clients withdraw because of tumultuous feelings. Contact promotes sense of support, concern, involvement, and understanding. Supporting loved ones as they learn of the diagnosis is beneficial and can provide optimism for the long term.
Encourage honesty in relationships, as appropriate.	As a rule, acquaintances do not need to be informed of client's health status. However, information should be shared with close relationships such as SO, family, and current or potential sexual partners. Honesty can help identify stable support persons.
Assist client to problem-solve solutions to short-term and/or imposed isolations, such as communicable disease measures or severely compromised immune system.	Anticipatory planning can defuse sense of isolation and loneliness that can accompany these situations.

(continues on page 798)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Help client differentiate between isolation and loneliness or aloneness, which may be by choice.	Provides an opportunity for client to realize the control he or she has to make decisions about the choice to take care of self about these issues.
Be alert to verbal and nonverbal cues, such as withdrawal, statements of despair, and sense of aloneness. Determine presence and level of risk of suicidal thoughts.	Indicators of despair and suicidal ideation may be present. When these cues are acknowledged, client is often more willing to divulge thoughts and sense of isolation and hopelessness.
<b>Collaborative</b>	
Identify community resources, self-help groups, and rehabilitation or drug cessation programs, as indicated.	Provides opportunities for resolving problems that may contribute to sense of loneliness and isolation, transmission risks, and sense of guilt.
Refer to psychiatric clinical nurse specialist or psychiatrist, as needed.	May require more in-depth support to deal with feelings and manage difficult situations.

## NURSING DIAGNOSIS: **ineffective Health Management**

### May Be Related To

Difficulty managing complex treatment regimen, or navigating complex healthcare system  
Decisional conflict; perceived seriousness of condition, susceptibility, barriers, or benefits  
Family conflict; insufficient social support; powerlessness

### Possibly Evidenced By

Difficulty with prescribed regimens  
Failure to include treatment regimen in daily living or to take action to reduce risk factors  
Ineffective choices in daily living for meeting health goals  
[Unexpected acceleration of illness symptoms]

### Desired Outcomes/Evaluation Criteria—Client/Family Will

#### Self-Management: Chronic Disease **NOC**

Identify individual factors affecting management of regimen.  
Accept personal responsibility for own actions and participate in problem-solving activities.  
Develop contract for care with mutually agreeable goals for treatment and mechanisms for changing or terminating elements of plan.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Patient Contracting <b>NIC</b></b>	
<i>Independent</i>	
Make time to listen to client concerns.	Promotes feelings of value and may identify additional factors that affect outcome of therapy. Timing of teaching needs to consider the stage of acceptance.
Note client's stage of acceptance of the diagnosis:	
Precontemplation stage	Client has just learned of the diagnosis and may not be able to participate in any discussions.
Contemplation stage	Client can participate in, and may initiate, discussions of therapy. Encourages individual's responsibility to be involved with planning. Promotes increased sense of control and self-esteem.
Action or maintenance stage	Client is actively involved in understanding and managing own care.
Determine client's and SO's perception or understanding of regimen.	Identifies areas of confusion or conflict or lack of accurate information that may impede cooperation with regimen.
Assess perceived and actual barriers to accessing healthcare services and reasons for deviations from prescribed plan.	Provides opportunity to clarify actual problems and develop alternative plan acceptable to healthcare provider.
Instruct client carefully in all aspects of medication regimen, times, interaction with food, and side effects:	Thorough understanding may enhance cooperation with regimen and help in identifying potential for compromise.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide written schedule, if desired.	Helpful for keeping track of multiple drugs and changes that occur.
Recommend various methods to alert client to medication time, such as portable pill container or alarms.	Will assist busy or forgetful client to take medications at appropriate intervals.
Reduce dose frequency and number of pills when possible.	Increases ability to manage treatment regimen with little interference.
Emphasize importance of keeping healthcare providers informed of concerns and ability to continue prescribed medication regimen.	Drug levels quickly fall below therapeutic levels if one dose is missed. Reduces potential for drug resistance or increased viral load. Poor adherence or factors leading to discontinuation of an antiretroviral medication can impede future attempts to reduce viral load. Suboptimal drug exposure increases the potential for drug resistance.
Assist client to develop realistic health goals and incorporate wellness activities and practices—exercise, smoking cessation, nutrition, vitamin supplements—into daily routine.	Multiple responsibilities and demands on the client's time, especially with women, make it appear difficult to include any additional activities of self-care.
Provide anticipatory guidance and possible choices, if any, to prevent or delay complications.	Provides opportunity for client to prepare for expected changes and may permit earlier intervention.
Identify adaptive interventions valid for progressive long-term care needs.	Builds on coping strategies already effective for this individual.
Monitor adherence to prescribed medical regimen. Alter plan of care as needed.	Regimen is likely to be complicated and time-consuming. Thoughtful changes in plan may help enhance cooperation.
<b>Support System Enhancement NIC</b>	
Identify potential or actual support person(s). Include in teaching and problem-solving activities, as appropriate.	Helpful in planning for future and current needs of client and family.
Help client develop strategies that can gain supportive persons.	The more support persons there are available, the lower the risk of support burnout.
<b>Collaborative</b>	
Identify appropriate women's groups and services, social worker, financial resources, respite care, and other community programs.	Often female clients are single parents and caretakers for family. Groups can provide support and tangible help in dealing with issues of child care, parenting, and what to do when client is too ill to parent.
Refer to counselor, therapist, or spiritual advisor, as appropriate.	Opportunity to discuss concerns and fears may aid in problem-solving solutions and living with required changes.

**POTENTIAL CONSIDERATIONS** (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Fatigue**—disease state; stress; depression
- **imbalanced Nutrition: less than body requirements**—inability to ingest/digest food; insufficient finances
- **Decisional Conflict**—unclear personal values or beliefs; perceived threat to value system; multiple or divergent sources of information; support system deficit; interference with decision making
- **risk for Infection**—chronic disease; suppressed inflammatory response; malnutrition
- **ineffective Health Management**—complexity of healthcare system or therapeutic regimen; perceived seriousness and susceptibility, or benefits of therapy; family conflicts or crises

# ACQUIRED IMMUNODEFICIENCY SYNDROME (AIDS)

## I. Pathophysiology

- a. AIDS is the most advanced stage of the human immunodeficiency virus (HIV) infection (stage 3) (HIV.gov, 2017a).
- b. Progression from HIV infection to AIDS is highly variable.
- c. AIDS (in adults) is defined as the presence of HIV infection with at least one other criterion:
  - i. Person with HIV must have an AIDS-defining condition (opportunistic infections and cancers that are life-threatening in a person with HIV), or
  - ii. Have a CD4 count less than 200 cells/mm<sup>3</sup>, regardless of whether the person has an AIDS-defining condition.
- d. Without treatment, people who progress to AIDS typically survive about 3 years.

## II. Etiology

- i. AIDS is an acquired complex of symptoms and infections caused by the HIV virus and may be the result of undiagnosed HIV, not taking antiretrovirals, drug resistance, or failure of antiretroviral therapy.
- ii. Opportunistic infections (OIs), while decreased in number, are still major contributors to morbidity and mortality in the HIV-infected client with advanced disease, especially for those who have not yet received anti-HIV therapy, as well as those for whom it has failed.
- iii. The pattern of opportunistic infections in a geographic region reflects the pathogens that are common in that area. For example, persons with AIDS in the United States tend to present with organisms such as *Pneumocystis* and *Candida* species (not a complete listing). Men having sex with men (MSM) are more likely to develop Kaposi's sarcoma because of coinfection with HHV-8. And TB, while on the rise, is more common in developing countries (Bennett & Gilroy, 2017a; Powderly, 2017; Selik et al., 2014).

iv. Research has revealed that certain infections are associated with particular CD4 counts. For example (Myhre & Sifris, 2017) [not a complete listing]:

1. CD4 counts from 500 to 250 cells/µL: candidiasis (especially of esophagus but also can affect bronchi, trachea, and lungs), Kaposi's sarcoma (KS) (pink or purplish skin lesions caused by the HHV-8 virus), TB (pulmonary or extrapulmonary; incidence rising globally)
2. CD4 counts from 250 to 100 cells/µL: *Pneumocystis jiroveci* pneumonia (PJP also called PCP); *Salmonella* (septicemia)
3. CD4 counts between 100 and 50 cells/µL: toxoplasmosis or HIV encephalopathy (dementia); cysitoisporiasis
4. CD4 counts under 50 cells/µL: cytomegalovirus (CMV), mycobacterium avium complex (MAC) (retinitis with vision loss; also severe diarrhea and ulcers), HIV wasting syndrome (profound weight loss accompanied by weakness and persistent diarrhea)

## III. Statistics

- a. Morbidity: As of 2015, an estimated 18,303 individuals were newly diagnosed with AIDS, and an estimated 521,002 persons were living with AIDS in the United States at the end of 2014 (CDC, 2016, 2017d).
- b. Mortality: Deaths of persons with diagnosed HIV infection ever classified as stage 3 (AIDS) may be due to "any cause." Using that classification, in 2015, the number of deaths in the United States ever classified as AIDS was 12,497. Deaths directly caused by HIV in 2014 were 6721 (CDC, 2017d).
- c. Cost: According to the Kaiser Family Foundation (KFF), in fiscal year (FY) 2017, the U.S. federal government spent a total of \$26.4 billion on HIV care (KFF, 2017).

## G L O S S A R Y

**AIDS-defining illnesses:** Group of over 20 conditions that, when coupled with a diagnosis of HIV, indicates the individual has progressed to AIDS. *Note:* While AIDS-defining illnesses can be classified as opportunistic infections, the opposite is not necessarily true. AIDS-defining illnesses, by contrast, tend to appear during later-stage disease when the CD4 count has dropped significantly. (See Opportunistic diseases below.)

**AIDS dementia complex (ADC):** Progressive mental disorder with different nervous system and mental symptoms—memory loss, speech problems, inability to concentrate, or poor judgment. There may be behavior changes, mood changes, and motor difficulties. ADC is considered an AIDS-defining condition in people with HIV. Also known as HIV-associated dementia.

**AIDS wasting syndrome:** AIDS wasting is the involuntary loss of more than 10% of body weight (fat and muscle mass), plus more than 30 days of either diarrhea or weakness and fever. Although the incidence of wasting syndrome has decreased dramatically since 1996, wasting

is still a problem for people with AIDS, even people whose HIV is controlled by medications.

**Antigen:** Substance that can stimulate the body to produce antibodies against it. Antigens include bacteria, viruses, pollen, and other foreign materials.

**Antiretroviral (ARV, also called ART):** Medication that interferes with the ability of a retrovirus (such as HIV) to make more copies of itself.

**Coinfection:** Infection with more than one virus, bacterium, or other micro-organism at a given time. For example, an HIV-infected individual may be coinfected with hepatitis C virus (HCV) or tuberculosis (TB).

**Combination therapy:** Two or more drugs used together to achieve optimal results in controlling HIV infection.

**Highly active antiretroviral therapy (HAART):** Aggressive anti-HIV treatment, using several antiretroviral drugs at one time. Also known as ART, ARV, and HART.

**Immunomodulators:** Drugs that strengthen the immune system and help the body to fight off infections or other diseases that attack people living with HIV/AIDS.

**G L O S S A R Y** (continued)

**Immunosuppression:** Inability of the immune system to function normally. May be caused by drugs, such as chemotherapy, or result from certain diseases, such as HIV infection.

**Opportunistic infections (OIs):** Opportunistic infections are those caused by otherwise common, harmless viruses, bacteria, fungi, or parasites that can cause disease when immune defenses have been compromised. Many opportunistic infections are not life-threatening and can develop even when a person's CD4 count is high. Some opportunistic infections, such as herpes simplex, are only AIDS-defining when they spread (disseminate) beyond the

tissue or organ where they are typically seen. (See AIDS-defining illness above.)

**Prophylaxis in HIV-infected client:** Primary prophylaxis is initiated at a stage when client is at risk of developing a particular infection (such as tuberculosis). Secondary prophylaxis (also called maintenance therapy) is initiated after appropriate treatment of the acute OI.

**Retrovirus:** Type of virus that stores its genetic information in a single-stranded RNA molecule, then constructs a double-stranded DNA version of its genes using a special enzyme called reverse transcriptase. The DNA copy is then integrated into the host cell's own genetic material.

**CARE SETTING**

The interventions listed here are appropriate for community care as well as an inpatient or hospice setting. Most of the signs and symptoms and psychosocial issues happen long before inpatient care.

**RELATED FACTORS**

Palliative/end-of-life care—hospice, page 970

Extended/long-term care, page 896

Fluid and electrolyte imbalances (see *DavisPlus*)

HIV-positive client, page 785

Psychosocial aspects of care, page 835

Sepsis/septic shock, page 772

**CLIENT ASSESSMENT DATABASE**

\*\*\*\*Data depend on the organs and body tissues involved, the current viral load, and the specific AIDS-related condition.

**DIAGNOSTIC DIVISION  
MAY REPORT****ACTIVITY/REST**

- Profound fatigue and malaise
- Weakness
- Altered sleep patterns

**CIRCULATION**

- Bruising or bleeding with minor injury
- Slow healing (if anemic)

**EGO INTEGRITY**

- Stress factors related to lifestyle changes—specifically healthcare planning and regimen of multiple medications—losses, including family support, relationships, independence, financial; spiritual concerns and change in self-concept (loss of control)
- Concern about appearance—hair loss, disfiguring lesions, weight loss, altered distribution of body fat associated with protease-inhibiting drug therapy, and wrinkling of skin
- Denial of diagnosis
- Feelings of hopelessness, helplessness, worthlessness, guilt, depression, and powerlessness

**MAY EXHIBIT**

- Muscle weakness, wasting of muscle mass
- Physiological response to activity—changes in blood pressure (BP), heart rate, and respirations

- Tachycardia, postural BP changes
- Decreased peripheral pulse volume
- Pallor or cyanosis
- Delayed capillary refill

- Denial, anxiety, depression, fear, and withdrawal
- Angry behaviors, dejected body posture, crying, and poor eye contact
- Failure to keep appointments or multiple appointments for similar symptoms

(continues on page 802)

**CLIENT ASSESSMENT DATABASE (contd.)****MAY REPORT (continued)****MAY EXHIBIT (continued)****ELIMINATION**

- Intermittent, persistent, frequent diarrhea that may last for more than a week at time with or without abdominal cramping
- Rectal pain, itching
- Flank pain, burning on urination

- Loose-formed to watery stools with or without mucus or blood; frequent, copious diarrhea
- Abdominal tenderness
- Incontinence
- Rectal, perianal lesions or abscesses
- Changes in urinary output, color, or character

**FOOD/FLUID**

- Anorexia, changes in taste of foods; food intolerance
- Nausea or vomiting
- Food intolerance—diarrhea after ingestion of dairy products, nausea, early satiation, or bloating
- Rapid, progressive weight loss
- Difficulty chewing and swallowing, retrosternal pain with swallowing (candidiasis of esophagus)

- Hyperactive bowel sounds
- Abdominal distention
- Thin frame, decreased subcutaneous fat or muscle mass
- Poor skin turgor
- Edema—generalized, dependent
- Lesions of the oral cavity, white patches, discoloration
- Poor dental and gum health, loss of teeth

**HYGIENE**

- Inability to complete activities of daily living (ADLs) independently

- Deficits in many or all personal care, self-care activities

**NEUROSENSORY**

- Changes in ability to solve problems, forgetfulness, poor concentration
- Impaired sensation or sense of position
- Muscle weakness, tremors
- Numbness, tingling in extremities
- Fainting spells and dizziness
- Changes in vision—light flashes or floaters, photophobia; blurred visions

- Mental status changes ranging from confusion to dementia, delirium with sudden onset
- Forgetfulness, poor concentration, decreased alertness, apathy, psychomotor retardation or slowed responses
- Paranoid ideation, free-floating anxiety, unrealistic expectations
- Abnormal reflexes, decreased muscle strength, ataxic gait
- Fine and/or gross motor tremors, focal motor deficits, hemiparesis
- Seizures
- Retinal hemorrhages and exudates (CMV retinitis); blindness

**PAIN/DISCOMFORT**

- Generalized or localized pain
- Headache
- Pleuritic chest pain

- Swelling of joints, painful nodules, tenderness
- Decreased range of motion (ROM)
- Gait changes, limp
- Muscle guarding

**RESPIRATION**

- Progressive shortness of breath
- Congestion or tightness in chest
- Cough ranging from mild to severe, nonproductive or productive of sputum; spasmodic cough on deep breathing (may be earliest sign of PCP)
- Frequent, persistent upper respiratory infections (URIs)
- History of exposure to or prior episode of active TB

- Tachypnea, respiratory distress
- Changes in breath sounds, presence of adventitious breath sounds
- Pneumonia

**SAFETY**

- Exposure to infectious diseases, such as TB or sexually transmitted infections (STIs)
- History of other immune deficiency diseases, such as rheumatoid arthritis, cancer

- Recurrent fevers, low-grade, intermittent temperature elevations or spikes, night sweats
- Nodules, enlarged lymph nodes in two or more areas of the body—neck, axillae, and groin, for example

MAY REPORT (continued)	MAY EXHIBIT (continued)
<ul style="list-style-type: none"> <li>Changes in skin integrity—cuts, ulcerations, rashes (eczema), exanthemas, psoriasis; discolorations; changes in size or color of moles; unexplained, easy bruising; multiple injection scars</li> <li>History of frequent or multiple blood or blood product transfusions; hemophilia, major vascular surgery, traumatic incident</li> <li>Suicidal or homicidal ideation with or without a plan</li> <li>Experiencing anger, disgust, rejection, and/or violence from others</li> </ul>	<ul style="list-style-type: none"> <li>Red, brown, pink, or purplish blotches on or under the skin or inside the mouth, nose, or eyelids</li> <li>Easy bruising, prolonged bleeding, and hemorrhage (thrombocytopenia)</li> </ul>
<b>SEXUALITY</b>	
<ul style="list-style-type: none"> <li>History of high-risk behavior, such as having sex with a partner who is HIV positive, multiple sexual partners, condomless sexual activity, and anal sex; substance use or abuse, injection drug user</li> <li>Loss of libido, too sick for sex, afraid to engage in any sexual activities</li> <li>Continued high-risk behavior (e.g., unchanged sexual behavior or injection drug use)</li> <li>Inconsistent use of condoms</li> </ul>	<ul style="list-style-type: none"> <li>Pregnancy or risk for pregnancy (sexually active), pregnancy resulting in HIV-positive infant</li> <li>Genitalia—herpes, warts, discharge</li> </ul>
<b>SOCIAL INTERACTION</b>	
<ul style="list-style-type: none"> <li>Problems related to diagnosis and treatment—loss of family/significant other (SO), friends, support; fear of telling others, fear of rejection; loss of income</li> <li>Isolation, loneliness, close friends or sexual partners who have died of, or are sick with, AIDS</li> <li>Questioning of ability to remain independent, unable to plan for needs</li> </ul>	<ul style="list-style-type: none"> <li>Changes in family or SO interaction pattern</li> <li>Disorganized activities, difficulty with goal setting</li> </ul>
<b>TEACHING/LEARNING</b>	
<ul style="list-style-type: none"> <li>Unaware of HIV infection</li> <li>Failure to comply with treatment</li> <li>Injection drug use or abuse, current smoking, alcohol abuse</li> </ul>	
<b>DISCHARGE PLAN CONSIDERATIONS</b>	
<ul style="list-style-type: none"> <li>Usually requires assistance with finances, medications and treatments, skin or wound care, equipment, supplies, transportation, food shopping and preparation, self-care, technical nursing procedures, homemaker and maintenance tasks, child care, and changes in living arrangements</li> </ul>	
<p>► Refer to section at end of plan for postdischarge considerations.</p>	

DIAGNOSTIC STUDIES	TEST WHY IT IS DONE	WHAT IT TELLS ME
<b>BLOOD TESTS</b>	<ul style="list-style-type: none"> <li>See <b>HIV-Positive Client Care Plan for Baseline HIV TESTs</b>, page 785</li> </ul>	(continues on page 804)

## DIAGNOSTIC STUDIES (contd.)

### WHY IT IS DONE (continued)

### WHAT IT TELLS ME (continued)

#### ADDITIONAL STUDIES

- **TB skin test/purified protein derivative (PPD):** Antigen used to aid in the diagnosis of TB infection.

- **Sexually transmitted infections (STI) screening tests:**

Lifestyle behaviors may increase risk of, or exposure to, infection by STIs.

- **Cytomegalovirus (CMV) serology**

Determines exposure to, or active, TB disease. Globally, TB is the leading cause of death among people who are HIV positive. From 1993 to 2015, the estimated percentage of HIV coinfection in persons with TB who reported HIV testing decreased from 63% to 8% among persons aged 25 to 44 years (CDC, 2017b). Note: It can be hard to diagnose TB in the HIV-infected client. If the immune system is very damaged, the tuberculin skin test (TST) may show negative, but TB disease can still be active. Chest x-ray and/or sputum tests may be needed to confirm TB diagnosis (Blahd, 2016).

Serology testing is done to evaluate for chronic infections (e.g., hepatitis B [HBV] hepatitis C [HVC], syphilis, and other common STIs [e.g., chlamydia, gonococcus]).

The presence of anti-CMV IgG indicates previous exposure to CMV. If test is positive in person with very low CD4 counts, an ophthalmic evaluation will be needed to evaluate for CMV retinitis (can result in blindness).

#### OTHER DIAGNOSTIC STUDIES

- **Monitoring blood studies (e.g., liver and kidney function tests, serum chemistries, CBC, lipids)**

Many different laboratory tests will be ordered depending on (1) stage of HIV infection, (2) presence and type of OIs, and (3) effects of AVR drugs on body systems

Done to identify the organism causing the OI and to determine best therapies.

- **Cultures:** Specific cultures (e.g., urine, blood, stool, spinal fluid, lesions, sputum, and secretions) may be done to identify causative organism(s). Sensitivity determines microorganism susceptibility or resistance to specific antimicrobials.

- **Neurological studies—electroencephalogram (EEG), magnetic resonance imaging (MRI), computed tomography (CT) scans of the brain, electromyography (EMG)/nerve conduction studies:** Indicated for persistent headache, changes in mentation, fever of undetermined origin, and/or changes in sensory or motor function.

Determines effects of HIV infection and/or OIs.

- **Chest x-rays:** Determines effects of disease process.

May initially be normal or may reveal progressive interstitial infiltrates secondary to *Pneumocystis jiroveci pneumonia* (PJP) (formerly known as *Pneumocystis carinii pneumonia* [PCP]), the most common OI and cause of death in the United States in persons with HIV infection (Bennett & Gilroy, 2017b). Other pulmonary complications can occur, such as TB, spontaneous pneumothorax, and hilar adenopathy.

Useful in early detection of interstitial pneumonias.

- **Pulmonary function tests:** Group of tests (e.g., spirometry, lung volumes, etc.) that measure how well the lungs take in and release air and how well they move oxygen into the blood.

May be done to identify OI (e.g., *Candida*, CMV) or to stage KS in the GI system.

- **Barium swallow, endoscopy, colonoscopy:** Tests for gastrointestinal (GI) function either by direct visualization or imaging studies.

May be done for differential diagnosis of KS or other neoplastic lesions.

- **Biopsies:** Determines presence of pathology and treatment options.

**NURSING PRIORITIES**

1. Prevent or minimize development of new infections.
2. Maintain homeostasis.
3. Promote comfort.
4. Support psychosocial adjustment.
5. Provide information about disease process, prognosis, and treatment needs.

**DISCHARGE GOALS/GOALS OF CARE**

1. Infection prevented or resolved.
2. Complications prevented or minimized.
3. Pain and discomfort alleviated or controlled.
4. Dealing with current situation realistically.
5. Diagnosis, prognosis, and therapeutic regimen understood.
6. Plan in place to meet ongoing needs.

**NURSING DIAGNOSIS:** **risk for Infection [progression/onset of opportunistic infection]****Possibly Evidenced By**

Chronic illness; inadequate vaccination [e.g., immunization against HCV, HCB, HPV]  
 Insufficient knowledge to avoid exposure  
 Alteration in skin integrity, traumatized tissue, stasis of body fluid  
 Immunosuppression; malnutrition  
 Invasive procedures

**Desired Outcomes/Evaluation Criteria—Client Will****Infection Severity NOC**

Be free of local and/or systemic signs of OIs.  
 Display usual orientation and mentation.  
 Achieve timely healing of any wounds or lesions.

**Risk Control NOC**

Identify individual risk factors.  
 Engage in behaviors/lifestyle changes to reduce risk of infection.

**ACTIONS/INTERVENTIONS****RATIONALE****Infection Control NIC****Independent**

Assess client knowledge and ability to maintain HIV treatment and opportunistic (OI) prophylactic regimen.

A multiple-medication regimen is difficult to maintain over a long period of time. Clients may adjust medication regimen based on side effects experienced, contributing to inadequate prophylaxis, active disease, and resistance. However, newer antiretroviral (ART or ARVT) regimens may increase adherence because they require less frequent dosing, fewer pills at each dose, and fewer side effects, thus maximizing quality of life and improving adherence to treatment. Note: Prophylaxis against an opportunistic infection (OI) is treatment given to HIV-infected individuals to prevent either a first episode of an OI (primary prophylaxis) or the recurrence of an OI (secondary prophylaxis). In the United States, prophylaxis is recommended to prevent three important OIs: *Pneumocystis jiroveci* pneumonia (PJP), *Mycobacterium avium* complex (MAC), and toxoplasmosis.

Provide a clean, well-ventilated environment. Screen visitors and staff for signs of infection and maintain isolation precautions for client protection, as indicated per protocol.

Reduces number of pathogens presented to the immune system and reduces possibility of client contracting a nosocomial infection.

Discuss extent and rationale for isolation precautions and maintenance of personal hygiene.

Promotes cooperation with regimen and may lessen feelings of isolation.

Monitor vital signs, including temperature.

Provides information for baseline and data to track changes. Recurrent temperature may indicate that the body is responding to a new infectious process or that medications are not effectively controlling noncurable infections.

(continues on page 806)

**ACTIONS/INTERVENTIONS (continued)**

Assess respiratory rate and depth; note dry spasmoid cough on deep inspiration, changes in characteristics of sputum, and presence of wheezes or rhonchi. Initiate respiratory isolation when etiology of productive cough is unknown.

Investigate reports of headache, stiff neck, and altered vision. Note changes in mentation and behavior. Monitor for nuchal rigidity or seizure activity.

Examine skin and oral mucous membranes for white patches or lesions. (Refer to NDs: impaired Skin Integrity; impaired oral Mucous Membrane Integrity.)

Clean client's nails frequently. File, rather than cut, and avoid trimming cuticles.

Monitor reports of heartburn, dysphagia, retrosternal pain on swallowing, increased abdominal cramping, and profuse diarrhea.

Inspect wounds and site of invasive devices, noting signs of local inflammation.

Use **Standard Precautions** when providing direct client care:

Perform hand hygiene before and after all care contacts, including before donning and after removing gloves. Instruct client and SO to wash hands, as indicated.

Use contact precautions where indicated.

Use other personal protective equipment (PPE) (e.g., gowns, masks, other eye and face protectors) where indicated.

Dispose of needles and sharps in rigid, puncture-resistant containers.

Label blood bags, body fluid containers, soiled dressings, or linens, and package appropriately for disposal per facility isolation protocol.

Clean up spills of body fluids or blood with bleach solution (1:10); add bleach to laundry.

**RATIONALE (continued)**

Respiratory congestion and distress may indicate developing respiratory disease, including PCP—the most common opportunistic disease in clients with CD4 count below 200. However, TB is on the rise and other fungal, viral, and bacterial infections may occur that compromise the respiratory system.

Neurological abnormalities are common and may be related to HIV or secondary infections. Symptoms may vary from subtle changes in mood or sensorium (personality changes or depression) to hallucinations, memory loss, severe dementias, seizures, and loss of vision. Central nervous system (CNS) infections (encephalitis is the most common) may be caused by protozoal and helminthic organisms or fungus.

Oral candidiasis, KS, herpes, CMV, and cryptococcosis are common opportunistic diseases affecting the cutaneous membranes.

Reduces risk of transmission of pathogens through breaks in skin. Note: Fungal infections along the nail plate are common.

Esophagitis may occur secondary to oral candidiasis, CMV, or herpes. Cryptosporidiosis is a parasitic infection responsible for watery diarrhea, often more than 15 L/d.

Early identification and treatment of secondary infection may prevent sepsis.

To reduce risk of transmission of HIV to healthcare providers and/or to reduce HIV-positive client's risk of exposure to potentially harmful disease-producing organisms.

The term *hand hygiene* includes both handwashing with either plain or antiseptic-containing soap and water and use of alcohol-based products (gels, rinses, foams) that do not require the use of water (Siegel et al, 2017).

Gloves are used to prevent contamination of healthcare personnel hands when anticipating direct contact with blood or body fluids, mucous membranes, nonintact skin (e.g., lesions, ulcerations), and other potentially infectious materials. OI symptoms requiring contact precautions may include (but are not limited to) body fluids visibly containing blood; presence of stool incontinence, draining wounds, uncontrolled secretions, pressure ulcers, presence of generalized rash, or presence of tubes and/or bags draining body fluids (Siegel et al, 2017; Waseem & Gernsheimer, 2017).

PPEs are required when there is potential contact with respiratory secretions and when healthcare procedures may generate splashes or sprays of blood, body fluids, secretions, and excretions (Siegel et al, 2017).

Prevents accidental inoculation of caregivers. Use of needle cutters and recapping is not to be practiced. Note: Accidental needlesticks should be reported immediately, with follow-up evaluations done per protocol.

Prevents cross-contamination and alerts appropriate personnel to exercise specific hazardous materials procedures.

Kills HIV and controls other microorganisms on surfaces.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Administer antiretroviral medications, as indicated.	The goal of pharmacotherapy is to inhibit viral replication and to reduce morbidity and development of OIs.
****Refer to Care Plan the HIV-Positive Client, ND: deficient Knowledge, page 785 for medication examples.	
Administer preventive therapies as indicated (e.g., to prevent <i>Pneumocystis jiroveci</i> pneumonia (PJP; also called PCP), <i>Mycobacterium avium</i> complex (MAC), toxoplasmosis, tuberculosis,	All clients with HIV infection are susceptible to a wide range of opportunistic infections and are at higher risk to pathogenic organisms than the general population. Besides causing morbidity and mortality by themselves, OIs accelerate the progression of HIV disease itself. Prophylaxis against an opportunistic infection is treatment given to prevent either a first episode of an OI (primary prophylaxis) or the recurrence of an OI (secondary prophylaxis) (AIDS Education & Training Center [AETC], 2014; DHHS, 2017b).
Anti-infectives, such as trimethoprim-sulfamethoxazole (Bactrim), pentamidine (Pentacarinat), flucytosine (Ancobon), and clotrimazole (Femizole)	Early identification and treatment of secondary infection may prevent sepsis.
Refer to and encourage cooperation with local epidemiology agency or public health department.	This is a legal requirement. Accurate information facilitates tracking disease spread and groups affected.

NURSING DIAGNOSIS: <b>risk for deficient Fluid Volume</b>
<b>Possibly Evidenced By</b> Excessive fluid loss through normal routes (e.g., prolonged or copious diarrhea, profuse sweating, vomiting) Factors influencing fluid needs—hypermetabolic state, fever Insufficient fluid intake—nausea, anorexia, lethargy
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>
<b>Hydration NOC</b> Maintain fluid volume at a functional level as evidenced by moist mucous membranes, good skin turgor, stable vital signs, and individually adequate urinary output.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid/Electrolyte Management NIC</b> <i>Independent</i>	
Monitor vital signs, including central venous pressure (CVP) if available. Note hypotension, including postural changes.	Indicators of circulating fluid volume.
Note temperature elevation and duration of febrile episode. Administer tepid sponge baths, as indicated. Keep clothing and linens dry. Maintain comfortable environmental temperature.	Fever is one of the most frequent symptoms experienced by clients with HIV infection. Increased metabolic demands and associated excessive diaphoresis result in increased insensible fluid losses and dehydration.
Assess skin turgor, mucous membranes, and thirst.	Indirect indicators of fluid status.
Measure urinary output and specific gravity. Measure or estimate amount of diarrheal loss. Note insensible losses.	Increased specific gravity and decreasing urinary output reflects altered renal perfusion or circulating volume. Note: Monitoring fluid balance is difficult in the presence of excessive GI and insensible losses.
Weigh, as indicated.	Although weight loss may reflect muscle wasting, sudden fluctuations reflect state of hydration. Fluid losses associated with diarrhea can quickly create a crisis and become life-threatening.
Monitor oral intake and encourage fluids of at least 2500 mL/d, if not contraindicated.	Maintains fluid balance, reduces thirst, and keeps mucous membranes moist.

(continues on page 808)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Make fluids easily accessible to client. Encourage use of fluids that are tolerable to client and that replace needed electrolytes, such as Gatorade or broth.	Enhances intake. Certain fluids such as acidic fruit juices or iced beverages may be too painful to consume because of mouth lesions.
Eliminate foods potentiating diarrhea, such as spicy or high-fat foods, nuts, cabbage, and milk products. Provide lactose-free products, such as Resource or Advera. Adjust rate or concentration of enteral feedings, if indicated.	Diarrhea is a common problem for people with HIV, especially those with severely compromised immune system (due to gut-associated lymphoid tissue [GALT]) (Smith et al, 2000). Stress, antiretroviral medications, and problems digesting dairy products can also cause/exacerbate diarrhea.
<b>Collaborative</b> Administer fluids and electrolytes via feeding tube or intravenously (IV), as appropriate.	May be necessary to support or augment circulating volume, especially if oral intake is inadequate or nausea or vomiting persists. Minerals such as sodium, potassium, and calcium (lost from severe diarrhea) should be replenished.
Monitor laboratory studies, as indicated, for example:	
Serum and urine electrolytes	Alerts to possible electrolyte disturbances and determines replacement needs.
Blood urea nitrogen/creatinine (BUN/Cr)	Evaluates renal perfusion and function.
Stool specimen collection	Bowel flora changes can occur with multiple or single antibiotic therapy.
Administer medications, as indicated, for example:	
Antiemetics, such as prochlorperazine maleate (Compazine)	Reduces incidence of vomiting to reduce further loss of fluids and electrolytes.
Antidiarrheals, such as diphenoxylate (Lomotil), loperamide (Imodium), or paregoric, or antispasmodics, such as mepenzolate bromide (Cantil)	Decreases the amount and fluidity of stool; may reduce intestinal spasm and peristalsis. Note: Antibiotics may also be used to treat diarrhea if caused by infection.
Antipyretics, such as acetaminophen (Tylenol)	Helps reduce fever and hypermetabolic response, decreasing insensible losses. Note: Studies caution that Tylenol toxicity can occur more frequently in the client with AIDS, so it needs to be used with caution.
Maintain hypothermia blanket if used.	May be necessary when other measures fail to reduce excessive fever and insensible fluid losses.

### NURSING DIAGNOSIS: risk for ineffective Breathing Pattern

#### Possibly Evidenced By

Respiratory muscle fatigue—wasting of respiratory musculature  
 Fatigue  
 [Pneumonias; other pulmonary effects of HIV-related opportunistic infections]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status NOC

Maintain effective respiratory pattern.  
 Experience no dyspnea or cyanosis, with breath sounds and chest x-ray clear or improving and arterial blood gases (ABGs) within client's normal range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b> <i>Independent</i> Assess for presence and type of respiratory symptoms. Ask about previous pulmonary disorders and typical symptoms, as well as and recurrence/frequency of pneumonia as appropriate.	Some HIV-related OIs recur frequently, and knowledge of the client's past pulmonary history may suggest the etiology of the current illness. For example, bacterial pneumonias are common and frequently recurrent. Client with a history of PCP/PJP is at high risk of recurrence and must

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Auscultate breath sounds, noting areas of decreased or absent ventilation and presence of adventitious sounds—crackles, wheezes, and rhonchi.	be offered secondary PCP prophylaxis regardless of tCD4 cell count. PCP characteristically presents with fever, shortness of breath, and a dry, nonproductive cough. In contrast, pneumonia caused by <i>S. pneumoniae</i> or <i>H. influenzae</i> characteristically presents with fevers, shaking chills or rigors, shortness of breath, pleuritic chest pain, and a productive cough with purulent or blood-streaked sputum. Dyspnea may be mild or severe and present at rest. Fever, chills, night sweats, fatigue, anorexia, and weight loss also may be present. In addition, extrapulmonary symptoms (e.g., headache, stiff neck, abdominal tenderness or fullness) may be present and could aid in differentiating the various OIs and neoplasms (Huang, 2009).
Note rate and depth of respiration, use of accessory muscles, increased work of breathing, and presence of dyspnea, anxiety, and cyanosis.	Suggests developing pulmonary complications or infections, such as atelectasis or pneumonia. Note: PCP is often advanced before changes in breath sounds occur.
Assess changes in level of consciousness.	Tachypnea, cyanosis, restlessness, and increased work of breathing reflect respiratory distress and need for increased surveillance or medical intervention.
Investigate reports of chest pain.	Hypoxemia can result in changes ranging from anxiety and confusion to unresponsiveness.
<b>Ventilation Assistance NIC</b>	Pleuritic chest pain may reflect nonspecific pneumonitis or pleural effusions associated with malignancies.
Elevate head of bed. Have client turn, cough, and deep breathe as indicated.	Promotes optimal pulmonary function and reduces incidence of aspiration or infection due to atelectasis.
Suction airways as indicated, using sterile technique and observing safety precautions—mask, protective eyewear, if indicated.	Assists in clearing the ventilatory passages, thereby facilitating gas exchange and preventing respiratory complications.
Allow adequate rest periods between care activities. Maintain a quiet environment.	Reduces oxygen consumption.
<b>Collaborative</b>	
Monitor and graph serial ABGs or pulse oximetry.	Indicators of respiratory status and treatment needs and effectiveness.
Review serial chest x-rays.	Presence of diffuse infiltrates may suggest pneumonia, whereas areas of congestion or consolidation may reflect other pulmonary complications, such as atelectasis or KS lesions.
Assist with and instruct in use of incentive spirometer. Provide chest physiotherapy—percussion, vibration, and postural drainage.	Encourages proper breathing technique and improves lung expansion. Loosens secretions and dislodges mucous plugs to promote airway clearance. Note: In the event of multiple skin lesions, chest physiotherapy may be discontinued.
Provide humidified supplemental oxygen via appropriate means—cannula, mask, or intubation with mechanical ventilation.	Maintains effective ventilation and oxygenation to prevent or correct respiratory crisis.
Administer medications, as indicated, for example:	Choice of therapy depends on individual situation and infecting organism(s).
Bronchodilators, expectorants, and cough suppressants	May be needed to improve or maintain airway patency or help clear secretions.

(continues on page 810)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Antimicrobials, such as trimethoprim and sulfamethoxazole (TMP-SMX), or dapsone (Avlosulfon); atovaquone (Mepron); aerosolized pentamidine (not a complete listing)	The best way to prevent complications is by improving immune function with ongoing antiretroviral therapy (ART). While immune function is recovering, antibiotic prophylaxis should be given. Note: Many other antimicrobials are used to prevent or treat lung diseases associated with HIV infections (e.g., TB, bacterial pneumonias, MAC, KS, lung cancers, COPD, illicit drug or medication-induced diseases).
Prepare for and assist with procedures as indicated, such as bronchoscopy, lavage, and biopsy.	May be required to clear mucous plugs or obtain specimens for diagnosis.

NURSING DIAGNOSIS: risk for Bleeding
<b>Possibly Evidenced By</b>
Gastrointestinal condition (e.g., KS, MAC, cryptosporidiosis) Impaired liver function; inherent coagulopathy; malignancies Trauma; treatment regimen [e.g., surgery, medications] Insufficient knowledge of bleeding precautions
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>
<b>Blood Loss Severity NOC</b>
Be free of active bleeding or excessive blood loss as evidenced by stable vital signs, usual mentation, and skin/mucous membranes free of pallor.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bleeding Precautions NIC</b>	
<b>Independent</b>	
Avoid injections and rectal temperatures and rectal tubes; administer rectal suppositories with caution.	Protects client from procedure-related causes of bleeding; for example, insertion of thermometers or rectal tubes can damage or tear rectal mucosa. Note: Some medications may need to be given via suppository despite risk.
Maintain a safe environment—keep all necessary objects and call bell within client's reach and keep bed in low position.	Reduces accidental injury, which could result in bleeding.
Maintain bedrest or chair rest when platelets are low or as individually appropriate. Assess medication regimen.	Reduces possibility of injury, although activity needs to be maintained. May need to discontinue or reduce dosage of a drug. Note: Client can have a surprisingly low platelet count without bleeding.
Hematest body fluids—urine, stool, and vomitus—for occult blood.	Prompt detection of bleeding and initiation of therapy may prevent critical loss of blood. Note: Clinical studies have revealed that rectal bleeding is present in 45% of patients with HIV-related squamous cell carcinoma of anus (SCCA) (Department of Veterans Affairs [VA], 2009).
Observe for and report epistaxis, hemoptysis, hematuria, nonmenstrual vaginal bleeding, or oozing from lesions, body orifices, or IV insertion sites.	Spontaneous bleeding may indicate presence of active HIV-related condition (e.g., TB) or development of disseminated intravascular coagulation (DIC) or immune thrombocytopenia, necessitating further evaluation and prompt intervention.
Monitor for changes in vital signs and skin color, such as BP, pulse, respirations, and skin pallor or discoloration.	Presence of bleeding or hemorrhage may lead to circulatory failure and shock.
Evaluate change in level of consciousness.	May reflect cerebral bleeding or diminished cerebral blood flow and oxygenation.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b>	
Review laboratory studies, such as prothrombin time (PT), international normalized ratio (INR), activated partial thromboplastin time (aPTT), clotting time, platelets, and Hgb and Hct.	Detects alterations in clotting capability; identifies therapy needs. Note: Many individuals display platelet counts below 50,000 and may be asymptomatic, necessitating regular monitoring.
Administer blood products, as indicated.	Transfusions may be required in the event of persistent or massive spontaneous bleeding.
Avoid use of aspirin products and NSAIDs, especially in presence of gastric lesions.	These medications reduce platelet aggregation, prolonging the coagulation process, and may cause further gastric irritation, increasing risk of bleeding. Note: Aspirin is contraindicated even in the short term because of its nonreversible effect on platelets.

### NURSING DIAGNOSIS: imbalanced Nutrition: less than body requirements

#### May Be Related To

Insufficient dietary intake—anorexia, nausea, vomiting, hyperactive gag reflex, fatigue  
Inability to absorb nutrients—intestinal disturbances, GI tract (HIV-related) infections; (HIV medications)

#### Possibly Evidenced By

Body weight 20% or more below ideal weight range [decreased subcutaneous fat or muscle mass]  
Food intake less than recommended daily allowances (RDA); insufficient interest in food; food aversion; alteration in taste sensation; sore buccal cavity  
Abdominal cramping [nausea, vomiting]  
[Abnormal laboratory results—vitamin, mineral, and protein deficiencies, electrolyte imbalances]

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Nutritional Status NOC

Maintain weight or display weight gain toward desired goal.  
Report improved energy level.

##### Nutritional Status: Biochemical Measures NOC

Be free of signs of malnutrition, with lab values (e.g., albumin/prealbumin, hemoglobin) stable or improving.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutritional Monitoring NIC</b>	
<b>Independent</b>	
Assess ability to chew, taste, and swallow.	Lesions of the mouth, throat, and esophagus are often caused by candidiasis, herpes simplex, hairy leukoplakia, or KS and other cancers, and metallic or other taste changes caused by medications may cause dysphagia, limiting client's ability to ingest food and reducing desire to eat.
Auscultate bowel sounds.	Hypermotility of intestinal tract is common and is associated with vomiting and diarrhea, which may affect choice of diet or route. Note: Lactose intolerance and malabsorption, such as associated with CMV, MAC, or cryptosporidiosis, contribute to diarrhea and may necessitate change in diet or supplemental formula, such as Advera or Resource.
Weigh, as indicated. Evaluate weight in terms of weight before onset of illness. Compare serial weights and anthropometric measurements.	Indicator of nutritional needs and adequacy of intake.
Note drug side effects. Schedule medications between meals if possible.	Prophylactic and therapeutic medications can have side effects affecting nutrition, for example, altered taste, anorexia, nausea, and vomiting.

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**ACTIONS/INTERVENTIONS (continued)****RATIONALE (continued)****Nutritional Therapy NIC**

Plan diet with client and SO, incorporating foods client likes or food from home. Encourage small, frequent meals and snacks of nutritionally dense foods and nonacidic foods and beverages, with choice of foods palatable to client. Encourage high-calorie, nutritious foods, some of which may be considered appetite stimulants. Note time of day when appetite is best, and try to serve a larger meal at that time.

Limit food(s) that induce nausea or vomiting or are poorly tolerated by client with mouth sores or dysphagia. Avoid serving very hot liquids and foods.

Serve foods that are easy to swallow, such as eggs, ice cream, or cooked vegetables.

Limit fluid intake with meals unless fluid has nutritional value.

Encourage as much physical activity as possible.

Provide frequent mouth care, observing secretion precautions. Avoid alcohol-containing mouthwashes.

Provide rest period before meals. Avoid stressful procedures close to mealtime.

Remove existing noxious environmental stimuli or conditions that aggravate gag reflex.

Encourage client to sit up for meals.

Record ongoing caloric intake.

**Collaborative**

Review laboratory studies, such as BUN, glucose, liver function studies, electrolytes, protein, and albumin or prealbumin.

Maintain nothing by mouth (NPO) status when appropriate.

Insert and maintain nasogastric (NG) tube, as indicated.

Consult with dietitian or nutritional support team.

Administer enteral or parenteral feedings, as indicated.

Administer medications, as indicated, for example:

Antiemetics, such as prochlorperazine (Compazine), ondansetron (Zophran); cannabidiol (CBD) vapors; dronabinol (Marinol)

Including client in planning gives a sense of control of environment and may enhance intake. Fulfilling cravings for desired food may also improve intake. Note: In this population, foods with a higher fat content may be recommended (if tolerated) to enhance taste and oral intake.

Pain in the mouth or fear of irritating oral lesions may cause client to be reluctant to eat.

These measures may be helpful in increasing food intake.

Gastric fullness diminishes appetite and food intake.

May improve appetite and general feelings of well-being.

Reduces discomfort associated with nausea or vomiting, oral lesions, mucosal dryness, and halitosis. A clean mouth may enhance appetite.

Minimizes fatigue; increases energy available for work of eating.

Reduces stimulus of the vomiting center in the medulla.

Facilitates swallowing and reduces risk of aspiration.

Identifies need for supplements or alternative feeding methods.

Indicates nutritional status and organ function and identifies replacement needs. Note: Nutritional tests can be altered because of disease processes and response to some medications or therapies.

May be needed to reduce nausea or vomiting.

May be required to reduce vomiting or to administer tube feedings. Note: Esophageal irritation from existing infection, such as *Candida*, herpes, or KS, may provide site for secondary infections or trauma; therefore, NG tube should be used with caution.

Provides for diet based on nutritional needs and appropriate route.

Enteral feedings are preferred because they cost less and carry less risk of exacerbating endocrine dysfunction than total parenteral nutrition (TPN). However, TPN may be required when oral or enteral feedings are not tolerated. TPN is reserved for those whose gut cannot absorb even an elemental formula, such as Vivonex, or those with severe refractory diarrhea.

Reduces incidence of nausea and vomiting, possibly enhancing oral intake. Note: Medical marijuana is widely recognized as an effective treatment for symptoms of HIV/AIDS as well as the side effects related to the antiretroviral therapies that constitute the first line of treatment for HIV/AIDS. According to the Institute of Medicine (IOM, 1999), "For patients such as those with

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Gastric protective agents such as sucralfate (Carafate) suspension; oral suspension sometimes known as Magic Mouthwash, which is a mixture of Maalox, diphenhydramine (Benadryl), and lidocaine (Xylocaine)	AIDS or who are undergoing chemotherapy and who suffer simultaneously from severe pain, nausea, and appetite loss, cannabinoid drugs might offer broad-spectrum relief not found in any other single medication.” The IOM report did find more potential promise in synthetic cannabinoid drugs than in smoked marijuana (IOM, 1999). The ACP encourages the use of nonsmoked forms of THC that have proven therapeutic value (American College of Physicians [ACP], 2008). The IOM follow-up reported on the benefits of utilizing vaporizers as a safer delivery system, eliminating harmful effects of smoking (IOM, 2009).
Vitamin supplements, as prescribed by physician and/or nutritionist	Given with meals—swish and hold in mouth—to relieve mouth pain and enhance intake. Mixture may be swallowed in presence of pharyngeal or esophageal lesions.
Appetite stimulants, such as dronabinol (Marinol), megestrol (Megace), or oxandrolone (Oxandrin)	Corrects vitamin deficiencies resulting from decreased food intake and/or disorders of digestion and absorption in the GI system. Note: Many supplements (vitamins, minerals, protein powder, meal replacement drinks, amino acids, herbs) are not regulated by the FDA and could contain ingredients that interfere with ART medications.
Antidiarrheals, such as diphenoxylate (Lomotil), loperamide (Imodium), or octreotide (Sandostatin)	Marinol, an antiemetic, and Megace, an antineoplastic, act as appetite stimulants in the presence of AIDS.
Antifungals, such as ketoconazole (Nizoral) or fluconazole (Diflucan)	These drugs inhibit GI motility, subsequently decreasing diarrhea. Imodium or Sandostatin is an effective treatment for secretory diarrhea with secretion of water and electrolytes by intestinal epithelium.
	These may be given to treat or prevent infections involving the GI tract.

### NURSING DIAGNOSIS: acute/chronic Pain

#### May Be Related To

Biological injury agent (e.g., HIV and HIV-related infections; neoplasms; malignancies)

Physical injury agent (e.g., tissue inflammation or destruction—internal/external cutaneous lesions, rectal excoriation; HIV-related peripheral neuropathies; necrosis)

Fatigue; malnutrition; emotional distress

#### Possibly Evidenced By

Self-reports of pain intensity/characteristics using standardized pain scale/instrument

Self-focusing, narrowed focus; reduced interaction with people

Guarding and protective behaviors; emotional distress

Alteration in appetite, sleep pattern, in ability to continue previous activities

Changes in vital signs (acute)

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Pain Level NOC

Verbalize and demonstrate relief or control of pain/discomfort.

Demonstrate relaxed posture and facial expression.

Be able to sleep or rest appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management NIC</b>	
<i>Independent</i>	
Assess pain reports, noting location, intensity (0-10 or similar coded scale), frequency, and time of onset. Note nonverbal cues, such as restlessness, tachycardia, or grimacing.	Indicates need for, and effectiveness of, interventions and may signal development or resolution of complications. Note: Chronic pain does not produce autonomic changes; however, acute and chronic pain can coexist.
Encourage client to report pain as it develops rather than waiting until level is severe.	Efficacy of comfort measures and medications is improved with timely intervention.
Encourage verbalization of feelings.	Can reduce anxiety and fear and thereby reduce perception of intensity of pain.
Provide diversional activities, such as reading, visiting, music, television, video games.	Refocuses attention; may enhance coping abilities.
Perform palliative measures—repositioning, massage, or ROM exercises of affected joints.	Promotes relaxation and decreases muscle tension.
Instruct client in, and encourage use of, visualization, guided imagery, progressive relaxation, deep-breathing techniques, meditation, and mindfulness.	Promotes relaxation and feeling of well-being. May decrease the need for opioid analgesics (CNS depressants) when a neurological or motor degenerative process is already involved. May not be successful in presence of dementia, even when dementia is minor. Note: Mindfulness is the skill of staying in the here and now.
Provide oral care. (Refer to ND: impaired oral Mucous Membrane Integrity.)	Oral ulcerations or lesions may cause severe discomfort.
<i>Collaborative</i>	
Administer analgesics, antipyretics, or opioid analgesics. Use patient-controlled analgesia (PCA) or provide around-the-clock analgesia with rescue doses, as needed.	Provides relief of pain and discomfort; reduces fever. PCA or around-the-clock medication keeps the blood level of analgesia stable, preventing cyclic undermedication or overmedication.

### NURSING DIAGNOSIS: risk for impaired Skin Integrity

#### Possibly Evidenced By

Immunodeficiency  
Inadequate nutrition  
Alteration in fluid volume, skin turgor; humidity; moisture; excretions; secretions  
Pressure over bony prominence(s); impaired circulation; alteration in sensation

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Risk Control NOC

Demonstrate behaviors or techniques to prevent skin breakdown and promote healing.

#### Wound Healing: Secondary Intention NOC

Be free of or display improvement in wound or lesion healing.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Skin Surveillance NIC</b>	
<i>Independent</i>	
Assess skin daily. Note color, turgor, circulation, and sensation. Describe and measure lesions and observe changes.	Establishes comparative baseline providing opportunity for timely intervention.
Provide and instruct in good skin hygiene—wash thoroughly, pat dry carefully, and apply moisturizing lotion or appropriate cream.	Maintaining clean, dry skin provides a barrier to infection. Patting skin dry instead of rubbing reduces risk of dermal trauma to dry, fragile skin. Note: Isolation precautions are required when extensive or open cutaneous lesions are present.
Reposition frequently. Use turn sheet as needed. Encourage periodic weight shifts. Protect bony prominences with pillows, heel and elbow pads, or sheepskin.	Reduces stress on pressure points, improves blood flow to tissues, and promotes healing.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Maintain clean, dry, wrinkle-free linen, preferably soft cotton fabric.	Skin friction caused by movement over wet, wrinkled, or rough sheets leads to irritation of fragile skin and increases risk of infection.
Encourage ambulation as tolerated.	Decreases pressure on skin from prolonged bedrest.
Cleanse perianal area by removing stool with water and mineral oil or commercial product. Avoid use of toilet paper if vesicles are present. Apply protective creams (e.g., zinc oxide, A & D ointment).	Prevents maceration caused by diarrhea and keeps perianal lesions dry. Note: Use of toilet paper may abrade lesions.
File nails regularly.	Long or rough nails increase risk of dermal damage.

**Wound Care NIC**

Cover open pressure ulcers with sterile dressings or protective barrier, such as Tegaderm or DuoDerm, as indicated.

**Collaborative**

Provide foam, flotation, or alternate pressure mattress or bed.

If open skin lesions develop, obtain cultures and notify physician for treatment interventions.

May reduce bacterial contamination and promote healing.

Reduces pressure on skin and tissues, decreasing tissue ischemia.

Certain OIs can impact the skin (e.g., bacterial infections causing painful skin bumps or abscesses, or viral infections resulting in warts, sores, shingles). Cultures may be necessary to reveal pathogens and suggest appropriate treatment choices.

Refer to physical therapy for regular exercise program.

Promotes improved muscle tone and skin health.

**NURSING DIAGNOSIS: impaired oral Mucous Membrane Integrity****May Be Related To**

Immunodeficiency; stressors

Dehydration; malnutrition

Inadequate oral hygiene

Treatment regimen (e.g., side effects pharmaceutical agents); chemotherapy

**Possibly Evidenced By**

Open lesions/ulcers; oral vesicles

Oral pain/discomfort

Stomatitis; white patches in mouth; gingivitis

Difficulty eating; impaired ability to swallow

**Desired Outcomes/Evaluation Criteria—Client Will****Oral Hygiene NOC**

Display intact mucous membranes, which are pink, moist, and free of inflammation or ulcerations.

**Risk Control NOC**

Demonstrate techniques to restore or maintain integrity of oral mucosa.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Oral Health Restoration NIC</b>	

**Independent**

Assess mucous membranes and document all oral lesions. Note reports of pain, swelling, and difficulty with chewing or swallowing.

Edema, open lesions, and crusting on oral mucous membranes and throat may cause pain and difficulty with chewing or swallowing. Note: More than 90% of persons infected with HIV who are not receiving highly active antiretroviral therapy (HAART) eventually develop oropharyngeal candidiasis (OPC), and 10% eventually develop at least one episode of esophageal candidiasis (Hidalgo & Vasquez, 2017).

(continues on page 816)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide oral care daily and after food intake, using soft toothbrush, nonabrasive toothpaste, nonalcoholic mouthwash, floss, and lip moisturizer.	Alleviates discomfort, prevents acid formation associated with retained food particles, and promotes feeling of well-being.
Rinse oral mucosal lesions with saline or dilute hydrogen peroxide or baking soda solutions.	Reduces spread of lesions and encrustations from candidiasis and promotes comfort.
Suggest use of sugarless gum or candy or commercial salivary substitute.	Stimulates flow of saliva to neutralize acids and protect mucous membranes. Note: Sorbitol in some artificially sweetened products can increase risk for loose stools.
Plan diet to avoid salty, spicy, abrasive, and acidic foods or beverages. Check for temperature tolerance of foods. Offer cool or cold smooth foods.	Abrasive foods may open healing lesions. Open lesions are painful and aggravated by salt, spices, and acidic foods and beverages. Extreme cold or heat can cause pain to sensitive mucous membranes.
Encourage oral intake of at least 2500 mL/d.	Maintains hydration; prevents drying of oral mucous membranes.
Encourage client to refrain from smoking.	Smoke is drying and irritating to mucous membranes.
<b>Collaborative</b>	
Obtain culture specimens of lesions.	Reveals causative agents and identifies appropriate therapies.
Administer medications, as indicated, such as topical antifungal agents (e.g., nystatin (Mycostatin), clotrimazole (Mycelex), amphotericin B oral suspension), or systemic azoles—fluconazole (Diflucan), itraconazole (Onmel, Sporanix) (Hidalgo & Vasquez, 2017).	Specific drug choice depends on particular type and location of <i>Candida</i> infection.
Apply Magic Mouthwash (mixture of Maalox, diphenhydramine [Benadryl], and lidocaine [Xylocaine]), or similar product to oral lesions, as prescribed.	Reduces local pain of <i>Candida</i> and other oral lesions.
Refer for dental consultation, if appropriate.	May require additional therapy to prevent dental losses.

## NURSING DIAGNOSIS: Fatigue

### May Be Related To

Illness; physical deconditioning  
Stressors; anxiety; depression  
Malnutrition

### Possibly Evidenced By

Insufficient energy; tiredness; lethargy; increase in rest requirements; nonrestorative sleep pattern; increase in physical symptoms  
Disinterest in surroundings; introspection; alteration in concentration  
Impaired ability to maintain usual routines/physical activity; guilt about difficulty maintaining responsibilities

### Desired Outcomes/Evaluation Criteria—Client Will

#### Fatigue Level NOC

Report improved sense of energy.  
Participate in desired activities at level of ability.  
Participate in recommended treatment program.

#### Energy Conservation NOC

Identify individual areas of control and engage in energy conservation techniques.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Energy Management NIC</b> <i>Independent</i>	
Obtain client/SO descriptions and rating (using numerical scale) of fatigue. Note presence of additional concerns (e.g., irritability, lack of concentration, relationship difficulties).	Helps to evaluate impact of fatigue on client's quality of life and identify areas that are exacerbating low energy. Note: A recent study reported that fatigue affects nearly 90% of people living with HIV and has been reported as one of the most persistent and troubling symptoms they experience. An elevated risk of fatigue may be related to hematologic and metabolic changes (direct results of HIV infection and treatment), as well as psychological and psychosocial stressors (Barroso et al, 2015).
Assess sleep patterns and other factors that may be aggravating fatigue.	Multiple factors can cause and aggravate fatigue, including sleep deprivation, emotional distress associated with diagnosis, side effects of drugs, or developing HIV-related complications.
Encourage evaluation of fatigue when antiretroviral treatment is initiated or medications have been added to regimen.	Fatigue is present in variable degrees as part of HIV infection process but is often aggravated by nutritional deficiencies and side effects of certain medications. Even though anti-HIV drugs may improve energy levels, some may also cause fatigue. Tiredness, fatigue, insomnia, and sleep disturbances are possible side effects of several anti-HIV drugs. Side effects are most common in the first few weeks after starting HIV treatment, or when PIs are added or changed, fatigue may worsen.
Discuss reality of client's feelings of exhaustion and identify limitations imposed by fatigue state. Advise client to maintain a fatigue diary, and note daily energy patterns—peaks and valleys.	Helpful in planning activities within tolerance levels. Clients often expect too much of themselves, believing that they should be able to do more.
Assist client to set realistic activity goals, determining individual priorities and responsibilities.	Client may need to alter priorities and delegate some responsibilities to manage fatigue and optimize performance.
Discuss energy conservation techniques, such as sitting instead of standing for activities, as appropriate.	Enables client to become aware of ways in which energy expenditure can be maximized to complete necessary tasks.
Review importance of meeting individual nutritional needs.	Adequate nutrition is needed for optimizing energy production. (Refer to ND: imbalanced Nutrition: less than body requirements, following.)
Encourage adequate rest periods during the day, routine schedule for bedtime and arising, and scheduling activities during time of best energy.	Helps client recoup energy to manage desired activities.
Instruct in stress management techniques, such as breathing exercises, visualization, and music and light therapy.	Reduction of stress factors in client's life can minimize energy output.
Identify available resources and support systems.	May require outside assistance with many things, including homemaking and maintenance activities and child care.

### NURSING DIAGNOSIS: risk for acute/chronic Confusion

#### Possibly Evidenced By

Infection [HIV-associated dementia]  
Dehydration; malnutrition; impaired metabolic functioning [electrolyte imbalance, increased blood urea nitrogen (BUN)/creatinine]  
Pharmaceutical agents—multiple medications

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Cognition NOC

Maintain usual reality orientation and optimal cognitive functioning.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Cognitive Stimulation NIC</b>	
<b>Independent</b>	
Assess mental and neurological status using appropriate tools.	Establishes functional level at time of admission and provides baseline for future comparison.
Consider effects of emotional distress, such as anxiety, grief, and anger.	May contribute to reduced alertness, confusion, withdrawal, and hypoactivity, requiring further evaluation and intervention.
Monitor medication regimen and usage.	Actions and interactions of various medications, prolonged drug half-life, and altered excretion rates result in cumulative effects, potentiating risk of toxic reactions. Some drugs may have adverse side effects, such as haloperidol (Haldol), which can seriously impair motor function in clients with AIDS dementia complex.
Investigate changes in behavior, response to stimuli, orientation, and level of consciousness or development of headache, nuchal rigidity, vomiting, fever, loss of balance, or seizure activity.	Changes may occur for numerous reasons, including development or exacerbation of opportunistic diseases or CNS infection. Note: Early detection and treatment of CNS infection may limit permanent impairment of cognition.
Maintain a pleasant environment with appropriate auditory, visual, and cognitive stimuli.	Providing normal environmental stimuli can help in maintaining some sense of reality orientation.
Provide cues for reorientation such as radio, television, calendars, clocks, or a room with an outside view. Use client's name; identify yourself. Maintain consistent personnel and structured schedules, as appropriate.	Frequent reorientation to place and time may be necessary, especially during fever or acute CNS involvement. Sense of continuity may reduce associated anxiety.
Discuss use of datebooks, lists, and other devices to keep track of activities.	These techniques help client manage problems of forgetfulness.
Encourage family/SO to socialize and provide reorientation with current news and family events.	Familiar contacts are often helpful in maintaining reality orientation, especially if client is hallucinating.
Encourage client to do as much as possible, such as dressing and grooming and visiting with friends.	Can help maintain mental abilities for longer period.
Provide support for SO. Encourage discussion of concerns and fears.	Bizarre behavior or deterioration of abilities may be very frightening for SO and makes management of care and dealing with situation difficult. SO may feel a loss of control as stress, anxiety, burnout, and anticipatory grieving impair coping abilities.
Provide information about care on an ongoing basis. Answer questions simply and honestly. Repeat explanations as needed.	Can reduce anxiety and fear of unknown; can enhance client's understanding, involvement, and cooperation in treatment when possible.
<b>Cognitive Restructuring NIC</b>	
Reduce provocative or noxious stimuli. Maintain bedrest in quiet, darkened room, if indicated.	If client is prone to agitation, violent behavior, or seizures, reducing external stimuli may be helpful.
Decrease noise, especially at night.	Promotes sleep, reducing cognitive symptoms and effects of sleep deprivation.
Set limits on maladaptive or abusive behavior; avoid open-ended choices.	Provides sense of security and stability in an otherwise confusing situation.
Maintain safe environment, such as excess furniture out of the way, call bell within client's reach, bed in low position, rails up; restriction of smoking unless monitored by caregiver and SO; seizure precautions; and soft restraints, if indicated.	Decreases the possibility of client injury.
Discuss future expectations and treatment if dementia is diagnosed. Use concrete terms.	Obtaining information that some medications have been shown to improve cognition can provide hope.
<b>Collaborative</b>	
Assist with diagnostic studies, such as mental status exams, MRI, CT scan, and spinal tap, and monitor laboratory studies (BUN/Cr, electrolytes, ABGs), as indicated.	Choice of tests or studies depends on clinical manifestations and index of suspicion, because changes in mental status may reflect a wide variety of causative factors, such as CMV meningitis or encephalitis, drug toxicity, electrolyte imbalances, and altered organ function.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Administer medications, as indicated, for example: Retrovir (AZT), nevirapine (Viramune), amprenavir (Agenerase), amphotericin B (Fungizone), and other medications alone or in combination	HIV medications that are known to cross the blood-brain barrier and may help slow or stop HIV damage to the brain. Note: Antifungals have been useful in treatment of cryptococcosis meningitis (POZ,n.d.)
Antipsychotics, such as haloperidol (Haldol), antidepressants such as fluoxetine (Prozac) and bupropion (Wellbutrin), and/or antianxiety agents, such as lorazepam (Ativan)	Shown to improve neurological and mental functioning for undetermined period of time. Cautious use may help with problems of sleeplessness, emotional lability, hallucinations, suspiciousness, and agitation (POZ, n.d.).
Provide controlled environment and behavioral management, as indicated.	Team approach may be required to protect client when mental impairment, especially delusions, threatens client safety.
Refer to counseling, as indicated.	May help client gain control in presence of thought disturbances or psychotic symptoms.

### NURSING DIAGNOSIS: Death Anxiety

#### May Be Related To

Uncertainty of prognosis; perceived imminence of death  
Anticipation of pain, suffering  
Uncertainty about life after death, encountering a higher power  
Anticipation of impact of death on others

#### Possibly Evidenced By

Negative thoughts related to death and dying; deep sadness; powerlessness  
Fear of pain or suffering related to dying, or prolonged dying process

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Dignified Life Closure NOC

Verbalize acceptance of reality of situation.  
Express hopefulness and sense of control.  
Appear calm and peaceful.  
Participate in decisions about care and death.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Dying Care NIC</b>	
<i>Independent</i>	
Assure client of confidentiality within limits of situation.	Provides reassurance and opportunity for client to problem-solve solutions to anticipated situations.
Maintain frequent contact with client. Talk with and touch client. Limit use of isolation clothing and masks.	Provides assurance that client is not alone or rejected; conveys respect for and acceptance of the person, fostering trust.
Provide accurate, consistent information regarding prognosis. Avoid arguing about client's perceptions of the situation.	Can reduce anxiety and enable client to make decisions or choices based on realities.
Be alert to signs of denial or depression, including withdrawal or angry, inappropriate remarks. Determine presence of suicidal ideation and assess potential on a scale of 1 to 10.	Client may use defense mechanism of denial and continue to hope that diagnosis is inaccurate. Feelings of guilt and spiritual distress may cause client to become withdrawn and believe that suicide is a viable alternative. Although client may be too "sick" to have enough energy to implement thoughts, ideation must be taken seriously and appropriate intervention initiated.
Provide open environment in which client feels safe to discuss feelings or to refrain from talking.	Helps client feel accepted in present condition without feeling judged and promotes sense of dignity and control.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Permit expressions of anger, fear, and despair without confrontation. Give information that feelings are normal and are to be appropriately expressed.	Acceptance of feelings allows client to begin to deal with situation.
Recognize and support the stage client and family are at in the grieving process. (Refer to CP: Cancer, ND: Grieving.)	Choice of interventions is dictated by stage of grief and coping behaviors, such as anger, withdrawal, and denial.
Explain procedures, providing opportunity for questions and honest answers. Arrange for someone to stay with client during anxiety-producing procedures and consultations.	Accurate information allows client to deal more effectively with the reality of the situation, thereby reducing anxiety and fear of the unknown.
Identify and encourage client interaction with support systems. Encourage verbalization and interaction with family and SO.	Reduces feelings of isolation. If family support systems are not available, outside sources such as local AIDS task force may be needed.
Provide reliable and consistent information and support for SO.	Allows for better interpersonal interaction and reduction of anxiety and fear.
Include SO as indicated when major decisions are to be made.	Ensures a support system for client and allows SO the chance to participate in client's life. Note: If client, family, and SO are in conflict, separate care consultations and visiting times may be needed.
Encourage advance directives or living will and durable medical power of attorney documents, with specific and precise instructions regarding acceptable and unacceptable procedures to prolong life and explaining the various options clearly.	Many factors associated with the treatments used in this debilitating and often fatal disease process place client at the mercy of medical personnel and other unknown people who may be making decisions for and about client without regard for client's wishes, increasing loss of independence. Note: Many individuals do not understand medical terminology or options such as percutaneous endoscopic gastrostomy (PEG) tube for short- or long-term feeding and pain management techniques.
Discuss desires and assist with planning for funeral, as appropriate.	The individual can gain a sense of completion and value to his or her life when he or she decides to be involved in planning this final ceremony. This provides an opportunity to include things that are of importance to the client.
Refer to CP Palliative and Hospice/End-of-Life Care, ND Grieving/Death Anxiety.	Provides additional interventions to support client/SO needs.
<b>Collaborative</b> Refer to counseling—psychiatric clinical nurse specialist, psychiatrist, or social worker.	May require further assistance in dealing with diagnosis/prognosis, especially when suicidal thoughts are present.
Provide contact with other resources, as indicated:	
Spiritual advisor	Provides opportunity for addressing spiritual concerns.
Hospice staff	May help relieve anxiety regarding end-of-life care and provide physical and emotional support for client and SO.

## NURSING DIAGNOSIS: Social Isolation

### May Be Related To

Social behavior incongruent with norms  
Alteration in wellness, physical appearance, mental status  
Insufficient personal resources

### Possibly Evidenced By

Illness; disabling condition  
Aloneness imposed by others; history of rejection  
Absence of support system; values incongruent with cultural norms

### Desired Outcomes/Evaluation Criteria—Client Will

#### Loneliness Severity NOC

Express sense of satisfaction with relationship(s).  
Reports sense of acceptance or belonging.

**NURSING DIAGNOSIS:** **Social Isolation** (continued)**Social Support NOC**

Identify supportive individual(s).  
Develop stable support system.  
Use resources for assistance, as appropriate.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Support System Enhancement NIC</b>	
<i>Independent</i>	
Ascertain client's perception of situation.	Isolation may be partly self-imposed because client fears rejection or reaction of others.
Spend time talking with client during and between care activities. Be supportive, allowing for verbalization. Treat with dignity and regard for client's feelings.	Client may experience physical isolation as a result of current medical status and some degree of social isolation secondary to diagnosis of AIDS.
Identify factors that can lead to feelings of powerlessness (e.g., diagnosis of a terminal illness, lack of support systems, rejection by others, and lack of knowledge about present situation).	Powerlessness is most prevalent in a client newly diagnosed with HIV and when dying of AIDS. Fear of AIDS (by the general population and the client's family/SO) is the most profound cause of client's isolation. Multiple medications and inconvenient dosing regimens can also reduce a person's sense of control, independence, and general quality of life.
Limit or avoid use of mask, gown, and gloves when possible, such as when talking to client.	Reduces client's sense of physical isolation and provides positive social contact, which may enhance self-esteem and decrease negative behaviors.
Identify support systems available to client, including presence of, relationship with, immediate and extended family.	When client has assistance from SO, feelings of loneliness and rejection are diminished. However, for some homosexual clients, this may be the first time that the family has been made aware that client lives an alternative lifestyle. Note: Client may not receive needed support for coping with life-threatening illness and associated grief because of discrimination, fear, and lack of understanding—AIDS hysteria.
Explain isolation precautions and procedures to client and SOs.	Gloves, gowns, and mask are not routinely required with a diagnosis of AIDS, except when contact with secretions or excretions is expected. Misuse of these barriers enhances feelings of emotional and physical isolation. When precautions are necessary, explanations help client understand reasons for procedure and provide feeling of inclusion in what is happening.
Encourage open visitation, as appropriate, telephone contacts, and social activities within level of tolerance.	Participation with others can foster a feeling of belonging.
Encourage active role of contact with SO.	Helps reestablish a feeling of participation in a social relationship. May lessen likelihood of suicide attempts.
Be aware of client's/SO's view of self-regarding HIV diagnosis and concerns or reports of problems associated with diagnosis (e.g., negative attitudes expressed in various ways; lack of access to healthcare or services; loss of relationships, homelessness, etc.).	Research reveals that stigma continues to be experienced by persons living with HIV/AIDS (Johnson, 2015). Literature indicates that higher levels of stigma correlate with inability or reluctance to seek medical attention, a decrease in compliance with antiretroviral therapy, and an increase in psychological distress such as anxiety, depression, hopelessness, and risk for AIDS-related conditions. These issues are especially prevalent in certain populations (e.g., homeless, the LGBTQ community, persistent poverty) (Gerber, 2013; Varni et al, 2012).
Develop a plan of action with client that looks at available resources and supports healthy behaviors. Help client problem-solve solution to short-term or imposed isolation.	Having a plan promotes a sense of control over own life and gives client something to look forward to and actions to accomplish.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Be alert to verbal and nonverbal cues, including withdrawal, statements of despair, helplessness, and sense of aloneness. Ask client if thoughts of suicide are being entertained.	Indicators of despair and suicidal ideation are often present. When these cues are acknowledged by the caregiver, client is usually willing to talk about thoughts of suicide and sense of isolation and hopelessness.
<b>Collaborative</b> Refer to resources, such as social services counselors and local and national AIDS organizations.	Establishes support systems; may reduce feelings of isolation.
Provide for placement in sheltered community when necessary.	May need more specific care when unable to be maintained at home or when SO cannot manage care.

## NURSING DIAGNOSIS: **ineffective Health Management**

### May Be Related To

Difficulty navigating complex healthcare system, managing complex treatment regimen; insufficient knowledge of therapeutic regimen  
 Decisional conflict; family conflict; family pattern of healthcare  
 Economically disadvantaged; powerlessness; perceived seriousness of condition, susceptibility, benefit or barrier  
 Insufficient social support

### Possibly Evidenced By

Difficulty with prescribed regimen  
 Failure to include treatment regimen in daily living  
 [Unexpected acceleration of illness symptoms]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Self-Management: Chronic Disease **NOC**

Verbalize understanding of condition, disease process, and potential complications.  
 Identify relationship of current signs and symptoms to the disease process and correlate symptoms with causative factors.  
 Demonstrate behaviors necessary therapeutic regimen.  
 Identify and use available resources.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process <b>NIC</b></b>	
<b>Independent</b>	
Review disease process and future expectations.	Provides knowledge base from which client can make informed choices. Note: Clients with AIDS are usually aware of current prognosis unless newly diagnosed.
Determine level of dependence and physical condition. Note extent of care and support available from family and SO and need for supplemental caregivers.	Helps plan amount of care and symptom management required and need for additional resources.
Instruct client and caregivers concerning infection control:	Reduces risk of transmission of HIV and opportunistic infections.
Using good handwashing techniques for everyone, including client, family, and caregivers	
Using gloves when handling bedpans, dressings, and soiled linens	
Wearing mask if client has productive cough	
Placing soiled or wet linens in plastic bag and separating them from family laundry; washing with detergent and hot water	
Cleaning surfaces with bleach and water solution of 1:10 ratio, disinfecting toilet bowl or bedpan with full-strength bleach	
Preparing client's food in clean area; washing dishes and utensils in hot, soapy water—can be washed with the family dishes	

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Emphasize necessity of daily skin care, including inspecting skinfolds, pressure points, and perineum, and of providing adequate cleansing and protective measures such as ointments and padding.	Healthy skin provides barrier to infection. Measures to prevent skin disruption and associated complications are critical.
Ascertain that client/SO can perform necessary oral and dental hygiene. Review procedures, as indicated. Encourage regular dental care.	The oral mucosa can quickly exhibit severe, progressive complications; therefore, preventative and early intervention measures are essential.
Review dietary needs and ways to improve intake when anorexia, diarrhea, weakness, or depression interfere with intake.	Promotes nutrition necessary for overcoming effects of OIs and enhances feeling of well-being. Note: A good diet for a person with advanced HIV may not be the low-fat, low-calorie diet recommended for healthy people. When client is able to eat, he or she may need to take in more calories and protein to keep from losing muscle mass (a component of wasting syndrome). If client can eat, some of these foods may be helpful: instant breakfast drinks, eggs, peanut butter, cheeses, and anything client enjoys.
Review medication regimen, interactions, and side effects.	May increase probability of success with therapeutic regimen.
Provide information about and assist in developing a plan for symptom management that complements medical regimen; for example, client experiencing intermittent diarrhea should take diphenoxylate (Lomotil) before going to a social event.	Quality of life is an important issue in the management of symptoms of severe HIV infection, such as anemia, pain, fatigue, weakness, sleep disorders, GI symptoms, and/or the side effects of medications. Having a plan provides client with increased sense of control, reduces risk of embarrassment, and promotes comfort.
Emphasize importance of adequate rest.	Helps manage fatigue; enhances coping abilities and energy level.
Encourage activity and exercise at level that client can tolerate.	Stimulates release of endorphins in the brain, enhancing sense of well-being.
Emphasize necessity of continued healthcare and follow-up.	Provides opportunity for altering regimen to meet individual changing needs.
Recommend cessation of smoking.	Smoking increases risk of respiratory infections and can further impair immune system.
Identify signs and symptoms requiring medical evaluation: persistent fever or night sweats, swollen glands, continued weight loss, diarrhea, skin blotches or lesions, headache, and chest pain or dyspnea.	Early recognition of developing complications and timely interventions, within client's advance directives, may prevent untimely decline.
Identify community resources such as hospice or residential care centers, visiting nurse, home-care services, Meals on Wheels, and peer group support.	Facilitates transfer from acute care setting for recovery and independence of end-of-life care.

**POTENTIAL CONSIDERATIONS** in addition to the nursing diagnoses listed in the plan of care.

- **Grieving**—loss of significant object (e.g., job, status, significant others/family, processes of body)
- **ineffective Protection**—abnormal blood profile (e.g., anemia, thrombocytopenia, coagulation), inadequate nutrition, pharmaceutical agents (e.g., antineoplastic, immune), cancer
- **caregiver Role Strain**—illness severity of care receiver, increasing care needs, amount/complexity of activities, history of family dysfunction, lack of respite for caregiver, caregiver's competing role commitments

# RHEUMATOID ARTHRITIS (RA)

## I. Pathophysiology (Ruffing & Bingham, 2017; Smith & Brown, 2017; Zack, 2014)

- a. Rheumatoid arthritis is best characterized as an **immune-mediated inflammatory disease (IMID)**. Swelling of the small joints, especially in the hands and feet, is the hallmark of the disease, but most joints in the body can become affected. In addition to the joints, other manifestations of the disease can be seen, including subcutaneous nodules, eye inflammation, lowering of the white blood count, and lung disease.
- b. Disease patterns include spontaneous remission (in less than 10% of clients in first 6 months), intermittent painful exacerbation of symptoms, or persistent and progressive disease activity.
- c. RA causes joint damage in 80% to 85% of individuals, with the brunt of the damage occurring during the first 2 years of the disease.
- d. The joints involved most frequently are the proximal interphalangeal (PIP) and metacarpophalangeal (MCP) joints of the hands, the wrists, and small joints of the feet, including the metatarsophalangeal (MTP) joints. Shoulders, elbows, knees, and ankles are also affected in many people. With the exception of the cervical spine, the spine is unaffected.
- e. Neurological manifestations include peripheral neuropathies (e.g., usually in lower extremities; wrist [carpal tunnel] and feet [tarsal tunnel]).
- f. Inflammatory process can also affect the eyes, blood vessels, the pleural membrane of the lungs, or the pericardial sac.

## II. Stages (Rheumatoid Arthritis Network, 2017)

- a. Monocyclic progressive (also called remissive): one episode that ends within 2 to 5 years of initial diagnosis and does not recur. This may result from early diagnosis and/or aggressive treatment.

- b. Polycyclic progressive (also called intermittent): constant recurrence of RA symptoms and flares but in fluctuating stages

## III. Etiology (Ruffing & Bingham, 2017; Smith & Brown, 2017)

- a. Specific cause unknown
- b. Associated factors: genetic predisposition; possible infectious triggers, bacterial periodontal disease, autoimmune responses against citrullinated peptides detected as anticitrullinated peptide antibodies (ACPAs)
- c. Other possible factors: more common in females, with ratio to males approximately 3:1; hormone interaction; psychological stress; heavy, long-term smoking; history of blood transfusions

## IV. Statistics

- a. Morbidity: In 2017, an estimated 1.5 million U.S. adults are living with RA (Rheumatoid Arthritis Network, 2017). It has been estimated that approximately 40% become disabled after 10 years, but outcomes are highly variable. Other sources suggest that more than 50% remain fully employed, even after 10 to 15 years of disease, with one-third having only intermittent low-grade disease and another one-third experiencing spontaneous remission (Smith & Brown, 2017).
- b. Mortality: A recent study reported that rheumatoid arthritis significantly increased participants' overall risk of death (40% higher than in general population), especially due to respiratory or cardiovascular causes (Brigham & Women's Hospital, 2015). RA is also known to be associated with higher risks for lymphoma, anemia, osteoporosis, and depression (Ruffing & Bingham, 2017).
- c. Cost: Numerous sources suggest that per person direct costs are approximately \$30,000 annually for RA treatments, while indirect costs can range from \$1500 to \$22,000 annually (Rheumatoid Arthritis Support Network, 2016).

## G L O S S A R Y

**Arthrodesis (fusion):** Surgical procedure that involves removing the joint and fusing the bones into one immobile unit. Although the procedure limits movement, it can be useful for increasing stability and relieving pain in affected joints. The most commonly fused joints are the ankles and wrists and joints of the fingers and toes.

**Disease-modifying antirheumatic drugs (DMARDs):** A class of medications used in the treatment of RA; they often slow or stop the course of the disease to help prevent joint destruction.

**Pannus:** Inflamed synovial granulation tissue reflecting chronic RA.

**Raynaud's phenomenon:** Condition in which cold temperatures or strong emotions cause blood vessel spasms that block blood flow to the fingers, toes, ears, and nose. This causes intermittent pallor, cyanosis, and then redness before color returns to normal.

**Sjögren's syndrome:** Chronic disorder that causes insufficient moisture production in certain glands of the body. This leads to impaired secretion of saliva and tears and results in the sicca complex: dry mouth (xerostomia) and dry eyes (keratoconjunctivitis sicca). Secondary Sjögren's syndrome is often associated with other autoimmune disorders, including RA.

**Synovial fluid:** A thick, straw-colored substance found in small amounts in joints, bursae, and tendon sheaths.

**Synovial membrane:** Tissue that lines a joint.

**Synovitis:** Inflammation of the lining of a joint.

**Tendon reconstruction:** RA can damage and even rupture tendons, the tissues that attach muscle to bone. This surgery, which is used most frequently on the hands to restore function, reconstructs the damaged tendon by attaching an intact tendon to it.

## CARE SETTINGS

Client is treated at community level unless surgical procedure is required or medical complication occurs.

## RELATED CONCERNs

Psychosocial aspects of care, page 835

Total joint replacement, page 729

## CLIENT ASSESSMENT DATABASE

Data depend on severity and involvement of other organs (e.g., eyes, heart, lungs, kidneys), stage (i.e., acute exacerbation or remission), and coexistence of other forms of arthritis and autoimmune diseases.

DIAGNOSTIC DIVISION MAY REPORT	MAY EXHIBIT
<b>ACTIVITY/REST</b> <ul style="list-style-type: none"> <li>• Joint swelling (hallmark for RA required for diagnosis)</li> <li>• Joint pain and tenderness, usually symmetrical, worsened by movement</li> <li>• Morning stiffness often lasting 1 hour or more and that does not improve with movement</li> <li>• Generalized weakness (possible effect of anemia)</li> <li>• Functional limitations affecting desired lifestyle, leisure time, and occupation</li> <li>• Fatigue; sleep disturbances</li> </ul>	<ul style="list-style-type: none"> <li>• Impaired ROM of joints, particularly hands—fingers and wrist, hips, knees, ankles, elbows, and shoulder</li> <li>• Joint deformities</li> <li>• Altered gait and posture</li> <li>• Muscle weakness, contractures, and atrophy</li> </ul>
<b>EGO INTEGRITY</b> <ul style="list-style-type: none"> <li>• Threat to self-concept, body image, and personal identity</li> <li>• Acute and/or chronic stress factors, including financial, employment, disability, and relationship</li> <li>• Hopelessness and powerlessness over incapacitating situation</li> </ul>	<ul style="list-style-type: none"> <li>• Dependence on others</li> </ul>
<b>FOOD/FLUID</b> <ul style="list-style-type: none"> <li>• Inability to consume adequate food and fluids (temporoman-dibular joint [TMJ] involvement)</li> <li>• Anorexia, nausea</li> </ul>	<ul style="list-style-type: none"> <li>• Weight loss</li> <li>• Dryness of oral mucous membranes, decreased oral secretions, and dental caries</li> </ul>
<b>HYGIENE</b> <ul style="list-style-type: none"> <li>• Varying degrees of difficulty performing self-care activities</li> <li>• Dependence on others</li> </ul>	
<b>NEUROSENSORY</b> <ul style="list-style-type: none"> <li>• Numbness, tingling of hands and feet</li> <li>• Loss of sensation or burning in fingers</li> </ul>	<ul style="list-style-type: none"> <li>• Symmetrical joint swelling</li> </ul>
<b>PAIN/DISCOMFORT</b> <ul style="list-style-type: none"> <li>• Acute episodes of pain that may or may not be accompanied by soft tissue swelling in joints</li> <li>• Symmetrical pattern of pain involving joints on both sides of the body</li> <li>• Chronic aching pain and stiffness with mornings most difficult</li> <li>• Pain limiting ability to perform tasks, such as lifting, using hands, or walking</li> </ul>	<ul style="list-style-type: none"> <li>• Red, swollen, hot joints (during acute exacerbations)</li> </ul>
<b>SAFETY</b> <ul style="list-style-type: none"> <li>• Persistent low-grade fever</li> <li>• Dryness of eyes and mucous membranes</li> <li>• Difficulty managing homemaker or maintenance tasks</li> <li>• History of smoking (<i>Note:</i> A number of studies have demonstrated that cigarette smoking is a significant risk factor for the development of RA and also implicated in disease severity) (Ruffing &amp; Bingham, 2017).</li> </ul>	<ul style="list-style-type: none"> <li>• Pale, shiny, taut skin</li> <li>• Skin problems, especially under nails, or skin rash, ulcers, blisters (reflects a more serious case of RA in general)</li> <li>• Subcutaneous rounded, nontender nodules on pressure points of elbows, feet, knees</li> <li>• Decreased muscle strength, altered gait, reduced ROM</li> </ul>
<b>SEXUALITY</b> <ul style="list-style-type: none"> <li>• Difficulty engaging in sexual activity as desired; abstinence</li> <li>• Risk for pregnancy complications</li> </ul>	

(continues on page 826)

## CLIENT ASSESSMENT DATABASE (contd.)

### MAY REPORT (continued)

### MAY EXHIBIT (continued)

#### SOCIAL INTERACTION

- Impaired interactions with family and others
- Change in roles, responsibilities
- Isolation

#### TEACHING/LEARNING

- Familial history of RA (in juvenile onset) **P**
- Higher risk of heart and lung disorders, including pericarditis, valvular lesions, pulmonary fibrosis, pleuritis
- Use of health foods, vitamins, untested arthritis “cures”

#### DISCHARGE PLAN CONSIDERATIONS

- May require assistance with transportation, self-care activities, homemaker/maintenance tasks, and changes in physical layout of home

► Refer to section at end of plan for postdischarge considerations.

#### DIAGNOSTIC STUDIES

##### TEST

##### WHY IT IS DONE

##### WHAT IT TELLS ME

#### BLOOD TESTS

- **Rheumatoid factor (RF):** Macroglobulin type of antibody found in blood of individuals with RA. RF antibodies are usually immunoglobulin (Ig) M but may also be IgG or IgA (Van Leeuwen & Bladh, 2015).

Rheumatoid factor is not specific for the diagnosis of RA (seen in many other inflammatory and autoimmune conditions), although the test is most useful when there is a moderate level of suspicion for RA. *Note:* <50% are positive within the first 6 months. Only 80% to 85% of clients are ever positive. High titer in early RA is associated with a worse prognosis (Pope, 2016).

- **Inflammatory markers:**

- **Cyclic citrullinated peptide antibody test (also called anti-CCP [ACCP]):** Useful in early detection of RA.
- **Antinuclear antibody (ANA) titer:** Presence of ANA indicates presence of collagen vascular and immune complex disorders such as RA.
- **C-reactive protein (CRP):** Glycoprotein produced by the body in response to inflammation.
- **Complement C<sub>3</sub> and C<sub>4</sub>:** Act as enzymes that aid in the immunologic and inflammatory response and are used to detect autoimmune disease.
- **Complete blood count (CBC):** Battery of screening tests, which typically includes hemoglobin (Hgb); hematocrit (Hct); RBC count and morphology, indices, and distribution width index; platelet count and size; white blood cell (WBC) count and differential.

More specific marker for RA. If both anti-CCP and rheumatoid factor (RF) are positive, it is likely the client has a more severe form of the disease.

If high levels ANA are present, it could indicate a higher risk of developing an autoimmune disorder. Follow-up tests are needed to pinpoint/diagnose the specific rheumatic disorder. May be elevated with RA but is not specific to RA.

C<sub>3</sub> and C<sub>4</sub> are increased in acute-onset RA. Normal C<sub>4</sub> and decreased C<sub>3</sub> may be present in chronic RA (Van Leeuwen et al, 2015). Immune disorder or exhaustion results in depressed total complement levels.

Hgb may be decreased, revealing anemia, which is a common problem in clients with RA (Ruffing & Bailey, 2017). Platelet count may be elevated when inflammation is present or low because of certain medications. WBCs are elevated when infectious processes are present.

**WHY IT IS DONE** (continued)**WHAT IT TELLS ME** (continued)**OTHER DIAGNOSTIC STUDIES**

- **X-rays/radiographs:** Identify early indicators of RA and changes over time.
- **Joint ultrasound, Doppler ultrasonography (PDUS), quantitative ultrasound (QUS):** Uses high-energy sound waves bounced off internal tissues to detect arthritis by identifying the presence of fluid in the joints.
- **Computed tomography (CT) scan:** X-ray procedure that produces cross-sectional images of the body layer by layer.
- **Magnetic resonance imaging (MRI):** Diagnostic technique that provides cross-sectional images of structures within the body without x-ray or other forms of radiation.
- **Direct arthroscopy:** Surgical technique where a scope with camera is inserted into a joint to inspect, diagnose, and repair tissues.
- **Synovial fluid aspirate:** Needle aspiration of joint fluid to note volume, clarity, and presence of cells (red and white cells), crystals, and bacteria to aid in diagnosing joint-related problems and determining treatment options.

Reveals soft tissue swelling, erosion of bone, destruction of cartilage, osteoporosis of adjacent bone, and progression to bone cyst formation, narrowing of joint space, and subluxation. Concurrent osteoarthritic changes may also be noted.

Can reveal joint inflammation before x-rays show damage and document early evidence of RA. PDUS may be reliable for monitoring inflammatory activity in the joint. QUS, which is used for osteoporosis, can detect bone loss in fingers, which may prove to be a good indicator of early RA.

Provides preoperative assessment as to the main indications for surgical intervention, namely, neurological deficit and severe pain. MRI can detect early inflammation in the hands before it is even visible on x-ray and is particularly accurate at pinpointing synovitis.

Visualization of area reveals bone irregularities and degeneration of joint.

May reveal volume greater than normal; may be opaque, cloudy, or yellow due to inflammatory response, bleeding, or degenerative waste products. WBCs and leukocytes are increased, whereas viscosity and complement ( $C_3$  and  $C_4$ ) are decreased.

**NURSING PRIORITIES**

1. Alleviate pain.
2. Increase mobility.
3. Promote positive self-concept.
4. Support independence.
5. Provide information about disease process, prognosis, and treatment needs.

**DISCHARGE GOALS**

1. Pain relieved or controlled.
2. Dealing realistically with current situation.
3. Managing activities of daily living (ADLs) by self or with assistance, as appropriate.
4. Disease process, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS:** acute/chronic Pain**May Be Related To**

Physical injury agent—accumulation of fluid/inflammatory process (e.g., swelling, damage/destruction of joint; extraarticular nodules)

Alteration in sleep pattern; fatigue

**Possibly Evidenced By**

Self-report of intensity and characteristics of pain using standardized instrument

Narrowed focus; self-focused

Expressive behavior (e.g., restlessness, irritability)

Guarding behavior; protective behavior

Changes in vital signs (acute)

Alteration in ability to continue previous activities

**Desired Outcomes/Evaluation Criteria—Client Will****Pain Control NOC**

Report pain is relieved or controlled.

Follow prescribed pharmacological regimen.

Incorporate relaxation skills and diversional activities into pain control program.

**Pain: Disruptive Behaviors NOC**

Appear relaxed and able to sleep or rest appropriately.

Participate in activities of daily living at level of ability.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management NIC</b>	
<b>Independent</b>	
Investigate reports of pain, noting location and intensity using a 0 to 10 (or similar) scale. Note precipitating factors and nonverbal pain cues.	Self-report should be the primary source of pain assessment in determining pain management needs and effectiveness of program.
Suggest client assume position of comfort while in bed or sitting in chair. Promote bedrest when indicated, but resume movement as soon as possible.	In severe disease or acute exacerbation, total bedrest may be necessary until objective and subjective improvements are noted to limit pain and injury to joint. Note: Immobility is known to worsen arthritis pain and stiffness.
Place and monitor use of pillows, sandbags, trochanter rolls, splints, and orthotics.	Stabilizes joint, decreasing joint movement and associated pain. Note: Orthotic devices play an important role in rehabilitation management to decrease pain and inflammation, improve function, reduce deformity, and correct biomechanical malalignment.
Encourage frequent changes of position.	Prevents general fatigue and joint stiffness.
Recommend that client take warm bath or shower on arising and/or at bedtime. Apply warm, moist compresses to affected joints several times a day. Monitor water temperature.	Heat promotes muscle relaxation and mobility, decreases pain, and relieves morning stiffness. Note: Sensitivity to heat may be diminished and dermal injury may occur.
Provide gentle massage.	Promotes relaxation and reduces muscle tension.
Encourage use of stress management techniques, such as progressive relaxation, biofeedback, visualization, guided imagery, self-hypnosis, and controlled breathing. Provide Therapeutic Touch, if desired.	Promotes relaxation, provides sense of control, and may enhance coping abilities.
Involve client in diversional activities appropriate for individual situation.	Refocuses attention, provides stimulation, and enhances self-esteem and feelings of general well-being.
Medicate before planned activities and exercises, as indicated.	Promotes relaxation, reduces muscle tension and spasms, facilitating participation in therapy.
<b>Collaborative</b>	
Administer medications, as indicated, for example:	Because irreversible joint damage occurs within the first 2 years, early diagnosis and intervention are necessary. Medications are the mainstay of treatment with a goal of (1) managing pain, (2) slowing joint destruction, and (3) preserving joint function.
Analgesics: NSAIDs, such as aspirin and acetaminophen (Tylenol Arthritis, Panadol); ibuprofen (Advil, Motrin); naproxen (Aleve); meloxicam (Mobic), etodolac (Lodine), and nabumetone (Relafen); diclofenac (Voltaren); oxaprozin (Daypro)	These drugs control mild to moderate pain and inflammation by inhibition of prostaglandin synthesis and allow for improvement in mobility and function.
COX-2 inhibitors, such as celecoxib (Celebrex)	The NSAID class of COX-2 inhibitors is also effective in controlling inflammation. However, Celebrex is the only one currently available in the United States due to Food and Drug Administration (FDA) findings of potential for adverse cardiovascular side effects with other COX-2 drugs.
Disease-modifying antirheumatic drugs (DMARDs), such as:	Although both NSAIDs and DMARDs improve symptoms of active RA, only DMARDs have been shown to alter the disease course (e.g., decreases disease severity, disability, and mortality).
Methotrexate (Rheumatrex, Trexall), sulfasalazine (Azulfidine), leflunomide (Arava), certolizumab pegol (Cimzia), golimumab (Simponi), abatacept (Orencia), rituximab (Rituxan), tocilizumab (Actemra), anakinra (Kineret), hydroxychloroquine (Plaquenil), sulfasalazine (SSZ), minocycline	Methotrexate is considered the first-line DMARD agent for most individuals with RA. Note: Current DMARD therapy typically includes combinations of two or three drugs, most of which are methotrexate based (e.g., methotrexate + hydroxychloroquine or methotrexate + hydroxychloroquine + sulfasalazine) (Pope, 2016; Ruffing & Bingham, 2017; Singh et al, 2012).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Anti-tumor necrosis factor (anti-TNF) agents (e.g., adalimumab [Humira], etanercept [Enbrel], infliximab [Remicade]). And non-tumor necrosis factor (non-TNF) biologics (e.g., abatacept [Orencia], rituximab [Rituxan], tocilizumab [Actemra]; sarilumab [Kevzara])	Tumor necrosis factor (TNF) is a proinflammatory cytokine produced by the immune system. Anti-TNFs reduce TNF to control inflammation and have been used for more than 10 years to treat inflammatory conditions. Given by injection or infusion, these drugs are able to stop disease progression. Non-TNFs use other mechanisms to interrupt the inflammatory autoimmune response. Note: Patients who have an inadequate response to a first-line antitumor TNF drug may experience a better response with non-TNF-targeted drugs (Garcia, 2016). Because of the effect of these drugs on the immune system, the client is at greater risk for infections. Therefore, screening for TB is recommended for all clients who are beginning or currently receiving biologic agents. And vaccinations are recommended for all clients taking DMARDs or biologic agents: pneumococcal, influenza, hepatitis B, human papillomavirus (HPV), and herpes zoster (Singh et al, 2012).
Immunomodulatory and cytotoxic agents, such as azathioprine (Imuran) and cyclosporine (Neoral)	Immune suppressants may be used for treatment of severe cases of RA when other medications have failed.
Corticosteroids, such as prednisone (Deltasone) and methylprednisolone (Medrol)	These drugs have both anti-inflammatory and immunoregulatory activity and are useful in early disease as temporary adjunctive therapy. Corticosteroids may be used as a bridge while waiting for DMARDs to work. In addition, cortisone may be injected directly into a joint space to provide localized reduction of inflammation without systemic overloading.
Assist with physical therapies, such as paraffin gloves or whirlpool baths.	Provides sustained heat to reduce pain and improve ROM of affected joints.
Apply ice or cold packs when indicated.	Cold may relieve pain and swelling during acute episodes.
Instruct in use and monitor effect of transcutaneous electrical nerve stimulator (TENS) unit, if used.	Constant low-level electrical stimulus blocks transmission of pain sensations.
Prepare for surgical interventions, such as tendon realignment and repair, tunnel release procedures, total joint replacement, joint fusion.	Corrective surgical procedures may be indicated to reduce pain and/or improve joint function and mobility.

## NURSING DIAGNOSIS: impaired physical Mobility

### May Be Related To

Musculoskeletal impairment; joint stiffness  
Pain; reluctance to initiate movement

### Possibly Evidenced By

Decrease in range of motion, fine motor skills; slowed movement  
Alteration in gait; difficulty turning

### Desired Outcomes/Evaluation Criteria—Client Will

#### Joint Movement NOC

Maintain or increase function of affected joint(s).  
Maintain position of function with absence of contractures.

#### Ambulation NOC

Engage in techniques or behaviors that enhance ability to ambulate.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Exercise Therapy: Joint Mobility NIC</b>	
<b>Independent</b>	
Evaluate and then continuously monitor degree of joint inflammation and pain.	Level of activity and exercise depends on progression or resolution of inflammatory process.
Maintain bedrest or chair rest when indicated. Schedule activities providing frequent rest periods and uninterrupted nighttime sleep.	Person with RA needs a good balance between rest and exercise, with more rest when disease is active and more exercise when it is not. Systemic rest is mandatory during acute exacerbations and important throughout all phases of disease to reduce fatigue and improve strength.
Assist with active or perform passive ROM and resistive exercises and strengthening exercises when able.	Maintains and may improve joint function, muscle strength, and general stamina. Note: Inadequate exercise leads to joint stiffening, whereas excessive activity can damage joints.
Discuss and provide safety needs, such as raised chairs and toilet seat, use of handrails in tub or shower and toilet, proper use of mobility aids, or wheelchair safety.	Helps prevent accidental injuries and falls.
<b>Positioning NIC</b>	
Reposition frequently using adequate personnel if hospitalized client is unable to walk.	Proper transfer techniques prevent shearing abrasions of skin. Repositioning relieves pressure on sensitive tissues and promotes circulation.
Demonstrate and assist with transfer techniques and use of mobility aids, such as walker, cane, or bed trapeze.	Facilitates self-care and client's independence.
Position with supports such as pillows, sandbags, or trochanter roll. Provide joint support with splints.	Promotes joint stability, reducing risk of injury, and maintains proper joint position and body alignment, minimizing contractures.
Suggest using small or thin pillow under neck.	Prevents flexion of neck, when client has RA of the cervical spine.
<b>Collaborative</b>	
Collaborate in treatment of underlying condition causing pain and dysfunction.	To maximize optimal level of function and prevent complications.
Recommend or provide pressure-reducing mattress.	Decreases pressure on fragile tissues to reduce risks of immobility and development of decubitus ulcers.
<b>Exercise Therapy: Joint Mobility NIC</b>	
Consult with physical and occupational therapists and vocational specialist.	Helps with formulating exercise and activity program based on individual needs in identifying and reducing impairments in ROM, flexibility, strength, and endurance, and to instruct in joint protection strategies and mobility devices and adjuncts.
<b>Self-Care Assistance: Instrumental Activities of Daily Living (IADLs) NIC</b>	
Determine appropriateness of, and ability to use, scooter or special enhancements to automobile such as hand controls and wide mirrors.	Facilitates movement within the environment, decreases fatigue, and promotes independence.

#### NURSING DIAGNOSIS: risk for ineffective Role Performance

##### Possibly Evidenced By

Pain; fatigue, depression  
 Insufficient resources (e.g., financial, social, knowledge)  
 Stressors; conflict; insufficient support system; powerlessness  
 Change in self-/other's perception of role, or incapacity to resume role

**NURSING DIAGNOSIS:** **risk for ineffective Role Performance** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Role Performance NOC**

Talk with family/employer about changes or limitations imposed by condition.  
 Verbalize acceptance of self in changed role.  
 Formulate realistic plans for adapting to role change.  
 Maintain safe, health-promoting environment.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Role Enhancement NIC</b>	
<i>Independent</i>	
Identify the client at risk and ascertain how client views self in usual lifestyle functioning, including home, employment, and sexual aspects, as indicated.	Although RA can develop in anyone, regardless of age or gender, it typically strikes women between the ages of 30 and 60. This age range necessarily means that RA can impact many life events and quality of life.
Encourage verbalization between client/SO about concerns of disease process and future expectations.	Provides opportunity to identify fears or misconceptions and deal with them directly.
Discuss meaning of change to client and SO as appropriate.	Identifying how illness can affect perception of self and interactions with others will determine need for further intervention or counseling.
Discuss client's perception of how SO perceives limitations.	Verbal and nonverbal cues from SO may have a major impact on how client views self.
Acknowledge and accept feelings of grief, hostility, and potential dependency.	Constant pain is wearing, and feelings of anger and hostility are common. Acceptance provides feedback that feelings are normal.
Note withdrawn behavior, use of denial, or overconcern with changes.	May suggest emotional exhaustion or maladaptive coping methods, requiring more in-depth intervention and psychological support.
Assist client to identify positive behaviors that will aid in coping.	Helps client maintain self-control, enhancing self-esteem.
Involve client in planning care and scheduling activities.	Enhances feelings of competency and self-worth and encourages independence and participation in therapy.
Encourage SO/family to identify ways to assist client in meeting child care/household/home maintenance duties as needed to maintain a clean, safe, and healthy environment.	Advance planning helps ensure that needs will be met on an ongoing basis as client's condition and ability to perform usual role fluctuate.
<i>Collaborative</i>	
Identify local and national support groups, disability advocate as appropriate.	Provides role models and assistance with problem-solving and adapting to changes as they occur. Disability advocates provide additional support when dealing with problems within the community.
Recommend vocational/employment counselors as indicated.	Employment counselors provide client with information regarding available assistive devices and appropriate worksite accommodations or modifications.
Coordinate home evaluation by occupational therapist and rehabilitation team as indicated.	Helpful in identifying potential or existing health and safety hazards and to determine adaptations that may be required (e.g., chair or stair lifts, wheelchair-accessible doors and hallways, clean water available, timely trash removal).
Identify community resources, such as visiting nurse, homemaker service, social services, senior citizens' groups, or sources for necessary home repairs or modifications.	Can facilitate transfer to, and support continuation in, safe home setting.
Refer to counseling, such as psychiatric clinical nurse specialist, psychiatrist/psychologist, or social worker.	Client/SO may require ongoing support to deal with long-term debilitating process.
Administer medications as indicated, such as antianxiety and mood-elevating drugs.	May be needed in presence of severe depression until client develops more effective coping skills.

**NURSING DIAGNOSIS:** **Self-Care deficit (specify)****May Be Related To**

Musculoskeletal impairment; pain, discomfort  
Fatigue; weakness

**Possibly Evidenced By**

Inability to manage ADLs—feeding, bathing, dressing, and/or toileting

**Desired Outcomes/Evaluation Criteria—Client Will****Self-Care: Status NOC**

Perform self-care activities at a level consistent with individual capabilities.  
Demonstrate techniques and lifestyle changes to meet self-care needs.  
Identify personal and community resources that can provide needed assistance.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Care Assistance NIC</b>	
<i>Independent</i>	
Determine usual level of functioning using Functional Level Classification 0–4 for status before onset or exacerbation of RA and anticipated changes.	Identifies degree of assistance and support required. For example, the level 0 client is able to perform usual ADLs, including self-care, vocational, and avocational, whereas the level 4 client is limited in all these areas and does not participate in activity.
Assess barriers to participation in self-care. Identify and plan for personal assistance and environmental modifications.	Prepares client for increased independence, which enhances self-esteem.
Perform or assist client with meeting client's needs.	Personal care is part of nursing care and should not be neglected while self-care independence is promoted and integrated.
Maintain mobility, pain management, and exercise programs.	Supports physical and emotional independence.
Allow client sufficient time to complete tasks to fullest extent of ability. Capitalize on individual strengths.	May need more time to complete tasks by self but provides an opportunity for greater sense of self-confidence and self-worth.
Identify sources for necessary assistive devices and equipment such as lifts, safety bars, elevated toilet seat, wheelchair, scooter.	Provides opportunity to acquire equipment before discharge.
Discuss client's/SO's perception of current environmental needs and ability to maintain safe surroundings.	Determines feasibility of changing home layout or access (e.g., doors may need to be larger; ramp may be needed) to meet individual needs.
Determine financial resources to meet needs of individual situation. Identify support systems available to client, such as extended family, friends, and neighbors.	Availability of personal resources and community supports will affect ability to problem-solve and choice of solutions.
<i>Collaborative</i>	
Consult with/refer to rehabilitation specialists.	Helpful in determining/obtaining assistive and adaptive devices to meet individual needs.
Arrange for consult with other agencies, such as Meals on Wheels, home-care service, or nutritionist.	May need additional kinds of assistance to continue in home setting.

**NURSING DIAGNOSIS:** **risk for ineffective Health Management****Possibly Evidenced By**

Difficulty managing complex treatment regimen; perceived barrier/benefit; insufficient knowledge of therapeutic regimen  
Excessive demands (e.g., family, employment)  
Insufficient social support; economically disadvantaged

**NURSING DIAGNOSIS:** **risk for ineffective Health Management** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Self-Management: Chronic Disease NOC**

Verbalize understanding of condition, prognosis, and potential complications.

Verbalize understanding of therapeutic needs.

Demonstrate behaviors and changes in lifestyle necessary to maintain therapeutic regimen.

Develop a plan for self-care, including lifestyle modifications consistent with mobility and/or activity restrictions.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b>	
<i>Independent</i>	
Review disease process, prognosis, and future expectations.	Provides knowledge base from which client can make informed choices.
Discuss client's role in management of disease process through nutrition, medication, and balanced program of exercise and rest.	Goal of disease control is to suppress inflammation in joints and other tissues to maintain joint function and prevent deformities.
Assist in planning a realistic and integrated schedule of activity, rest, personal care, drug administration, physical therapy, and stress management.	Provides structure and defuses anxiety when managing a complex chronic disease process.
Identify individually appropriate exercise program components, such as swimming, stationary bike, or nonimpact aerobics.	Can increase client's energy level and mental alertness and minimize functional limitations. Program needs to be customized based on joints involved and client's general condition to maximize effect and reduce risk of injury.
Emphasize importance of continued pharmacotherapeutic management.	Benefits of drug therapy depend on correct regimen, dosage, timing, and continuation without gaps.
Recommend use of enteric-coated or buffered aspirin or nonacetylated salicylates, such as choline salicylate (Arthropan) or choline magnesium trisalicylate (Trilisate).	These preparations, ingested with food, minimize gastric irritation, reducing risk of gastric bleeding. Note: Non-acetylated products have a longer half-life, requiring less frequent administration in addition to producing less gastric irritation.
Suggest taking medications, such as NSAIDs, with meals, milk products, or antacids and at bedtime.	Limits gastric irritation. Reduction of pain at bedtime enhances sleep and increased blood level decreases early morning stiffness.
Emphasize importance of reading product labels and refraining from over-the-counter (OTC) drug usage without prior medical approval.	Many products, such as cold remedies or antidiarrheals, contain hidden salicylates that increase risk of harmful side effects.
Review importance of balanced diet with foods high in vitamins, protein, and iron.	Promotes general well-being and tissue repair or regeneration.
Encourage overweight client to lose weight and supply with weight reduction information, as appropriate.	Weight loss reduces stress on joints, especially hips, knees, ankles, and feet.
Provide information about and resources for assistive devices, such as wheeled dolly or wagon for moving items, pickup sticks, lightweight dishes and pans, raised toilet seat, and safety handlebars.	Reduces force exerted on joints and enables individual to participate more comfortably in needed or desired activities.
Discuss energy-saving techniques, such as sitting instead of standing to prepare meals, shower, shave, or apply makeup.	Prevents fatigue; facilitates self-care and independence.
Encourage maintenance of correct body position and posture both at rest and during activity—keeping joints extended, not flexed, wearing splints for prescribed periods, avoiding remaining in a single position for extended periods, positioning hands near center of body during use, and sliding rather than lifting objects when possible.	Good body mechanics must become a part of client's lifestyle to lessen joint stress and pain.

(continues on page 834)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review safety issues related to mobility devices, especially electric scooters. Suggest use of a pennant when traveling on open streets.	Ability to travel over uneven surfaces, gravel, or soft ground is dependent upon specific scooter model. In addition, speed and safe maneuvering are equally important for the driver and other individuals in the vicinity. A pennant can be seen by other motorists.
Review necessity of frequent inspection of skin and meticulous skin care under splints, casts, and supporting devices. Demonstrate proper padding.	Reduces risk of skin irritation and breakdown.
Discuss necessity of medical follow-up and laboratory studies.	Drug therapy requires frequent assessment and refinement to ensure optimal effect and to prevent overdose or dangerous side effects.
Provide for sexual and childbirth counseling, as necessary.	Information about different positions and techniques and/or other options for sexual fulfillment may enhance personal relationships and feelings of self-worth and self-esteem. Note: A large number of clients with RA are in childbearing years and need counseling, support, and medical interventions.
Identify community resources, such as chapters of the National Institute of Arthritis and Muscular and Skin Diseases (NIAMS) and the Arthritis Foundation.	Assistance and support from others promote maximal recovery.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Fatigue**—disease state, poor physical condition, stress, depression
- **chronic Pain**—chronic physical disability
- **impaired physical Mobility**—pain, joint stiffness, disuse, decreased endurance, reluctance to initiate movement
- **Self-Care deficit**—pain, musculoskeletal impairment, weakness, fatigue, environmental barriers

## General

### PSYCHOSOCIAL ASPECTS OF CARE

#### I. Mind-Body-Spirit Connection

- a. When a physiological response occurs, there is a corresponding psychological response (Anandarajah & Hight, 2001).
  - i. Emotional instability associated with steroid therapy or Cushing's syndrome
  - ii. Irritability of hypoglycemia
  - iii. Anxiety associated with impaired oxygenation
- b. Emotional response during illness is of extreme importance.
  - i. The stress of illness is well recognized; however, the effect on the individual is unpredictable.
  - ii. The client's perception of, and response to, the event may result in unmet psychological needs that drain energy resources needed for healing.
  - iii. Values brought to the interactions between clients, families, and healthcare providers affect the care that a client expects and receives.

**II. Psychoneuroimmunology**—(PNI) provides new information about how interactions between the mind and the neuroendocrine and immune systems influence health and healing.

- a. Negative emotions or stressful experiences can intensify health threats, contribute to prolonged infection, and result in delayed healing (Kiecolt-Glaser et al, 2002).
  - i. Chronic stress: decreased T and B cells, decreased natural killer (NK) cells, increased blood levels of Epstein-Barr virus
  - ii. Depression: decreased T cells, decreased number and function of lymphocytes, decreased NK cells
  - iii. Grieving: decreased lymphocyte proliferation
- b. Positive emotions can enhance immune response, facilitate healing, and slow disease progression.
  - i. Personal sharing of traumatic experience: increased lymphocyte response
  - ii. Support group intervention: increased NK cells and activity, increased lymphocyte count
  - iii. Humor and laughter: increased immunoglobulin A, increased lymphocyte count and activity

#### G L O S S A R Y

**Active-listening:** Reflecting the underlying feelings in the message that is heard.

**Eye movement desensitization and reprocessing (EMDR):** Information-processing psychotherapy technique that integrates elements of psychodynamic, cognitive-behavioral, interpersonal, experiential, and body-centered therapies to assist individuals to deal with anxious feelings and stress associated with traumatic memories.

**Guided imagery:** Method of helping an individual relax by means of guiding him or her in a vision of tranquil places.

**I-messages:** Expression of feelings stated as "I feel . . ." in a nonblameful way.

**Implosive therapy (flooding):** The individual is "flooded" with a continuous presentation of the phobic stimulus until it no longer elicits anxiety.

**Labile affect:** Excessive emotional reactivity associated with frequent changes or swings in emotions and mood.

**LGBTQ:** Lesbian, gay, bisexual, transgender, queer or questioning.

**Locus of control:** Site of control in an individual, which may be internal or external.

**Mindfulness:** Method of staying in the moment.

**Natural killer (NK) cells:** Cytotoxic lymphocytes play a major role in suppressing cancer cells and killing cells infected by viruses.

**Psychoneuroimmunology (PNI):** Field of study that focuses on relationship between psychosocial processes and nervous, endocrine, and immune system functioning.

**Psychosocial:** Theory of development proposed by Eric Erickson (1963).

**Religiosity:** Excessive demonstration of or obsession with religious ideas and behavior.

**Tapping:** A healing method using ancient Chinese acupressure and modern psychology (Ortner, 2013).

**Therapeutic Touch:** Method of healing by use of the hands moving through the energy field.

## CARE SETTING

Any setting in which nursing contact occurs and care is provided.

## RELATED CONCERNS

This is an aspect of all care and plans of care.

ASSESSMENT FACTORS TO BE CONSIDERED	
SUBJECTIVE	OBJECTIVE
<b>INDIVIDUAL</b> <ul style="list-style-type: none"><li>• Level of knowledge and education, how the individual accesses and incorporates information—auditory, visual, kinesthetic</li><li>• Religious affiliation—church attendance, importance of religion in client's life, belief in life after death</li><li>• Perception of body and its functions in health, illness, current situation</li><li>• Past experience with illness, hospitalization, and healthcare systems</li><li>• Emotional reactions in feeling (sensory) terms, for example, client states, "I feel scared"</li></ul>	<ul style="list-style-type: none"><li>• Age and gender (LGBTQ)</li><li>• Client's dominant language, literacy, knowledge and use of other languages, style of speech</li><li>• Patterns of communication with significant others (SOs), with healthcare givers</li><li>• How is client experiencing illness versus what illness actually is</li><li>• Emotional response to current treatment or hospitalization</li><li>• Behavior when anxious, afraid, impatient, withdrawn, or angry</li></ul>
<b>SIGNIFICANT OTHERS (SOs)</b> <ul style="list-style-type: none"><li>• Marital status, SOs, nuclear and extended family, recurring or patterned relationships</li><li>• Client's role in family tasks and functions</li><li>• How are SOs affected by the illness and prognosis?</li><li>• Lifestyle preferences to be considered: dietary, spiritual, sexual preference, other community—religious order, commune, retirement center</li></ul>	<ul style="list-style-type: none"><li>• Family development cycle—just married; young, adolescent children, leaving or returning home; retired</li><li>• Interaction processes within the family may or may not be supportive.</li></ul>
<b>SOCIOECONOMIC</b> <ul style="list-style-type: none"><li>• Employment; finances</li><li>• Environmental factors—residence, work, and recreation; out of usual environment such as on vacation, visiting</li></ul>	<ul style="list-style-type: none"><li>• Social class, value system, LGBTQ</li><li>• Social acceptability of disease or condition—sexually transmitted infections (STIs), HIV, obesity, substance abuse</li></ul>
<b>CULTURAL</b> <ul style="list-style-type: none"><li>• Ethnic background, heritage, and residence or locale</li><li>• Beliefs regarding caring and curing</li><li>• Values related to health and treatment</li><li>• Cultural factors related to illness in general and to pain response</li></ul>	<ul style="list-style-type: none"><li>• Health-seeking behaviors, illness referral system</li></ul>
<b>DISEASE (ILLNESS)</b> <ul style="list-style-type: none"><li>• Kind and cause of illness; how has it been treated and how should it be treated?</li><li>• Anticipated response to treatment; client's and SO's expectations</li><li>• If terminal illness, what do the client and SO know and anticipate?</li></ul>	<ul style="list-style-type: none"><li>• Is this an acute or chronic condition, is it inherited, what is the threat to self or others?</li><li>• Is the condition "appropriate" to the afflicted individual, for example, multiple sclerosis, diabetes mellitus (DM), cancer? (Note: Some theories suggest certain personalities are more prone to certain illnesses.) (Jongeward &amp; James, 1996)</li><li>• Illness related to personality factors, such as type A (may be myth or valid relative to management of stressors); high-risk behaviors</li></ul>
<b>NURSE RELATED</b> <ul style="list-style-type: none"><li>• Basic knowledge of human responses and how the current situation is related to response of the individual</li><li>• Basic knowledge of biological, psychological, social, cultural, and religious issues</li></ul>	<ul style="list-style-type: none"><li>• Knowledge and use of therapeutic communication skills</li><li>• Willingness to look at own behavior in relation to interaction with others and make changes as necessary</li></ul>

SUBJECTIVE (continued)	OBJECTIVE (continued)
<ul style="list-style-type: none"> <li>Knowledge of own value and belief systems, including prejudices and biases</li> </ul>	<ul style="list-style-type: none"> <li>Respect of client's privacy, confidentiality, human needs</li> </ul>

**NURSING PRIORITIES**

- Encourage effective coping skills of client and SO.
- Reduce emotional distress.
- Facilitate integration of self-concept and body-image changes.
- Support grieving process.
- Promote safe environment and client well-being.

**DISCHARGE GOALS**

- Client and family dealing realistically with current situation.
- Anxiety or fear manageable.
- Progressing through stages of grieving.
- Safe environment maintained.
- Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS:** **ineffective Coping****May Be Related To**

Situational crises; high degree of threat  
 Disturbance in pattern of appraisal of threat  
 Inadequate tension release strategies  
 Inadequate resources  
 Gender differences in coping strategies

**Possibly Evidenced By**

Alteration in concentration; difficulty organizing information  
 Ineffective coping strategies  
 Change in communication pattern  
 Fatigue

**Desired Outcomes/Evaluation Criteria—Client Will****Coping NOC**

Identify ineffective coping behaviors and consequences.  
 Verbalize awareness of own coping and problem-solving abilities.  
 Meet psychological needs as evidenced by appropriate expression of feelings, identification of options, and use of resources.

**Decision-Making NOC**

Make decisions and express satisfaction with choices.

**ACTIONS/INTERVENTIONS****RATIONALE****Coping Enhancement NIC***Independent*

Review pathophysiology affecting the client and extent of feelings of hopelessness, helplessness, and loss of control over life; level of anxiety; and perception of situation.

Indicators of degree of disequilibrium and need for intervention to prevent or resolve the crisis. Studies suggest that 20% to 40% of physically ill individuals are depressed (Robinson, 2002). Impairment of normal functioning for more than 2 weeks, especially in presence of chronic condition, may reflect depression, requiring further evaluation. Note: In contrast, depression is believed to contribute to the development and progression of some physical illnesses, such as heart or vascular disease or certain viral infections (Thomas, 2010).

Establish therapeutic nurse-client relationship.

Client may feel less inhibited in the context of this relationship to verbalize feelings of helplessness and powerlessness and feel more freedom to discuss changes that may be necessary in the client's life to improve situation.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess presence of positive coping skills and inner strengths, such as use of relaxation techniques, willingness to express feelings, and use of support systems.	When the individual has coping skills that have been successful in the past, they may be used in the current situation to relieve tension and preserve the individual's sense of control. However, limitations of condition may impact choices available to client; for example, playing a musical instrument to relieve stress may not be possible for individual with tremors or hemiparesis, but listening to tapes or CDs may provide some degree of comfort.
Encourage client to talk about what is happening at this time and what has occurred to precipitate feelings of helplessness and anxiety.	Provides clues to assist client to develop coping and regain equilibrium.
Provide quiet, nonstimulating environment. Determine what client needs, and provide, if possible. Give simple, factual information about what client can expect and repeat as necessary.	Decreases anxiety and provides control for the client during crisis situation.
Allow client to be dependent in the beginning, with gradual resumption of independence in ADLs, self-care, and other activities. Make opportunities for client to make simple decisions about care and other activities when possible, accepting choice not to do so.	Promotes feelings of security—client knows nurse will provide safety. As control is regained, client has the opportunity to develop adaptive coping and problem-solving skills.
Accept verbal expressions of anger, setting limits on maladaptive behavior.	Verbalizing angry feelings is an important process for resolution of grief and loss. However, preventing destructive actions, such as striking out at others, preserves client's self-esteem.
Discuss feelings of self-blame or projection of blame on others.	Although these mechanisms may be protective at the moment of crisis, they eventually are counterproductive and intensify feelings of helplessness and hopelessness.
Note expressions of inability to find meaning in life or reason for living and feelings of futility or alienation from God.	Crisis situation may evoke questioning of spiritual beliefs, affecting ability to cope with current situation and plan for the future.
Promote safe and hopeful environment, as needed. Identify positive aspects of this experience and assist client to view it as a learning opportunity.	May be helpful while client regains inner control. The ability to learn from the current situation can provide skills for moving forward.
Provide for gradual implementation and continuation of necessary behaviors or lifestyle changes. Reinforce positive adaptation and new coping behaviors.	Reduces anxiety of sudden change and allows for developing new and creative solutions.

#### **Collaborative**

Refer to other resources as necessary, such as clergy, psychiatric clinical nurse specialist, psychiatrist, family or marital therapist, and addiction support groups.

Additional assistance may be needed to help client resolve problems or make decisions. Note: If untreated, depression may complicate recovery from physical illness (Robinson, 2002).

## **NURSING DIAGNOSIS: Decisional Conflict**

### **May Be Related To**

Conflicting information sources  
Inexperience with or interference in decision-making  
Insufficient information  
Conflict with moral obligations

### **Possibly Evidenced By**

Questioning of moral principle while attempting a decision  
Recognizes undesired consequences of alternative actions being considered  
Delay in decision making; vacillation among choices  
Physical signs of tension; self-focused

**NURSING DIAGNOSIS:** **Decisional Conflict** (continued)**Desired Outcomes/Evaluation Criteria: Client Will****Decision-Making NOC**

Verbalize awareness of problem-solving abilities.

Use relevant information, and cultural/social considerations as appropriate, to make decisions.

Identify alternatives and potential consequences.

Verbalize satisfaction with decisions made.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Decision-Making Support</b> <b>NIC</b>	
<i>Independent</i>	
Establish therapeutic nurse-client relationship.	Client may feel less inhibited in the context of this relationship to verbalize feelings of helplessness and powerlessness and feel more freedom to discuss changes that may be necessary in the client's life to improve situation.
Note expressions of indecision, dependence on others, and inability to manage own activities of daily living (ADLs).	May indicate need to lean on others for a time. Early recognition and intervention can help client regain equilibrium.
Evaluate ability to understand events. Correct misperceptions and provide factual information.	Assists in identification and correction of perception of reality and enables problem-solving to begin.
Active-listen; identify reason for indecisiveness.	Helps client to clarify problem and begin looking for resolution, alternative choices.
Identify cultural values and beliefs or moral obligations that may be creating conflict for client.	These issues must be addressed before client can be at peace with the decision that is made.
Provide support for client to problem-solve solutions for current situation. Provide information and reinforce reality as client begins to ask questions and look at what is happening.	Helping client and SO to brainstorm possible solutions and giving consideration to the pros and cons of each promotes feelings of self-control and strengthens self-esteem.
<i>Collaborative</i>	
Refer to other resources as necessary, such as clergy, psychiatric clinical nurse specialist, psychiatrist, family or marital therapist, and addiction support groups.	Additional assistance may be needed to help client resolve problems or make decisions. Note: If untreated, depression may complicate recovery from physical illness (Robinson, 2002).

**NURSING DIAGNOSIS:** **compromised family Coping****May Be Related To**

Family disorganization or role change

Exhaustion of support person's capacity

Insufficient reciprocal support

Insufficient understanding of information by support person

**Possibly Evidenced By**

Client complaint about support person's response to health problem

Support person reports inadequate knowledge or understanding that interferes with effective behaviors

Assistive behaviors by support person produce unsatisfactory results

Protective behavior by support person incongruent with client's abilities

Support person withdraws from client

**Desired Outcomes/Evaluation Criteria—Family Will****Family Coping NOC**

Identify resources within themselves to deal with situation.

Visit regularly and participate positively in care of client, within limits of abilities.

Express more realistic understanding and expectations of the client.

Provide opportunity for client to deal with situation in own way.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Family Involvement Promotion NIC</b>	
<b>Independent</b>	
Establish rapport and acknowledge difficulty of the situation for the family.	May assist family to accept what is happening and be willing to share problems with caregivers.
Determine current knowledge and perception of the situation.	Lack of information or unrealistic perceptions can interfere with family members' and client's response to illness situation.
Assess level of anxiety present in family and SO.	Anxiety level needs to be dealt with before problem-solving can begin. Individuals may be so preoccupied with own reactions to situation that they are unable to respond to another's needs.
Evaluate preillness and current behaviors that are interfering with care or recovery of the client.	Information about family problems, such as divorce or separation, financial limitations, and substance use, will be helpful in determining options and developing an appropriate plan of care.
Discuss underlying reasons for client behaviors with family.	When family members know why client is behaving in different ways, it helps them understand and accept or deal with situation.
Assist family/client to understand "who owns the problem" and who is responsible for resolution. Avoid placing blame or guilt (Gordon, 2000).	When these boundaries are defined, each individual can begin to take care of own self and stop taking care of others in inappropriate ways.
Reframe negative expressions into positives whenever possible.	Promotes more hopeful attitude and helps family and client look toward the future.
Involve SO in information giving, problem-solving, and care of client as feasible. Identify other ways of demonstrating support while maintaining client's independence.	Information can reduce feelings of helplessness. Involvement in care enhances feelings of control and self-worth.
<b>Collaborative</b>	
Refer to appropriate resources for assistance, as indicated, such as counseling, psychotherapy, and financial and spiritual support.	May need additional assistance in resolving family issues.

### NURSING DIAGNOSIS: **readiness for enhanced family Coping**

#### Possibly Evidenced By

- Expresses desire to enhance connection with others who have experienced a similar situation
- Expresses desire to choose experiences that optimize wellness
- Expresses desire to acknowledge growth impact of crisis
- Expresses desire to enhance health promotion, enrichment of lifestyle

#### Desired Outcomes/Evaluation Criteria—Family Will

#### Family Resiliency NOC

- Express willingness to look at own role in family's growth.
- Use community resources for support or assistance as needed.
- Undertake tasks leading to change.
- Verbalize feelings of self-confidence and satisfaction with progress being made.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Family Support NIC</b>	
<b>Independent</b>	
Provide opportunities for family to talk with client and/or caregiver(s).	Reduces anxiety and allows expression of what has been learned and how they are managing as well as opportunity to make plans for the future and share support.
Listen to family's expressions of hope, planning, effect on relationships and life, and change of values.	Provides clues to avenues to explore for assistance with growth.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide opportunities for, and instruction in, how SOs can care for client. Discuss ways in which they can support client in meeting own needs.	Enhances feelings of control and involvement in situation in which SOs cannot do many things. Also provides opportunity to learn how to be most helpful when client is discharged from care.
Provide a role model with which family may identify.	Having a positive example can help with adoption of new behaviors to promote growth.
Discuss importance of open communication. Role-play effective communication skills of active-listening, "I-messages," and problem-solving.	Helps individuals to express needs and wants in ways that will develop family cohesiveness. Promotes solutions in which everyone wins.
Encourage family to learn new and effective ways of dealing with feelings.	Effective recognition and expression of feelings clarify situation for involved individuals.
Encourage seeking support appropriately. Give information about available persons and agencies.	Permission to seek help as needed allows them to choose to take advantage of available assistance and resources.
<b>Collaborative</b> Refer to specific support group(s) as indicated.	Provides opportunities for sharing experiences, provides mutual support and practical problem-solving, and can aid in decreasing alienation and helplessness.

### NURSING DIAGNOSIS: Anxiety [specify level]

#### May Be Related To

Major change in health status, economic status, or role function  
 Maturational/situational crisis; stressors  
 Family history of anxiety  
 Interpersonal contagion/transmission  
 Conflict about life goals

#### Possibly Evidenced By

Worried about change in life event  
 Apprehensive; distressed  
 Dry mouth  
 Alteration in sleep pattern  
 Increased tension  
 Self-focused  
 Change in blood pressure, pulse, and/or respirations  
 Facial tension; hand tremors; voice quivering  
 Blocking of thoughts; rumination; confusion  
 Diminished ability to problem solve

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Anxiety Self-Control NOC

Acknowledge and discuss fears and concerns.  
 Verbalize awareness of feelings of anxiety and healthy ways to deal with them.  
 Demonstrate problem-solving and use resources effectively.

##### Anxiety Level NOC

Appear relaxed and report anxiety is reduced to a manageable level.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction NIC</b> <i>Independent</i> Note palpitations and elevated pulse or respiratory rate.	Changes in vital signs may suggest the degree of anxiety the client is experiencing or reflect the impact of physiological factors such as pain or endocrine imbalances.
Acknowledge presence of anxiety. Validate observations with client, for example, "You seem to be afraid."	Feelings are real, and it is helpful to bring them out in the open so they can be discussed and dealt with.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess degree and reality of threat to client and level of anxiety—mild, moderate, severe—by observing behavior, such as clenched hands, wide eyes, startle response, furrowed brow, clinging to family and staff, or physical and verbal lashing out.	Individual responses can vary according to cultural beliefs and traditions and culturally learned patterns. Distorted perceptions of the situation may magnify feelings.
Note narrowed focus of attention and client concentrating on one thing at a time.	Narrowed focus usually reflects extreme fear or panic.
Observe speech content, vocabulary, and communication patterns, such as rapid or slow, pressured speech; words commonly used, repetition, use of humor or laughter, and swearing.	Provides clues about such factors as the level of anxiety, ability to comprehend what is currently happening, cognition difficulties, and possible language differences.
Assess severity of pain when present. Delay gathering of information if pain is severe.	Severe pain and anxiety leave little energy for critical thinking and other activities.
Determine client's and SO's perception(s) of the situation.	Regardless of the reality of the situation, perception affects how each individual deals with the illness and stress.
Acknowledge reality of the situation as the client sees it, without challenging the belief.	Client may need to deny reality until ready to deal with it. It is not helpful to force the client to face facts.
Evaluate coping and defense mechanisms being used to deal with the perceived or real threat.	May be dealing well with the situation at the moment; for example, denial and regression may be helpful coping mechanisms for a time. However, use of such mechanisms diverts energy the client needs for healing, and problems need to be dealt with at some point in time.
Review coping mechanisms used in the past, such as problem-solving skills and recognizing and asking for help.	Provides opportunity to build on resources the client and SO may have used successfully.
Assist client to use the energy of anxiety for coping with the situation when possible.	Moderate anxiety heightens awareness and can help motivate the client to focus on dealing with problems.
Maintain frequent contact with the client and SO. Be available for listening and talking, as needed.	Establishes rapport, promotes expression of feelings, and helps client and SO look at realities of the illness and treatment without confronting issues they are not ready to deal with.
Acknowledge feelings, as expressed, using active-listening or reflection. If actions are unacceptable, take necessary steps to control or deal with behavior. (Refer to ND: risk for Violence.)	Often acknowledging feelings enables client to deal more appropriately with situation. May need chemical or physical control for brief periods.
Identify ways in which client can get help when needed, including telephone numbers of contact persons.	Provides assurance that staff and resources are available for assistance/support.
Stay with or arrange to have someone stay with client, as indicated.	Continuous support may help client regain internal locus of control and reduce anxiety and fear to a manageable level.
Provide accurate information as appropriate and when requested by the client and SO. Answer questions freely and honestly and in language that is understandable by all. Repeat information as necessary; correct misconceptions.	Complex and/or anxiety-provoking information can be given in manageable amounts over an extended period. As opportunities arise and facts are given, individuals will accept what they are ready for. Note: Words and phrases may have different meanings for each individual; therefore, clarification is necessary to ensure understanding.
Avoid empty reassurances, with statements of “everything will be all right.” Instead, provide specific information, such as “Your heart rate is regular, your pain is being easily controlled, and that is what we want,” or “Your CD4 count has been stable for the last three visits.”	It is not possible for the nurse to know how the specific situation will be resolved, and false reassurances may be interpreted as lack of understanding or honesty, further isolating the client. Sharing observations used in assessing condition and prognosis provides opportunity for client and SO to feel reassured.
Note expressions of concern or anger about treatment or staff.	Anxiety about self and outcome may be masked by comments or angry outbursts directed at therapy or caregivers.
Ask client and SO to identify what he or she can or cannot do about what is happening.	Assists in identifying areas in which control can be exercised and those in which control is not possible.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide as much order and predictability as possible in scheduling care, activities, and visitors.	Helps client anticipate and prepare for difficult treatments or movements, as well as look forward to pleasant occurrences.
Instruct in ways to use positive self-talk: “I can manage this pain for now,” or “My cancer is shrinking.”	Internal dialogue is often negative. When this is shared out loud, the client becomes aware and can be directed in the use of positive self-talk, which can help reduce anxiety.
Encourage client to develop regular exercise and activity program.	Has been shown to raise endorphin levels to enhance sense of well-being and help reduce level of anxiety.
Encourage and instruct in guided imagery or other relaxation methods, such as imagining a pleasant place, use of music, deep breathing, meditation, and mindfulness (Healthwise Staff, 2011).	Promotes release of endorphins and aids in developing internal locus of control, reducing anxiety. May enhance coping skills, allowing body to go about its work of healing.
<b>Collaborative</b>	
Provide touch, Therapeutic Touch, massage, and other adjunctive therapies as indicated (Krieger, 1998).	Aids in meeting basic human need, decreasing sense of isolation and assisting client to feel less anxious. Note: Therapeutic Touch requires the nurse to have specific knowledge and experience to use the hands to correct energy field disturbances by redirecting human energies to help or heal.
<b>Collaborative</b>	
Administer medications, as needed, for example:	
Antianxiety agents, such as diazepam (Valium), clorazepate (Tranxene), or chlordiazepoxide (Librium)	Antianxiety agents and/or antidepressants may be useful for brief periods to assist the client and SO to reduce anxiety to manageable levels, providing opportunity for initiation of client's own coping skills. Note: Use of SSRIs, such as Prozac or Zoloft, has been associated with sexual function complaints. Alternatives may need to be considered. Also, ethnic variations affecting psychotropic drugs require close monitoring to determine therapeutic dosage. For example, East Asians and blacks may be more sensitive or react faster, have higher plasma drug levels, and have increased risk of side effects, necessitating lower dosage than whites in general (Munoz & Hilgenberg, 2005).
Benzodiazepines, such as alprazolam (Xanax), oxazepam (Serax), lorazepam (Ativan), or temazepam (Restoril)	
Selective serotonin reuptake inhibitors (SSRIs), such as fluoxetine (Prozac), sertraline (Zoloft), fluvoxamine (Luvox), citalopram HABr (Celexa), or paroxetine HCL (Paxil)	
Other drugs, such as buspirone (BuSpar) or doxepin (Adapin, Sinequan)	

### NURSING DIAGNOSIS: risk for situational low Self-Esteem

#### Possibly Evidenced By

Decrease in control over environment  
Physical illness; functional impairment; alteration in body image  
History of abandonment, neglect  
Pattern of helplessness  
Unrealistic self-expectations

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Self-Esteem NOC

Verbalize realistic view and acceptance of self in situation.  
Identify existing strengths and view self as capable person.  
Recognize and incorporate change into self-concept in accurate manner without negating self-worth.  
Demonstrate adaptation to changes or events that have occurred as evidenced by setting of realistic goals and active participation in work, play, and personal relationships.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Esteem Enhancement NIC</b>	
<b>Independent</b>	
Ask how the client would like to be addressed.	Shows courtesy and respect and acknowledges person.
Identify SO from whom the client derives comfort and who should be notified in case of emergency.	Allows provisions to be made for specific person(s) to visit or remain close and provides needed support for client. Note: May or may not be legal next of kin.
Identify basic sense of self-esteem and image client has of existential, physical, psychological self. Identify locus of control.	May provide insight into whether this is a single episode or recurrent or chronic situation and can help determine needs and treatment plan. Determining whether the individual's locus of control is internal or external facilitates choosing most effective interventions.
Determine client's perception of threat to self.	Client's perception is more important than what is really happening and needs to be dealt with before reality can be addressed.
Active-listen to client concerns and fears.	Conveys sense of caring and can be helpful in identifying the client's needs, problems, and coping strategies and how effective they are. Provides opportunity to develop and begin a problem-solving process.
Encourage verbalization of feelings, accepting what is said.	Helps client and SO begin to adapt to change and reduces anxiety about altered function or lifestyle.
Discuss stages of grief and the importance of grief work. (Refer to ND: Grieving.)	Grieving is a necessary step for integration of change or loss into self-concept.
Provide nonthreatening environment; listen and accept client as presented.	Promotes feelings of safety, encouraging verbalization.
Observe nonverbal communication, including body posture and movements, eye contact, gestures, and use of touch.	Nonverbal language is a large portion of communication and therefore is extremely important. How the person uses touch provides information about how it is accepted and how comfortable the individual is with being touched.
Reflect back to the client what has been said, for example, "You were upset when he told you that."	Clarification and verification of what has been heard promotes understanding and allows client to validate information; otherwise, assumptions may be inaccurate.
Observe and describe behavior in objective terms.	All behavior has meaning, some of which is obvious and some of which needs to be identified. This is a process of educated guesswork and requires validation by the client.
Identify age and developmental level.	Age is an indicator of the stage of life client is experiencing, whether it be adolescence or middle age. However, developmental level may be more important than chronological age in anticipating and identifying some of the client's needs. Some degree of regression occurs during illness, depending on many factors, such as the normal coping skills of the individual, the severity of the illness, and family and cultural expectations.
Discuss client's view of body image and how illness or condition might affect it.	The client's perception of a change in body image may occur suddenly or over time, such as actual loss of a body part through injury or surgery, or a perceived loss, such as a heart attack; or be a continuous subtle process, such as chronic illness, eating disorders, or aging. Awareness can alert the nurse to the need for appropriate interventions tailored to the individual need.
Encourage discussion of physical changes in a simple, direct, and factual manner. Give realistic feedback and discuss future options such as rehabilitation services.	Provides opportunity to begin incorporating actual changes in an accepting and hopeful atmosphere.
Acknowledge efforts at problem-solving, resolution of current situation, and future planning.	Provides encouragement and reinforces continuation of desired behaviors.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Recognize client's pace for adaptation to demands of current situation.	Failure to acknowledge client's need to take time and/or pressuring client to "get on with it" conveys a lack of acceptance of the person as an individual and may result in feelings of lowered self-esteem.
Introduce tasks at client's level of functioning, progressing to more complex activities as tolerated.	Provides opportunity for client to experience successes, reaffirming capabilities and enhancing self-worth.
Ascertain how the client sees own role within the family system: breadwinner, homemaker, or husband or wife.	Illness may create a temporary or permanent problem in role expectations. Sexual role and how the client views self in relation to the current illness also play important parts in recovery.
Assist client and SO with clarifying expected roles and those that may need to be relinquished or altered.	Provides opportunity to identify misconceptions and begin to look at options; promotes reality orientation.
Determine client awareness of own responsibility for dealing with situation and personal growth.	Conveys confidence in client's ability to cope. When client acknowledges own part in planning and carrying out treatment plan, he or she has more investment in following through on decisions that have been made.
Assess impact of condition, surgery, or medication regimen on sexuality.	Sexuality encompasses the whole person in the total environment. Many times, problems of illness are superimposed on already existing problems of sexuality and can affect client's sense of self-worth. Some problems are more obvious than others, such as illness involving the reproductive parts of the body. Others are less obvious, such as sexual values and role in family: mother, wage earner, or single parent.
Be alert to comments and innuendos, which may mean the client has a concern in the area of sexuality.	People are often reluctant and/or embarrassed to ask direct questions about sexual or sexuality concerns.
Be aware of caregiver's feelings about dealing with the subject of sexuality.	Nurses and caregivers are often as reluctant and embarrassed in dealing with sexuality issues as most clients. (Refer to CP: Extended/Long-Term Care; ND: Sexual Dysfunction.)
<b>Collaborative</b>	
Provide information and referral to community resources.	Enables client and SO to be in contact with interested groups with access to assistive and supportive devices, services, and counseling.
Support participation in group or community activities, such as assertiveness classes, volunteer work, and support groups.	Promotes skills of coping and sense of self-worth. Provides role models and facilitates problem-solving.
Refer to psychiatric support or therapy group and social services, as indicated.	May be needed to assist client and SO to achieve optimal recovery.
Refer to appropriate resources for sexuality counseling as need indicates.	May be someone with comfort level and knowledge who is available, or it may be necessary to refer to professional resources for additional guidance and support.

## NURSING DIAGNOSIS: Grieving

### May Be Related To

Anticipatory or actual loss of significant object (e.g., parts or processes of body, status, job, home)  
Anticipatory loss of a significant other  
Death of a significant other  
Lack of social support

### Possibly Evidenced By

Alteration in activity level, sleep pattern, dream patterns  
Anger; blaming; despair  
Finding meaning in a loss  
Detachment  
Disorganization  
Psychological distress, panic behavior

(continues on page 846)

**NURSING DIAGNOSIS:** **Grieving** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Grief Resolution NOC**

Identify and express feelings freely and effectively.  
Verbalize a sense of progress toward acceptance of loss.  
Function at an acceptable level and participate in work and ADLs, as appropriate.

**ACTIONS/INTERVENTIONS****RATIONALE****Grief Work Facilitation NIC****Independent**

Provide open environment in which client feels free to realistically discuss feelings and concerns.

Therapeutic communication skills, such as active-listening, silence, being available, and acceptance, provide opportunity and encourage the client to talk freely and deal with the perceived or actual loss (Evesham, 2017).

Determine client perception and meaning of loss—current and past. Note cultural or religious factors and expectations.

Affects client's responses and needs to be acknowledged in planning care.

Identify stage of grieving and effect on functioning:

Awareness allows for appropriate choice of interventions because individuals handle grief in many different ways.

**Denial:** Be aware of avoidance behaviors, such as anger and/or withdrawal; allow client to talk about what he or she chooses, and do not try to force client to “face the facts.”

Denying the reality of diagnosis and/or prognosis is an important phase in which the client protects self from the pain and reality of the threat of loss. Each person does this in an individual manner based on previous experiences with loss and cultural or religious factors.

**Anger:** Note behaviors of withdrawal, lack of cooperation, and direct expression of anger; be alert to body language and check meaning with client, noting congruency with verbalizations; encourage, and provide opportunity for, verbalization of anger; and acknowledge feelings and set limits regarding destructive behavior.

Denial gives way to feelings of anger, rage, guilt, and resentment. Client may find it difficult to express anger directly and may feel guilty about normal feelings of anger. Although staff may have difficulty dealing with angry behaviors, acceptance allows client to work through the anger and move on to more effective coping behaviors.

**Bargaining:** Be aware of statements such as “... if God will just . . . I will do . . .” Allow verbalization without confrontation about realities.

Bargaining with care providers or God often occurs and may be helpful in beginning resolution and acceptance. Client may be working through feelings of guilt about things done or undone.

**Depression:** Give client permission to be where he or she is, provide hope within parameters of individual situation without giving false reassurance, and provide comfort and availability as well as caring for physical needs.

When client can no longer deny the reality of the loss, feelings of helplessness and hopelessness replace feelings of anger. The client needs information that this is a normal progression of feelings.

**Acceptance:** Respect client's needs and wishes for quiet, privacy, and/or talking.

Having worked through the denial, anger, and depression stages, client often prefers to be alone and may not want to talk much at this point. Client may still cling to hope, which can be sustaining through whatever is currently happening.

Active-listen to client's concerns and be available for support, as necessary.

The process of grieving does not proceed in an orderly fashion but fluctuates with various aspects of all stages present at one time or another. If process is dysfunctional or prolonged, more aggressive interventions may be required to facilitate the process.

Determine quality of interactions with others, including family members.

Although periods of withdrawal and loneliness usually accompany grieving, persistent isolation may indicate deepening depression, necessitating further evaluation and intervention. Note: Family/SO may not be dysfunctional but may be intolerant of client's behaviors.

Identify and problem-solve solutions to existing physical responses, such as eating, sleeping, activity levels, and sexual desire.

May need additional assistance to deal with the physical aspects of grieving.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess needs of SO and assist, as indicated.	Identification of problems indicating dysfunctional grieving allows for individual interventions.
Include family/SO, as appropriate, when determining future needs.	Depending on client's desires and legal requirements, choices regarding future plans (e.g., living situation, continuation of care, end-of-life decisions, funeral arrangements) can provide guidance and peace of mind.
Discuss healthy ways of dealing with difficult situation.	Provides opportunity to look toward the future and plan for family's/SO's needs (e.g., for life after loss).
<b>Collaborative</b> Refer to other resources, such as support groups, counseling, spiritual or pastoral care, and psychotherapy, as indicated.	May need additional help to resolve grief, make plans, and look toward the future.

## NURSING DIAGNOSIS: risk for impaired Religiosity

### Possibly Evidenced By

Illness; depression; suffering  
Life transitions  
Cultural/environmental barriers to practicing religion  
Ineffective support; social isolation

### Desired Outcomes/Evaluation Criteria—Client Will

#### Spiritual Health NOC

Participate in beliefs and rituals of desired religion.  
Discuss beliefs and values about spiritual or religious issues.  
Attend religious or worship services of choice as desired.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Spiritual Support NIC</b>	
<b>Independent</b>	
Listen to client's and SO's reports and expressions of anger and concern or alienation from God. Note sense of guilt or retribution.	May be suffering from severe or terminal illness or accident, straining resources and affecting client's ability to cope. Perception of guilt may cause spiritual crisis or suffering, resulting in rejection of religious activities and symbols.
Discuss differences between grief and guilt and help client to identify and deal with each. Point out consequences of actions based on guilt.	As client recognizes consequences of actions, they can be discussed, and desire to change may enhance new coping skills, avoid acting out of false guilt, and enable client to resume desired religious activities.
Use therapeutic communication skills of reflection and active-listening.	Communicates acceptance and enables client to find own solutions to concerns.
Determine sense of futility, feelings of hopelessness, and lack of motivation to help self.	Indicators that client may see no, or only limited, options or personal choices available and lack energy to deal with situation.
Assess extent of depression client may be experiencing.	Some studies suggest that a focus on religion may protect against depression (Columbia University, 2014).
Note recent changes in behavior, such as withdrawal from others and religious activities and dependence on alcohol or medications.	Helpful in determining severity and duration of situation and possible need for additional referrals, such as substance withdrawal. Lack of connectedness with self or others impairs ability to trust others or feel worthy of trust from others or God.
Suggest use of journaling and/or reminiscence.	Promotes life review. Can assist in clarifying values and ideas, recognizing and resolving feelings and situation, and identifying reasons for resuming desired religious activities.

(continues on page 848)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage client to identify SO(s) and others such as spiritual advisor or parish nurse who can provide needed support.	Ongoing support is required to enhance sense of connectedness and strengthen religious ties as desired.
<b>Religious Ritual Enhancement NIC</b>	
Identify client's religious affiliation, associated rituals, and beliefs.	Helps determine individual's needs and possible resources, if desired.
Make time for nonjudgmental discussion of philosophical issues related to religious belief patterns and customs.	Open communication can assist client to check reality of perceptions and identify personal options and willingness to resume desired activities.
Discuss desire to continue or reconnect with previous belief patterns and customs.	Enables client to identify barriers to participating in desired activities and take appropriate actions to resume them.
Involve client in refining healthcare goals and therapeutic regimen, as appropriate.	Identifies role illness is playing in current concerns about ability to or appropriateness of participating in desired religious activities.
Provide privacy for meditation, prayer, or performance of rituals, as appropriate.	Allows client to engage in spiritual activities in own way without fear of interruption or judgment of others.
Explore alternatives to, or modifications for, ritual based on setting and individual needs or limitations.	Assists client to develop new ways of expressing religious beliefs and satisfying these needs.
<b>Collaborative</b>	
Refer to spiritual resources, such as spiritual advisor—who has qualifications and experience in dealing with specific problems individual is concerned about—or to facility's chaplain or visiting clergy and parish nurse.	Provides answers to spiritual questions, assists in the journey of self-discovery, helps client learn to accept, forgive self, and engage in desired rituals.

## NURSING DIAGNOSIS: **ineffective Health Management**

### May Be Related To

Complexity of therapeutic regimen; decisional conflicts  
Economic difficulties  
Perceived barrier/benefit  
Family conflict, patterns of health care; insufficient social support

### Possibly Evidenced By

Difficulty with prescribed regimens  
Failure to include treatment regimen in daily living  
Ineffective choices in daily living for meeting health goals  
Failure to take action to reduce risk factors

### Desired Outcomes/Evaluation Criteria—Client Will

#### **Self-Management: Acute Illness [or] Chronic Disease NOC**

Participate in the development of goals and treatment plan.  
Verbalize accurate knowledge of disease, prognosis, and potential complications.  
Demonstrate behaviors or changes in lifestyle necessary to incorporate or maintain therapeutic regimen in daily life.  
Identify and use available resources.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Values Clarification NIC</b>	
<i>Independent</i>	
Review client's and SO's knowledge and understanding of the need for treatment or medication as well as consequences of actions and choices. Note ability to comprehend information, including literacy, level of education, and primary language.	Provides opportunities to clarify viewpoints or misconceptions. Verifies that client and SO have accurate and factual information with which to make informed choices.
Be aware of developmental and chronological age.	Impacts ability to understand own needs and incorporate into treatment regimen.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Determine cultural, spiritual, and health beliefs and ethical concerns.	Provides insight into thoughts and factors related to individual situation. Beliefs will affect client's perception of situation and participation in treatment regimen. Treatment may be incongruent with client's social and cultural lifestyle and perceived role/responsibilities.
<b>Self-Modification Assistance NIC</b>	
Review treatment plan with client and SO.	Provides opportunities to exchange accurate information and to clarify viewpoints or misconceptions.
Contract with client for participation in care.	Client who agrees to own responsibility is more apt to adhere to treatment plan.
Establish graduated goals or modified regimen as necessary; work out alternate solutions.	Promotes client involvement and independence; provides opportunity for compromise and may enhance cooperation with regimen. When client participates in setting goals, there is a sense of investment that encourages cooperation and willingness to follow through with the program.
Assess availability and use of support systems. Identify additional resources, as appropriate.	Access to and proper use of helpful resources can assist client in meeting treatment goals and provide purpose for living. Presence of caring, empathic family/SO(s) can help client in process of recovery.
Determine problems that may, or do, interfere with treatment, including lack of financial or personal resources or lack of availability of providers. Assess level of anxiety, locus of control, and sense of powerlessness.	Many factors may be involved in behavior that is disruptive to the treatment regimen, such as fear of hospitalization or treatment, denial of situation consequences, suspicion about healthcare system, and physical factors such as pain, hypoxemia, and chemical imbalance.
Note length of illness and prognosis.	Clients tend to become passive and dependent in long-term, debilitating illness.
Active-listen client's reports and comments	Conveys message of concern and belief in individual's capabilities to resolve situation in positive manner.
Develop a system for self-monitoring. Share data pertinent to client's condition such as laboratory results or blood pressure (BP) readings.	Provides a sense of control; enables client to follow own progress and make informed choices.
Have same personnel care for client as much as possible.	Enables relationship to develop in which the client can begin to trust and participate in care and may be willing to give up smoking or other negative behaviors.
Accept client's choice or point of view even if it appears to be self-destructive, such as a decision to continue smoking.	Client has the right to make own decisions, and acceptance may give a sense of control, which can help client look more clearly at consequences. Confrontation is not beneficial and may actually be detrimental to future cooperation and goal achievement. Negative feelings regarding these choices may create power struggles and be expressed in judgmental behaviors that block or interfere with client's wishes, comfort, and/or care. Note: If resolution cannot be found, providers have the right to terminate their services with appropriate notice.
Be aware of own and caregiver's response to client's treatment choices such as refusal of blood or chemotherapy and living will or advance directive choices.	

### NURSING DIAGNOSIS: risk for self- or other-directed Violence

#### Possibly Evidenced By

Physical health issue; neurological impairment; alteration in cognitive functioning  
 Mental health issue (e.g., depression)  
 Employment concern; insufficient personal resources  
 Impulsivity; history of violence; suicidal behavior

(continues on page 850)

**NURSING DIAGNOSIS:** risk for self- or other-directed Violence**Desired Outcomes/Evaluation Criteria—Client Will****Impulse Self-Control NOC**

Acknowledge realities of the situation.

Verbalize understanding of reason(s) for behavior/precipitating factors.

Reports absence of thoughts of violence or suicidal ideation.

**Agitation Level NOC**

Demonstrate self-control, as evidenced by relaxed posture and nonviolent behavior.

**ACTIONS/INTERVENTIONS****RATIONALE****Mood Management NIC****Independent**

Observe for early signs of distress and investigate possible causes.

Irritability, pacing, shouting or cursing, lack of cooperation, and demanding behavior may all be signs of increasing anxiety or indicate change in health status of confused client that requires further evaluation.

Identify conditions that may interfere with ability to control own behavior.

Acute or chronic brain syndrome, drug-induced or post-surgical confusion may precipitate violent behavior that is difficult to control.

Assume that the client has control and is responsible for own behavior.

Often enables the individual to exercise control. Note: When violent behavior is the result of drug use, client may not be able to respond appropriately.

Remain calm and state limits on behavior in a firm manner. Be truthful and nonjudgmental.

Understanding that helplessness and fear underlie this behavior aids in choosing appropriate response.

Accept client's anger without reacting on an emotional basis.

Responding with anger is not helpful in resolving the situation and may result in escalating client's behavior. Anger is usually not directed at the nurse but at the situation and feelings of powerlessness.

Maintain straightforward communication and assist client to learn assertive rather than manipulative, nonassertive, or aggressive behavior.

Avoids reinforcing manipulative behavior and enhances positive interactions with others, accomplishing the goal of getting needs met in acceptable ways.

Help client identify more adequate solutions and behaviors such as motor activities or exercise. Redirect and provide directions for actions client can take.

Promotes release of energies in acceptable ways. Redirecting confused client can minimize escalation of agitation. (Refer to CP: Dementia of the Alzheimer's Type/Vascular Dementia.)

Give as much autonomy as is possible in the situation.

Enhances feelings of power and control in a situation in which many things are not within individual's control.

Monitor for suicidal or homicidal ideation, for example, morbid or anxious feelings while with the client; thoughts expressed by, or warning from, the client, "It doesn't matter, I'd be better off dead"; mood swings, putting affairs in order, and previous suicide attempt.

Indicators of need for further assessment and intervention or psychiatric care.

Assess suicidal intent (scale of 1 to 10) by asking directly if client is thinking of killing self, has plan, means, and so on.

Provides guidelines for necessity and urgency of interventions. Direct questioning is most helpful when done in a caring, concerned manner.

Acknowledge reality of suicide or homicide as an option. Discuss consequences of actions if client were to follow through on intent. Ask how it will help client resolve problems.

Client may focus on suicide, or possibly homicide, as the "only" option, and this response provides an opening to look at and discuss other options. Note: Be aware of own responsibility under Tarasoff's rule to warn possible victim(s) when client is expressing homicidal ideation. (Under Tarasoff's rule, the counselor/care provider has a legal responsibility to notify a third party of a credible threat made by the client.) (Tarasoff v. Regents of the University of California—17 Cal.3d 425 [1976]).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Environmental Management: Violence Prevention NIC</b> Provide protection within the environment such as constant observation and removal of objects that might be used to harm self and others.	May need more structure to maintain control until own internal locus of control is regained.
Tell client to stop.	May be sufficient to help client control own actions if exhibiting hostile actions. Note: Client is often afraid of own actions and wants staff to set limits.
Use an organized team approach when necessary to subdue client with force. Tell client clearly and concisely what is happening.	Knowing and practicing these actions before they are needed helps prevent untoward problems. Keeping client informed can help client to regain internal control.
Hold client; place in restraints or seclusion if necessary. Do so in a calm, positive, nonstimulating, and nonpunitive manner.	As a last resort, physical restraint may be necessary while the client regains control. Note: These measures are meant to protect client, not punish the behavior.
Apply and adjust restraint devices properly.	It is important to maintain body alignment and client safety and comfort.
Document precise reason for restraints, actions taken, and doctor's order. Check restraints frequently per facility protocol, each time documenting the condition and how long the restraints are used.	Restraints are to be used for very specific reasons, which need to be clearly documented to avoid overuse or misuse and to ensure client safety.
<b>Collaborative</b> Administer medications, such as antianxiety or antipsychotic agents, sedatives, and narcotics, as appropriate.	May be indicated to quiet or control behavior. Note: May need to be withheld if they are suspected to be the cause of, or contribute to, the behavior.
Refer to psychiatric resource(s): psychiatric clinical nurse specialist, psychiatrist, psychologist, social worker.	More in-depth assistance may be needed to deal with client and defuse situation. Learning new ways to deal with feelings can provide opportunity for individual to manage life in a more optimal way.
Encourage participation in classes such as anger management. Discuss what client is learning about dealing with anger.	Attending class helps individual to learn positive ways to handle anger instead of usual acting out.

## DEMENTIAS—ALZHEIMER'S TYPE/VASCULAR DEMENTIA/LEWY BODY DISEASE/FRONTOTEMPORAL DEMENTIA

### I. Pathophysiology (Alzheimer's Association, 2017; Nelson-Marsh, 2005)

- a. Cognitive disorder characterized by impaired memory, language, thinking, and perception
- b. Alzheimer's, vascular, and Lewy body dementias are irreversible and share common symptomology and therapeutic intervention.
- c. Criteria for dementia diagnosis
  - i. Decline in memory and at least one of the following cognitive abilities:
    1. Coherent speech, understand spoken or written language
    2. Recognize or identify objects, assuming intact sensory function
    3. Execute motor activities, assuming intact motor abilities, sensory function, and comprehension of the required task
    4. Abstract thinking, make sound judgments, plan, and carry out complex tasks
  - ii. Decline in cognitive abilities must be severe enough to interfere with daily life.

### II. Classification

- a. Dementia of the Alzheimer's type (DAT) (Alzheimer's Association, 2017; Hausman, 2006; Nelson-Marsh, 2005; Trahan et al, 2011)
  - i. Accounts for 60% to 80% of dementia diagnoses
  - ii. The three stages of Alzheimer's disease identified in the 2011 criteria and guidelines are (1) preclinical Alzheimer's disease, (2) mild cognitive impairment (MCI) due to Alzheimer's disease, and (3) dementia due to Alzheimer's disease.
    1. Characterized by structural and chemical changes in the brain, causing a steady and global decline in function
    2. Degenerative process occurring primarily in the cells located at the base of the forebrain that sends information to the cerebral cortex and hippocampus
    3. Decrease in acetylcholine production reduces the amount of neurotransmitter released to cells in the cortex, hippocampus, and nucleus basalis, resulting in a disruption of memory processes.

(continues on page 852)

4. Enzyme required to produce acetylcholine is dramatically reduced, especially in the area of the brain where neuritic plaques and neurofibrillary tangles occur in the greatest numbers.
  5. Formation of plaques composed of beta-amyloid and tangles appears to be related to the cholesterol transporting protein apolipoprotein-E (ApoE).
- b. Vascular dementia**
- i. Vascular dementia accounts for 17% of cases.
  - ii. Referred to as multi-infarct, poststroke dementia, or vascular cognitive impairment, resulting in decreased blood flow to parts of the brain
  - iii. Multiple infarcts to various areas of the brain result in a pattern of intermittent deterioration determined by the area of the brain that is affected.
- c. Lewy body disease (Lewy Body Dementia Association [LBDA], 2012; Mayo Clinic Staff, 2017; National Institute of Neurological Disorders and Stroke [NINDS], 2018)**
- i. Umbrella term for two related diagnoses, Parkinson's disease dementia (PDD) and dementia with Lewy bodies (DLB)
  - ii. Lewy body diseases (LBDs) are the second most common type of progressive dementia after Alzheimer's.
  - iii. Protein bodies (alpha synuclein) develop in nerve cells in the areas of the brain involved with thinking, memory, and movement.
  - iv. Differentiated from Alzheimer's disease or other nonsynucleinopathies by the diagnosis of REM sleep behavior disorder (RBD)
  - v. The central feature of DLB is progressive cognitive decline, combined with three additional defining features: (1) pronounced fluctuations in alertness and attention, (2) recurrent visual hallucinations, and (3) parkinsonian-type motor symptoms, such as rigidity and the loss of spontaneous movement.
- d. Frontotemporal dementia (Alzheimer's Association, 2017)**
- i. A group of disorders that cause progressive nerve cell loss in the frontal and temporal lobes of the brain
  - ii. Behavior variant frontotemporal dementia (FTD) is characterized by prominent changes in personality, interpersonal relationships, and conduct with nerve cell loss prominent in areas controlling conduct, judgment, foresight, and empathy for others. Often occurs in people in their 50s and 60s but can develop as early as their 20s or as late as their 80s.
  - iii. Primary progressive aphasia (PPA) is the other major form of frontotemporal degeneration more limited to the left hemisphere of the brain affecting speaking, writing, or comprehension.
  - iv. Prevalence of both FTD and PPA in the 45- to 65-year age range is nearly as common as younger-onset Alzheimer's disease
- III. Etiology**
- a. DAT: Exact cause unknown; most likely due to multiple factors rather than a single cause (Alzheimer's Association, 2017)
- i. Lifelong process—Incidence increases with longevity, and changes in the brain may develop decades before the onset of dementia.
  - ii. Genetics—familial pattern four times greater than general population (Nelson-Marsh, 2005)
1. Familial or early-onset Alzheimer's is linked to defects on genes on chromosome 1, 14, or 21, with some families exhibiting a pattern of inheritance suggesting possible autosomal dominant gene transmission (Lakhan, 2018).
2. Down syndrome: presents with an extra chromosome 21; may have a relationship to Alzheimer's disease
- A. At autopsy, both disorders have many of the same pathophysiological changes.
  - B. High percentage of individuals with Down syndrome who survive to adulthood develop Alzheimer's lesions by late 40s or early 50s (Alvarez, 2016).
3. Studies suggest that autoantibodies are produced in the brain, reflecting a possible alteration in the body's immune system.
- iii. Known risk factors: age and genetics. Familial Alzheimer's is a rare form of early onset disease and is known to be caused by mutations on one of three chromosomes: 1, 14, and 21 (Benetti, 2012).
- iv. Proposed risk factors: Studies to date have not confirmed causal relationship; however, various factors that have been suggested include cardiovascular disease, type 2 diabetes, and oxidative damage. Inflammation occurs as protein plaques appear, but it is not known whether inflammation is a cause or result. Other factors that may contribute are prior severe head trauma, low educational level, and female gender. Aluminum has been disproven as a cause.
- b. Vascular dementia**
- i. Predisposing factors: Various diseases and conditions that interfere with blood circulation, including cerebral and systemic vascular disease, hypertension, cerebral hypoxia, hypoglycemia, cerebral embolism, and severe head injury. Sometimes called "mixed dementia" (Mayo Clinic Staff, 2018).
- c. Frontotemporal dementia**
- i. Only known risk factor is family history, accounting for approximately 33% of cases, autosomal dominant linked to chromosome 17 (tau gene) and chromosome 3.
- IV. Statistics (Alzheimer's Association, 2017; Centers for Disease Control and Prevention [CDC], 2017)**
- a. Morbidity: In 2013, an estimated 5.2 million people in the United States were living with Alzheimer's disease. Current statistics suggest one in nine adults aged 65 and older are affected, with one in three age 85 or older affected (Atkinson, 2016). By 2025, the number of people age 65 and older with Alzheimer's disease is estimated to reach 7.1 million.
- b. Mortality: DAT is the sixth-leading cause of death and the fifth leading cause of death for people age 65 and older. In 2015, 110,561 Americans died, the most recent year for which final data are available (CDC, 2017).
- c. Cost: In 2017, the estimated cost of caring for Americans with Alzheimer's and other dementias was \$277 billion—and that doesn't include unpaid caregiving. Also, in 2017, more than 16 million Americans provided about 18.4 billion hours of unpaid care to Alzheimer's patients, worth \$232 billion. Total payments for healthcare, long-term care, and hospice for people with Alzheimer's and other dementias are projected to increase from \$277 billion in 2017 to \$1.1 trillion in 2050 (Alzheimer's Association, 2018).

## G L O S S A R Y

**Apolipoprotein-E (ApoE):** Lipoprotein with three isoforms with the ApoE<sub>4</sub> variant associated with an earlier-than-average age of onset for the common form of Alzheimer's disease.

**Amyloid plaque:** Buildup of amyloid protein and a primary hallmark of Alzheimer's disease.

**Atrophy:** Wasting or a decrease in the size of an organ or tissue.

**Beta-amyloid:** Insoluble protein that is an abnormal breakdown product of the cell membrane constituent amyloid precursor protein (APP) and is a component of the neurofibrillary tangles and plaques characteristic of Alzheimer's disease.

**Catastrophic reactions:** Extreme outbursts of emotion, most often anger or agitation. Also called "challenging behaviors," "disruptive behaviors," "behavioral symptoms related to dementia," "Alzheimer's behaviors," "behavioral issues," "behavioral and psychological symptoms of dementia" (BPSD).

**Emotional lability:** Excessive emotional reactivity associated with frequent changes or swings in emotions or mood.

**Hippocampus:** Part of the limbic system of the brain and one of several structures involved with emotion, memory, and learning.

**Hypermetamorphosis:** Compulsive exploration of environment, including touching.

**Hyperorality:** Consists of unexplained movements of the mouth and tongue and the act of placing nonfood items in the mouth.

**Lewy bodies:** Abnormal protein deposits that disrupt the brain's normal functioning, found in an area of the brain-stem where they deplete the neurotransmitter dopamine. In Lewy body disease, these abnormal proteins are diffuse throughout other areas of the brain, including the cerebral cortex. The brain chemical acetylcholine is depleted, causing disruption of perception, thinking, and behavior.

**Neuritic plaques:** Extracellular abnormalities composed of beta-amyloid in the gray matter of the brain.

**Neurofibrillary tangles:** Masses of fine fibrous elements found in cytoplasm signaling an abnormality of the hippocampus and neurons of the cerebral cortex that occurs especially in Alzheimer's disease. Classic finding at autopsy in the brain of client with DAT.

**Proprioception:** Awareness of posture, movement, changes in equilibrium, and the knowledge of position, weight, and resistance of objects in relation to the body.

**Sundowner's syndrome (also called sundowning syndrome):** Increased restlessness, wandering, aggression, or exacerbation of behavioral symptoms of Alzheimer's disease in the afternoon and evening.

**Synucleinopathies:** Alpha-synuclein is the primary structural component of Lewy body fibrils. It is an unstructured soluble protein that mutates in pathological conditions characterized by Lewy bodies, such as Parkinson's disease, dementia with Lewy bodies, and multiple system atrophy. These disorders are known as synucleinopathies (Arima et al, 1999).

**Tau:** Protein that channels chemical messages inside nerve cells.

## CARE SETTING

Client is cared for primarily in the home or assisted living/extended care; however, inpatient care may be required for treatment of other health problems.

## RELATED CONCERNS

Palliative/end-of-life care—hospice, page 970  
 Extended/long-term care, page 896  
 Pneumonia, page 147  
 Psychosocial aspects of care, page 835  
 Sepsis/septic shock, page 772  
 Total nutritional support: parenteral/enteral feeding, page 525

## CLIENT ASSESSMENT DATABASE

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Feeling tired
- Decreased interest in usual activities, hobbies; inability to recall what is read or follow plot of television program
- Forced to retire from work

### MAY EXHIBIT

- Day-night reversal
- Wakefulness disturbance of sleep rhythms
- Lethargy
- Impaired motor skills
- Inability to carry out familiar, purposeful movements
- Content sitting and watching others

(continues on page 854)

**CLIENT ASSESSMENT DATABASE (contd.)****MAY REPORT (continued)****MAY EXHIBIT (continued)**

- Repetitive motions, such as folding, unfolding, refolding linen
- Wandering

**CIRCULATION**

- History of systemic vascular disease, cerebral vascular disease, hypertension, embolic episodes (may be predisposing factors)

**EGO INTEGRITY**

- Anxiety, depression—usually during early stages related to the knowledge that cognitive abilities are deteriorating
- Multiple losses, such as changes in body image and self-esteem
  - Inconsistent behavior
  - Verbal and nonverbal communication and behavior may be incongruent
  - Suspicious or fearful of imaginary people and situations
  - May cling to significant others SO(s)
  - Misperception of environment, misidentification of objects and people
  - Hoarding objects
  - Belief that misplaced objects are stolen
  - Emotional lability—may cry easily or laugh inappropriately
  - Variable mood changes, such as apathy, lethargy, restlessness, short attention span, or irritability
  - Catastrophic reactions
  - May deny significance of early changes and symptoms, especially cognitive changes
  - May conceal limitations, such as make excuses for not being able to perform tasks, redirect conversation, or avoid direct answers to questions
  - Feelings of helplessness; strong, depressive overlay; delusions; or paranoia

**ELIMINATION**

- Incontinence
- Diarrhea—related to impaction

**FOOD/FLUID**

- Changes in taste, appetite
- Denial of hunger, refusal to eat—may be trying to conceal lost skills

- Hypoglycemic episodes—predisposing factor
- Lack of interest in or forgetting mealtimes
- Dependence on others for food cooking and preparation at table, feeding, or using utensils
- Loss of ability to chew—silent aspiration concerns
- Weight loss
- Decreased muscle mass; emaciation in advanced stage

**HYGIENE**

- Dependence on others to meet basic hygiene needs

- Disheveled, unkempt appearance
- Body odor
- Poor personal habits
- Inappropriate clothing for situation or weather conditions
- Misinterpretation of, or ignoring, internal cues
- Forgetting steps involved in toileting self or inability to find the bathroom

**NEUROSENSORY**

- Family members may report a gradual decrease in cognitive abilities, impaired judgment, or inappropriate decisions; impaired recent memory but good remote memory; behavioral changes and altered or exaggerated individual personality traits

- Concealing abilities, may make excuses not to perform task or may thumb through a book without actually reading
- Loss of proprioception
- Primitive reflexes such as positive snout, suck, and palmar reflexes may be present

**MAY REPORT (continued)****SAFETY**

- Predisposing or factors that may accelerate the condition, such as a history of recent viral illness or serious head trauma, drug toxicity, stress, or nutritional deficits
- Incidental trauma such as falls or burns

**SOCIAL INTERACTIONS**

- Difficulty in relating to others
- Fragmented speech, aphasia, and dysphasia
- Demonstrates inappropriate behavior and ignores rules of social conduct
- Behavioral pattern alterations related to prior psychosocial factors and individuality and personality
- Family roles possibly altered/reversed as individual becomes more dependent

**TEACHING/LEARNING**

- Family history of DAT
- May present a total healthy picture, with exception of memory or behavioral changes
- Use or misuse of medications, over-the-counter (OTC) drugs, including alcohol
- Difficulty managing medications

**DISCHARGE PLAN CONSIDERATIONS**

- May require support and legal services, financial assistance, caregiver support groups, respite and home health care
- ◆ Following inpatient acute care, refer to underlying condition requiring admission for postdischarge considerations.

**MAY EXHIBIT (continued)**

- Facial signs or symptoms dependent on degree of vascular insults
- Seizure activity secondary to associated brain damage
- Disorientation to time initially then place; usually oriented to person until late in disease process
- Impaired recent memory, progressive loss of remote memory
- May change answers during the interview
- Difficulty in comprehension, abstract thinking
- Unable to do simple calculations or repeat the names of three objects; short attention span
- Hallucinations, delusions, severe depression, or mania may occur in advanced stage
- May have impaired communication—difficulty finding correct words, especially nouns; conversation repetitive or scattered with substituted meaningless words; speech may become inaudible; gradually loses ability to write or read

## DIAGNOSTIC STUDIES

Although no diagnostic studies are specific for Alzheimer's disease, these studies are used to rule out reversible problems that may be confused with these types of dementia.

TEST WHY IT IS DONE	WHAT IT TELLS ME
<b>DIAGNOSTIC STUDIES</b>	
• <b>Neurological mental status examination:</b> The client is asked to perform maneuvers or answer questions that are designed to elicit information about the condition of specific parts of the brain or peripheral nerves. Testing assesses mental status and alertness, muscle strength, reflexes, sensory perception, language skills, and coordination.	Many tests may be administered to evaluate client's brain functioning, each measuring a different aspect. One such test, the 7-minute screen (7MS), appears to be highly sensitive to Alzheimer's disease by differentiating between cognitive changes related to the normal aging process and those related to Alzheimer's disease (Solomon et al, 1998).
• <b>Electroencephalogram (EEG):</b> Measures electrical activity of the brain.	May reveal slow-wave delta activity indicative of later stages of Alzheimer's disease. May also reveal focal vascular lesions associated with vascular dementia.
• <b>Skull x-rays:</b> Determine presence of structural injury.	Usually normal but may reveal signs of head trauma.
• <b>Positron emission tomography (PET) scan:</b> Three-dimensional, computer-enhanced, full-color image of the brain.	Traces a positron-emitting chemical that binds effectively to abnormal protein plaques and tangles, thus detecting these Alzheimer markers.
• <b>Computed tomography (CT) or CAT scan:</b> X-ray procedure that uses a computer to produce a detailed picture of a cross section of the brain.	May show widening of ventricles or cerebral atrophy. These studies are also used to rule out other central nervous system (CNS) disease.
• <b>Single photon emission computed tomography (SPECT) scan:</b> Three-dimensional scan mapping blood flow in certain areas of the brain.	Can reveal abnormalities of oxygen uptake as well as levels of acetylcholine characteristic of Alzheimer's disease.
• <b>Cerebrospinal fluid (CSF):</b> Fluid produced within the brain, which surrounds the brain and spinal cord. Samples are obtained by means of lumbar puncture and evaluated for abnormal proteins.	Evidence supports that some cases of mild cognitive impairment may be an early form of Alzheimer's disease. Individuals likely to progress can be identified by measuring A $\beta$ 42, T-tau, and P-tau in the CSF (Kang et al, 2013).

## NURSING PRIORITIES

1. Provide safe environment and prevent injury.
2. Promote socially acceptable responses and limit inappropriate behavior.
3. Maintain reality orientation and prevent sensory deprivation or overload.
4. Encourage participation in self-care within individual abilities.
5. Promote coping mechanisms of client/SO(s).
6. Support client and family in grieving process.
7. Provide information about disease process, prognosis, and resources available for assistance.

## DISCHARGE GOALS

Not indicated in home or community setting. Following inpatient care, based on underlying condition requiring admission.

### NURSING DIAGNOSIS: risk for Injury

#### Possibly Evidenced by

Alteration in cognitive/psychomotor function

#### Desired Outcomes/Evaluation Criteria—Family/Caregiver(s) Will

#### Safe Home Environment NOC

Identify and correct environmental factors that increase risk of injury to client.

**NURSING DIAGNOSIS:** **risk for Injury** (continued)**Client Will****Physical Injury Severity NOC**

Be free of injury.

**Safe Wandering NOC**

Ambulate freely in environment without harm to self or others.

Accept redirection from unsafe activities.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Environmental Management: Safety NIC</b>	
<i>Independent</i>	
Assess degree of impairment in ability and competence and presence of impulsive behavior.	Identifies potential risks in the environment and heightens awareness of risks so caregivers are more alert to dangers. Clients demonstrating impulsive behavior are at increased risk of injury because they are less able to control their own behavior/actions.
Assist caregiver to identify any risks or potential hazards and visual-perceptual deficits that may be present.	Visual-perceptual deficits increase the risk of falls.
Eliminate or minimize identified hazards in the environment.	A person with cognitive impairment and perceptual disturbances is prone to accidental injury because of the inability to take responsibility for basic safety needs or to evaluate the unforeseen consequences, such as lighting a stove or cigarette and forgetting about it, mistaking plastic fruit for the real thing and eating it, or misjudging distance involving chairs and stairs. Preventive measures can contain client without constant supervision. Activities promote involvement and keep client occupied.
Lock outside doors as appropriate, especially in evening and night. Do not allow access to stairwell or exit. Provide supervision and activities for client who is regularly awake during the night. Recommend use of "childproof locks"; secure such items as medications, cleaning products, poisonous substances, tools, and sharp objects. Remove stove knobs and burners.	As the disease worsens, the client may compulsively handle or fidget with objects, including locks, or put small items in mouth, which potentiates possibility of accidental injury and death.
<b>Dementia Management NIC</b>	
Monitor behavior routinely; note timing of behavioral changes, increasing confusion, and hyperactivity. Initiate least restrictive interventions before behavior escalates.	Early identification of negative behaviors with appropriate action can prevent need for more stringent measures. Note: Sundowner's syndrome develops in late afternoon or early evening, requiring programmed interventions and closer monitoring at this time to redirect and protect client.
Distract or redirect client's attention when behavior is agitated or dangerous, for example, climbing out of bed. Place bed in low position and mattress on floor, as indicated.	Maintains safety while avoiding a confrontation that could escalate behavior or increase risk of injury.
Obtain and have client wear identification jewelry, such as bracelet or necklace showing name, phone number, and diagnosis.	Facilitates safe return of client if lost. Because of poor verbal ability and confusion, these persons may be unable to state name, address, and phone number. Client may wander, exhibit poor judgment, and be detained by police, appearing confused, irritable, or having violent outbursts.
Dress according to physical environment and individual need.	The general slowing of metabolic processes results in lowered body heat. The hypothalamic gland may be affected by the disease process or by aging, causing client to feel cold. Client may have seasonal disorientation and may wander out in the cold. Note: Leading causes of death in these clients include pneumonia and accidents (Neergard, 2013).

(continues on page 858)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Be attentive to nonverbal physiological symptoms.	Because of sensory loss and language dysfunction, client may express needs nonverbally such as thirst by panting and pain by sweating or doubling over. Note: Wandering may be a coping mechanism as client seeks a change in environment if too hot or cold, bored, or overstimulated, or searches for food or relief from discomfort.
Be alert to underlying meaning of verbal statements.	May direct a question to another, such as, "Are you cold or tired?" meaning client is cold or tired.
Monitor for medication side effects and signs of overmedication—extrapyramidal signs, orthostatic hypotension, visual disturbances, and gastrointestinal (GI) upsets.	Client may not be able to report signs or symptoms, and drugs can easily build up to toxic levels in the elderly. Dosages or drug choice may need to be altered.
Provide quiet room and reduced activity.	Overstimulation increases irritability and agitation, which can escalate to violent outbursts.
Avoid use of restraints. Have SO or others stay with client during periods of acute agitation.	Endangers the individual who succeeds in partial removal of restraints. May increase agitation and potentiate fall risk and fractures in the elderly.
<b>Collaborative</b>	
Administer medications as appropriate, such as:	
Risperidone (Risperdal), olanzapine (Zyprexa), quetiapine (Seroquel), or ziprasidone (Geodon), memantine (Namenda), galantamine (Razadyne), rivastigmine (Exelon), donepezil (Aricept)	Some antipsychotics are favored to control agitation, aggression, hallucinations, thought disturbances, and wandering because of their lower propensity to cause anticholinergic and extrapyramidal side effects. Note: May help moderate "sundowning," a condition related to deterioration of the hypothalamus, which controls the sleep-wake cycle. Other drugs, such as rivastigmine (Exelon) and donepezil (Aricept), prevent the breakdown of acetylcholine in the brain.

## NURSING DIAGNOSIS: chronic Confusion

### May Be Related To

Alzheimer's disease; multi-infarct dementia  
Head injury; cerebral vascular attack

### Possibly Evidenced By

Alteration in interpretation or response to stimuli  
Alteration in personality; impaired social functioning  
Progressive alteration in cognitive function  
Organic brain disorder

### Desired Outcomes/Evaluation Criteria—Client Will

#### Dementia Level NOC

Experience a decrease in level of frustration, especially when participating in daily activities.

#### Family/Caregiver Will

#### Caregiver Performance: Direct Care NOC

Verbalize understanding of disease process and client's needs.  
Identify and participate in interventions to deal effectively with situation.  
Provide for maximal independence while meeting safety needs of client.  
Initiate behaviors or lifestyle changes to maximize client's cognitive functioning.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Dementia Management NIC</b>	
<b>Independent</b>	
Assess degree of cognitive impairment, including changes in orientation to person, place, and time and attention span and thinking ability. Talk with SO and caregiver about changes from usual behavior and length of time problem has existed.	Provides baseline for future evaluation and comparison and influences choice of interventions. Note: Repeated evaluation of orientation may actually heighten negative responses and client's level of frustration.
Maintain a pleasant, quiet environment.	Reduces distorted input, whereas crowds, clutter, and noise generate sensory overload that stresses the impaired neurons.
Approach in a slow, calm manner.	This nonverbal gesture lessens the chance of misinterpretation and potential agitation. Hurried approaches can startle and threaten the confused client who misinterprets or feels threatened by imaginary people and/or situations.
Face the individual when conversing.	Maintains reality, expresses interest, and arouses attention, particularly in persons with perceptual disturbances.
Address client by name.	Names form our self-identity and establish reality and individual recognition. Client may respond to own name long after failing to recognize family or caregiver.
Use lower voice register and speak slowly to client.	Increases the chance for comprehension. High-pitched, loud tones convey stress and anger, which may trigger memory of previous confrontations and provoke an angry response.
Give simple directions, one at a time, or step-by-step instructions, using short words and simple sentences.	As the disease progresses, the communication centers in the brain become impaired, hindering the individual's ability to process and comprehend complex messages. Simplicity is the key to communicating, both verbally and nonverbally, with the cognitively impaired person.
Pause between phrases or questions.	Invites a verbal response and may increase comprehension.
Give hints and use open-ended phrases when possible.	Hints stimulate communication and give the person a chance for a positive experience.
Listen with regard despite content of client's speech.	Conveys interest and worth to the individual.
Interpret statements, meanings, and words. If possible, supply the correct word.	Assisting the client with word processing aids in decreasing frustration.
Reduce provocative stimuli, such as negative criticism, arguments, and confrontations.	Any provocation decreases self-esteem and may be interpreted as a threat, which may trigger agitation or increase inappropriate behavior.
Use distraction. Talk about real people and real events when client begins ruminating about false ideas, unless talking realistically increases anxiety or agitation.	Rumination promotes disorientation. Reality orientation increases client's sense of reality, self-worth, and personal dignity.
Change the subject if current topic increases anxiety or agitation.	Enables the client to focus on another topic and decreases anxiety.
Refrain from forcing activities and communications.	Force decreases cooperation and may increase suspiciousness and delusions.
Change activity if client loses interest in present activity.	Changing activity maintains interest and reduces restlessness and possibility of confrontation.
Use humor with interactions.	Laughter can assist in communication.
Focus on appropriate behavior. Give verbal feedback and positive reinforcement such as a pat on the back or applause. Use touch judiciously and respect individual's personal space and response.	Reinforces correctness and appropriate behavior. A focus on inappropriate behavior can encourage repetition. Although touch frequently transcends verbal interchange and conveys warmth and acceptance, the individual may misinterpret the meaning of touch. Intrusion into personal space may be interpreted as threatening because of the client's distorted perceptions.

(continues on page 860)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Respect individuality and evaluate individual needs.	Persons experiencing a cognitive decline deserve respect, dignity, and recognition of worth as an individual. Client's past and background are important in maintaining self-concept, planning activities, and communication.
Allow personal belongings.	Familiarity enhances security, sense of self, and decreases feelings of loss and deprivation.
Permit hoarding of safe objects.	This activity may preserve security and counterbalances irrevocable losses.
Create simple, noncompetitive activities paced to the individual's abilities. Provide entertaining, memory-stimulating music, videos, and TV programs. Engage in old hobbies and preferred activities, such as arts and crafts, music, supervised cooking, gardening, and spiritual programs.	Motivates client in ways that will reinforce usefulness and self-worth and stimulate reality.
Make useful activities or jobs out of hoarding and repetitive motions, such as collecting junk mail, creating scrapbook, folding and unfolding linen, bouncing balls, dusting, or sweeping floors.	May decrease restlessness and provide option for pleasurable activity. Having a "job" helps client feel useful.
Provide several drawers or baskets that are acceptable to rummage through. Fill with safe items that would be of interest to client, such as yarn balls, quilt blocks, fabrics with different textures and colors, baby clothes, pictures, costume jewelry (without pins), small tools, or sports magazines.	Availability of this kind of assortment provides stimulation that enhances the sense and promotes memories of past life experiences.
Help client find misplaced items; label drawers and belongings. Do not challenge client.	May decrease defensiveness when client believes he or she is being accused of stealing a misplaced, hoarded, or hidden item. To refute the accusation will not change the belief and may invite anger.
Monitor phone use closely. Post significant phone numbers in prominent place and secure long-distance numbers.	Can be used as reality orientation. However, client may forget time of day when making calls or may try to call dead relative. Impaired judgment does not allow for distinguishing long-distance numbers and makes client easy prey for phone sales pitches.
Evaluate sleep and rest pattern and adequacy. Note lethargy, increasing irritability or confusion, frequent yawning, and dark circles under eyes.	Lack of sleep can impair cognitive function and coping abilities. Fatigue may increase severity of symptoms, especially as evening approaches. (Refer to ND: disturbed Sleep Pattern.)
Monitor for medication side effects and signs of overmedication.	Drugs can easily build up to toxic levels in the elderly, aggravating confusion. Dosages or drug choice may need to be altered.
<b>Collaborative</b>	
Administer medications, as individually indicated, for example:	
Acetylcholinesterase (AChE) inhibitors, such as donepezil (Aricept), rivastigmine (Exelon), or galantamine (Razadyne)	Cholinesterase inhibitors prevent the breakdown of acetylcholine, a chemical messenger important for learning and memory. These Food and Drug Administration (FDA)-approved medications are being used for the treatment of mild to moderate cognitive impairment by delaying progression of symptoms in Alzheimer's disease (Atkinson, 2016).
N-methyl-D-aspartate (NMDA) inhibitors, such as memantine (Namenda, Axura)	This class of drugs works by regulating the activity of glutamate, a different messenger chemical involved in learning and memory. This medication is also FDA approved for treatment of moderate to severe Alzheimer's disease. It slows the progression of the disease and has been shown to improve cognitive and physical abilities in the later stages of the disease (Atkinson, 2016).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Antipsychotic agents, such as aripiprazole (Abilify), clozapine (Clozari), haloperidol (Haldol), quetiapine (Seroquel), or ziprasidone (Geodon)	Psychotic symptoms, such as hallucinations, delusions, aggression, agitation, and hostility, may respond to neuroleptic management in most clients with dementia.
Anxiolytic agents, such as buspirone (BuSpar), lorazepam (Ativan), or oxazepam (Serax)	These drugs may be useful for management of anxiety, restlessness, verbally disruptive behavior, and resistance.
Investigational drugs approved for other uses, for example, nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen (Motrin), estrogen, Ginkgo biloba, vitamin E, selegiline (Eldepryl), and prednisone	These drugs are being studied for possible benefit of treatment or for delaying the onset and progression of DAT (National Institute on Aging [NIA], 2018).
Refer to therapist for personal cognitive rehabilitation therapy.	Identifying individual's goals for improvement and developing specific strategies has been found to assist some clients with early stage dementia to maintain function (Kudlicka et al, 2017).

### NURSING DIAGNOSIS: [disturbed Sensory Perception (specify)]

#### May Be Related To

Altered sensory reception or integration  
Biochemical/electrolyte imbalance  
Excessive/insufficient environment stimuli

#### Possibly Evidenced By

Change in usual response to stimuli; change in behavior pattern  
Restlessness; irritability; disorientation  
Change in sensory acuity; hallucinations  
Impaired communication

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Sensory Function Status NOC

Demonstrate improved or appropriate response to stimuli.

#### Caregivers Will

##### Risk Control NOC

Identify and control external factors that contribute to alterations in sensory and/or perceptual abilities.  
Assist client to identify real items in their environment.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Reality Orientation NIC</b>	
<i>Independent</i>	
Assess degree of impairment and how it affects the individual, including hearing or visual deficits.	Although brain involvement is usually global, a small percentage of clients may exhibit asymmetrical involvement, which may cause unilateral neglect. Client may not be able to access internal cues, recognize hunger or thirst, perceive external pain, or locate body within the environment.
Encourage use of corrective lenses and hearing aids, as appropriate.	May enhance sensory input and limit or reduce misinterpretation of stimuli.
Maintain a reality-oriented relationship and environment.	Reduces confusion and promotes coping with the frustrating struggles of misperception and being disoriented or confused.
Provide clues for 24-hour reality orientation with calendars, clocks, notes, cards, signs, music, seasonal hues, and scenic pictures; color-code rooms.	Dysfunction in visual-spatial perception interferes with the ability to recognize directions and patterns, and the client may become lost even in familiar surroundings. Clues are tangible reminders that aid recognition and may permeate memory gaps, increasing independence.

(continues on page 862)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide quiet, nondistracting environment when indicated, including soft music or room with plain but colorful wallpaper or paint.	Helps to avoid visual or auditory overload by emphasizing qualities of calmness and consistency. Note: Patterned wallpaper may be disturbing to the client.
Provide touch in a caring way.	May enhance perception to self and body boundaries.
Engage client in individually meaningful activities, supporting remaining abilities and minimizing failures. Examples include meal preparation, setup and cleaning activities, making bed, and gardening or watering plants.	Supports client's dignity, familiarizes individual with home and community events, and enables him or her to experience satisfaction and pleasure (Casciani, 2008).
Use sensory games to stimulate reality, such as smelling mentholated ointment may prompt client to tell of the time mother used it on client; use of spring or fall nature boxes may stimulate reality.	Communicates reality through multiple channels (Casciani, 2008).
Indulge in periodic reminiscence, such as listening to old music, recalling historical events, and looking at photos, mementoes, or videos.	Stimulates recollections, awakens memories, aids in the preservation of self and individuality via past accomplishments, and increases feelings of security. Helpful in easing adaptation to a changed environment (Casciani, 2008).
Provide intellectual stimulation activities, such as word games, review of current events, story time, or travel discussions.	Stimulates remaining cognitive abilities and provides a sense of normalcy.
Include in Bible study group, church activities, and TV services for shut-ins, or arrange for visitation by clergy or spiritual advisor, as appropriate.	Provides opportunity to meet spiritual needs and to maintain connection with religious beliefs; may help reduce sense of isolation from humanity.
Encourage simple outings and short walks. Monitor activity.	Outings refresh reality and provide pleasurable sensory stimuli, which may reduce suspiciousness or hallucinations caused by feelings of imprisonment. Motor functioning may be decreased because nerve degeneration results in weakness, decreasing stamina.
Promote balanced physiological functions, such as tossing colorful foam or beach balls or beanbags, marching, dancing, or arm dancing with music.	Preserves mobility by reducing the potential for bone loss and muscle atrophy; provides diversional activity and opportunity for interaction with others.
Involve in activities with others as dictated by individual situation—one-to-one visitors, animal visitation, socialization groups at an Alzheimer center, or occupational therapy, including crafts, painting or finger paints, and modeling clay.	Provides opportunity for the stimulation of participation with others and may maintain some level of social interaction.

## NURSING DIAGNOSIS: Anxiety

### May Be Related To

Major change (e.g., health/economic/role status)  
Interpersonal transmission  
Unmet needs

### Possibly Evidenced By

Extraneous movement, restlessness, hypervigilance  
Apprehensive, irritability, increase in wariness  
Increase in tension; alteration in sleep pattern

### Desired Outcomes/Evaluation Criteria—Client Will

#### Anxiety Level NOC

Display decreased muscle tension and restlessness.  
Demonstrate more appropriate range of feelings and lessened anxiety.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction NIC</b>	
<i>Independent</i>	
Note change of behavior, suspiciousness, irritability, and defensiveness. Identify strengths the individual had previously.	Change in moods may be one of the first signs of cognitive decline, and the client, fearing helplessness, tries to hide the increasing inability to remember and engage in normal activities.
Identify the individual's previous strengths	Facilitates assistance with communication and management of current deficits.
Deal with aggressive behavior by imposing calm, firm limits.	Acceptance can reduce fear and lessen progression of aggressive behavior.
Provide safe containment when necessary.	Safety of client and staff is important for avoidance of injury.
Provide clear, honest information about actions and events.	Assists in maintaining trust and orientation as long as possible. When the client knows the truth about what is happening, coping is often enhanced, and guilt over what is imagined is decreased.
Discuss feelings of SO and caregivers. Acknowledge normalcy of feelings and concerns and provide information as needed.	Client senses but may not understand reaction of others. This may heighten client's sense of anxiety and fear.

**NURSING DIAGNOSIS: Grieving****May Be Related To**

Anticipatory loss (e.g., memory, job, status, and independence)  
Family perception of potential loss of loved one

**Possibly Evidenced By**

Psychological distress; anger  
Despair; suffering  
Alteration in activity level, sleep pattern

**Desired Outcomes/Evaluation Criteria—Client/Family Will****Grief Resolution NOC**

Express feelings, concerns openly, as able.  
Acknowledge difficulty of dealing with impaired cognition.  
Discuss sense of loss with significant others.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Grief Work Facilitation NIC</b>	
<i>Independent</i>	
Assess degree of deterioration or level of coping.	Information is helpful to understand how much the client is capable of doing to maintain highest level of independence and to provide encouragement to help individuals deal with losses.
Provide open environment for discussion. Use therapeutic communication skills of active-listening and acknowledgment.	Encourages client and caregivers to discuss feelings and concerns realistically.
Note statements of despair, hopelessness, "nothing to live for," and expressions of anger.	May be indicative of suicidal ideation. Angry behavior may be client's way of dealing with feelings of despair.
Respect desire not to talk.	May not be ready to deal with or share grief.
Be honest; refrain from false reassurances or dire predictions about the future.	Honesty promotes a trusting relationship. Expressions of gloom, such as "You'll spend the rest of your life in a nursing home," are not helpful because no one knows what the future holds.

(continues on page 864)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss with client and SOs ways they can plan together for the future.	Having a part in problem-solving and planning can provide a sense of control over anticipated events.
Assist client and SO to identify positive aspects of the situation.	Ongoing research, possibility of slow progression may offer some hope for the future.
Identify strengths client and SO see in self and situation and support systems available.	Recognizing these resources provides opportunity to work through feelings of grief.
<b>Collaborative</b>	
Refer to other resources, such as support groups, counseling, and spiritual advisor.	May need additional support or assistance to resolve feelings.

## NURSING DIAGNOSIS: **Sleep Deprivation**

### May Be Related To

Dementia, sundowner's syndrome  
Aging-related sleep stage shifts  
Inadequate daytime activity  
Prolonged discomfort (e.g., physical, psychological)

### Possibly Evidenced By

Irritability; restlessness; agitation  
Fatigue; daytime drowsiness; lethargy  
Decrease in ability to function

### Desired Outcomes/Evaluation Criteria—Client Will

#### Sleep NOC

Establish adequate sleep pattern, with wandering reduced.  
Report or appear rested.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Sleep Enhancement NIC</b>	
<b>Independent</b>	
Provide for adequate rest. Restrict daytime sleep as appropriate; increase interaction time between client and family and staff during the day, then reduce mental activity late in the day.	Although prolonged physical and mental activity results in fatigue, which can increase confusion, programmed activity without overstimulation promotes sleep.
Avoid use of continuous restraints.	Restraints may potentiate sensory deprivation, agitation, and restrict rest. Note: The U.S. Department of Health and Human Services: Centers for Medicare & Medicaid Services (2006) finalizes the Patients' Rights guidelines of 1999 that require that clients be free from chemical or mechanical restraint unless warranted by a medical diagnosis; that, when used, restraints must be used for a specified period of time; and that the least restrictive means of control be used.
Evaluate level of stress and orientation as day progresses.	Increasing confusion, disorientation, and uncooperative behaviors may interfere with attaining restful sleep pattern.
Adhere to regular bedtime schedule and rituals. Tell client that it is time to sleep.	Reinforces that it is bedtime and maintains stability of environment. Note: Later-than-normal bedtime may be indicated to allow client to dissipate excess energy and facilitate falling asleep.
Provide evening snack, warm milk, bath, or back rub or general massage with lotion.	Promotes relaxation and drowsiness and helps to address skincare needs.
Reduce fluid intake in the evening. Toilet before retiring.	Decreases need to get up to go to the bathroom/incontinence during the night.
Provide soft music or "white noise."	Reduces sensory stimulation by blocking out other environmental sounds that could interfere with restful sleep.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Allow to sleep in shoes or clothing if client demands.	Provided no harm is done, altering the “normal” lessens the rebellion and allows rest.
<b>Collaborative</b>	
Administer medications, as indicated for sleep, for example:	
Antidepressants, such as trazadone (Desyrel) or quetiapine (Seroquel)	May be effective in treating pseudodementia or depression, thus improving ability to sleep.
Sedative-hypnotics, such as zolpidem (Ambien) or zaleplon (Sonata)	Used sparingly, low-dose, short-acting, rapid-onset hypnotics may be effective in treating insomnia or sundowner’s syndrome.
Avoid use of diphenhydramine (Benadryl).	Once used for sleep, this drug is now contraindicated because it interferes with the production of acetylcholine, which is already inhibited in the brains of clients with DAT.

### NURSING DIAGNOSIS: Self-Care deficit (specify type)

#### May Be Related To

Alteration in cognitive functioning  
Fatigue; decrease in motivation

#### Possibly Evidenced By

Impaired ability to: prepare food, bring food to mouth; wash body part(s), regulate water temperature; choose clothing, put on/take off clothing; complete toileting tasks

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Self-Care Status NOC

Perform self-care activities within level of own ability.

##### Caregiver Will

##### Caregiver Performance: Direct Care NIC

Identify and use personal and community resources to provide necessary assistance; support client’s independence.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Care Assistance: [specify] NIC</b>	
<b>Independent</b>	
Identify reason for difficulty in self-care related to physical limitations in motion, depression, cognitive decline, or environment.	Underlying cause affects choice of interventions and strategies. Clients reported to be unable to perform specific ADLs are often able to do so given the right circumstances, such as adequate and knowledgeable caregiver support.
Determine hygienic needs and provide assistance as needed with activities, including care of hair, nails, and skin; brushing teeth; and cleaning glasses.	As the disease progresses, basic hygienic needs may be forgotten. Infection, gum disease, disheveled appearance, or harm may occur when client or caregivers become frustrated, irritated, or intimidated by degree of care required.
Inspect skin regularly.	Presence of such lesions as ecchymoses, lacerations, or rashes may require treatment as well as signal the need for closer monitoring and protective interventions.
Incorporate usual routine into activity schedule as possible. Wait or change the time to initiate dressing and hygiene if a problem arises.	Maintaining routine may prevent worsening of confusion and enhance cooperation. Because anger is quickly forgotten, another time or approach may be successful.
Be attentive to nonverbal physiological symptoms.	Sensory loss and language dysfunction may cause client to express self-care needs in nonverbal manner, such as thirst by panting, need to void by holding self or fidgeting, and pain by facial grimacing.
Be alert to underlying meaning of verbal statements.	May direct a question to another, such as “Are you cold?” meaning “I am cold and need additional clothing.”

(continues on page 866)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Supervise but allow as much autonomy as possible.	Eases the frustration over lost independence.
Allot plenty of time to perform tasks.	Tasks that were once easy, such as dressing or bathing, are now complicated by decreased motor skills or cognitive and physical changes. Time and patience can reduce chaos resulting from trying to hasten this process.
Assist with neat dressing and provide colorful clothes.	Enhances esteem; may diminish sense of sensory loss and convey aliveness.
Offer one item of clothing at a time in sequential order. Talk client through each step of the task. Allow the wearing of extra clothing if client demands.	Simplicity reduces frustration and the potential for rage and despair. Guidance reduces confusion and allows autonomy. Altering the “normal” may lessen rebellion.
Provide reminders for elimination needs. Involve in bowel and bladder program, as appropriate.	Loss of control and independence in this self-care activity can have a great impact on self-esteem and may limit socialization. (Refer to ND: Constipation.)
Assist with and provide reminders for pericare after toileting or incontinence.	Good hygiene promotes cleanliness and reduces risks of skin irritation and infection.

### NURSING DIAGNOSIS: risk for imbalanced Nutrition: less than body requirements/Overweight

#### Possibly Evidenced By

Inability to ingest food (e.g., regressed habits); insufficient dietary intake  
Disordered eating behaviors or perceptions; portion sizes larger than recommended  
Sedentary behavior occurring for >2 hours/d  
Psychological disorder

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Nutritional Status NOC

Ingest nutritionally balanced diet.  
Maintain or regain appropriate weight.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Management NIC</b>	
<i>Independent</i>	
Assess caregiver’s and client’s knowledge of nutritional needs.	Identifies needs to assist in formulating individual teaching plan. Role reversals may occur: a child now cooks for a parent, or a husband taking over “duties” of his wife, increasing the need for information.
Perform Edinburgh Feeding Evaluation in Dementia (EdFED) scale, as appropriate, if client demonstrates weight loss or decline in mealtime function. Schedule regular repeat reviews at same time of day and in same environment, as needed.	Helps establish baseline and monitors behaviors in moderate to severe dementia and determines level of assistance required (Stockdell & Amella, 2008).
Determine amount of exercise or pacing client does.	Nutritional intake may need to be adjusted to meet needs related to individual energy expenditure.
Offer or provide assistance in menu selection.	Poor judgment may lead to poor choices; client may be indecisive or overwhelmed by choices and/or unaware of the need to maintain elemental nutrition. Note: In general, metabolic rate decreases with age, requiring caloric adjustment that must be balanced with activity.
Provide privacy when eating habits become an insoluble problem. Accept eating with hands, spills, and whimsical mixtures such as salad dressing in milk or salt and pepper on ice cream. Avoid solo dining or separating client from other people too early in the disease process.	Socially unacceptable and embarrassing eating habits develop as the disease progresses. Acceptance preserves esteem and decreases irritability or refusal to eat as a result of anger or frustration. Early separation can result in client feeling upset and rejected and can actually result in decreased food intake.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Offer small meals and/or snacks of one or two foods around the clock, as indicated.	Large feedings may overwhelm the client, resulting either in complete abstinence or gorging. Small feedings may enhance appropriate intake. Limiting number of foods offered at a single time reduces confusion regarding which food to choose.
Simplify steps of eating and serve food in courses.	Promotes autonomy and independence; decreases potential frustration or anger over lost abilities.
Anticipate needs, cut foods, and provide soft or finger foods.	Coordination decreases as the disease progresses, which impairs the client's ability to chew and handle utensils.
Provide ample time for eating.	A leisurely approach aids digestion and decreases the chance of anger precipitated by rushing.
Place food items in pita bread or paper sack for the client who paces.	Carrying food may encourage client to eat.
Avoid baby food and excessively hot foods.	Baby foods lack adequate nutritional content, fiber, and taste for adults and can add to client's humiliation. Hot foods may result in mouth burns and/or refusal to eat.
Observe swallowing ability; monitor oral cavity.	Diminished abilities may result in client or caregiver repeatedly placing food in client's mouth, which is not swallowed, increasing risk of aspiration.
Stimulate oral-suck reflex by gentle stroking of the cheeks or stimulating the mouth with a spoon.	As the disease progresses, the client may clench teeth and refuse to eat. Stimulating the reflex may increase cooperation and intake.
<b>Collaborative</b>	
Refer to dietitian or nutritionist, as indicated.	Assistance may be needed to develop nutritionally balanced diet individualized to meet client needs or food preferences..
Provide MIND diet as appropriate.	The MIND diet (a hybrid of the Mediterranean and Dietary Approaches to Stop Hypertension diets) has been reported to slow the progress of cognitive decline in some individuals (Morris et al, 2015). Note: This diet includes a glass of wine daily, which may not be appropriate for all clients

### NURSING DIAGNOSIS: bowel Incontinence/impaired urinary Elimination

#### May Be Related To

Multiple causality; alteration in cognitive functioning; deficient dietary habits; generalized decline in muscle tone  
Difficulty in toileting self-care; inability to locate bathroom  
Medications

#### Possibly Evidenced By

Inability to recognize or inattention to urge to defecate/void  
Urgency; incontinence

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Bowel [or] Urinary Elimination NOC

Establish adequate or appropriate pattern of elimination.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Urinary Elimination [or] Bowel Management NIC</b>	
<b>Independent</b>	
Assess prior pattern and compare with current situation.	Provides information about changes that may require further assessment and intervention.
Establish bowel and bladder training program. Promote client participation to level of ability.	Stimulates awareness, enhances regulation of body function, and helps to avoid accidents.

(continues on page 868)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor appearance and color of urine. Note amount and consistency of stool.	Detection of changes provides opportunity to alter interventions to prevent complications or acquire treatment, as indicated. Note: Although it is difficult, the caregiver must try to monitor frequency of bowel movements during the stage of the illness when the client is still toileting self. It is not enough to ask client, "Did you have a bowel movement today?" Client cannot remember. Monitoring is essential to prevent constipation and potential for impaction.
Encourage adequate fluid intake during the day, with diet high in fiber and fruit juices. Limit intake during the late evening and at bedtime.	Essential for bodily functions and prevents potential dehydration and constipation. Restricting intake in evening may reduce frequency and incontinence during the night.
<b>Self-Care Assistance: Toileting NIC</b>	
Locate bed near a bathroom when possible; make signs or color code door. Place a picture of a commode on the door. Provide adequate lighting, particularly at night.	Promotes orientation and increases success in finding bathroom. Incontinence may be attributed to inability to find a toilet.
Take client to the toilet at regular intervals. Dictate each step one at a time and use positive reinforcement.	Adherence to a daily and regular schedule may prevent accidents. Frequently, the problem is forgetting how to toilet, such as pushing pants down or positioning.
Avoid a sense of hurrying or being rushed.	Hurrying may be perceived as intrusion, which leads to anger and lack of cooperation with activity.
Be alert to nonverbal cues, such as restlessness, holding self, or picking at clothes.	May signal urgency or inattention to cues and/or inability to locate bathroom.
Be discreet and respect client's privacy.	Although the client is confused, a sense of modesty is often retained.
Convey acceptance when incontinence occurs. Change promptly; provide good skin care.	Acceptance is important to decrease the embarrassment and feelings of helplessness that may occur during the changing process. Prompt changing reduces risk of skin irritation and breakdown.
<b>Collaborative</b>	
Administer stool softeners, bulk expanders (e.g., Metamucil), or glycerin suppository, as indicated.	May be necessary to facilitate or stimulate regular bowel movement.

## NURSING DIAGNOSIS: risk for Sexual Dysfunction

### Possibly Evidenced by

Alteration in body function (e.g., disease, medication)  
Absence of privacy, significant other (SO)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Sexual Functioning NOC

Meet sexuality needs in an acceptable manner.  
Experience fewer or no episodes of inappropriate behavior.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Sexual Counseling NIC</b>	
<i>Independent</i>	
Assess individual needs, desires, and abilities of client and partner.	Alternative methods need to be designed for the individual situation to fulfill the need for intimacy and closeness.
Encourage partner to show affection and acceptance.	The cognitively impaired person retains the basic needs for affection, love, acceptance, and sexual expression.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Ensure privacy or encourage home visitation for residential client, as appropriate.	Sexual expression or behaviors may differ. The individual may masturbate or expose self. Privacy allows sexual expression without embarrassment and the objections of others.
Use distraction, as indicated. Remind client that, when in a public area, sexual behavior is unacceptable.	This tool is useful when there is inappropriate or objectionable behavior, such as self-exposure. Gently guide client toward room as you talk to them.
Provide time to listen to and discuss concerns of partner.	Partner may need information and/or counseling about alternatives for sexual activity and ways to deal with problems, such as impotence or sexual aggression.

### NURSING DIAGNOSIS: compromised family Coping

#### May Be Related To

Prolonged disease that exhausts the capacity of support person  
 Insufficient reciprocal support  
 Insufficient information available to support person  
 Insufficient understanding of information by support person  
 Coexisting situations affecting the significant person

#### Possibly Evidenced By

Assistive behaviors by support person produce unsatisfactory results  
 Limitation in communication between support person and client; support person withdraws from client  
 Protective behavior by support person incongruent with client's abilities  
 Client complaint about significant person's response to health problem  
 Support person reports inadequate knowledge/understanding that interferes with effective behaviors

#### Desired Outcomes/Evaluation Criteria—Family Will

##### Family Coping NOC

Identify strategies/resources within themselves to deal with the situation.  
 Demonstrate positive coping behaviors in dealing with problems.  
 Use outside support systems/resources effectively.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Family Support NIC</b>	
<i>Independent</i>	
Include family in teaching and planning for home care.	Can ease the burden of home management and increase adaptation. A comfortable and familiar lifestyle at home helps preserve the client's need for belonging.
Review past life experiences, role changes, and coping skills.	Identifies skills that may help individuals cope with grief of current situation more effectively.
Focus on specific problems as they occur, the "here and now."	Disease progression follows no set pattern. A premature focus on the possibility of long-term care or possible incontinence, for example, impairs the ability to cope with present issues.
Establish priorities.	Helps to create a sense of order and facilitates problem-solving.
Be realistic and honest in all matters.	Decreases stress that surrounds false hopes, such as that client may regain past level of functioning from advertised or unproven medication. Aids in preparing family for progression of condition and increasing care needs.
Reassess family's ability to care for client at home on an ongoing basis.	Behaviors like hoarding, clinging, unjust accusations, and angry outbursts can precipitate family burnout and interfere with ability to provide effective care.

(continues on page 870)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide time to listen with regard to concerns and anxieties.	SO and caregiver require constant support with the multifaceted problems that arise during the course of this illness to ease the process of adaptation and grieving.
Help caregiver/family understand the importance of maintaining psychosocial functioning.	Embarrassing behavior and the demands of care may cause withdrawal from social contact.
Discuss possibility of isolation. Reinforce need for support systems.	The belief that a single individual can meet all the needs of the client increases the potential for physical or mental illness due to caregiver role strain. Note: Mortality rate for primary caregivers is actually higher than for the client with DAT.
Provide positive feedback for efforts.	Reassures individuals that they are doing their best and provides reinforcement to continue efforts.
Acknowledge concerns generated by consideration or decision to place client in long-term care facility. Answer questions honestly and explore options, as appropriate.	Constant care requirements may be more than can be managed by the caregiver and support systems. Support is needed for this difficult, guilt-producing decision, which may create a financial burden as well as family disruption and dissension.
Encourage visitation by extended family and friends as tolerated by client.	Familiarity forms a base of reality and can provide a reassuring freedom from loneliness. Recurrent contact helps family members realize and accept situation. Note: Family members may require ongoing support in dealing with visitation and issues of client's deterioration and their own personal needs.
<b>Collaborative</b> Involve SO and family members in planning care and problem-solving. Verify presence of advance directives and durable medical power of attorney.	Consensus may be more readily achieved when family participates in decision making. It is important, however, to keep client's wishes in mind when making choices and to be aware of who actually has the power to make decisions for the cognitively impaired client. Note: Approximately 25% of individuals with Alzheimer's who died in 2014 died at home (Steenhysen, 2017).
Refer to local resources such as adult day program, respite care, homemaker services, or a local chapter of Alzheimer's Disease Education and Referral (ADEAR) and the National Family Caregivers Association (NFCA).	Coping with these clients is a full-time, frustrating task. Respite and day care may lighten the burden, reduce potential social isolation, and prevent family burnout and caregiver role strain. ADEAR provides group support and family teaching and promotes research. Local groups provide a social outlet for sharing grief and promote problem-solving with such matters as financial or legal advice and home care. NFCA also provides programs for educating caregivers and healthcare providers and a quarterly publication.
Refer for family counseling or to appropriate ethical committee, as indicated.	Differing opinions regarding client care and placement can result in conflict requiring professional mediation.

## NURSING DIAGNOSIS: **Ineffective Health Maintenance**

### May Be Related To

Alteration in cognitive functioning; impaired decision-making  
Decrease in gross and/or fine motor skills  
Ineffective coping strategies  
Insufficient resources

### Possibly Evidenced By

Pattern of lack of health-seeking behavior  
Insufficient social support

**NURSING DIAGNOSIS:** **ineffective Health Maintenance** (continued)**Desired Outcomes/Evaluation Criteria—Family/Caregiver(s) Will****Health-Promoting Behavior NOC**

Identify factors related to difficulty in maintaining a safe, healthy environment.

Assume responsibility for and initiate behaviors and screenings supporting client healthcare goals.

Demonstrate effective use of resources such as respite or home health care services, homemakers, and other resources.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Health System Guidance NIC</b>	
<i>Independent</i>	
Evaluate level of cognitive, emotional, and physical functioning, including level of independence.	Identifies strengths, areas of need, and how much responsibility the client may be expected to assume. (Refer to ND: Self-Care deficit.)
Assess environment, noting unhealthy factors and ability of client to care for self.	Determines what changes need to be made to accommodate disabilities/challenges. (Refer to ND: risk for Injury.)
Assist client to develop plan for keeping track of and dealing with health needs.	Schedule can be helpful to maintain system for managing routine healthcare services.
Identify support systems available to client and SO, including other family members and friends.	Planning and constant care is necessary to maintain this client at home. If family system is unavailable or unaware, client health needs, such as nutrition, dental care, or eye exams, can be neglected. Primary caregiver can benefit from sharing responsibilities and constant care with others. (Refer to ND: risk for caregiver Role Strain, following.)
Evaluate coping abilities, effectiveness, and commitment of caregiver(s) and support persons.	Progressive debilitation taxes caregiver(s) and may alter ability to meet client's and own needs. (Refer to ND: compromised family Coping.)
<i>Collaborative</i>	
Identify senior services such as Meals on Wheels and community resources for homemaking and cleaning or handyman tasks.	As client's condition worsens, caregiver will require additional support to maintain healthy environment for client and self, especially if family support is limited or not available.
Refer to supportive services, as needed.	Medical and social services consultant may be needed to develop ongoing plan or identify resources as needs change.
Identify in-home healthcare options, including medical, dental, and diagnostic services.	Delivery of healthcare needs "on site" may prevent exacerbation of confusion, increase cooperation, and provide more accurate picture of client's status.

**NURSING DIAGNOSIS:** **risk for caregiver Role Strain****Possibly Evidenced by**

Illness severity of the care receiver; extended duration of caregiving required; caregiving task complexity

Partner is caregiver, female

Care receiver exhibits deviant, bizarre behavior

Alteration in cognitive functioning in care receiver

Family/caregiver isolation; insufficient caregiver respite or recreation

**Desired Outcomes/Evaluation Criteria—Caregiver Will****Caregiver Role Endurance NOC**

Demonstrate effective use of family and community resources to assist in meeting client's needs.

Engage in behaviors or lifestyle changes to promote own well-being.

Take advantage of respite opportunities as available.

Demonstrate ability to manage difficult behaviors.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Caregiver Support NIC</b>	
<i>Independent</i>	
Determine family/caregiver's understanding of condition and expectations for the future.	Identifies teaching needs. Provides opportunity to update information and clarify misconceptions. During the prolonged caregiving experience, 7 of 10 clients with Alzheimer's continue to live at home, where family and friends provide almost 75% of their care (Alzheimer's Association, 2017). As the individual descends into the disease, he or she cannot translate a thought into a motor action, thus full-time supervision and care is required. For some family members and care partners, this supervision becomes overwhelming and exhausting (Rentz, 2008).
Provide bibliotherapy.	Materials that can be reviewed as time permits or questions arise can be very helpful in expanding knowledge and providing ongoing support.
Identify strengths of caregiver and care receiver.	Helps to use positive aspects of each individual to the best of abilities in daily activities.
Facilitate family conference to share responsibilities as indicated and to stress importance of self-nurturing for caregiver, including such factors as pursuing self-development interests, personal needs, hobbies, and social activities.	Helps family to focus on needs of caregiver as well as care receiver. When others are involved in care, the risk of one person becoming overwhelmed is lessened.
Determine available supports and resources currently used.	Organizations including Alzheimer's Foundation of America, Alzheimer's Association, NFCA, or local support groups can provide information regarding adequacy of supports, identify needs, and suggest possible options.
Identify alternate-care sources such as sitter or daycare facility, senior care services such as Meals on Wheels and respite care, and Alzheimer's programs or a home-care agency.	As client's condition worsens, caregiver may need additional help from several sources to maintain client at home, even on a part-time basis.

Refer to CP: Multiple Sclerosis, ND: risk for caregiver Role Strain for additional interventions.

### NURSING DIAGNOSIS: **risk for Relocation Stress Syndrome**

#### Possibly Evidenced by

Deficient mental capacity; compromised health status  
Insufficient support system  
Insufficient predeparture counseling  
Move from one environment to another

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Stress Level NOC

Experience minimal disruption of usual activities.  
Display limited increase in agitation or emotional lability.

#### Family/Caregiver Will

#### Family Participation in Professional Care NOC

Engage in proactive planning to match client care needs with available resources.  
Include client in prior planning and decision-making process to level of ability.  
Recognize need to provide stability for client during adaptation period.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Relocation Stress Reduction</b> <b>NIC</b> <i>Independent</i>	
Discuss ramifications of move to new surroundings.	Discussing pros and cons of this decision helps those involved to reach an informed decision and feel better about and plan for the future.
Encourage visitation to facility prior to planned move.	Familiarizes family and client with new options to enable them to make informed decision.
Provide clear, honest information about actions and events.	Decreases “surprises.” Assists in maintaining trust and orientation. When the client knows the truth about what is happening, coping may be enhanced.

Refer to CP: Extended/Long-Term Care; ND: risk for Relocation Stress Syndrome for additional interventions.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on underlying cause for admission and comorbidities). Refer to appropriate care plan.

## SURGICAL INTERVENTIONS

- I. **Procedure**—therapeutic manipulation or use of instruments to diagnose or remedy physical disorders or defects
  - a. Indications
    - i. Diagnose or cure a specific disease process
    - ii. Correct a structural deformity
    - iii. Restore a functional process
    - iv. Reduce the level of dysfunction or pain
  - b. Classification
    - i. Generally elective or preplanned
      - 1. Inpatient procedure
      - 2. Ambulatory or outpatient
- ii. Potentially life-threatening conditions can arise requiring emergent intervention.
- III. **Pathophysiology**—dependent upon the type of injury or disease process that the client has experienced
- III. **Statistics** (Centers for Disease Control and Prevention [CDC], 2006)
  - a. Population—Approximately 80 million surgical procedures were performed in the United States at in-patient hospitals and affiliated ambulatory or freestanding facilities.

## G L O S S A R Y

- Ambulatory surgery:** Refers to surgical procedures performed on an outpatient basis in a hospital or free-standing ambulatory surgery center's general or main operating rooms, satellite operating rooms, cystoscopy rooms, endoscopy rooms, cardiac catheterization labs, or laser procedure rooms.
- Atelectasis:** Collapsed or airless condition of the lung or lung segment.
- Bronchospasm:** Abnormal narrowing with partial obstruction of the lumen of the bronchi due to spasm of the peribronchial smooth muscle.
- Cephalad diffusion:** Movement toward the head, in context of spinal anesthesia, indicates advancement of drug effect generally beyond desired level.
- Cubital:** Refers to the ulna or the forearm.
- Dehiscence:** Bursting open or separation of surgical incision or wound.
- Electrocautery:** Cauterization using a variety of electrical modalities to create thermal energy, including a directly heated metallic applicator or bipolar or monopolar electrodes.
- Fasciculation:** Involuntary contraction or twitching of muscle fibers, which are visible under the skin.
- Hemostasis:** Arrest or cessation of bleeding from an injured vessel.
- Hypercoagulation:** Increased ability of blood, for example, to coagulate.
- Hypoxia:** An oxygen deficiency in body tissues.
- Intraoperatively:** Occurring during surgery.
- Laryngospasm:** Spasm of the laryngeal muscles that may be life-threatening.
- Perioperative:** Period of time that constitutes the surgical experience; includes the preoperative, intraoperative, and postoperative phases of nursing care.
- Postoperative:** Period of time that begins with admission to the postanesthesia care unit (PACU) and ends after a follow-up evaluation in the clinical setting or home.

(continues on page 874)

## G L O S S A R Y (continued)

**Preoperative:** Period of time from when the decision for surgical intervention is made to when the individual is transferred to the operating room table.

**Prophylactically:** Any agent or regimen that contributes to the prevention of infection or disease.

**Surgical Care Improvement Project:** Multiyear, national quality partnership of organizations called the Surgical Care Improvement Project, or SCIP, with the goal of decreasing surgical complications. The focuses being reported for SCIP areas (as of 2011) are infection

prevention (administration of antibiotics, monitoring blood glucose levels, appropriate hair removal, removal of urinary catheters, and perioperative temperature management), cardiac care, and venous thromboembolism (VTE) prevention (QualityNet Specifications Manual, 2011).

**Time-out protocol:** Procedure for ensuring final verification of the correct client, procedure, site, and, if applicable, implants. Includes active communication among all members of the surgical team; procedure is not started until this has occurred.

## CARE SETTING

Client may be inpatient on a surgical unit or outpatient or have a short stay in an ambulatory surgical setting.

## RELATED CONCERNS

Alcohol: acute withdrawal, page 919  
Cancer, general considerations, page 945  
Diabetes mellitus and diabetic ketoacidosis, page 454  
Fluid and electrolyte imbalances (see *DavisPlus*)  
Metabolic acidosis—primary base bicarbonate deficiency (see *DavisPlus*)  
Metabolic alkalosis—primary base bicarbonate excess (see *DavisPlus*)  
Pediatric considerations, page 993  
Peritonitis, page 389

Pneumonia, page 147

Pneumothorax/hemothorax, page 169

Psychosocial aspects of care, page 835

Respiratory acidosis (primary carbonic acid excess) (see *DavisPlus*)

Respiratory alkalosis (primary carbonic acid deficit) (see *DavisPlus*)

Sepsis/septic shock, page 772

Venous thromboembolism (VTE) disease including deep vein thrombosis (DVT) and pulmonary embolism (PE), page 120

Total nutritional support: parenteral/enteral feeding, page 525

Also refer to plan of care for specific surgical procedure performed.

## CLIENT ASSESSMENT DATABASE

Data depend on the duration and severity of underlying problem and involvement of other body systems. Refer to specific plans of care for data and diagnostic studies relevant to the procedure and additional nursing diagnoses.

### DIAGNOSTIC DIVISION MAY REPORT

#### CIRCULATION

- History of cardiac problems, heart failure (HF), pulmonary edema, peripheral vascular disease, or vascular stasis, which increases risk of thrombus formation

### MAY EXHIBIT

- Changes in heart rate due to sympathetic stimulation

#### EGO INTEGRITY

- Feelings of anxiety, fear, anger, apathy
- Multiple stress factors related to financial, relationship, lifestyle issues

- Restlessness, increased tension or irritability
- Sympathetic stimulation—changes in heart or respiratory rate

#### ELIMINATION

- History of kidney or bladder conditions
- Use of diuretics and/or laxatives
- Change in bowel habits

- Abdominal tenderness, distention
- Absence of bowel elimination
- Decreased or absent urinary elimination

**MAY REPORT (continued)****MAY EXHIBIT (continued)****FOOD/FLUID**

- History of pancreatic insufficiency or diabetes mellitus (DM), which may predispose client to hypoglycemia or ketoacidosis
- Use of diuretics

**PAIN/DISCOMFORT**

- History of painful body area—often the reason for surgical procedure—due to disease, inflammation, infection, or trauma

**RESPIRATION**

- History or presence of respiratory infections
- Chronic lung conditions
- Past and/or current smoking

**SAFETY**

- Differences in personal identifiers, procedure type, and/or site when compared to verification tools, such as the consent form, history and physical examination, surgery schedule
- Allergies or sensitivities to medications, iodine, food, tape, latex, and solution(s)
- Immune deficiencies—increased risk of systemic infections and delayed healing
- Presence of cancer or recent cancer therapy
- Family history of malignant hyperthermia or reaction to anesthesia, autoimmune diseases
- History of hepatic disease, which might affect drug detoxification and may alter coagulation
- History of blood transfusion(s) or transfusion reaction

**TEACHING/LEARNING**

- Use of medications, such as anticoagulants, steroids, NSAIDs, antibiotics, antihypertensives, cardiotonic glycosides, antidysrhythmics, bronchodilators, diuretics, decongestants, analgesics, anti-inflammatory drugs, anticonvulsants, or antipsychotics and antianxiety agents as well as over-the-counter (OTC) medications, herbal supplements (e.g., garlic, ginseng, Ginkgo biloba, ginger, and feverfew present risk of excessive postoperative bleeding), or alcohol or other drugs of abuse, with risk of liver damage affecting coagulation and choice of anesthesia as well as potential for postoperative withdrawal

**DISCHARGE PLAN CONSIDERATIONS**

- May require temporary assistance with transportation, dressing(s), supplies, self-care, and homemaker or maintenance tasks
- Possible placement in rehabilitation or extended-care facility
- ▶ Refer to section at end of plan for postdischarge considerations.

- Malnutrition, including obesity
- Dry mucous membranes due to limited intake or nothing-by-mouth (NPO) status preoperatively
- Guarding behavior, facial mask, sleep disturbance, restlessness, moaning

- Changes in respiratory rate (respiratory pathology, pain, or sympathetic stimulation)

- Presence of existing infectious process
- Fever
- Advanced age

## DIAGNOSTIC STUDIES

Studies depend on type of operative procedure, underlying medical conditions, current medications, age, and weight. Deviations from normal should be corrected, if possible, for safe administration of anaesthetic agents.

TEST WHY IT IS DONE	WHAT IT TELLS ME
<b>BLOOD TESTS</b> <ul style="list-style-type: none"><li>• <b>Complete blood count (CBC):</b> Battery of screening tests, which typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; and white blood cell (WBC) count and differential.</li><li>• <b>Electrolytes:</b> Substances that dissociate into ions in solution and acquire the capacity to conduct electricity. Common electrolytes include sodium, potassium, chloride, calcium, and phosphate.</li><li>• <b>Arterial blood gases (ABGs):</b> Measurement of the pH level and the oxygen and carbon dioxide concentrations in arterial blood.</li><li>• <b>Bleeding or coagulation studies—prothrombin time (PT) and activated partial thromboplastin time (aPTT):</b> Screening for coagulation problems indicated with history of abnormal bleeding, liver or kidney disease, use of anticoagulants, or when medical history is not available as well as for high-risk procedures, such as peripheral vascular surgery, cardiopulmonary bypass, or prostatectomy.</li></ul>	An elevated WBC count is indicative of inflammatory process. It may be diagnostic, as in appendicitis. A decreased WBC count suggests viral processes, requiring further evaluation because immune system may be dysfunctional. Low Hgb suggests anemia or blood loss, which impairs tissue oxygenation and decreases the amount of Hgb available to bind with inhalation anesthetics. It may suggest need for crossmatch for possible blood transfusion. An elevated Hct may indicate dehydration, whereas decreased Hct suggests fluid overload. Imbalances impair organ function; for example, decreased potassium affects cardiac muscle contractility, leading to decreased cardiac output.
	Evaluates current respiratory status, which may be especially important in smokers or clients with chronic lung diseases.
	May be prolonged, interfering with intraoperative and/or postoperative hemostasis. Hypercoagulation increases risk of thrombosis formation, especially in conjunction with dehydration and decreased mobility associated with surgery.
<b>OTHER DIAGNOSTIC STUDIES</b> <ul style="list-style-type: none"><li>• <b>Chest x-ray:</b> Procedure used to evaluate organs and structures within the chest for symptoms of disease.</li><li>• <b>Electrocardiogram (ECG):</b> Record of the electrical activity of the heart.</li><li>• <b>Urinalysis:</b> Examination of urine for various cells and chemicals such as RBCs, WBCs, infection, or excessive protein.</li><li>• <b>Pregnancy test:</b> Recommended in presence of recently absent or irregular menses, unreliable use of contraception, or for gynecological procedures to limit fetal exposure to teratogenic agents.</li></ul>	Should be free of infiltrates or pneumonia. Used for identification of masses and chronic obstructive pulmonary disease (COPD). Abnormal findings require attention before administering anesthetics. Presence of WBCs or bacteria indicates infection. Elevated specific gravity may reflect dehydration. Positive results affect timing of procedure and choice of pharmacological agents.

## NURSING PRIORITIES

1. Assure correct client, procedure, and site.
2. Reduce anxiety and emotional trauma.
3. Provide for physical safety.
4. Prevent complications.
5. Alleviate pain.
6. Facilitate recovery process.
7. Provide information about disease process, surgical procedure, prognosis, and treatment needs.

## DISCHARGE GOALS

1. Client dealing realistically with current situation.
2. Injury prevented.
3. Complications prevented or minimized.
4. Pain relieved or controlled.
5. Wound healing and organ function progressing toward normal.
6. Disease process, surgical procedure, prognosis, and therapeutic regimen understood.
7. Plan in place to meet needs after discharge.

## PREOPERATIVE

NURSING DIAGNOSIS:	readiness for enhanced Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs
ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Preoperative NIC</b> <i>Independent</i>	
Assess client's level of understanding.	Facilitates planning of preoperative teaching program and identifies content needs.
Review specific pathology and anticipated surgical procedure. Verify correct client, procedure, and marked site and that appropriate consent has been signed.	Provides knowledge base from which client can make informed therapy choices and consent appropriate for correct procedure and site. Presents opportunity to clarify misconceptions.
Use institution's protocol for Preventing Wrong Site, Wrong Procedure, and Wrong Person Surgery and resource teaching materials and audiovisuals, as available.	Completion of specific checklists will minimize risk of error. Specifically designed materials can facilitate the client's learning.
Implement individualized preoperative teaching program:	Enhances client's understanding and control and can relieve stress related to the unknown or unexpected.
Preoperative and postoperative procedures and expectations, urinary and bowel changes, dietary considerations, activity levels, transfers, respiratory and cardiovascular exercises; anticipated intravenous (IV) lines and tubes such as nasogastric (NG) tubes, drains, and catheters	Absence or limitation of preoperative preparation and teaching increases the need for postoperative support in addition to managing underlying medical conditions.
Preoperative instructions, including bowel prep, NPO time, antibacterial soap shower and other skin preparation, which routine medications/OTC drugs and herbs to take or hold—prophylactic antibiotics or anticoagulants; anesthesia premedication	Helps reduce the possibility of postoperative complications and promotes a rapid return to normal body function. Depending on time and type of surgical procedure and anesthetic agent/route, medications may be held (e.g., warfarin may be held 4 to 5 days preoperatively and changed to low-molecular-weight heparin with last dose 12 hours prior to OR (Daley et al, 2018). Note: In some instances, liquids and medications are allowed up to 2 hours before scheduled procedure.
Intraoperative client safety—positional needs due to arthritis, previous injury, or current mobility; not crossing legs during procedures performed under local or light anesthesia	Reduced risk of complications or untoward outcomes, such as muscular, nerve (e.g., injury to the peroneal and tibial nerves with postoperative pain in the calves and feet), or joint soreness.
Expected or transient reactions such as low backache, localized numbness, and reddening or skin indentations	Minor effects of immobilization or positioning should resolve in 24 hours. If they persist, medical evaluation is required.
Inform client and SO about timely arrival on surgical day, itinerary, and physician-SO communications.	Logistical information about preoperative preparation time, operating room (OR) schedule and locations (e.g., recovery room, postoperative room assignment), as well as where and when the surgeon will communicate with SO relieves stress and miscommunications, preventing confusion and doubt over client's well-being.

(continues on page 878)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss and develop individual postoperative pain management plan. Identify misconceptions client may have and provide appropriate information. Review use of 0 to 10 or similar pain assessment scale.	Increases likelihood of successful pain management. Some clients may expect to be pain-free or fear becoming addicted to opioid agents.
Provide opportunity to practice coughing, deep-breathing exercises, possible use of incentive spirometry, and muscular exercises.	Enhances learning and continuation of activity postoperatively.

## NURSING DIAGNOSIS: Anxiety [specify level]

### May Be Related To

Situational crisis (e.g., wrong client, procedure or site error; unfamiliarity with environment)  
Change in health status, threat of death  
Separation from usual support systems

### Possibly Evidenced By

Increase in tension, apprehensive, uncertain, fearful  
Worried about change in life events, being scared  
Facial tension, restlessness, self-focused  
Sympathetic stimulation (increased P/B, pulse, respirations)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Anxiety Self-Control NOC

Acknowledge feelings and identify healthy ways to deal with them.  
Appear relaxed and be able to rest appropriately.  
Report anxiety reduced to a manageable level.  
Demonstrate ability to carry out procedure requirements.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Preoperative Coordination NIC</b> <i>Independent</i> Provide quiet environment and age-appropriate comfort measures.	Speaking in a calm, reassuring voice, allowing presence of family member or having parent hold child, etc., enhances level of comfort, helping to reduce anxiety.
Provide preoperative education, including intentional repetitive verification of client identifiers, procedure, marked site steps, and surgical “time-out” process. Arrange visit with OR personnel before surgery when possible. Discuss or demonstrate routine procedures and processes that may frighten or concern client, such as masks, lights, IVs, blood pressure (BP) cuff, electrodes, bovie pad, feel of oxygen cannula or mask on nose or face, autoclave and suction noises, or child crying.	Can provide reassurance (that client safety precautions are constantly ongoing), alleviate client’s anxiety, as well as provide information for formulating intraoperative care. Acknowledges that foreign environment may be frightening and alleviates associated fears. Decreased anxiety level reduces elevation of glucocorticosteroid levels, which can interfere with healing.
Inform client and SO of nurse’s intraoperative advocate role.	Develops trust and rapport, decreasing fear of loss of control in a foreign environment. Provides client and SO with contact person.
Assure client anticipating conscious sedation or spinal anesthesia that drowsiness or sleep occurs, that more sedation may be requested and will be given if needed, and that surgical drapes will block view of the operative field.	Reduces concerns that client may “see” the procedure.
<b>Surgical Preparation NIC</b> Identify anxiety levels that may necessitate postponement of surgical procedure.	Overwhelming or persistent fears result in excessive stress reaction and increasing glucocorticosteroid levels, potentiating risk of adverse reaction to procedure and anesthetic agents and impairing healing.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Validate source of concerns. Provide accurate factual information. Active-listen concerns.	Identification of specific fears helps client deal realistically with concerns, such as misidentification or wrong operation, dismemberment, disfigurement, loss of dignity and control, or being awake or aware with local anesthesia. Client may have misinterpreted preoperative information or have misinformation regarding surgery or disease process. Concerns regarding previous experiences of self, family, or acquaintances may be unresolved.
Note expressions of distress or feelings of helplessness, preoccupation with anticipated change or loss, and choked feelings.	Client may already be grieving for the loss represented by the anticipated surgical procedure, diagnosis, or prognosis of illness.
Introduce client to staff at time of transfer to operating suite.	Establishes rapport and psychological comfort with operative team.
Verbalize and document client identifiers to surgery schedule, client identification band, chart, marked site, and signed operative consent for surgical procedure according to facility's protocol and checklist.	Provides for positive identification, reducing fear that wrong procedure may be done as well as minimizing risk for wrong procedure and site.
Prevent unnecessary body exposure during transfer to and in OR suite.	Preserves client's modesty, reduces concern of loss of dignity and inability to exercise control, and reinforces nurse advocacy role.
Give simple, concise directions and explanations to sedated client. Review environmental concerns, as needed.	Impairment of thought processes makes it difficult for client to understand lengthy instructions.
Control external stimuli.	Extraneous noises and commotion may accelerate anxiety.
<b>Collaborative</b>	
Refer to surgeon, anesthesiologist, clinical manager, pastoral spiritual care, psychiatric clinical nurse specialist, or psychiatric counseling, if indicated.	Further evaluation, information, or counseling may be desired or required for client to deal with fear, especially concerning life-threatening conditions and serious and/or high-risk procedures.
Discuss postponement or cancellation of surgery with physician, anesthesiologist, client, and family, as appropriate.	May be necessary if overwhelming anxiety not reduced or resolved.
Refer wrong client, procedure, site, or implant discrepancies to surgeon, anesthesiologist, and appropriate persons.	Discrepancies must be corrected and verified by surgeon, client, and SO prior to OR entry. Note: Important to be aware of client's individual sensitivities that may affect drug dosage (e.g., clients with late effects of polio may have increased sensitivity to injection drugs, muscle relaxants, opioids) (Schwartz & Bosch, 2012).
Administer medications, as indicated, for example:	
Sedatives and hypnotics	Used to promote sleep the evening before surgery; may enhance coping abilities.
IV antianxiety agents	May be provided in the outpatient admitting or preoperative holding area to reduce nervousness and provide comfort. Note: Respiratory depression or bradycardia may occur, necessitating prompt intervention.
Antacids and H <sub>2</sub> blocker, preoperatively as indicated	Neutralizes gastric acidity and may reduce risk of aspiration or severity of pneumonia should aspiration occur, especially in obese or pregnant clients in whom there is an 85% risk of mortality with aspiration. Note: Ranitidine (Zantac) has been found to reduce postoperative infections in acute colorectal surgery.

## INTRAOPERATIVE

### NURSING DIAGNOSIS: risk for Perioperative Positioning Injury

#### Possibly Evidenced By

Disorientation, sensory/perceptual disturbances from anesthesia  
Immobilization, muscle weakness  
Obesity, emaciation, edema

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Physical Injury Severity NOC

Be free of injury related to perioperative disorientation.  
Be free of untoward skin or tissue injury or changes lasting beyond 24 to 48 hours following procedure.  
Report resolution of localized numbness, tingling, or changes in sensation related to positioning within 24 to 48 hours, as appropriate.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Positioning Intraoperative NIC</b> <i>Independent</i> Note anticipated length of procedure and customary position. Provide for potential complications.	Supine position may cause low back pain and skin pressure at heels, elbows, and sacrum; lateral chest position can cause shoulder and neck pain as well as eye and ear injury on the client's downside.
Review client's history, noting age, weight, height, nutritional status, and physical limitation or preexisting conditions that may affect choice of position and skin and tissue integrity during surgery.	Many conditions, such as lack of subcutaneous padding in elderly person, arthritis, thoracic outlet or cubital tunnel syndrome, diabetes, obesity, presence of abdominal stoma, peripheral vascular disease, level of hydration, and temperature of extremities, can make individual prone to injury.
Stabilize both client cart and OR table when transferring client to and from OR table, using an adequate number of personnel for transfer and support of extremities.	Unstabilized cart or table can separate, causing client to fall. Both side rails must be in the down position for caregiver(s) to assist client transfer and prevent loss of balance.
Anticipate movement of extraneous lines and tubes during the transfer and secure or guide them into position.	Prevents undue tension and dislocation of IV lines, NG tubes, catheters, and chest tubes; maintains gravity drainage when appropriate.
Secure client on OR table with safety belt and arm protection as appropriate, explaining necessity for safety precautions.	OR tables and arm boards are narrow, placing client at risk for injury, especially during fasciculation. Client may become resistive or combative when sedated or emerging from anesthesia, furthering potential for injury.
Protect body from contact with metal parts of the operating table.	Reduces risk of electrical injury.
Prepare equipment and padding for required position, according to operative procedure and client's specific needs. Pay special attention to pressure points of bony prominences on arms and ankles and neurovascular pressure points and soft tissues such as breasts and knees.	Depending on individual client's size, weight, and preexisting conditions, extra padding materials may be required to protect bony prominences, prevent circulatory compromise or nerve pressure, or to allow for optimal chest expansion for ventilation.
Position extremities so they may be periodically checked for safety, circulation, nerve pressure, and alignment. Monitor peripheral pulses and skin color and temperature.	Prevents accidental trauma to hands, fingers, and toes, which could inadvertently be scraped, pinched, or amputated by moving table attachments. Reduces risk of positional pressure on brachial plexus, peroneal, and ulnar nerves, which can cause serious neurovascular impairment in extremities, or prolonged plantar flexion, which may result in footdrop.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Place legs in stirrups simultaneously when lithotomy position used, adjusting stirrup height to client's legs, maintaining symmetrical position. Pad popliteal space and heels and feet, as indicated.	Prevents muscle strain and reduces risk of hip dislocation in elderly clients. Padding helps prevent peroneal and tibial nerve damage. Note: Prolonged positioning in stirrups may lead to compartment syndrome in calf muscles.
Provide foot board, elevate drapes off toes, and decrease blanket weight on extremities. Avoid or monitor equipment and instrumentation placement on trunk or extremities during procedure.	Pressure may cause neural, circulatory, and skin integrity disruption.
Reposition slowly at transfer from table and to bed.	Myocardial depressant effect of various agents increases risk of hypotension and/or bradycardia. Controlling movement enhances volume accommodation.
Determine specific postoperative positioning guidelines, such as elevation of head of bed following spinal anesthesia or nose and throat surgery, or turning to unoperated side following pneumonectomy.	Reduces risk of postoperative complications, such as headache associated with migration of spinal anesthesia or loss of maximal respiratory effort.
<b>Collaborative</b> Recommend position changes to anesthesiologist and/or surgeon, as appropriate.	Close attention to proper positioning can prevent muscle strain, nerve damage, circulatory compromise, and undue pressure on skin and bony prominences. Although the anesthesiologist is responsible for positioning, the nurse may be able to see or have more time to note client needs and provide assistance.

## NURSING DIAGNOSIS: risk for Injury

### Possibly Evidenced By

Wrong client, procedure, site, implants, equipment, or materials  
 External environment—physical design, structure of environment, exposure to equipment, instrumentation, positioning, use of pharmaceutical agents, alteration in cognitive function  
 Internal environment—tissue hypoxia, abnormal blood profile or altered clotting factors, broken skin

### Desired Outcomes/Evaluation Criteria—Care Provider Will

#### Safe Health Care Environment NOC

Implement surgical universal “time-out” protocol.  
 Identify individual risk factors.  
 Modify environment, as indicated, to enhance safety and use resources appropriately.

### Desired Outcomes/Evaluation Criteria—Client Will

#### Physical Injury Severity NOC

Be free of injury.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Surgical Precautions NIC</b> <b>Independent</b> Verify client identity and scheduled operative procedure by comparing client chart, arm band, and surgical schedule. Verbally ascertain correct name, procedure, operative site, and physician.	Ensures correct client, procedure, and appropriate extremity or side.
Remove dentures, partial plates, or bridges preoperatively per protocol. Inform anesthesiologist of problems with natural teeth such as loose teeth.	Foreign bodies may be aspirated during endotracheal intubation and extubation.

(continues on page 882)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Remove prosthetics or other devices preoperatively or after induction, depending on sensory or perceptual alterations and mobility impairment.	Contact lenses may cause corneal abrasions while under anesthesia; eyeglasses and hearing aids are obstructive and may break; however, clients may feel more in control of environment if hearing and visual aids are left on as long as possible. Artificial limbs may be damaged and skin integrity impaired if left on.
Remove jewelry preoperatively. Tape over, or isolate from skin, according to institution protocol. Remove piercing hardware.	Metals conduct electrical current and provide an electro-cautery hazard. Piercings may be “snagged,” resulting in soft tissue injury. In addition, loss or damage to client’s personal property can easily occur in the foreign environment. Note: In some cases (e.g., arthritic knuckles), it may not be possible to remove rings without cutting them off. In this situation, applying tape over the ring may prevent client from “catching” ring and prevent loss of stone or damage to finger and decrease psychological loss because of damage to personal property.
Document allergies, including risk for adverse reaction to latex, tape, and prep solutions.	Reduces risk for allergic responses that may impair skin integrity or lead to life-threatening systemic reactions.
Give simple and concise directions to the sedated client.	Impairment of thought process makes it difficult for client to understand lengthy directions.
Position client based on planned procedure and mindful of individual client needs.	Clients with arthritis, muscle contractures, etc. may require special padding/positioning to prevent injury.
Prevent pooling of skin prep solutions under and around client.	Antiseptic solutions may chemically burn skin as well as conduct electricity.
Assist with induction as needed, for example, standing by to apply cricoid pressure during intubation or stabilizing position during lumbar puncture for spinal block.	Facilitates safe administration of anesthesia.
Verify electrical safety of equipment used in surgical procedure, which includes intact cords, grounds, and medical engineering verification labels.	Malfunction of equipment can occur during the operative procedure, causing not only delays and unnecessary anesthesia but also injury or death. Short circuits, faulty grounds, laser malfunctions, or laser misalignment could occur. Periodic electrical safety checks are imperative for all OR equipment.
Place dispersive electrode or electrocautery pad over largest available muscle mass closest to surgical site, ensuring its contact.	Provides for shortest distance and maximum conductivity to ground to prevent electrical burns.
Confirm and document correct sponge, instrument, needle, and blade counts.	Foreign bodies remaining in body cavities at closure may result in inflammation, infection, perforation, abscess formation, and disastrous complications that can lead to death.
<b>Laser Precautions NIC</b>	
Verify credentials of laser operators for specific wavelength laser required for particular procedure.	Because of the potential hazards of lasers, physician and equipment operators must be certified in the use and safety requirements of specific wavelength laser and procedure, including open, endoscopic, abdominal, laryngeal, and intrauterine procedures.
Confirm presence of fire extinguishers and wet fire-smothering materials when lasers are used intraoperatively.	Laser beam may inadvertently contact and ignite combustibles outside of surgical site such as drapes and sponges.
Apply client and personnel eye protection before laser activation.	Eye protection for specific laser wavelength must be used to prevent injury.
Protect surrounding skin and anatomy appropriately utilizing wet towels, sponges, dams, and cottonoids.	Prevents inadvertent skin integrity disruption, hair ignition, and adjacent anatomy injury in area of laser beam use.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Specimen Management NIC</b> Handle, label, and document specimens appropriately, ensuring proper medium and transport for tests required.	The OR nurse advocate must properly identify specimens to client, site, and test to ensure validity and maximum client outcome. Loss or mislabeling of specimens renders the surgical procedure fruitless and grossly compromises further treatment and client outcome. Frozen sections, preserved or fresh examination, and cultures all have different medium and transfer requirements.
<b>Fluid Management NIC</b> Observe intake and output (I&O) during procedure. Anticipate need for volume replacement or rapid infusion via infusion pumps and set up appropriately. Ascertain that pumps are functioning accurately.	Potential for fluid volume deficit or excess exists, affecting safety of anesthesia, tissue perfusion, organ function, and client well-being.
<b>Collaborative</b> Administer IV fluids, blood, or blood components, as indicated.  Collect autologous blood intraoperatively, as appropriate.	Maintains homeostasis and adequate level of sedation and muscle relaxation to produce optimal surgical outcome.  Blood lost intraoperatively may be collected, filtered, and reinfused either intraoperatively or postoperatively. A continuous, closed circuit must be maintained for the procedure to be acceptable for use by Jehovah's Witnesses. Note: Alternatively, red blood cell (RBC) production may be increased by the administration of epoetin (Epogen, Procrit) for up to 3 weeks preoperatively, reducing the need for blood transfusion whether autologous or donated.

<b>Surgical Precautions NIC</b> Validate surgical field medications and dosages with surgeon and anesthesiologist, including local anesthetics with or without epinephrine in regional blocks.	Prevents administration of contraindicated medications or inappropriate dosages. Note: Excessive doses of local anesthetic agents may potentiate cardiovascular compromise.
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NURSING DIAGNOSIS: risk for Infection
<b>Possibly Evidenced By</b> Alteration in skin integrity, stasis of body fluids Environmental exposure, invasive procedures
<b>Desired Outcomes/Evaluation Criteria—Care Provider Will</b>
<b>Knowledge: Infection Management NOC</b> Identify individual risk factors and interventions to reduce potential for infection. Maintain safe aseptic environment.
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>
<b>Infection Severity NOC</b> Be free of signs of healthcare-acquired infection.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Control: Intraoperative NIC</b> <i>Independent</i> Adhere to surgical care policies and procedures.	These policies have been established nationwide for inpatient and outpatient surgeries to prevent or reduce infections. Note: The Surgical Care Improvement Project (SCIP) initiated measurement standards focused on reduction of surgically related infections through use and (continues on page 884)

**ACTIONS/INTERVENTIONS (continued)****RATIONALE (continued)**

Verify sterility of all items used in procedure.	timing of prophylactic antibiotics, appropriate hair removal, serum glucose management, perioperative temperature management, and timely removal of urinary catheters (QualityNet Specifications Manual, 2011).
Review laboratory studies for systemic infections and scrutinize operative area for possibility of localized infections.	Prepackaged items may appear to be sterile; however, each item must be scrutinized for manufacturer's sterility statement or central sterile processing indicators, package integrity, environmental effect on package, and delivery techniques. Note: Package sterilization and expiration dates and lot and serial numbers must be documented on implant items for further follow-up if necessary.
Verify that preoperative skin, vaginal, and bowel cleansing procedures have been done, as needed, depending on specific surgical procedure.	Increased WBC count may indicate ongoing infection, which the operative procedure will alleviate, such as appendicitis, abscess, and inflammation from trauma. Presence of local or systemic infection such as an upper respiratory infection (URI), urinary tract infection (UTI), skin lesions, or unknown infections may contraindicate or adversely affect the surgical procedure and/or anesthesia.
Prepare operative site according to specific procedure per agency protocol (e.g., scrubbing with liquid antibacterial soap, swabbing with betadine prep).	Cleansing reduces bacterial counts on the skin, vaginal mucosa, and alimentary tract.
Maintain normal client temperature range as much as possible.	Minimizes bacterial counts at operative site. Note: New CDC guidelines recommend skin prep in the OR should be performed using an alcohol-based agent unless contraindicated (CDC, 2017).
Examine skin for breaks or irritation and signs of infection.	CDC recommends maintaining normothermia in all clients (CDC, 2017). One study found that patients who experienced mild hypothermia during surgery were three times more likely to have positive cultures from the surgical site (Association of PeriOperative Registered Nurses [AORN], 2011).
Maintain dependent gravity drainage of indwelling catheters, tubes, and/or positive pressure of parenteral or irrigation lines.	Disruptions of skin integrity at or near the operative site are sources of contamination to the incision. Careful clipping of hair as close as possible to incision time will prevent skin cuts or abrasions, which provide potential entry for bacteria. Note: AORN recommendations state that hair at the surgical site should be left in place whenever possible. If hair must be removed, remove only the hair at the surgical site using clippers or depilatory (AORN, 2016).
Identify breaks in aseptic technique and resolve immediately upon occurrence.	Prevents stasis and reflux of body fluids.
Utilize universal precautions, contain contaminated fluids or materials to specific site in operating room suite, and dispose of them according to facility protocol.	Contamination by environmental or personnel contact renders the sterile field unsterile, thereby increasing the risk of infection.
Monitor blood glucose levels of diabetic clients, and maintain tight glycemic control, as indicated.	Containment of blood and body fluids, tissue, and materials in contact with an infected wound or client will prevent spread of infection to environment and other clients or personnel.
	Depending on length of procedure and type of IV fluids infused, intervention may be required to maintain preferred glucose levels. Note: Studies have supported that control of blood glucose contributes to better outcomes in critically ill and surgical patients (Frangou, 2008) with target levels less than 200 mg/dL (CDC, 2017).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Apply sterile dressing.	Prevents environmental contamination of fresh wound. Note: The CDC recommends topical antimicrobial agents should not be applied to the surgical incision (CDC, 2017).
<b>Collaborative</b>	
Provide and document copious wound irrigation with saline, water, antibiotic, or antiseptic solution.	May be used intraoperatively to reduce bacterial counts at surgical site and cleanse the wound of bone, ischemic tissue, bowel contaminants, toxins, or other debris.
Obtain specimens for cultures and Gram stain.	Immediate identification of infective organism type by Gram stain allows prompt treatment, whereas more specific identification by cultures can be obtained in hours or days.
Administer appropriate antibiotics in timely manner, as indicated.	Antibiotics may be given prophylactically for selected elective surgical procedures or planned in clients at high risk for infection or when procedures need to be performed in the setting of known or suspected wound contamination. SCIP guidelines require the antibiotic to be administered within 1 hour of cut time (any time skin integrity is disrupted, such as in laparoscopic procedures) with the belief that it provides opportunity for the medication to travel through the body and be available at the surgical site at the time of incision (van Kasteren et al, 2007).

### NURSING DIAGNOSIS: risk for [perioperative] Hypothermia/Hyperthermia

#### Possibly Evidenced By

Low environmental temperature  
Pharmaceutical agent; sedation  
Extremes of age, weight; dehydration; [genetic trait]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Thermoregulation NOC

Maintain body temperature within normal range.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Temperature Regulation: Perioperative NIC</b>	
<b>Independent</b>	
Note preoperative temperature related to age and disease process.	Used as baseline for monitoring intraoperative temperature. Preoperative temperature elevations may be indicative of disease process, such as appendicitis, abscess, or systemic disease requiring perioperative treatment. Note: Effects of aging on hypothalamus may decrease fever response to infection in the older adult client.
Assess environmental temperature and modify, as needed, by providing warming blankets or increasing room temperature.	Manipulating ambient air around client will prevent heat loss. Some clients may be cold intolerant such as elderly or very young, lack of subcutaneous tissue, and certain disease conditions (e.g., postpolio) (Schwartz & Bosch, 2012).
Cover exposed areas outside of operative field.	Heat losses will occur as skin on head, arms, and legs is exposed to cool environmental temperatures.
Provide cooling measures for client with preoperative or intraoperative temperature elevations.	Cool irrigations, exposure of skin surfaces to air, or cooling blanket may be required to decrease temperature.

(continues on page 886)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Increase ambient room temperature (e.g., to 78°F or 80°F [25.6°C to 26.7°C]) at conclusion of procedure.	Minimizes client heat loss when drapes are removed and client is prepared for transfer.
Apply warming blankets at emergence from anesthesia.	Inhalation anesthetics depress the hypothalamus, resulting in poor body temperature regulation.
<b>Collaborative</b> Monitor temperature throughout intraoperative phase.	Continuous warm or cool humidified inhalation anesthetics are used to maintain humidity and temperature balance within the tracheobronchial tree. Temperature fluctuations may indicate adverse response to anesthesia. Note: Use of atropine or scopolamine may further increase temperature.

#### Malignant Hyperthermia Precautions NIC

Respond promptly to symptoms of malignant hyperthermia (MH)—rapid temperature elevation and persistent high fever:	Prompt recognition and immediate action to control temperature is necessary to prevent serious complications or death.
Provide iced saline to all body surfaces and orifices.	Iced solution lavage of body surfaces and cavities will reduce body temperature.
Obtain dantrolene (Dantrium) for IV administration per protocol.	Immediate action to control temperature is necessary to prevent intense catabolic process associated with MH.

## POSTOPERATIVE

### NURSING DIAGNOSIS: **ineffective Breathing Pattern**

#### May Be Related To

Neuromuscular dysfunction (e.g., sedation); obesity  
Pain  
[Tracheobronchial obstruction]

#### Possibly Evidenced By

Abnormal breathing pattern (e.g., rate, depth); decrease in vital capacity  
Bradypnea; tachypnea

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status: Ventilation NOC

Establish an effective respiratory pattern free of cyanosis or other signs of hypoxia.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Postanesthesia Care NIC</b>	
<b>Independent</b>	
Maintain client airway by head tilt, jaw hyperextension, or oral pharyngeal airway.	Prevents airway obstruction.
Auscultate breath sounds. Listen for gurgling, wheezing, crowing, and/or silence after extubation.	Lack of breath sounds is indicative of obstruction by mucus or tongue and may be corrected by positioning and/or suctioning. Diminished breath sounds suggest atelectasis. Wheezing indicates bronchospasm, whereas crowing or silence reflects partial to total laryngospasm.
Observe respiratory rate and depth, chest expansion, use of accessory muscles, retraction or flaring of nostrils, and skin color; note airflow.	Ascertains effectiveness of respirations immediately so that corrective measures can be initiated.
Monitor vital signs continuously.	Increased respirations, tachycardia, and/or bradycardia suggest hypoxia.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Position client appropriately, depending on respiratory effort and type of surgery.	Head elevation and left lateral Sims' position prevents aspiration of secretions or vomitus, enhances ventilation to lower lobes, and relieves pressure on diaphragm.
Observe for return of muscle function, especially respiratory.	After administration of intraoperative muscle relaxants, return of muscle function occurs first to the diaphragm, intercostals, and larynx; followed by large muscle groups, neck, shoulders, and abdominal muscles; then by midsized muscles, tongue, pharynx, extensors, and flexors; and finally by eyes, mouth, face, and fingers.
Initiate “stir-up” regimen—turn, cough, deep breathe—as soon as client is reactive and continue in the postoperative period.	Hypoxia is common during the initial recovery period and respiratory control may be abnormal for weeks after surgery (e.g., reduced ventilation response to hypercapnia and hypoxia) (Miskovic & Lamb, 2017). Active deep ventilation inflates alveoli, breaks up secretions, increases O <sub>2</sub> transfer, and removes anesthetic gases; coughing enhances removal of secretions from the pulmonary system. Note: Respiratory muscles weaken and atrophy with age, possibly hampering elderly client's ability to cough or deep-breathe effectively.
Observe for excessive somnolence.	Opioid-induced respiratory depression or action of muscle relaxants in the body may be cyclical in recurrence, creating sine-wave pattern of depression and reemergence from anesthesia. In addition, thiopental sodium (Pentothal) is absorbed in the fatty tissues, and as circulation improves, it may be redistributed throughout the bloodstream.
Elevate head of bed as appropriate to surgical procedure. Get out of bed as soon as possible.	Promotes maximal expansion of lungs, decreasing risk of pulmonary complications.
Suction, as necessary.	Airway obstruction can occur as a result of blood or mucus in throat or trachea.
<b>Collaborative</b>	
Administer supplemental O <sub>2</sub> , as indicated.	Maximizes oxygen for uptake to bind with Hgb in place of anesthetic gases to enhance removal of inhalation agents.
Administer IV medications, such as naloxone (Narcan), doxapram (Dopram), or neostigmine (Prostigmin).	Narcan reverses opioid-induced central nervous system (CNS) depression; Dopram stimulates respiratory muscles. The effects of both drugs are cyclic in nature and respiratory depression may return. Prostigmin reverses nonpolarizing muscle blockers.
Provide and maintain ventilator assistance, as indicated.	Depending on cause of respiratory depression or type of surgery (e.g., pulmonary, extensive abdominal, cardiac), endotracheal tube (ET) may be left in place and mechanical ventilation continued for a time.
Assist with use of respiratory aids such as incentive spirometer.	Maximal respiratory efforts reduce potential for atelectasis and pulmonary infection. Client may need to be reminded and coached to reach specific goals.

### NURSING DIAGNOSIS: [disturbed Sensory Perception (specify)]

#### May Be Related To

Chemical alteration—use of pharmaceutical agents, hypoxia  
Therapeutically restricted environments; excessive sensory stimuli  
Physiological stress

(continues on page 888)

**NURSING DIAGNOSIS:** [disturbed Sensory Perception (specify)] (continued)**Possibly Evidenced By**

Disorientation (e.g., person, place, time); hallucinations  
Change in usual response to stimuli  
Change in problem-solving ability  
Motor incoordination

**Desired Outcomes/Evaluation Criteria—Client Will****Cognition NOC**

Regain usual level of consciousness and mentation.  
Recognize limitations and seek assistance as necessary.

**ACTIONS/INTERVENTIONS****RATIONALE****Postanesthesia Care NIC****Independent**

Reorient client continuously when emerging from anesthesia; confirm that surgery is completed.

As client regains consciousness, support and assurance of current physical status will help alleviate anxiety.

Speak in normal, clear voice without shouting, being aware of what you are saying. Minimize discussion of negatives about the client or personal or work-related problems within client's hearing. Explain procedures and environmental events even if client does not seem aware.

The nurse cannot tell when client is aware, but it is thought that the sense of hearing returns before client appears fully awake; so it is important not to say things that may be misinterpreted. Providing factual information helps client preserve dignity and prepare for next recuperative activity.

Evaluate sensation and movement of extremities and trunk, as appropriate.

Return of function following local or spinal nerve blocks depends on type and amount of agent used and duration of procedure.

Use bed rail padding, other medical protective devices as necessary.

Provides for client safety and protection from environment during emergence state. Prevents injury if client becomes combative while disoriented.

Secure parenteral lines, ET tube, and catheters, if present, and check for patency.

Disoriented client may pull on lines and drainage systems, disconnecting or kinking them.

Maintain quiet, calm environment.

External stimuli, such as noise, lights, and touch, may cause psychic aberrations when dissociative anesthetics (e.g., ketamine, tiletamine [Telazo]) have been administered.

Investigate changes in sensorium.

Continued confusion, specific to pediatric and geriatric age groups, may reflect drug interactions, hypoxia, anxiety, pain, electrolyte imbalances, or fear.

Observe for hallucinations, delusions, depression, or an excited state.

May develop following trauma/surgery and indicate delirium or may reflect sundowner's syndrome in elderly client. In client who has used alcohol or other drugs to excess, may suggest impending delirium tremens. Requiring further evaluation and intervention. Note: In one study, 24% of clients age 70+ years without history of dementia or delirium developed delirium postsurgery, prolonging length of stay and negatively impacting recovery (Gleason et al, 2015).

Reassess sensory, motor, and cognitive function thoroughly before discharge.

Phase II recovery or ambulatory surgical client must be able to care for self with the help of SO, if available, to prevent personal injury after discharge.

**Collaborative**

Evaluate need for extended stay in postoperative recovery area or need for additional nursing care before discharge, as appropriate.

Disorientation may persist, and SO may not be able to protect the client at home.

Contact or refer to case manager for alternate care options.

May not be ready or able to care for self, especially if no SO or family member is available to provide necessary assistance.

**NURSING DIAGNOSIS:** risk for deficient Fluid Volume**Possibly Evidenced By**

Deviations affecting intake of fluids (e.g., sedation, nausea)  
 Loss of fluid through abnormal routes—indwelling tubes, drains; through normal routes—vomiting  
 Active fluid loss (bleeding)  
 Extremes of age and weight

**Desired Outcomes/Evaluation Criteria—Client Will****Hydration NOC**

Demonstrate adequate fluid balance, as evidenced by stable vital signs, palpable pulses of good quality, normal skin turgor, moist mucous membranes, and individually appropriate urinary output.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Management NIC</b> <i>Independent</i>	
Measure and record I&O including tubes and drains. Calculate urine specific gravity, as appropriate. Review intraoperative record for potential causes of imbalance.	Accurate documentation helps identify fluid losses and replacement needs and influences choice of interventions. Note: Ability to concentrate urine declines with age, increasing renal losses despite general fluid deficit.
Assess urinary output specifically for type of operative procedure done.	May be decreased or absent after procedures on the genitourinary system and/or adjacent structures, such as ureteroplasty, ureterolithotomy, and abdominal or vaginal hysterectomy, indicating malfunction or obstruction of the urinary system.
Provide voiding assistance measures as needed such as privacy, sitting position, running water in sink, and pouring warm water over perineum, as needed.	Promotes relaxation of perineal muscles and may facilitate voiding efforts.
Monitor vital signs, noting changes in BP, heart rate and rhythm, and respirations. Calculate pulse pressure.	Hypotension, tachycardia, and increased respirations may indicate fluid deficit—dehydration or hypovolemia. Although a drop in BP is generally a late sign of fluid deficit or hemorrhagic loss, widening of the pulse pressure may occur early, followed by narrowing as bleeding continues and systolic BP begins to fall.
Note presence of nausea or vomiting.	Women, obese individuals, and those prone to motion sickness have a higher risk of postoperative nausea and vomiting. In addition, the longer the duration of anesthesia, the greater the risk for nausea. Note: Nausea occurring during first 12 to 24 hours postoperatively is frequently related to anesthesia (including regional anesthesia). Nausea persisting more than 3 days postoperatively may be related to the choice of opioid for pain control or other drug therapy.
Inspect dressings and drainage devices at regular intervals. Assess wound for swelling.	Excessive bleeding can lead to hypovolemia and circulatory collapse. Local swelling may indicate hematoma formation or hemorrhage. Note: Bleeding into a cavity (e.g., retroperitoneal) may be hidden and diagnosed only via vital sign depression or client reports of pressure sensation in affected area.
Monitor skin temperature; palpate peripheral pulses.	Cool or clammy skin and/or weak pulses indicate decreased peripheral circulation and need for additional fluid replacement.

(continues on page 890)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Administer parenteral fluids, blood products including autologous collection, and/or plasma expanders, as indicated. Increase IV rate, if needed.	Replaces documented fluid loss. Timely replacement of circulating volume decreases potential for complications of deficit, including electrolyte imbalance, dehydration, and cardiovascular collapse. Note: Increased volume may be required initially to support circulating volume and prevent hypotension because of decreased vasomotor tone following halothane (Fluothane) administration.
Insert and maintain urinary catheter with or without urimeter, as necessary.	Provides mechanism for accurate monitoring of urinary output.
Resume oral intake gradually, or begin enteral feeding, as indicated.	Following surgical procedures not involving the gastrointestinal (GI) tract, the small bowel may be capable of absorbing nutrients regardless of absence of bowel sounds reflecting GI motility. If there is no evidence of abdominal distention, mechanical obstruction, or GI bleeding, early enteral feeding can hasten resolution of postoperative ileus and reduce risk of infection. As ileus resolves, oral fluids can be started.
Administer medications, as appropriate, for example:	
Antiemetics	Relieves nausea and vomiting, which may impair intake and add to fluid deficit. Note: Naloxone (Narcan) may relieve nausea related to use of anesthetic agents such as morphine (Duramorph) or fentanyl citrate (Sublimaze).
Epoetin alfa, vitamins B <sub>12</sub> and C, and folic acid	Medications used to stimulate production of RBCs are begun preoperatively, when needed, and may be administered postoperatively as well.
Monitor laboratory studies, such as Hgb and Hct or electrolytes. Compare preoperative and postoperative blood studies.	Indicators of hydration and circulating volume. Preoperative anemia and/or low Hct combined with unreplaced fluid losses intraoperatively will further potentiate deficit.

### NURSING DIAGNOSIS: acute Pain

#### May Be Related To

Physical agents (e.g., disruption of skin, tissue, and muscle integrity; musculoskeletal or bone trauma; presence of tubes and drains)

#### Possibly Evidenced By

- Self-report of pain intensity/characteristics
- Proxy report of pain behavior
- Expressive behavior (e.g., restlessness, crying)
- Guarding behavior; protective gestures
- Self-focus; narrowed focus
- Changes in vital signs

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Pain Level NOC

Report pain relieved or controlled.

Appear relaxed, able to rest or sleep and participate in activities appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute NIC</b> <i>Independent</i> Note client's age, weight, coexisting medical or psychological conditions, concomitant medications, idiosyncratic sensitivity to analgesics, and intraoperative course, including size and location of incision, drain placement, and anesthetic agents used.	Approach to postoperative pain management is based on multiple variable factors, especially medications used for chronic pain.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Review intraoperative and recovery room record for type of anesthesia and medications administered.	Presence of opioids and droperidol in system potentiates opioid analgesia, whereas inhalation anesthetics have no analgesic effects. In addition, intraoperative local and regional blocks have varying duration based on drug choice and dose. Note: Recovery time may be prolonged in clients with muscular diseases/conditions (e.g., postpolio) (Schwartz & Bosch, 2012).
Evaluate pain frequently in immediate postoperative phase and regularly (e.g., hourly per protocol) following transfer, noting characteristics, location, and intensity (0 to 10 [or similar] scale) using a validated pain assessment tool (Chou et al, 2016).	Provides information about need for, and effectiveness of, interventions. Note: It may not always be possible to eliminate pain; however, analgesics should reduce pain to a tolerable level. A frontal and/or occipital headache may develop 24 to 72 hours following spinal anesthesia, necessitating recumbent position, increased fluid intake, and notification of the anesthesiologist for alternative pain relief plan.
Note presence of anxiety, and relate with nature of and preparation for procedure.	Concern about the unknown, such as outcome of a biopsy and/or inadequate preparation due to emergent procedure, can heighten client's perception of pain.
Assess causes of possible discomfort other than operative procedure.	Discomfort can be caused or aggravated by other factors (e.g., presence of indwelling catheter causing bladder pain, NG tube resulting in gastric fluid and gas accumulation, or parenteral lines that have infiltrated IV fluids or medications).
Provide information about transitory nature of discomfort, as appropriate.	Understanding the cause of the transitory discomfort, such as sore muscles from administration of succinylcholine, which may persist up to 48 hours postoperatively; sinus headache, which may be associated with nitrous oxide; or sore throat, which may be due to intubation, provides emotional reassurance. Note: Paresthesia of body parts suggests nerve injury. Symptoms may last hours or months and require additional evaluation.
Reposition as indicated, such as semi-Fowler's or lateral Sims'.	May relieve pain and enhance circulation. Semi-Fowler's position relieves abdominal muscle tension and arthritic back muscle tension, whereas lateral Sims' will relieve dorsal pressures.
Provide additional comfort measures such as backrub and heat or cold applications.	Improves circulation, reduces muscle tension and anxiety associated with pain. Enhances sense of well-being.
Encourage use of relaxation techniques such as deep-breathing exercises, guided imagery, visualization, or music.	Relieves muscle and emotional tension; enhances sense of control and may improve coping abilities.
Provide regular oral care, occasional ice chips, or sips of fluids as tolerated.	Reduces discomfort associated with dry mucous membranes due to anesthetic agents and oral restrictions.
Monitor sedation, respiratory status. Note effectiveness and side or adverse effects of analgesia (Chou et al, 2016).	Respirations may decrease on administration of opioid, or synergistic effects with anesthetic agents may occur. Note: Migration of epidural analgesia toward head may cause respiratory depression or excessive sedation.
<b>Collaborative</b>	
Administer medications, as indicated, for example:	
IV analgesics after reviewing anesthesia record for contraindications and/or presence of agents that may potentiate analgesia	Analgesics given IV reach the pain centers immediately, providing more effective relief with smaller doses of medication. Note: Initial opioid dosage should be reduced by one-fourth to one-third after use of fentanyl (Innovar) or droperidol (Inapsine) to prevent respiratory depressant effects (Vallerand et al, 2017).
Avoid intramuscular route for analgesic medications.	Intramuscular (IM) administration is not recommended as it can cause significant pain and unreliable absorption (Chou et al, 2016).

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Around-the-clock analgesia via patient-controlled analgesia (PCA) or epidural analgesia (PCEA) with intermittent rescue doses, as needed	Research supports need to administer analgesics around the clock initially to prevent rather than merely treat pain. Use of PCA necessitates detailed client instruction. PCA is considered very effective in managing acute postoperative pain with smaller amounts of opioid and increased client satisfaction. However, new guidelines recommend avoiding the use of routine basal infusion of opioids with IV PCA in opioid-naïve adults (Chou et al, 2016). Note: Continuous epidural infusions may be used for 1 to 5 days following procedures that are known to cause severe pain such as certain types of thoracic or abdominal procedures.
Regional anesthetics, such as epidural block	Analgesics may be injected into the operative site, or nerves to the site may be kept blocked in the immediate postoperative phase to prevent severe pain.
NSAIDs, such as ketorolac (Toradol), diflunisal (Dolobid), or naproxen (Anaprox); acetaminophen (Tylenol)	Useful for mild to moderate pain in adults and children without contraindications (Chou et al, 2016) or as adjuncts to opioid therapy in moderate to severe pain. Allows for a lower dosage of opioids, reducing potential for side effects. Use alternating schedule with NSAIDs administered between opioid doses so peak effect occurs at a different time.
Monitor use and effectiveness of transcutaneous electrical nerve stimulation (TENS) unit when used.	TENS may be useful in reducing pain and amount of medication required postoperatively.

## NURSING DIAGNOSIS: impaired Tissue Integrity

### May Be Related To

Surgical procedure  
Mechanical factors (e.g., pressure, shear, friction)  
Impaired physical mobility  
Altered circulation

### Possibly Evidenced By

Damaged tissues (e.g., integumentary, subcutaneous, muscle)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Wound Healing: Primary Intention NOC

Achieve timely wound healing.

#### Knowledge: Treatment Regimen NOC

Demonstrate behaviors or techniques to promote healing and prevent complications.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Incision Site Care NIC</b>	
<b>Independent</b>	
Identify client's individual risk factors for delayed healing.	Presence of comorbidities (e.g., diabetes, COPD, anemia, obesity, malnutrition, alcohol withdrawal, use of steroid therapy) and extremes of age can delay healing.
Inspect incision regularly, noting characteristics and integrity in relation to specific type of skin closure and postoperative stage.	Edges of incisions closed with tissue adhesives/glue may be joined within a week. Incisions closed with sutures or staples may require 10 days or longer. Early recognition of delayed healing or developing complications may prevent a more serious situation. Incisions may heal more slowly in clients with comorbidity or the elderly, in whom reduced cardiac output decreases capillary blood flow. Note: Inflammation

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Observe initial surgical dressings, noting accumulation of blood/other drainage. Reinforce initial dressing or change, as indicated, using clean or sterile technique per protocol or surgeon preference.	may be observed during first few days postoperatively, reflecting a normal phase of wound healing as long as client remains afebrile and pain level is not increasing (Delmore et al, 2017).
Gently remove tape in direction of hair growth and dressings when changing.	Close observation of surgical dressings promotes early identification of problems, such as hematoma formation, outright bleeding. Sterile surgical dressing should be left in place for first 24 to 48 hours and first dressing change may be reserved for surgeon.
Apply skin sealants or barriers before soft cloth tape, if needed. Use hypoallergenic tape, Montgomery straps, or elastic netting for dressings requiring frequent changing.	Reduces risk of skin trauma and disruption of wound.
Check tension of dressings. Apply tape parallel to incision beginning at center of incision to outer margin of dressing. Avoid wrapping tape around extremity.	Reduces potential for skin trauma or abrasions and provides additional protection for delicate skin and tissues.
Assess amounts and characteristics of drainage.	Prevents tape skin abrasions. Wrapping tape can impair or occlude circulation to wound and to distal portion of extremity.
Empty active low-pressure suction drains (e.g., Hemovac, Jackson-Pratt) when half full or more often per protocol.	Decreasing drainage suggests evolution of healing process, whereas continued drainage or presence of bloody or odoriferous exudate suggests complications, which may include hemorrhage, infection, and fistula formation.
Apply collection bag over passive drains or incisions in presence of copious or caustic drainage.	Suction action is diminished as device fills with drainage and pressure on the incision is increased.
Elevate extremities, as appropriate.	Facilitates approximation of wound edges; reduces risk of infection and chemical injury to skin and tissues.
Splint abdominal and chest incisions or area with pillow or pad during coughing and movement.	Promotes venous return and limits edema formation. Note: Elevation in presence of venous insufficiency may be detrimental.
Caution client not to touch incision.	Equalizes pressure on the wound, minimizing risk of dehiscence—especially important during stage I healing during the first 3 to 4 days—and for incisions closed with adhesives.
Cleanse skin surface, if needed, with running water and mild soap after incision is sealed.	Prevents contamination of area.
Monitor blood glucose levels of diabetic clients, as indicated.	Reduces skin contaminants; aids in removal of drainage or exudate.
These clients are at higher risk for healthcare-associated infections and delayed healing, and the risk increases if glucose level exceeds 220 mg/dL on the first postoperative day.	
<b>Collaborative</b>	
Apply ice, if appropriate.	Reduces edema formation that may cause undue pressure on incision during initial postoperative period.
Use abdominal binder, as indicated.	Provides additional support for high-risk incisions, especially in obese clients.
<b>Wound Care NIC</b>	
Irrigate open wounds; assist with debridement as needed.	Removes infectious exudate and necrotic tissue to promote healing.
Monitor and maintain dressings, whether hydrogel, vacuum dressing, or other types.	May be used to hasten healing in large, draining wound or fistula, to increase client comfort, and to reduce frequency of dressing changes. Also allows drainage to be measured more accurately and analyzed for pH and electrolyte content, as appropriate. (Refer to CP: Wound Care—Complicated or Chronic.)

**NURSING DIAGNOSIS:** risk for ineffective Tissue Perfusion (specify)**Possibly Evidenced By**

Hypovolemia  
Coagulopathy

**Desired Outcomes/Evaluation Criteria—Client Will****Circulation Status NOC**

Demonstrate adequate perfusion evidenced by stable vital signs; peripheral pulses present and strong, warm, and dry skin; usual mentation; and individually appropriate urinary output.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hypovolemia Management NIC</b> <i>Independent</i> Change position slowly initially.	Vasoconstrictor mechanisms are depressed and quick movement may lead to orthostatic hypotension, especially in the early postoperative period.
Monitor vital signs, palpate peripheral pulses, and note skin temperature, color, and capillary refill. Evaluate urinary output and time of voiding. Document dysrhythmias.	Indicators of adequacy of circulating volume and tissue perfusion or organ function. Effects of medications and electrolyte imbalances may create dysrhythmias, impairing cardiac output and tissue perfusion.
Investigate changes in mentation or failure to achieve usual mental state.	May reflect a number of problems, such as inadequate clearance of anesthetic agent, oversedation with pain medication, hypoventilation, hypovolemia, or intraoperative complications such as emboli.
<b>Embolus Precautions NIC</b> Determine client's risk and assess for development of venous thromboembolism (VTE) symptoms (e.g., warm, red, painful lower leg; sudden-onset dyspnea with chest pain and cough).	Preventing complications of thromboembolic phenomena is part of improved surgical care according to the Surgical Care Improvement Project (Drake, 2011). Risk factors for VTE (which includes both deep vein thrombosis and pulmonary embolism) include the specific type of surgery (e.g., higher risk with hip or knee surgery), trauma to lower extremities, increasing age (older than age 40), hormonal therapy, chemotherapy, central line catheter placement, immobility, obesity, varicose veins, and pregnancy. (Refer to CP: Venous Thromboembolism [VTE] Disease including Deep Vein Thrombosis [DVT] and Pulmonary Embolism [PE].)
Assist with range-of-motion (ROM) exercises, including active ankle and leg exercises.	Stimulates peripheral circulation; aids in preventing venous stasis to reduce risk of thrombus formation.
Encourage and assist with early ambulation.	Enhances circulation and return of normal organ function.
Avoid use of knee gatch or pillow under knees. Caution client against crossing legs or sitting with legs dependent for prolonged period.	Prevents stasis of venous circulation and reduces risk of thrombophlebitis.
Assess lower extremities for erythema, edema, and calf tenderness.	Circulation may be restricted by some positions used during surgery, whereas anesthetics and decreased activity alter vasomotor tone, potentiating vascular pooling and increasing risks of thrombus formation.
<i>Collaborative</i> Apply antiembolic hose or sequential compression device (SCDs), as indicated.	Promotes venous return and prevents venous stasis of legs to reduce risk of thrombosis.
Administer low-dose unfractionated or low-molecular-weight heparin, as indicated.	Client identified as moderate or high risk will receive pharmacologic intervention to prevent or treat VTE (Drake, 2011).
<b>Hypovolemia Management NIC</b> Administer IV fluids and/or blood products, as needed.	Maintains circulating volume and supports perfusion.

**NURSING DIAGNOSIS:** **readiness for enhanced Health Management****Possibly Evidenced By**

Expresses desire to enhance management of prescribed regimens, risk factors

**Desired Outcomes/Evaluation Criteria—Client Will****Knowledge: Disease Process NOC**

Verbalize understanding of condition, effects of procedure, and potential complications.

**Knowledge: Treatment Regimen NOC**

Verbalize understanding of therapeutic needs.

Correctly perform necessary procedures and explain reasons for actions.

Initiate necessary lifestyle changes and participate in treatment regimen.

**ACTIONS/INTERVENTIONS****RATIONALE****Treatment: Disease Process NIC***Independent*

Ascertain client's readiness and ability to receive information about self-care management following surgery. Note barriers to learning, such as short hospitalization for surgical procedure, client's pain and fatigue, complexity and number of tasks client must perform at home (e.g., simple dressing change vs. open wound care), client's developmental and cognitive abilities and health literacy, and access and use of support and resources.

Throughout the postoperative recovery period, the nurse has a professional obligation to plan for discharge. This includes providing information to clients and their families to help them come to terms with their current condition and to prepare them for the future, in order to prevent complications. The length of the hospital stay is usually short; this impacts the time available for client/SO teaching and also means that much of the postoperative care and monitoring is done at home by clients and their families. Potential problems that may occur after discharge have little chance of getting addressed if not identified during the discharge planning process (Bowles et al, 2011).

Determine amount and type of information desired, and utilize desired teaching style, considering client's personal preferences and values, family situation and lifestyles, and cultural traditions.

These factors are involved in client-centered care. Studies have shown that certain aspects of postoperative care are important to clients (e.g., understanding their health progress [67%], appropriate activity level [66%], knowledge of insurance coverage [61%], information regarding medications and side effects [52%], understanding pain management [51%], and knowing when to consult the physician [49%]) (Boyle, 1992).

Review specific surgery or procedure performed and future expectations.

Provides knowledge base from which client can make informed choices.

Review and have client and SO demonstrate dressing change and incision and tube care, when indicated. Identify source for supplies.

Promotes competent self-care and enhances independence. Note: For incisions closed with a surgical zipper, client should be instructed as to when it is appropriate to peel off the device.

Emphasize avoidance of environmental risk factors, including exposure to crowds or persons with infections.

Reduces potential for acquired infections.

Discuss drug therapy, including use of prescribed and OTC analgesics and resumption of herbal supplements.

Enhances cooperation with regimen, reduces risk of adverse reactions or untoward effects. Note: Herbal preparations such as garlic, ginseng, Ginkgo biloba, ginger, and feverfew increase the risk of postoperative bleeding and are contraindicated for several days following surgery.

Identify specific activity limitations.

Prevents undue strain on operative site.

Recommend planned, progressive exercise program.

Promotes return of normal function and enhances feelings of general well-being.

Schedule adequate rest periods.

Prevents fatigue and conserves energy for healing.

Review importance of nutritious diet and adequate fluid intake.

Provides elements necessary for tissue regeneration and healing and support of tissue perfusion and organ function.

(continues on page 896)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage cessation of smoking.	Smoking increases risk of pulmonary infections, causes vasoconstriction, and reduces oxygen-binding capacity of blood, affecting cellular perfusion and potentially impairing healing.
Identify signs and symptoms requiring medical evaluation, such as nausea or vomiting; difficulty voiding; fever; continued or odoriferous wound drainage; incisional swelling, erythema, or separation of edges; and unresolved pain or changes in characteristics of pain.	Early recognition and treatment of developing complications, which may include ileus, urinary retention, infection, and delayed healing, may prevent progression to more serious or life-threatening situation.
Emphasize necessity of follow-up visits with providers, including therapists and laboratory.	Monitors progress of healing and evaluates effectiveness of regimen.
Include SO in teaching program and discharge planning. Provide written instructions and teaching materials in client's dominant language. Instruct in use of and arrange for special equipment.	Provides additional resources for reference after discharge. Promotes effective self-care.
Identify available resources, including home-care services, visiting nurse, Meals on Wheels, outpatient therapy, and contact phone number for questions.	Enhances support for client during recovery period and provides additional evaluation of ongoing needs or new concerns.

**POTENTIAL CONSIDERATIONS** following surgical procedure (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **Fatigue**—disease states, anemia, stress
- **risk for Infection**—broken skin, traumatized tissues, stasis of body fluids, increased environmental exposure to pathogens, invasive procedures
- **Self-Care deficit**—pain or discomfort, weakness, decreased motivation
- **risk for delayed Surgical Recovery**—extremes of age, extensive surgical procedure, pain, diabetes mellitus, impaired mobility

Refer also to appropriate plans of care regarding underlying condition/specific surgical procedure for additional considerations.

## EXTENDED/LONG-TERM CARE

### I. Indications

- a. Level of care and needs of the client are frequently the deciding factors in the choice of placement.
- b. Short-term rehabilitation—individuals requiring services postdischarge from acute care setting
- c. Long-term nursing care—individuals requiring assistance with activities of daily living (ADLs)
  - i. Elderly individuals are the primary population requiring assistance with (on average) four to six ADLs.
  - ii. Increasing numbers of younger individuals are requiring care for debilitating conditions when they cannot be managed in the home setting (Family Caregiver Alliance, 2015).

### II. Statistics (Centers for Disease Control [CDC], 2006)

- a. Population: In 2004, 1.5 million people resided in nursing homes nationally, of which almost 75% were women. One recent study released by the National Center for Health Statistics' Long-Term Care Surveys states, "About 45% of nursing home residents in 2004 . . . were 85 years and older, white, and women. . . . More than two-thirds of the oldest nursing home residents, home health care patients, and discharged hospice care patients needed assistance in

performing three or more activities of daily living (ADLs) and were bladder incontinent" (Park-Lee et al, 2013). A 2013 report from the Centers for Disease Control and Prevention (updated in 2015), quoted by the Family Caregiver Alliance, states, "Annually 8,357,100 people receive support from the 5 main long-term care service; home health agencies (4,742,500), nursing homes (1,383,700), hospices (1,244,500), residential care communities (713,300) and adult day service centers (273,200)."

- b. Cost: In 2004, spending on long-term care services exceeded \$115.2 billion and accounted for 7.4% of national healthcare expenditures (Stewart, Grabowski, Lakdawalla, 2009). In 2016, the average daily rate for a private room in a skilled nursing facility was \$253, or \$92,350 annually; for a semiprivate room, \$225, or \$82,125 annually, according to data from the U.S. Department of Health and Human Services (DHHS, 2016). Studies published by insurance companies in 2017 showed that national median monthly rates for a private room were \$8121, or \$97,452 annually; rates for a semiprivate room rose to \$7150 monthly, or \$85,800 annually.

**G L O S S A R Y**

- Activities of daily living (ADLs):** Basic everyday self-care activities, including bathing, grooming, dressing, feeding, toileting, hygiene, and personal safety.
- Instrumental activities of daily living (IADLs):** Activities needed to function independently in the home or community, including shopping, meal preparation, housekeeping/home maintenance, laundry, managing medications and health maintenance, use of transportation, and money management.
- Long-term or extended care facility:** Provision of custodial or personal care services, with ongoing supervision and

coordination of care by licensed nurses (RN or LPN/LVN).

**Polypharmacy:** Use of multiple medications for one condition, or more medications than are medically necessary, a growing concern for older adults.

**Short-term rehabilitation or skilled nursing facility:**

Provision of registered nursing and rehabilitation services, such as physical, occupational, and/or speech therapies; intravenous (IV) antibiotics or chemotherapy; complicated wound care; and respiratory and nutritional support.

**CARE SETTING**

Primary focus of care is an extended or long-term care facility. However, many of the interventions are appropriate for assisted living or home-care situations.

**RELATED CONCERNS**

- Acquired immunodeficiency syndrome (AIDS), page 800  
 Cancer, general considerations, page 945  
 Cerebrovascular accident (CVA)/stroke, page 247  
 Craniocerebral trauma—acute care and rehabilitative phase, page 226

Dementia of the Alzheimer's type: vascular dementia; Lewy body disease; frontotemporal dementia, page 851

Palliative/end-of-life care/hospice, page 970

Multiple sclerosis, page 311

Psychosocial aspects of care, page 835

Spinal cord injury—acute care and rehabilitation phase, page 288

Surgical intervention, page 873

Respiratory failure/ventilatory assistance, page 187

**CLIENT ASSESSMENT DATABASE**

Data depend on underlying physical and psychosocial conditions necessitating continuation of structured care.

**DIAGNOSTIC DIVISION  
MAY REPORT****MAY EXHIBIT****TEACHING/LEARNING**

- **Discharge plan considerations:** May require assistance with treatments, self-care activities, health maintenance, and nutritional support

► Refer to section at end of plan for postdischarge considerations.

## DIAGNOSTIC STUDIES

Dependent on age, general health, and medical condition. Individuals are often transferred to facility or admitted following an acute care episode where diagnostic studies were previously performed.

TEST WHY IT IS DONE	WHAT IT TELLS ME
<b>TESTS</b> <ul style="list-style-type: none"><li>• <b>Complete blood count (CBC):</b> Battery of screening tests, which typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; and white blood cell (WBC) count and differential.</li><li>• <b>Chemistry profile:</b> Evaluates general organ function and imbalances.</li></ul>	Hgb suggests anemia. Elevated Hct may indicate dehydration, whereas decreased Hct suggests fluid overload. An elevated WBC count is indicative of inflammatory process. Decreased WBC count suggests viral processes, requiring further evaluation because immune system may be dysfunctional. Age-related changes include decreased serum albumin, up to 20% increase in alkaline phosphatase, and decreased urine creatinine clearance.
<b>OTHER DIAGNOSTIC TESTS</b> <ul style="list-style-type: none"><li>• <b>Urinalysis:</b> Provides information about kidney function.</li><li>• <b>Pulse oximetry:</b> Determines oxygenation and respiratory function.</li><li>• <b>Communicable disease screens:</b> Rule out tuberculosis (TB), HIV, venereal disease, and hepatitis.</li><li>• <b>Drug screen:</b> As indicated by usage to identify therapeutic or toxic levels.</li><li>• <b>Visual acuity testing:</b> Assesses sight and health of the eyes.</li><li>• <b>Tonometer test:</b> Measures intraocular pressure.</li><li>• <b>Chest x-rays:</b> Procedure used to evaluate organs and structures within the chest for symptoms of disease.</li><li>• <b>Electrocardiogram (ECG):</b> Provides baseline data; detects abnormalities.</li></ul>	Determines presence of urinary tract infection (UTI) or diabetes mellitus (DM). <i>Note:</i> Bacteria are common in some populations, especially the elderly and bedridden, reflecting urinary stasis. Decreased levels indicate need for supplemental oxygen therapy. Testing identifies treatment needs and provides for safety of staff and other residents. Therapeutic drug monitoring aids in establishing individually appropriate drug dosage and frequency to maintain steady state for maximal drug effect and with minimal side effects. Identifies cataracts or other vision problems. Elevation indicates glaucoma. Reveals size of heart and lung abnormalities or disease conditions, or changes of the large blood vessels and bony structure of the chest. ST-segment and T-wave changes, atrial and ventricular dysrhythmias, and various heart blocks are common in the elderly population.

## NURSING PRIORITIES

1. Promote physiological and psychological well-being.
2. Provide for security and safety.
3. Prevent complications of disease and/or aging process.
4. Promote effective coping skills and independence.
5. Encourage continuation of healthy habits and participation in plan of care to meet individual needs and wishes.

## DISCHARGE GOALS

1. Client dealing realistically with current situation.
2. Homeostasis maintained.
3. Injury prevented.
4. Complications prevented or minimized.
5. Client performing ADLs by self or with assistance, as necessary.
6. Plan in place to meet needs after discharge, as appropriate.

## NURSING DIAGNOSIS: risk for Relocation Stress Syndrome

### Possibly Evidenced By

Decreased health status

Move from one environment to another; insufficient predeparture counseling; unpredictability of experience

Compromised health status

History of losses

Powerlessness

**NURSING DIAGNOSIS:** **risk for Relocation Stress Syndrome** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Anxiety Level NOC**

Demonstrate appropriate range of feelings and appear relaxed.

**Psychosocial Adjustment: Life Change NOC**

Verbalize understanding of reasons for change as able.

Participate in routine and special or social events as capable.

Verbalize acceptance of situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Relocation Stress Reduction NIC</b>	
<i>Independent</i>	
Ascertain if client has completed an advance directive. Provide information, as appropriate.	Assures client/family wishes will be known to provide direction to caregivers.
Determine client's and SO's attitude toward admission to facility and expectations for the future.	If this is expected to be a temporary placement, client's and SO's concerns will be different than if placement is permanent. When client is giving up own home and way of life, feelings of helplessness, loss, and grief are to be expected.
Help family and SO to be honest with client regarding admission. Be clear about actions and events.	Family may have difficulty dealing with decision and reality of permanent placement and may avoid discussing situation with client. Honesty decreases "surprises," assists in maintaining trust, and may enhance coping.
Identify support person(s) important to client and include in care activities, mealtime, and so on, as appropriate.	During adjustment period and times of stress, client may benefit from presence of trusted individual who can provide reassurance and reduce sense of isolation.
Assess level of anxiety and discuss reasons when possible.	Identifying specific problems enables individual to deal more realistically with them and care provider to intervene as necessary; for example, a client who is being neglected or abused or has unrelieved pain may be very anxious and afraid or unable to verbalize.
Develop nurse-client relationship.	Trusting relationships among client, SO, and staff promotes optimal care and support.
Make time to listen to client about concerns, and encourage free expression of feelings, including anger, hostility, fear, and loneliness.	Being available in this way allows client to feel accepted and begin to acknowledge and deal with feelings related to circumstances of admission.
Acknowledge reality of situation and feelings of client. Accept expressions of anger while limiting aggressive, acting-out behavior.	Permission to express feelings allows for beginning of resolution. Acceptance promotes sense of self-worth. Note: Psychosocial and/or physiological disturbances can occur as a result of transfer from one environment to another, especially if the move is unexpected or involuntary.
Assist client to identify strengths and successful coping behaviors and incorporate into problem-solving.	Building on past successes increases likelihood of positive outcome in present situation. Enhances sense of control and management of current deficits.
Orient to physical aspects of facility, schedules, and activities. Introduce to roommate(s) and staff. Give explanation of roles.	Getting acquainted is an important part of admission. Knowledge of where things are and from whom client can expect assistance can be helpful in reducing anxiety.
Provide above information in written or audiovisual form as well.	Overload of information is difficult to handle. Client can refer to written or audiovisual materials as needed to refresh memory or learn new information.

(continues on page 900)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Give careful thought to room placement. Provide help and encouragement in placing client's own belongings around room. Do not transfer from one room to another without client approval and documentable need.	Location, roommate compatibility, and place for personal belongings are important considerations for helping the client feel "at home." Changes are often met with resistance and can result in emotional upset and decline in physical condition. Note: Persons with severe behavioral problems or cognitive dysfunctions may require a private room.
Determine client's usual schedule and incorporate into facility routine as much as possible.	Consistency provides reassurance and may lessen confusion and enhance cooperation.
Determine avocation and hobbies client previously pursued. Incorporate activities, if appropriate, into present program.	Encourages involvement in facility activities and helps to stimulate client mentally and physically to improve overall condition and sense of well-being/belonging. Activities need to be personally meaningful for the client to derive the most enjoyment from them, such as talking or Braille books for the blind and closed-caption TV broadcasts for the deaf or hearing impaired.
Note behavior, presence of suspiciousness or paranoia, irritability, and defensiveness. Compare to SO's description of client's customary responses.	Increased stress, physical discomfort, and fatigue may temporarily exacerbate mental deterioration and cognitive decline and further impair communication and social accessibility. This represents a catastrophic episode that can escalate into a panic state and violence.
Be aware of escalating anxiety and presence of delirium. Look for possible causes.	Common causes of delirium include drug toxicity, electrolyte imbalances, withdrawal from alcohol and other drugs, pain, and trauma—especially hip fractures and advanced disease resulting in organ failure.

#### **Collaborative**

Refer to social service or other appropriate agency for assistance. Have case manager or social worker discuss ramifications of Medicare and/or Medicaid if client is eligible for these resources.

Client may not be aware of the resources available, and sources of support can assist with adjustment in new situation.

## NURSING DIAGNOSIS: **Grieving**

### **May Be Related To**

Loss of significant object (e.g., processes of body, job, status, home, possessions)

### **Possibly Evidenced By**

Psychological distress; suffering; despair  
Alterations in activity level; disturbed sleep pattern

### **Desired Outcomes/Evaluation Criteria—Client Will**

#### **Grief Resolution NOC**

Identify and express feelings appropriately.  
Progress through the grieving process.  
Enjoy the present and plan for the future one day at a time.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Grief Work Facilitation NIC</b> <i>Independent</i> Assess emotional state. Note cultural beliefs and expectations.	Anxiety and depression are common reactions to changes and losses associated with long-term illness or debilitating condition. In addition, changes in neurotransmitter levels, such as increased monoamine oxidase (MAO) and serotonin levels with decreased norepinephrine, may potentiate depression in elderly clients. Personal expectations may affect response to change.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Make time to listen to the client. Encourage free expression of hopeless feelings and desire to die.	Allowing these feelings to be expressed, rather than denying or ignoring them, provides a sounding board for the client to hear and reflect on own thoughts, start to deal with the feelings, and consider alternatives.
Assess suicidal potential.	May be related to physical disease, social isolation, and grief. Note: Statistics show that suicide is the eighth leading cause of death among older adults, and elderly males (age 75 and older) are disproportionately more likely than women to die by suicide (CDC, 2012c).
Involve SOs in discussions and activities to the level of their willingness.	When SOs are involved, there is more potential for successful problem-solving. Note: SO may not be available or may choose not to be involved.
Provide liberal touching and hugs as individually accepted.	Conveys sense of concern and closeness to reduce feelings of isolation and enhance sense of self-worth. Note: Touch may be viewed as a threat by some clients and escalate feelings of anger or fear.
Identify spiritual concerns. Discuss available resources and encourage participation in religious activities, as appropriate.	Search for meaning is common to those facing changes in life. Participation in religious or spiritual activities can provide sense of direction and peace of mind.
Assist with planning for specifics as necessary, including advance directives to determine code status, living will wishes, making of will, and funeral arrangements, if appropriate.	Having these issues resolved can help client and SO deal with the grieving process and may provide peace of mind.
<b>Collaborative</b> Refer to other resources as indicated, such as a spiritual advisor, parish nurse, case manager, or social worker.	May need further assistance to resolve some issues.

## NURSING DIAGNOSIS: **impaired Memory**

### May Be Related To

Hypoxia; anemia; decrease in cardiac output  
Neurological disturbances

### Possibly Evidenced By

Inability to recall events or factual information; forgetfulness  
Inability to recall if a behavior was performed  
Inability to learn new information

### Desired Outcomes/Evaluation Criteria—Client Will

#### Cognition NOC

Maintain usual cognitive orientation.  
Demonstrate appropriate information processing.  
Engage in effective decision making.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Cognitive Stimulation NIC</b> <i>Independent</i> Allow adequate time for client to respond to questions or comments and to make decisions.	Reaction time may be slowed with aging due to changes in metabolism and cerebral blood flow or with brain injuries and some neuromuscular conditions.
Discuss happenings of the past. Place familiar objects in room. Encourage the display of photographs and photo albums and frequent visits from SO and friends.	Events of the past may be more readily recalled by the elderly client because long-term memory usually remains intact. Reminiscence or life review and companionship are beneficial to clients.

(continues on page 902)

**ACTIONS/INTERVENTIONS (continued)**

Note presence of short-term memory loss, and provide with such aids as calendars, clocks, room signs, and pictures.

Evaluate individual stress level and deal with it appropriately

Assess physical status and psychiatric symptoms, especially in presence of recent change in mentation or development of confusion. Institute interventions appropriate to findings.

Reorient to person, place, and time, as appropriate.

Have client repeat verbal or written instructions, when indicated.

Note cyclic changes in mentation or behavior, such as evening confusion, picking at bedclothes, pacing, shouting or angry outbursts, or wandering aimlessly.

Involve in regular exercise, activity, and diversional programs.

Schedule at least one rest period per day.

Provide brighter lighting in room and common areas by midafternoon (e.g., 3 p.m.) or earlier on cloudy or winter days.

Turn off lights at bedtime. Provide night lights where appropriate.

Support client's involvement in own care. Provide opportunity for choices on a daily basis.

**Collaborative**

Review results of laboratory and diagnostic tests, such as electrolytes, thyroid studies, or full drug screen and computed tomography (CT) scan.

Administer medications as indicated, such as donepezil (Aricept), rivastigmine (Exelon), galantamine (Razadyne), and memantine (Namenda).

**RATIONALE (continued)**

Short-term memory loss presents a challenge for nursing care, especially if the client cannot remember such things as how to use the call bell or how to get to the bathroom. This problem is not in client's control but may be less frustrating if simple reminders are used to assist in providing continual reorientation. It may be helpful for older person and his or her family to know that short-term memory loss is common and is not necessarily a sign of "senility."

Stress level may be greatly increased because of recent losses, such as poor health, death of spouse or companion, or loss of home. In addition, some conflicts that occur with age come from previously unresolved problems that may need to be dealt with now.

Not all mental changes are the result of aging, and it is important to rule out physical causes before accepting these as unchangeable. Possibilities include pain that is often unreported and underestimated, metabolic imbalances, adverse toxic medication levels, drug-induced side effects (e.g., anti-parkinsonian agents, tricyclic antidepressants), or the result of infectious, cardiac, or respiratory disorders (Amella, 2004).

Helps client maintain focus.

Verifies hearing and ability to read and comprehend.

"Sundowners syndrome" may occur in response to visual and/or hearing deficits enhanced by declining light or an accumulation of all the sensory stimulation during the day, fatigue, inflexible institution schedules, peak-and-trough drug levels, dehydration, and electrolyte imbalances.

Promotes release of endorphins, enhancing sense of well-being, and can improve thinking abilities.

Prevents fatigue; enhances general well-being.

Maximizes visual perception; may limit evening confusion.

Reinforces "sleep time" while meeting safety needs.

Choice is a necessary component in everyday life. Cognitively impaired clients may respond with aggressive behavior as they lose control in their lives.

Aids in establishing cause of changes in mentation and determining treatment options.

Aricept, Exelon, and Razadyne are cholinesterase inhibitors used to treat mild to moderate dementia, whereas Namenda, which regulates glutamine activation, is prescribed for the treatment of moderate to severe dementia (National Institute on Aging [NIA], 2018). (Refer to CP: Dementia of the Alzheimer's Type; Vascular Dementia; Lewy Body Disease; Frontotemporal Dementia.)

**NURSING DIAGNOSIS:** **compromised family Coping****May Be Related To**

Prolonged disease that exhausts supportive capacity of support person  
Insufficient reciprocal support  
Coexisting situations affecting the significant person

**Possibly Evidenced By**

Support person reports preoccupation with personal reactions (e.g., fear, anticipatory grief, guilt, anxiety) to client's need  
Assistive behaviors by support person produce unsatisfactory results  
Support person withdraws from client  
Protective behavior by support person incongruent with client's abilities

**Desired Outcomes/Evaluation Criteria—Family Will****Family Coping NOC**

Identify resources within themselves to deal with the situation.  
Interact appropriately with the client and staff, providing support and assistance, as indicated.  
Verbalize knowledge and understanding of situation.  
Participate in planning for discharge, as appropriate.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Family Support NIC</b>	
<i>Independent</i>	
Introduce staff and provide SO with information about facility and care. Be available for questions. Provide tour of facility.	Helpful to establish beginning relationships. Offers opportunities for enhancing feelings of involvement.
Determine involvement and availability of family and SO.	Clarifies expectations and abilities and identifies needs.
Encourage SO participation in care at level of desire and capability and within limits of safety. Include in social events and celebrations.	Helps family to feel at ease and allows them to feel supportive and a part of the client's life.
Accept choices of SO/family regarding level of involvement in care.	Families may choose to ignore client or may project feelings of guilt regarding placing client in facility by criticizing staff. Note: Feelings of dissatisfaction with the staff may be transferred back to the client.
Evaluate SO's and caregiver's level of stress and coping abilities, especially before planning for discharge.	Caring for and about client with chronic or debilitating conditions places a heavy strain on SO. Recognizing own strengths and areas for improvement provides opportunity for personal growth, enhancing potential for success if client returns home.
Support the caregiver with attention, compassion, time, respect, honesty, advocacy, and understanding.	Nursing interventions need to prepare the caregivers for the challenges they face and meet their needs for compassion and caring.
Identify availability and use of community support systems.	Helps determine areas of need and provides information regarding additional resources to enhance coping.
Be aware of staff's own feelings of anger and frustration about client's and SO's choices and goals that differ from those of staff, and deal with them appropriately.	Group care conferences or individual counseling may be helpful in problem-solving and providing effective care.
<i>Collaborative</i>	
Inform SO of services available to them such as meal tickets, family cooking time or celebrations, group care conference, visiting nurse, caseworker, and other social services.	Promotes feeling of involvement; eases transition in adjustment to client's admission to home care or facility care.
Advise caregivers of resources available, such as Eldercare Locator, Seniornet, Today's Caregiver, and Caregiver Network, Inc.	Helps nurses, clients, and caregivers feel supported and able to provide more skillful care.
Refer SO and caregivers to stress management classes, as indicated.	Although support groups may be very helpful, learning stress management techniques may be more effective in strengthening individual coping as the focus is on the SO rather than the SO-client relationship.

## NURSING DIAGNOSIS: risk for Poisoning [drug toxicity]

### Possibly Evidenced By

[Reduced metabolism; impaired circulation; chronic diseases, organ involvement]  
[Use of multiple prescribed and/or over-the-counter (OTC) drugs]

### Desired Outcomes/Evaluation Criteria—Client Will

#### Risk Control: Drug Use NOC

Maintain prescribed drug regimen free of untoward side effects.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Medication Management NIC</b> <i>Independent</i> Review client's drug regimen on routine basis. Refer to physician for assessment of medications that could be reduced in dose or discontinued.	Reduces risk of client taking too many medications at once (polypharmacy), with attendant problems. Note: Studies support that older adults are more prone to adverse drug reactions (ADRs) and drug-drug interactions due to physiological changes and multiple comorbidities. These reactions are compounded by polypharmacy (Ziere et al, 2006).
Determine allergies, medication, and other drug use history.	Helps avoid repetition or creation of problems.
Review resources such as drug manuals or pharmacist for information about toxic symptoms and side effects. List drug actions and interactions and idiosyncrasies, such as medications that are given with or without foods, as well as those that should not be crushed.	Provides information about drugs being taken and identifies possible interactions. Toxicity can be increased in the debilitated and older client with symptoms not as apparent.
Discuss self-administration of, or access to, OTC products.	Limits interference with prescribed regimen, desired drug action, and organ function. May prevent inadvertent overdosing or toxic reactions. Note: Appropriate use of OTC products kept at bedside or via free access at nurses' station fosters independence and enhances sense of control and self-esteem.
Identify swallowing problems or reluctance to take tablets or capsules.	May not be able to or want to take medication.
Give pills in a spoonful of soft foods, such as applesauce or ice cream, or use liquid form of medication if available.	Ensures proper dosage if client is unable, or does not like, to swallow pills.
Open capsules or crush tablets only when appropriate.	Should not be done unless absolutely necessary because this may alter absorption of medications; for example, enteric-coated tablets may be absorbed in the stomach when crushed, instead of in the intestines.
Make sure client swallows medication.	Ensures effective therapeutic use of medication and prevents pill hoarding.
Observe for changes in condition or behavior.	Behavior may be only indication of drug toxicity, and early identification of problems provides for appropriate intervention. Note: Elderly individuals have increased sensitivity to anticholinergic effects of medications; therefore, use of anticholinergics, anti-parkinsonian agents, benzodiazepines, central nervous system (CNS) depressants, and tricyclic antidepressants may cause delirium or confusion.
Use discretion in the administration of sedatives.	A quiet place where the client can pace or be secluded may be more helpful. If client is destructive or excessively disruptive, pharmacological or mechanical control measures may be required. Convenience of the staff is never a reason for sedating client; however, client safety and rights of other clients need to be taken into consideration.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Review drug regimen routinely with physician and pharmacist.	Provides opportunity to alter therapy by reducing dosage or discontinue medications as client's needs and organ functions change, affecting drug absorption, distribution, and renal clearance (Amella, 2004).
Obtain serum drug levels, as indicated.	Determines therapeutic or toxic levels.

### NURSING DIAGNOSIS: impaired verbal Communication

#### May Be Related To

Central nervous system impairment (e.g., Parkinson's disease, Alzheimer's disease)  
Physical barrier (e.g., laryngectomy or tracheostomy)  
Decreased circulation to brain (e.g., stroke, traumatic brain injury)

#### Possibly Evidenced By

Difficulty expressing thoughts verbally (e.g., aphasia, dysphasia)  
Difficulty forming words or sentences (e.g., aphonia, dysarthria)  
Difficulty comprehending or maintaining communication  
Partial/total visual or hearing deficit

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Communication NOC

Establish method of communication by which needs can be expressed.  
Demonstrate congruent verbal and nonverbal communication.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Communication Enhancement: Speech Deficit NIC</b>	
<b>Independent</b>	
Assess reason for lack of communication, including CNS and neuromuscular functioning, gag and swallow reflexes, hearing, and teeth and mouth problems.	Identification of the problem is essential to appropriate intervention. Sometimes clients do not want to talk, may think they talk when they do not, may expect others to know what they want, or may not be able to comprehend or be understood.
Determine whether client is bilingual and what language is primary.	With declining cerebral function or diminished thought processes and increased level of stress, client may mix languages or revert to original language.
Investigate how SO communicates with the client.	Provides opportunity to develop or continue effective communication patterns that have already been established.
Assess client knowledge base and level of comprehension. Treat the client as an adult, avoiding pity and impatience.	Knowing how much to expect of the client can help to avoid frustration and unreasonable demands for performance. However, having an expectation that the client will understand may help raise level of performance.
Establish therapeutic nurse-client relationship through active-listening, being available for problem-solving.	Demonstrates caring about the client as a person.
Make client aware of presence when entering the room by speaking, turning a light off and on, or touching client, as appropriate.	Getting clients' attention is the first step in communication.
Make eye contact, place self at or below client's level, and speak face to face. Encourage client to wear glasses as appropriate.	Conveys interest and promotes contact. Necessary for clients with hearing deficit. Note: When personal protective equipment worn, use special face mask that allows for visualization of mouth.
Speak slowly and distinctly, using simple sentences and yes-or-no questions. Avoid speaking loudly or shouting. Supplement with written communication when possible or needed. Allow sufficient time for reply; remain relaxed with client.	Assists in comprehension and overall communication. Client may respond poorly to high-pitched sounds; shouting also obscures consonants and amplifies vowels.

(continues on page 906)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Use other creative measures to assist in communication, such as picture chart or alphabet board, sign language, or lip reading, when appropriate.	Many options are available, depending on individual situation. Note: Sign language also may be used effectively with other than hearing-impaired individuals.
<b>Communication Enhancement: Hearing Deficit NIC</b>	
Check ears for excess cerumen.	Hardened earwax may decrease hearing acuity and cause tinnitus.
Ascertain if client has or uses hearing aid.	Client may have, but not use, a hearing aid because it may not fit well or it may need batteries.
Be aware that behavioral problems may be associated with hearing loss.	Anger, explosive temper outbursts, frustration, embarrassment, depression, withdrawal, and paranoia may be attempts to deal with communication problems.
<b>Collaborative</b>	
Refer to speech therapists, ear-nose-throat physician, or for audiology, as needed.	Determines extent of hearing loss and whether a hearing aid is appropriate. May be helpful to a client and staff in improving communication. Note: Some sources believe 90% of the clients in extended-care facilities have some degree of hearing loss because this is a common age change. Hearing aids are most effective with conductive losses and may help with sensorineural losses.

## NURSING DIAGNOSIS: disturbed Sleep Pattern

### May Be Related To

Insufficient privacy; disruption caused by sleep partner/roommate  
Ambient temperature; noise; interruptions (facility routines); unfamiliar setting

### Possibly Evidenced By

Alteration in normal sleep pattern  
Feeling unrested; dissatisfaction with sleep  
Difficulty in daily functioning

### Desired Outcomes/Evaluation Criteria—Client Will

#### Sleep NOC

Report improvement in sleep or rest pattern.  
Verbalize increased sense of well-being and feeling rested.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Sleep Enhancement NIC</b>	
<b>Independent</b>	
Ascertain usual sleep habits and changes that are occurring.	Determines need for action and helps identify appropriate interventions.
Provide comfortable bedding and some of own possessions, such as a pillow or an afghan.	Increases comfort for sleep; provides physiological and psychological support.
Establish new sleep routine incorporating old pattern and new environment.	When new routine contains as many aspects of old habits as possible, stress and related anxiety may be reduced, enhancing sleep.
Match with roommate who has similar sleep patterns and nocturnal needs.	Decreases likelihood that “night owl” roommate may delay client’s falling asleep or create interruptions that cause awakening.
Encourage some light physical activity during the day. Make sure client stops activity several hours before bedtime, as individually appropriate.	Daytime activity can help client expend energy and be ready for nighttime sleep; however, continuation of activity close to bedtime may act as a stimulant, delaying sleep.
Promote bedtime comfort regimens such as warm bath, massage, a glass of warm milk, or small amount wine or brandy at bedtime.	Promotes a relaxing, soothing effect. Note: Milk has soporific qualities, enhancing synthesis of serotonin, a neurotransmitter that helps client fall asleep faster and sleep longer.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct in relaxation measures.	Helps induce sleep.
Reduce noise and light.	Provides atmosphere conducive to sleep.
Encourage position of comfort and assist in turning, if needed.	Repositioning reduces pressure on tissues, enhances muscle relaxation, and promotes rest.
Lower bed and position one side against wall when possible. Avoid use of side rails.	May have fear of falling because of change in size and height of bed. Note: Side rails place client at risk for falling when climbing over rails or for possible entrapment.
Avoid or limit interruptions such as awakening for medications or therapies.	Uninterrupted sleep is more restful, and client may be unable to return to sleep when wakened.
<b>Collaborative</b>	
Administer sedatives and hypnotics with caution, as indicated.	May be given to help client sleep or rest during transition period from home to new setting. Note: Avoid habitual use because these drugs decrease rapid eye movement (REM) sleep time.
Provide analgesic medications at bedtime as appropriate.	Perception of pain may be increased during hours of sleep when client is not engaged in daily activities/distraction behaviors.

### NURSING DIAGNOSIS: **risk for imbalanced Nutrition: less than body requirements/Overweight**

#### Possibly Evidenced By

Inability to ingest food (e.g., impaired dentition, inability to feed self effectively)  
 Biological factors (dulling of senses of smell and taste); insufficient interest in food  
 Food intake less than recommended daily allowances  
 Consumption of sugar-sweetened beverages, frequent snacking, portion size larger than recommended  
 Average daily physical activity less than recommended for gender/age

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Nutritional Status **NOC**

Maintain normal weight or progress toward weight goal with normalization of laboratory values and be free of signs of malnutrition and obesity.  
 Demonstrate eating patterns or behaviors to maintain appropriate weight.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Management <b>NIC</b></b>	
<b>Independent</b>	
Perform initial nutritional assessment—admission height, weight, and body mass index (BMI); ability to feed self, chew, and swallow; and eating preferences/cultural or religious beliefs.	Provides baseline evaluation to help determine dietary needs and formulate dietary plan incorporating personal preferences (Henkel, 2004).
Evaluate activity pattern.	Extremes of exercise, such as sedentary life or continuous pacing, affect caloric needs.
Incorporate favorite foods and maintain as near-normal food consistency as possible, such as soft or finely ground food with gravy or liquid added. Avoid pureed or baby food whenever possible.	Aids in maintaining intake, especially when mouth and dental problems exist. Baby food is often unpalatable and can decrease appetite and lower self-esteem.
Encourage the use of spices, other than sodium, to client's personal taste.	Reduction in number and acuity of taste buds results in food tasting bland and decreases enjoyment of food and desire to eat.
Provide small, frequent feedings, as indicated.	Decreased gastric motility causes client to feel full and reduces intake.
Serve hot foods hot and cold foods cold.	Foods served at the proper temperature are more palatable, and enjoyment may increase appetite.

(continues on page 908)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Promote a pleasant environment for eating in dining room or with company, if possible.	Eating is, in part, a social event and appetite can improve with increased socialization.
Have healthy snack foods, such as cheese, crackers, soup, and fruit available on a 24-hour basis.	Helps meet individual needs and enhances intake within caloric recommendations.
Plan for social events and provide for snacks even when working to reduce total calories.	Eating is part of socialization, and being able to respond to body's needs enhances sense of control and willingness to participate in dietary program.
Weigh on a regular basis—preferably, same time of day and in similar clothing.	Monitors nutritional state and effectiveness of interventions.
Assess causes of weight loss or gain, such as dysphagia due to decreased saliva production, neurogenic or psychogenic disturbances, tumors, muscular dysfunction, altered senses of smell and taste, or dysfunctional eating patterns related to depression or dementia.	Aids in adjusting plan of care and choice of interventions. Note: In elderly clients, saliva secretion may be decreased and taste buds may be atrophied with reduced sensitivity to sweet and salt.
Review medication regimen for potential effects on food intake.	Drug side effects can impact client's intake; for example, corticosteroids may increase intake; angiotensin-converting enzyme (ACE) inhibitors and antihistamines cause change in taste; antidepressants, NSAIDs, and ferrous sulfate can decrease appetite or cause dysphagia; NSAIDs, antibiotics, digoxin, opiates, and chemotherapeutic agents can cause gastrointestinal (GI) distress, nausea, constipation, or mucositis (Henkel, 2004).
Check state of client's dental health periodically, including fit and condition of dentures, if present.	Oral infections and dental problems, shrinking gums, reaction of client's oral mucous membranes and saliva (associated with some medications or treatments), loss of teeth or ill-fitting dentures can all decrease client's ability to chew.
Monitor total caloric intake, as indicated.	If dietary plan is ineffective in meeting individual goals, calorie count or food diary may help identify problem areas.
Observe condition of skin; note muscle wasting; brittle nails; dry, lifeless hair; and signs of poor healing.	Reflects lack of adequate nutrition.
Encourage exercise and activity program within individual ability.	Promotes sense of well-being and may improve appetite.
<b>Collaborative</b>	
Consult with dietitian.	Aids in establishing specific nutritional program to meet individual client needs.
Provide balanced diet with individually appropriate protein, complex carbohydrates, and calories or as indicated for client's chronic condition/disease state: for example, Mediterranean diet (MeDi) for general well-being and brain health, DASH diet (Dietary Approaches to Stop Hypertension), carbohydrate counting for diabetes, or gluten-free for celiac disease.	Adjustments may be needed to deal with the body's decreased ability to process protein, as well as decreased metabolic rate and levels of activity. Note: Reduced production of salivary ptyalin inhibits digestion of complex carbohydrates in elderly individuals, affecting dietary plan. In addition, delayed insulin release by the pancreas and reduced peripheral sensitivity to insulin decrease glucose tolerance.
Include supplements between meals, as indicated.	May be useful in meeting daily requirements, especially when additional calories/protein required for healing.
Administer vitamin and mineral supplements, as appropriate.	With age, renal and other regulatory systems cannot compensate as well for errors in intake. Mineral requirements change as hormone levels, metabolism, and GI function change. In addition, absorption can be impaired by medication use and chronic illness.
Refer to speech therapist for swallowing evaluation, as indicated.	Information useful in determining diet type or consistency, need for special exercises to strengthen muscles for swallowing, and/or inclusion in a restorative dining program (Henkel, 2004).
Refer for dental care routinely and as needed.	Maintenance of oral and dental health with good dentition can enhance intake.

**NURSING DIAGNOSIS:** **Self-Care deficit: [specify]****May Be Related To**

Alteration in cognitive functioning; perceptual impairment; decreased motivation  
 Neuromuscular or musculoskeletal impairment; weakness  
 Pain, discomfort  
 Fatigue

**Possibly Evidenced By**

Inability to perform ADLs

**Desired Outcomes/Evaluation Criteria—Client Will****Self-Care Status NOC**

Perform self-care activities within level of own ability.  
 Demonstrate techniques or lifestyle changes to meet own needs.  
 Use resources effectively.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Care Assistance NIC</b>	
<i>Independent</i>	
Determine current capabilities (using 0 to 4 scale) and barriers to participation in self-care.	Comprehensive functional assessment includes independent performance of basic ADLs, social activities, sensory abilities, cognition, and ability to ambulate.
Involve client in formulation of plan of care at level of ability.	Enhances sense of control and aids in cooperation and maintenance of independence.
Encourage self-care. Work within present abilities; do not pressure client, but encourage client to reach beyond current capabilities. Provide adequate time for client to complete tasks. Have expectation of improvement and assist as needed.	Doing for oneself enhances feeling of self-worth. Failure can produce discouragement and depression.
Provide and promote privacy, including during bathing or showering.	Modesty may lead to reluctance to participate in care or perform activities in the presence of others.
Use specialized equipment as needed, such as tub transfer seat, grab bars, or raised toilet seat.	Enhances ability to move and perform activities safely.
Give tub bath, using walk-in tub or two-person or mechanical lift if necessary. Use shower chair and spray attachment, as appropriate. Avoid chilling.	Provides safety for those who cannot get into the tub alone. Shower may be more feasible for some clients, though it may be less beneficial or desirable to the client. Elderly or debilitated clients are more prone to chilling.
Shampoo and style hair, as needed. Provide or assist with manicure	Aids in maintaining appearance. Shampooing may be required more or less frequently than bathing schedule.
Encourage use of barber or beauty salon if client is able.	Enhances self-image and self-esteem, preserving dignity of the client.
Acquire clothing with modified fasteners, as indicated.	Use of Velcro instead of buttons or shoelaces can facilitate process of dressing, undressing, and toileting.
Encourage and assist with routine mouth and teeth care daily. Promote, or provide, denture care on a regular basis—cleaning, disinfecting, storage, repair, and use of dental adhesive. Use alternate oral hygiene measures as indicated, such as suction toothbrush, backward-bent toothbrush, chlorhexidine and fluoride mouth rinses, and regular suctioning.	Reduces risk of gum disease and tooth loss, enhances oral health, and promotes proper fitting and use of dentures.
<i>Collaborative</i>	
Consult with physical and/or occupational therapists and rehabilitation specialist.	Useful in establishing exercise and activity program, identifying assistive devices to meet individual needs and safety concerns, and facilitating independence.

## NURSING DIAGNOSIS: risk for impaired Skin Integrity

### Possibly Evidenced By

Mechanical factors (e.g., shearing forces, pressure, restraint)  
Impaired circulation, alteration in sensation  
Moisture (bladder or bowel incontinence)  
Inadequate nutrition (e.g., obesity, emaciation); skeletal prominence  
Extremes of age

### Desired Outcomes/Evaluation Criteria—Client Will

#### Risk Control NOC

Maintain intact skin.  
Identify individual risk factors.  
Demonstrate behaviors or techniques to prevent skin breakdown or facilitate healing.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Skin Surveillance NIC</b> <i>Independent</i> Assess for presence of conditions that may impact skin health.	Client's age and general health can impact skin health; however, other conditions may have more impact (e.g., older client who is smoking, or presence of diabetes, impaired kidney function, vascular insufficiency, incontinence, high risk for falls).
Inspect skin, tissues, and mucous membranes routinely. Observe for dry skin, rashes, evidence of pruritus (e.g., redness, scratches), any type of lesion, skin tears.	Provides opportunity for early intervention in high-risk population, which has less elastic and more fragile skin and tissues.
Anticipate and use preventive measures in clients who are at risk for skin breakdown, such as anyone who is thin, obese, aging, or debilitated; receiving steroid therapy.	Decubitus ulcers/pressure injuries are difficult to heal, and prevention is the best treatment.
Assess nutritional status and initiate corrective measures, as indicated. Provide balanced diet with adequate protein, vitamins, and minerals.	A positive nitrogen balance and improved nutritional state can help prevent skin breakdown and promote wound healing. Note: May need additional calories and protein if draining wound is present.
Encourage adequate fluid intake, especially in presence of cognitive impairment or dementia.	Prevention of dehydration is necessary to maintain circulating volume and tissue perfusion, moist mucous membranes, and good skin turgor to reduce risk of tissue breakdown.
Maintain skin hygiene, using mild, nondetergent soap (e.g., Dove), drying gently and thoroughly, and lubricating.	A daily bath is usually not necessary in elderly clients because there is atrophy of sebaceous and sweat glands, and bathing may create dry skin problems. However, as epidermis thins with age, cleansing and use of moisturizing agents (containing occlusive ingredients [e.g., Vaseline, lanolin], humectants [e.g., glycerin, sorbitol], and emollients) are needed to keep skin soft, smooth, and pliable and to protect susceptible skin from breakdown (Haroun, 2003).
Change position frequently in bed and chair. Recommend 10 minutes of exercise each hour and/or perform passive ROM.	Improves circulation, muscle tone, and joint motion and promotes client participation.
Use a rotation schedule in turning client. Use draw or turn sheet. Pay close attention to client's comfort level.	Allows for longer periods free of pressure; prevents shearing or tearing motions that can damage fragile tissues. Note: Use of prone position depends on client tolerance and should be maintained for only a short time.
Keep sheets and bedclothes clean, dry, and free from wrinkles, crumbs, and other irritating material.	Avoids friction or abrasion injury of skin.
Use elbow and heel protectors and foam, water, or gel pads for positioning in bed and when up in chair. Avoid use of plastic sheet protectors or incontinent pads.	Reduces risk of tissue abrasions and decreases pressure that can impair cellular blood flow. Promotes circulation of air along skin surface to dissipate heat and moisture. Plastic can actually trap heat and moisture against fragile tissues, increasing risk of tissue irritation and breakdown.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide for safety during ambulation, using appropriate adaptive devices, such as a walker or cane.	Loss of muscle strength and flexibility and physical disease process or debilitation may result in impaired coordination.
Limit exposure to temperature extremes and use of heating pad or ice pack.	Decreased sensitivity to pain, heat, or cold increases risk of tissue trauma.
Examine feet and nails routinely and provide foot and nail care as indicated:	Foot problems are common among clients who are elderly, diabetic, bedfast, and/or debilitated.
Keep nails cut short and smooth.	Jagged, rough nails can cause tissue damage and infection.
Use lotion or softening cream on feet.	Prevents drying or cracking of skin; promotes maintenance of healthy skin.
Check for fissures between toes, swab with hydrogen peroxide or dust with antiseptic powder, and place a wisp of cotton between the toes.	Prevents spread of infection and/or tissue injury.
Rub feet with witch hazel or a mentholated preparation and have client wear lightweight cotton socks.	Even though rash may not be present, burning and itching may be a problem. Note: Witch hazel may be contraindicated if skin is dry.
Inspect bony prominences, skin surface and folds routinely, especially when incontinence pad or pants are used. Increase preventive measures when reddened areas are noticed.	Skin breakdown can occur quickly with potential for infection and necrosis, possibly involving muscle and bone. There is increased risk of redness and irritation around legs due to elastic bands in adult incontinence pads or pants.
Continue regimen for redness and irritation when break in skin occurs.	Aggressive measures are important because pressure injury can develop in a matter of a few hours.
Observe for pressure injury/incontinence dermatitis development, and treat immediately according to protocol.	Timely intervention may prevent extensive damage.
<b>Collaborative</b>	
Provide waterbed, alternating-pressure, egg-crate, or gel mattress and pad for chair.	Provides protection and improved circulation by decreasing amount of pressure on tissues.
Monitor Hgb and Hct and blood glucose levels.	Anemia, dehydration, and elevated glucose levels are factors in skin breakdown and can impair healing.
Refer to podiatrist, as indicated.	May need professional care for such problems as ingrown toenails, corns, bony changes, and skin or tissue ulceration.
Assist with topical applications, such as hydrogel dressings, skin barrier dressings (Duoderm, Op-Site), collagenase therapy, absorbable gelatin sponges (Gelfoam), and aerosol sprays per protocol.	Although there are differing opinions about the efficacy of these agents, individual or combination use may enhance healing.
Administer nutritional supplements and vitamins, as indicated.	Aids in healing and cellular regeneration.
Prepare for skin grafting. (Refer to CP: Wound Care: Complicated or Chronic; Burns, ND: Impaired Skin/Tissue Integrity.)	May be required to close large ulcers/wounds.

### NURSING DIAGNOSIS: risk for impaired urinary Elimination

#### Possibly Evidenced By

Multiple causality (e.g., changes in fluid or nutritional pattern; perceptual or cognitive impairment)  
Urinary tract infection

#### Outcomes/Evaluation Criteria—Client Will

##### Urinary Elimination NOC

Maintain or regain effective pattern of elimination.  
Initiate necessary lifestyle changes.  
Participate in treatment regimen to correct or control situation, such as bladder training program or use of indwelling catheter.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Elimination Management NIC</b>	
<b>Independent</b>	
Monitor voiding pattern. Identify possible reasons for changes, such as disorientation, neuromuscular impairment, and psychotropic medications.	This information is essential to plan for care and influences choice of individual interventions. Nocturia, frequency, and urgency are common because bladder capacity and/or tone are affected. Bladder pelvic muscles and sphincter tone may also be affected. Note: Urinary incontinence occurs more frequently in older adults but is not considered a normal part of aging (Dowling-Castronovo & Bradway, 2012).
Palpate bladder. Observe for “overflow” voiding and determine frequency and timing of dribbling or voiding.	Bladder distention indicates urinary retention, which may cause incontinence and infection.
Promote fluid intake of 2000 to 3000 mL/d within cardiac tolerance; include fruit juices, especially cranberry juice. Schedule fluid intake times appropriately.	Maintains adequate hydration and promotes kidney function (Dowling-Castronovo & Bradway, 2012). Acid-ash juices act as an internal pH acidifier, retarding bacterial growth. Note: Client may decrease fluid intake in an attempt to control incontinence and become dehydrated. Instead, fluids may be scheduled to decrease frequency of incontinence, such as limiting fluids after 6 p.m. to reduce need to void during the night.
Institute bladder program, including scheduled voiding times and Kegel’s exercises, involving client and staff in a positive manner.	Regular toileting times may help control incontinence. Program is more apt to be successful when positive attitudes and cooperation are present.
Assist client to sit upright on bedside commode, or bedpan, if not able to use toilet.	Provides functional position for voiding.
Provide, or encourage, perineal care daily and as needed.	Reduces risk of contamination and ascending infection.
Use adult incontinence pads or pants during day if needed based on individual type and amount of incontinence. Keep client clean and dry. Provide frequent skin care.	When training is unsuccessful, this is the preferred method of management (Dowling-Castronovo, & Bradway, 2012). Note: Avoiding use of incontinence pads during night exposes skin to air, reducing risk of irritation.
Avoid verbal or nonverbal signs of rejection, disgust, or disapproval over failures.	Expressions of disapproval lower self-esteem and are not helpful to a successful program.
Provide regular catheter care with soap and water, keep collecting bag below level of bladder, and maintain patency of system when indwelling catheter is present.	Reduces risk of ascending infection and/or minimizes reflux (Cravens & Zweig, 2000; Umscheid et al, 2009).
<b>Collaborative</b>	
Administer medications as indicated, such as the following:	
Oxybutynin chloride (Ditropan) and tolterodine tartrate (Detro)l	Promotes bladder sphincter control.
Vitamin C and methenamine mandelate (Mandelamine)	Bladder pH acidifiers retard bacterial growth (Cravens & Zweig, 2000).
Maintain condom or indwelling catheter, or provide intermittent catheterization, if needed, using aseptic technique.	Catheterization for maintenance of continence should be avoided if at all possible, unless needed during healing of sacral or perineal wounds or for client with prolonged immobilization (e.g., spinal cord injury) or to improve comfort at end of life (Umscheid et al, 2009). Note: A single catheter insertion may lead to bacteriuria in up to 20% of elderly clients, and “chronic indwelling catheterization is not a substitute for good nursing care in the management of incontinence” (Cravens & Zweig, 2000).

#### NURSING DIAGNOSIS: **risk for Constipation/Diarrhea**

##### Possibly Evidenced By

Inadequate toileting habits  
Insufficient fluid/fiber intake; poor eating habits  
Decrease in gastrointestinal motility

**NURSING DIAGNOSIS:** **risk for Constipation/Diarrhea** (continued)

Mental confusion  
Prostate enlargement  
Adverse effects of pharmaceutical agents; treatment regimen  
Gastrointestinal inflammation/infection  
Enteral feedings

**Desired Outcomes/Evaluation Criteria—Client Will****Bowel Elimination NOC**

Establish or maintain normal pattern of bowel functioning.  
Demonstrate changes in lifestyle as necessitated by risk or contributing factors.  
Participate in bowel program as able.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bowel Management NIC</b>	
<i>Independent</i>	
Review medical, surgical, and social history to identify conditions commonly associated with elimination difficulties.	Elimination problems may be multifactorial, and include (1) physical conditions of the gut (e.g., diverticulitis, obstructions, anal fissures); (2) limited physical activity; (3) chronic pain and use of opioid analgesics; (4) neurological disorders (e.g., stroke); (5) poor eating habits, poor diet, food intolerances, malnutrition; (6) use of multiple medications, reaction to medication (e.g., diarrhea caused by antibiotic); (7) age and developmental issues; (8) cognitive decline or dementia with failure to attend to elimination needs; and (9) emotional/psychological issues, such as depression, distress over loss of privacy, and inability to adjust to new surroundings and routines.
Ascertain usual bowel pattern and aids used, including previous long-term laxative use. Compare with current routine.	Determines extent of problem and indicates type of interventions required. Many clients may already be laxative dependent, and it is important to reestablish as near-normal functioning as possible.
Assess reasons for elimination problems; rule out medical causes such as hemorrhoids, drug effect, impaction, infection, bowel obstruction, and cancer.	Identification and treatment of underlying medical condition is necessary to achieve optimal bowel function.
Determine presence of food and/or drug sensitivities.	May contribute to diarrhea.
Institute individualized program of exercise, rest, diet, and elimination.	Depends on the needs of the client. Loss of muscular tone reduces peristalsis or may impair control of rectal sphincter.
Provide diet high in bulk in the form of whole-grain cereals, breads, and fresh fruits—especially prunes and plums.	Improves stool consistency and promotes evacuation.
Encourage increased fluid intake.	Promotes normal stool consistency.
Avoid foods that precipitate diarrhea, limit caffeine and high-fiber foods, avoid milk and fruits, or restrict solid food intake as indicated.	Allows for bowel rest and reduces intestinal workload.
Use adult incontinence pads or pants, if needed. Keep client clean and dry. Provide frequent perineal care. Apply skin protective ointment to anal area.	Prevents skin breakdown.
Keep air freshener in room, at bedside, or in bathroom, as needed.	Limits noxious odors and may help reduce client embarrassment and concern.
Give emotional support to client. Avoid “blaming” talk or actions if incontinence occurs.	Decreases feelings of frustration and embarrassment that can diminish self-esteem.
<i>Collaborative</i>	
Administer medications, as indicated, for example:	If nonpharmacologic treatments are inadequate in managing constipation, laxatives may be added to the treatment regimen (Gallagher, 2008).

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Bulk-forming laxatives, (e.g., psyllium seed [Metamucil], methylcellulose [Citrucel]), osmotic laxatives (e.g., low-dose polyethylene glycol [Miralax] and saline laxatives [Ceo-Two, Fleet Enema, Milk of Magnesia])	These agents absorb water, adding to the size of the fecal mass.
Stimulant laxatives (e.g., senna [Ex-Lax, Fletchers Castoria, Senokot]; bisacodyl [Correctol, Dulcolax])	These agents aren't absorbed in the intestine; instead, they pull water into the fecal mass to create more watery stool.
Stool softeners or surfactants (e.g., docusate [Colase, Surfak])	These agents irritate the bowel to increase peristalsis.
Miscellaneous agents (e.g., mineral oil)	These agents cause more water and fat to be absorbed into the stool.
Loperamide (Imodium), atropine/diphenoxylate (Lomotil)	These agents act by lubricating the stool and colon mucosa.
Antibiotic agents	May be needed on a short-term basis for persistent diarrhea to decrease gastrointestinal motility and fluid loss. While diarrhea can be associated with antibiotic use, they may be indicated to treat severe infections (e.g., <i>Shigella</i> or <i>C. difficile</i> ).
Adjust rate/strength of enteral feeding or change formula as indicated.	First option for diarrhea associated with enteral feeding.

### NURSING DIAGNOSIS: impaired physical Mobility

#### May Be Related To

Decrease in endurance, physical deconditioning  
 Decrease in muscle mass/control; joint stiffness; musculoskeletal impairment  
 Pain  
 Alteration in cognitive functioning

#### Possibly Evidenced By

Discomfort; decrease in range of motion  
 Alteration in gait; postural instability  
 Slowed movement

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Mobility NOC

Maintain or increase strength and function of affected body parts.  
 Verbalize willingness to, and participate in, desired activities.  
 Demonstrate techniques or behaviors that enable continuation or resumption of activities.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Environmental Management NIC</b>	
<b>Independent</b>	
Determine functional ability using a scale of 0 to 4 and reasons for impairment.	Identifies need for and degree of intervention required.
Note emotional and behavioral responses to altered ability.	Physical changes and loss of independence often create feelings of anxiety, anger, frustration, and depression that may be manifested as reluctance to engage in activity.
Plan activities and visits with adequate rest periods as necessary.	Can limit or prevent fatigue; conserve energy for continued participation.
Encourage participation in self-care, occupational or recreational activities.	Promotes independence and self-esteem; may enhance willingness to participate.
Provide chairs with firm, high seats and lifting chairs, when indicated.	Facilitates rising from seated position.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Fall Prevention NIC</b> Perform initial and ongoing fall-risk assessment, including fall history, gait and balance assessment, cognition, use of mobility adjuncts, and environmental conditions.	Approximately 50 fall-risk assessment tools exist based on client situation and setting. Information can help determine client's potential for falling and identify which risk factors can be modified, such as medications, uncorrected sensory impairments, or poorly fitting shoes (Lunsford & Wilson, 2015).
Assist with transfers and ambulation if indicated; show client and SO ways to move safely. Use gait belt for assisted transfers.	Prevents accidental falls and injury, especially in the client with altered gait, generalized weakness, orthostatic hypotension, fatigue, and vision disturbances. Note: The highest incidence of falls occurs during transfers (Lunsford & Wilson, 2015).
Obtain supportive shoes and well-fitting, nonskid slippers.	Assists client to walk with a firm step, maintains sense of balance, and prevents slipping (Quigley, 2015).
Remove clutter, wires or cords, scatter rugs, and extraneous furniture from pathways. Keep floors dry.	Reduces risk of falling and injuring self.
Encourage use of hand rails in hallway, stairwells, and bathrooms. Keep bed height in low position except during transfers, provide floor mats, use bed/chair alarms.	Promotes independence in mobility; reduces risk of falls (Quigley, 2015).
Review safe use of mobility aids and adjunctive devices such as walker, braces, and prosthetics.	Facilitates activity and reduces risk of injury.
Provide for environmental changes to meet visual deficiencies:	Prevents accidents and reduces sense of sensory deprivation. If client is visually impaired, may need assistance and ongoing orientation to surroundings.
Keep areas well lighted. Accompany and keep close to client when in unfamiliar areas.	Provides for safety and psychological comfort.
Avoid use of physical restraints.	Studies show that older adults who are restrained, particularly when visually or cognitively impaired, are more likely to experience a fall than those who are not restrained.
Speak to client when entering the room, and let client know when leaving.	Special actions help client who cannot see to know when someone is there.
Encourage client with glasses or contacts to wear them. Be sure glasses are kept clean. Determine reason if glasses are not being worn.	Optimal visual acuity facilitates participation in activities and reduces risk of falls and injury. Client may not be wearing glasses because they need adjustment or change in correction.
<b>Collaborative</b> Arrange for regular eye examinations.	Identifies development or progression of vision problem such as myopia, hyperopia, presbyopia, astigmatism, cataract, glaucoma, tunnel vision, loss of peripheral fields, and blindness and specific options for care.
Consult with physical and occupational therapists and rehabilitation specialist.	Useful in creating individual exercise and activity program and identifying adjunctive aids and injury prevention devices (e.g., low-low beds, hip protectors, helmets, or protective caps) (Hester, 2015). Note: Even in the elderly population, inclusion of moderate weightlifting in the exercise program can improve and maintain the cardiovascular system, decrease obesity and blood pressure, and improve bone density, balance, and muscle tone and strength.

**NURSING DIAGNOSIS: chronic Pain****May Be Related To**

Injury agent (e.g., arthritis, cancer); chronic musculoskeletal condition; nerve compression; ischemic condition  
Age >50 years

(continues on page 916)

**NURSING DIAGNOSIS:** **chronic Pain** (continued)**Possibly Evidenced By**

Self-report of intensity/pain characteristics using standardized pain scale/instrument; self-focused  
Alteration in sleep pattern, ability to continue previous activities

**Desired Outcomes/Evaluation Criteria—Client Will****Pain Level NOC**

Verbalize/demonstrate relief or reduction of pain to manageable level.

**Pain Control NOC**

Engage in behavioral modifications and appropriate use of therapeutic interventions.  
Verbalize enhanced enjoyment of life.

**ACTIONS/INTERVENTIONS****RATIONALE****Pain Management: Chronic NIC****Independent**

Evaluate client's pattern of coping and locus of control.

Passive/avoidant behavioral pattern or lack of active engagement in self-management of activities can contribute to diminished activity and perpetuation of chronic pain. Individuals with external locus of control may take little or no responsibility for pain management.

Determine relevant cultural and spirituality factors affecting pain response.

Pain is accepted and expressed in different ways. Some may magnify symptoms to convince others of reality of pain or believe that suffering in silence helps atone for past wrongdoing.

Evaluate pain behavior, noting past and current pain experience, using pain rating scale (e.g., 0–10 scale or similar tool) or standardized behavior checklist for nonverbal clients, and including functional effects and psychological factors.

Pathophysiology of chronic pain is multifactorial. Effects on lifestyle can include depressed mood, fatigue, weight changes, sleep disturbances, decreased activity, withdrawal.

Provide nonpharmacological methods of pain control considering techniques that may or not been successful in the past.

Engaging in techniques such as progressive muscle relaxation, chair yoga, meditation, visualization or guided imagery, biofeedback, heat or cold application can enhance comfort and decrease need for analgesia.

Encourage participation in mix of activities and stimuli, such as music, news program, educational presentations, crafts, and social interactions, as appropriate.

Offering different activities helps client to try out new ideas and develop new interests providing diversion from focus on pain.

Provide change of scenery when possible, alter personal environment, encourage participation in facility activities, off-site outings, and family events.

Stimulates energy and provides new outlook for client.

**Collaborative**  
Assist in treatment for underlying cause of pain. (Refer to specific care plan.)

Pain management options can vary based on specific condition such as arthritis, multiple sclerosis, herniated disc, peripheral neuropathy of diabetes mellitus, cancer.

Administer medications as indicated such as NSAIDs, opioids, tranquilizers.

Medications may need to be scheduled around the clock, doses titrated up or down, and dose maximized to optimize pain control while managing side effects.

Refer to physical/occupational therapist.

Can design exercise programs, identify assistive devices to enhance mobility.

**NURSING DIAGNOSIS:** **risk for Sexual Dysfunction****Possibly Evidenced By**

Alteration in body function (e.g., disease process, medications, surgery)  
Absence of privacy and/or significant other

**NURSING DIAGNOSIS:** **risk for Sexual Dysfunction** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Sexual Functioning NOC**

Verbalize knowledge and understanding of sexual limitations, difficulties, or changes that have occurred.

Demonstrate improved communication and relationship skills.

Identify appropriate options to meet needs.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Sexual Counseling NIC</b>	
<i>Independent</i>	
Note client's and SO's cues regarding sexuality.	May be concerned that condition or environmental restrictions may interfere with sexual function or ability but is afraid to ask directly.
Determine cultural and religious values and conflicts or other factors that may be present.	Affects client's perception of existing problems and response of others—family, staff, and other residents. Provides starting point for discussion and problem-solving.
Assess developmental and lifestyle issues.	Factors such as menopause and aging, adolescence, and young adulthood need to be taken into consideration with regard to sexual concerns about illness and long-term care.
Provide atmosphere in which discussion of sexuality is permitted and encouraged.	When concerns are identified and discussed, problem-solving can begin.
Provide privacy for client and SO.	Demonstrates acceptance of need for intimacy and provides opportunity to continue previous patterns of interaction as much as possible.
<i>Collaborative</i>	
Refer to sex counselor or therapist and family therapy when indicated.	May require additional assistance for resolution of issues.

**NURSING DIAGNOSIS:** **readiness for enhanced Health Management****Possibly Evidenced By**

Expresses desire to enhance management of illness/symptoms, risk factors

Expresses desire to enhance management of prescribed regimen

Expresses desire to enhance choices of daily living for meeting goals

**Desired Outcomes/Evaluation Criteria—Client/Caregiver Will****Participation in Health Care Decisions NOC**

Verbalize understanding of factors contributing to current situation.

Adopt lifestyle changes supporting individual healthcare goals.

Assume responsibility for own healthcare needs when possible.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Health Coaching NIC</b>	
<i>Independent</i>	
Assess level of adaptive behavior, knowledge, and skills about health maintenance, environment, and safety.	Identifies areas of concern or need and aids in choice of interventions.
Provide information about individual healthcare needs.	Provides knowledge base and encourages participation in decision making.
Develop plan with client and SO for self-care incorporating existing disabilities and adapting and organizing care.	Assists client and caregiver to maintain and manage desired level of independence when possible.
Maintain adequate hydration and balanced diet with sufficient protein intake.	Promotes general well-being and aids in disease prevention.

(continues on page 918)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Schedule adequate rest with progressive activity program.	Prevents fatigue and enhances general well-being.
Promote good handwashing and personal hygiene. Use aseptic techniques as necessary.	Prevents contamination or cross-contamination, reducing risk of illness or infection.
Protect from exposure to infections and avoid extremes of temperature. Recommend the wearing of masks, monitor staff and visitors, and provide other interventions, as indicated.	With age, immune-protective responses slow down and physiological reactions to temperature extremes may be impaired. As organ function decreases, especially the thymus gland, and natural antibodies decline, clients are at increased risk for infection. Staff and/or visitors with colds or other infections may expose client to these illnesses. Note: Nursing home-acquired pneumonia (NHAP) is a common cause of infection in chronic care facilities and is a significant cause of mortality (Cunha, 2013).
Encourage cessation of smoking.	Smokers are prone to bronchitis and ineffective clearing of secretions.
Encourage reporting of signs and symptoms as they occur.	Provides opportunity for early recognition of developing complications and timely intervention to prevent serious illness.
<b>Health System Guidance NIC</b>	
Note client's previous use of professional services, and continue as appropriate. Include in choice of new health-care providers as able.	Preserves continuity and promotes independence in meeting own healthcare needs.
Observe for and monitor changes in vital signs such as temperature elevation.	Early identification of onset of illness allows for timely intervention and may prevent serious complications. Note: Elderly persons often display subnormal temperatures, so presence of a low-grade fever may be of serious concern.
<b>Collaborative</b>	
Identify resources for, or administer medications, as indicated, for example:	
Immunizations, such as <i>Haemophilus influenzae</i> (flu) and pneumonia	Reduces risk of acquiring contagious, potentially life-threatening diseases.
Antibiotics	May be used prophylactically, depending on individual disease process or risk factors, and to treat infections.
Schedule preventive and routine healthcare appointments based on individual needs with cardiologist, podiatrist, ophthalmologist, or dentist, etc.	Promotes optimal recovery and maintenance of health.
Prepare for discharge or transfer to independent care setting as appropriate.	For some clients, stabilization of chronic conditions, improved nutrition, and medication management may allow movement to lower level of care with adequate family/community support.
Refer to support services as indicated, such as home health care agency, durable medical equipment company, Senior Resources, social services, national hospice organization, Alzheimer's Disease and Related Disorders Association, American Association of Retired Persons (AARP), Center for Health Care Ethics, Choice in Dying, American Bar Association, Commission on Legal Problems of the Elderly, Internet resources, and Adult Protective Services.	Many community resources are available, and often untapped, to make life and care of the individual easier at a lower level of care.

#### POTENTIAL CONSIDERATIONS following discharge from care facility.

Refer to plan of care for diagnosis that required admission.

# ALCOHOL: ACUTE WITHDRAWAL

## I. Pathophysiology (McKeown & West, 2017)

- a. Alcohol intoxication and withdrawal—complex mechanism
- b. Most clinical effects explained by the interaction of ethanol with various neurotransmitters and neuropeptides in the brain
- c. Resulting changes in the inhibitory and excitatory neurotransmitters disrupt the neurochemical balance in the brain, causing symptoms of withdrawal if alcohol is suddenly stopped or decreased after extended usage (Burton, 2010; Donnelly et al, 2012).

## II. Stages of Alcohol Withdrawal (McKeown & West, 2017)

- a. Stage I: autonomic hyperactivity
- b. Stage II: hallucinations
- c. Stage III: neuronal excitation
- d. Stage IV: delirium tremens (DTs)

## III. Etiology

- a. Individual's desire to repeatedly reach a state of feeling high; numb, negative feelings
- b. Associated with serious mental health disorders—anxiety, mood disorders, or major depression
- c. Personality traits—dependency more common in isolation, loneliness, shyness, depression, dependency, hostile and self-destructive impulsivity, and sexual immaturity (Ali et al, 2013)
- d. Environment—frequently come from a broken home and have a disturbed relationship with their parents
- e. Genetics—Incidence of alcoholism is higher in biological children of alcoholics, and some people who become alcoholics are less easily intoxicated, having a higher threshold for central nervous system (CNS) effects.

## IV. Statistics

- a. Morbidity: Approximately 15.1 million adults in the U.S. ages 18 and older had alcohol use disorder (AUD) in 2015

(National Institutes of Health [NIH], n.d.). In 2007, approximately 463,000 hospital discharge episodes in the United States for persons age 15 and older had a principal (first-listed) alcohol-related diagnosis (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2010); approximately 5% of individuals who have alcohol withdrawal progress to DTs (McKeown & West, 2012).

- b. Mortality: There are approximately 88,000 deaths related to health consequences of alcohol abuse annually (CDC, 2015). This figure includes every type of alcohol-attributable condition or event, including acute causes (e.g., alcohol poisoning, vehicle crashes, fall injuries, homicide) and chronic causes (e.g., alcoholic liver disease, alcoholism, various cancers, pancreatitis, fetal alcohol syndrome). In 2013, over 32,000 liver disease deaths among individuals ages 12 and older involved alcohol (NIH, 2017). Review of death certificates from 2010 to 2012 revealed alcohol poisoning resulted in approximately 22,000 deaths annually (Kanny et al, 2015). Despite appropriate treatment, DTs are reported to have a 5% to 15% mortality rate (McKeown & West, 2012).
- c. Cost: In 2010, the estimated cost of excessive alcohol consumption reached \$249 billion (NIH, 2017). The costs largely resulted from losses in workplace productivity, healthcare expenses for problems caused by excessive drinking, law enforcement and other criminal justice expenses related to excessive alcohol consumption, and motor vehicle crash costs from impaired driving. In 2014, the number of emergency department visits involving alcohol consumption was almost 5 million, resulting in a cost of \$15.3 billion (White, 2018).

## G L O S S A R Y

**Addiction:** Dependence on a substance (such as alcohol or other drugs) or an activity to the point that stopping is very difficult and causes severe physical and mental reactions.

**Alcohol withdrawal syndrome (AWS):** The neurological, psychiatric, and cardiovascular manifestations that result when a person accustomed to consuming large quantities of alcohol suddenly becomes abstinent or reduces usual amount of alcohol intake (Burton, 2010).

**Arcus senilis:** White or gray ring-like opacity of the cornea. **Ataxia:** Gross incoordination of voluntary muscle movement, reflecting loss of proprioception in chronic alcohol abuse.

**Autonomic hyperactivity stage:** Usually occurs within 24 hours of the last drink. Symptoms may be mild, characterized by tremulousness, insomnia, anxiety, diaphoresis, mild tachycardia, and gastrointestinal (GI) upset.

**Binge:** Uninterrupted consumption of a drug for several hours or days.

**Blackout:** Amnesia for events occurring during the period of alcoholic intoxication, even though consciousness is still maintained during that time.

**Delirium tremens (DTs):** Potentially fatal form of alcohol withdrawal characterized by disorientation, confusion, impaired attention, pronounced autonomic hyperactivity, and visual and auditory hallucinations. Usually begins at 48 to 72 hours but can be delayed up to 4 to 5 days. Death is usually due to cardiovascular or respiratory collapse.

**Detoxification:** Process of removing alcohol or other drugs from the body. This is the initial period addicts must go through to become drug-free. Withdrawal symptoms appear early during this process. Depending on the drug, detoxification lasts for a few days to a week or more.

**Gluconeogenesis:** Conversion of glycogen to glucose in the liver.

**Hallucination stage:** Development of false visual (most common), olfactory, or auditory perceptions that have no relation to reality, usually occurring 24 to 36 hours after the cessation of alcohol intake.

**Hepatic encephalopathy:** Condition used to describe the deleterious effects of liver failure on the central nervous system (CNS). Features include confusion ranging to

(continues on page 920)

## G L O S S A R Y (continued)

coma, with alcoholic cirrhosis being the most common cause.	<b>Nystagmus:</b> Unintentional jittery movement of the eyes. Nystagmus usually involves both eyes and is often exaggerated by looking in a particular direction.
<b>Myelosuppression:</b> Decrease in the production by the bone marrow of red blood cells (RBCs), platelets, and some white blood cells (WBCs).	<b>Thrombocytopenia:</b> Low platelet count, which can lead to impaired blood clotting and spontaneous bleeding.
<b>Neuronal excitation stage:</b> Development of autonomic hyperactivity or seizures occurring within 48 hours after cessation of alcohol consumption.	<b>Wernicke's syndrome or Wernicke encephalopathy:</b> Neurological disease characterized by the clinical triad of confusion, inability to coordinate voluntary movement, and eye abnormalities.

## CARE SETTING

Client may be inpatient on a behavioral unit, at a substance abuse rehabilitation facility, or outpatient in community programs. Although clients are not generally admitted to the acute care setting with this diagnosis, withdrawal from alcohol may occur secondarily during hospitalization for other illnesses or conditions (Riddle et al, 2010). An alcohol screening should be done for all hospitalized clients (Burton, 2010; Daly et al, 2009). A short hospital stay may be required during the acute phase because of severity of general condition or comorbidities, or a delayed discharge from acute care can be the result of alcohol withdrawal beginning within 6 to 48 hours of admission.

## RELATED CONCERNS

Cirrhosis of the liver, page 494  
Heart failure: chronic, page 38  
Psychosocial aspects of care, page 835  
Respiratory failure/ventilatory assistance, page 187  
Substance use disorders (SUDs), page 929  
Upper gastrointestinal bleeding, page 340

## CLIENT ASSESSMENT DATABASE

Data depend on the duration and extent of use of alcohol, concurrent use of other drugs, degree of organ involvement, and presence of other pathology.

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Insomnia, difficulty sleeping, not feeling well rested
- Fatigue or weakness

#### CIRCULATION

### MAY EXHIBIT

- Abnormal heart rate or blood pressure (BP) in response to activity
- Tachycardia common during acute withdrawal
- Numerous dysrhythmias may be identified, especially atrial fibrillation
- Hypertension common in early withdrawal stage; may become labile or progress to hypotension
- Peripheral pulses weak, irregular, or rapid

#### EGO INTEGRITY

- Feelings of guilt, shame; defensiveness about drinking
- Denial, rationalization
- Multiple stressors or losses—relationships, employment, finances
- Use of alcohol to deal with life stressors, boredom

- Anxiety, fear
- Irritability
- Antisocial behavior

**MAY REPORT (continued)****ELIMINATION**

- Diarrhea

**FOOD/FLUID**

- Nausea, vomiting; food intolerance
- Anorexia

**NEUROSENSORY**

- “Internal shakes”
- Headache, dizziness, blurred vision
- Blackouts

**PAIN/DISCOMFORT**

- Constant upper abdominal pain and tenderness radiating to the back (pancreatic inflammation)
- Headache (may be “pulsating”)

**RESPIRATION**

- History of smoking
- Chronic respiratory problems

**SAFETY**

- History of recurrent trauma—falls, fractures, lacerations, burns, or motor vehicle crashes
- Violence toward self or others

**MAY EXHIBIT (continued)**

- Bowel sounds varied (may reflect gastric complications such as hemorrhage)

- Gastric distention, ascites, liver and spleen enlargement (seen in cirrhosis)
- Muscle wasting; dry, dull hair; swollen salivary glands; inflamed buccal cavity; capillary fragility (malnutrition)
- Bowel sounds varied (reflecting malnutrition, electrolyte imbalances, general bowel dysfunction)

- Psychopathology—paranoia, schizophrenia, major depression, neurosis (may indicate dual diagnosis)
- Level of consciousness (LOC) and orientation varied—confusion, stupor, hyperactivity, distorted thought processes, slurred, incoherent speech

- Memory loss, confabulation
- Affect/mood/behavior—fearful, anxious, easily startled, inappropriate, silly, euphoric, irritable, physically or verbally abusive, depressed, and/or paranoid

- Hallucinations may be visual, tactile, olfactory, or auditory; for example, client may be picking items out of the air or responding verbally to unseen person or voices

***Eye examination:***

- Nystagmus—associated with cranial nerve palsy
- Pupil constriction (may indicate CNS depression)
- Arcus senilis (normal in aging populations, suggests alcohol-related changes in younger individuals)
- Fine-motor tremors of face, tongue, and hands
- Seizure—grand mal or partial that is usually brief, generalized, tonic-clonic in nature, and without an aura, occurs in a cluster of one to three seizures with a short postictal period; in 20% to 50% of individuals, the seizures progress to DTs (McKeown & West, 2012; Riddle et al, 2010).
- Gait unsteady (ataxia), which may be due to thiamine deficiency or cerebellar degeneration associated with Wernicke’s encephalopathy (Riddle et al, 2010).

- Guarding affected area
- Narrowed focus

- Tachypnea, hyperventilation
- Breath sounds diminished, adventitious sounds (suggests pulmonary complications such as respiratory depression or pneumonia)

- Skin—flushed face and palms of hands; scars, ecchymotic areas; fissures at corners of mouth (vitamin deficiency)
- Fractures healed or new—signs of recent or recurrent trauma
- Temperature elevation, flushing, diaphoresis
- Suicidal ideation; alcohol is a major risk factor in suicide (Ali et al, 2013; Davies, 2012).

(continues on page 922)

## CLIENT ASSESSMENT DATABASE (contd.)

### MAY REPORT (continued)

### MAY EXHIBIT (continued)

#### SEXUALITY

- Loss of sexual desire
- Not achieving sexual satisfaction, or needing alcohol for satisfying sex
- Actual or perceived limitation imposed by disease

#### SOCIAL INTERACTION

- Frequent sick days off from work or school, fighting with others, arrests for disorderly conduct, or motor vehicle violations such as driving under the influence (DUI)
- Denial that alcohol intake has any significant effect on present condition
- Dysfunctional family system of origin (generational involvement), problems in current relationships, often alienated from family when problem is chronic
- Mood changes affecting interactions with others

#### TEACHING/LEARNING

- Family history of alcoholism
- History of alcohol and/or other drug use or abuse, tobacco use
- Ignorance and/or denial of addiction to alcohol, or inability to cut down or stop drinking despite repeated efforts, previous periods of abstinence or withdrawal
- History of daily alcohol use for at least 3 months
- Large amount of alcohol consumed in last 24 to 48 hours (“bingeing”)
- Previous hospitalizations for alcoholism or alcohol-related diseases such as cirrhosis and esophageal varices

#### DISCHARGE PLAN CONSIDERATIONS

- May require assistance to maintain abstinence and begin to participate in rehabilitation program

► Refer to section at end of plan for postdischarge considerations.

## DIAGNOSTIC STUDIES

### TEST

### WHY IT IS DONE

### WHAT IT TELLS ME

#### BLOOD TESTS

- **Blood alcohol level (BAL):** Measures level of alcohol in the blood.

BAL may or may not be severely elevated, depending on amount consumed, time between consumption and testing, and the degree of tolerance, which varies widely. In the absence of elevated alcohol tolerance, blood levels of 100 mg/dL are associated with loss of control of fine motor movements and confusion when faced with tasks requiring thinking; at 200 mg/dL, very slurred speech, ataxia, and lethargy; at 400 mg/dL, coma and respiratory depression; at 500 mg/dL, death is possible due to respiratory arrest, severe hypotension, and aspiration (Balentine, 2018).

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li><b>Complete blood count (CBC):</b> Battery of screening tests, which typically includes hemoglobin (Hgb); hematocrit (Hct); RBC count, morphology, indices, and distribution width index; platelet count and size; WBC count and differential.</li> </ul>	<p>Blood loss from the GI tract and nutritional deficiencies producing anemia are common in alcohol withdrawal. In addition, alcohol ingestion leads to myelosuppression with a slight reduction in all cell lines. Thrombocytopenia is common. Increased mean corpuscular volume (MCV) suggests anemia based on deficiencies in vitamin B<sub>12</sub> and folate. WBC count may be increased with infection or decreased if client is immunosuppressed.</p>
<ul style="list-style-type: none"> <li><b>Glucose and ketones:</b> Determines ability of liver to manage simple sugars and end products of sugar metabolism.</li> </ul>	<p>Clients with liver disease due to alcoholism have reduced glycogen stores, and alcohol impairs gluconeogenesis. As a consequence, these clients are susceptible to hypoglycemia (McKeown &amp; West, 2012). Ketoacidosis may be present with or without metabolic acidosis. Alcoholic ketoacidosis (AKA) can occur in chronic alcohol abuse with history of recent binge drinking, decreased food intake, and persistent vomiting (Ansstas et al, 2017).</p>
<ul style="list-style-type: none"> <li><b>Electrolytes:</b> Substances that dissociate into ions in solution and acquire the capacity to conduct electricity. Common electrolytes include sodium, potassium, chloride, calcium, and phosphate.</li> </ul>	<p>Alcoholics with liver disease frequently have abnormal sodium serum concentrations, with hyponatremia (low plasma sodium concentration) as the most common alteration. Decreased serum potassium concentration may be associated with respiratory alkalosis, elevated insulin levels, and elevated epinephrine levels resulting from alcohol withdrawal. Client with chronic alcoholism usually has dietary magnesium deficiency and possibly concurrent alcoholic hepatitis. Alcoholic pancreatitis may cause hypocalcemia.</p>
<ul style="list-style-type: none"> <li><b>Liver function tests—lactate dehydrogenase (LDH), alanine aminotransferase (ALT), lipase, and amylase:</b> Determine level of liver and pancreatic dysfunction.</li> </ul>	<p>May be elevated, reflecting liver or pancreatic damage.</p>
<ul style="list-style-type: none"> <li><b>Blood ammonia:</b> Helps evaluate the cause of the change in consciousness.</li> </ul>	<p>Level is elevated if hepatic encephalopathy is present.</p>
<ul style="list-style-type: none"> <li><b>Nutritional tests—albumin or prealbumin, total protein, carbohydrate-deficient transferrin (CDT), iron, vitamins D and B<sub>12</sub>, and folate:</b> Evaluates nutritional status, identifies deficiencies and treatment needs.</li> </ul>	<p>Albumin and total protein may be decreased. CDT, a protein molecule involved in iron transport, is a relatively new test that is sometimes used to help identify chronic, heavy drinking. Vitamin deficiencies are usually present, reflecting malnutrition or malabsorption.</p>
<ul style="list-style-type: none"> <li><b>Drug screens—serum, urine</b></li> </ul>	<p>Identifies drugs being used in conjunction with alcohol that may complicate withdrawal, impact therapy choices.</p>
<h3>OTHER DIAGNOSTIC STUDIES</h3> <ul style="list-style-type: none"> <li><b>Urinalysis:</b> Detects and measures various compounds that pass through the urine.</li> </ul>	<p>Increased WBCs and/or protein may indicate infection; ketones may be related to breakdown of fatty acids in malnutrition (pseudodiabetic condition).</p>
<ul style="list-style-type: none"> <li><b>Chest x-ray:</b> Procedure used to evaluate organs and structures within the chest for symptoms of disease.</li> </ul>	<p>May reveal right lower lobe pneumonia, a common manifestation that may be related to malnutrition, depressed immune system, and aspiration. X-ray may also reveal evidence of chronic lung disorders associated with heavy tobacco use, also common in alcoholics.</p>
<ul style="list-style-type: none"> <li><b>Electrocardiogram (ECG):</b> Record of the electrical activity of the heart.</li> </ul>	<p>Dysrhythmias, cardiomyopathies, and/or ischemia may be present because of direct effect of alcohol on the cardiac muscle and/or conduction system, as well as effects of electrolyte imbalance. The adrenergic storm produced by alcohol withdrawal increases cardiac demand, which may precipitate infarction in susceptible individuals. Atrial fibrillation is the most common cardiac symptom seen in the alcoholic (Burton, 2010).</p>
<ul style="list-style-type: none"> <li><b>Computed tomography (CT) scan of the head:</b> X-ray procedure that uses a computer to produce a detailed picture of a cross section of the body.</li> </ul>	<p>May be obtained in clients with depressed LOC, in those with multiple seizures or signs of head trauma, and in those with failure to respond to treatment. Note: Client with AWS is at risk for intracranial bleeding because of frequent falls, cortical atrophy, and coagulopathy.</p>

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WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"> <li>• <b>Clinical Institute Withdrawal Assessment of Alcohol, Revised (CIWA-Ar):</b> Clinical rating tool that provides a numerical rating for 10 factors, including nausea and vomiting, tactile disturbances, tremor, auditory and visual disturbances, sweating, anxiety, headache agitation, and orientation (Donnelly et al, 2012; Hoffman &amp; Weinhouse, 2017).</li> <li>• <b>Addiction severity index (ASI):</b> A 161-item multidimensional clinical and research tool that produces a “problem severity profile” of the client, including chemical, medical, psychological, legal, family and social, and employment and support aspects, indicating areas of treatment needs.</li> </ul>	<p>Provides a clinical quantification of the severity of the alcohol withdrawal syndrome and can be rapidly administered at the bedside. Scores of 9 to 15 points correspond with moderate withdrawal, and scores greater than 15 correspond to severe withdrawal symptoms and increased risk of DTs and seizures.</p> <p>Provides basic diagnostic information on a client prior to, during, and after treatment for substance use-related problems as well as for the assessment of change in client status and treatment outcome.</p>

## NURSING PRIORITIES

1. Maintain physiological stability during acute withdrawal phase.
2. Promote client safety.
3. Provide appropriate referral and follow-up.
4. Encourage and support significant other (SO) involvement in “intervention” or confrontation process.
5. Provide information about condition, prognosis, and treatment needs.

\*\*\*This plan of care is to be used in conjunction with CP: Substance Use Disorders.

## DISCHARGE GOALS

1. Homeostasis achieved.
2. Complications prevented or resolved.
3. Sobriety maintained on a day-to-day basis.
4. Ongoing participation in rehabilitation program or group therapy, such as Alcoholics Anonymous (AA).
5. Condition, prognosis, and therapeutic regimen understood.
6. Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: Acute Substance Withdrawal Syndrome

### May Be Related To

Developed dependence to alcohol; heavy use of an addictive substance over time  
Sudden cessation of an addictive substance

### Possibly Evidenced By

Anxiety; acute confusion  
Risk for electrolyte imbalance  
Risk for injury

### Desired Outcomes/Evaluation Criteria—Client Will

#### Substance Withdrawal Severity NOC

Demonstrate absence of untoward effects of withdrawal (e.g., seizures, dysrhythmias).  
Experience no physical injury.  
Report absence or reduced frequency of hallucinations.  
Verbalize reduction of fear and anxiety to a manageable level free of emotional outbursts.

#### Alcohol Abuse Cessation Behaviors NOC

Commit to cease alcohol use.  
Engage in counseling/support group.

## ACTIONS/INTERVENTIONS

## RATIONALE

### Substance Use Treatment: Alcohol Withdrawal NIC

#### Independent

Develop a trusting relationship through frequent contact and being honest and nonjudgmental. Project an accepting attitude about alcoholism.

Provides client with a sense of humanness, helping to decrease paranoia and distrust. Client will be able to detect biased or condescending attitude of caregivers.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Inform client about what you plan to do and why. Include client in planning process and provide choices when possible.	Enhances sense of trust, and explanation may increase cooperation and reduce anxiety. Provides sense of control over self in circumstance where loss of control is a significant factor. Note: Feelings of self-worth are intensified when one is treated as a worthwhile person.
Assess LOC, ability to speak, and response to stimuli and commands. Observe for behavioral responses such as hyperactivity, disorientation, confusion, sleeplessness, and irritability.	Speech may be garbled, confused, or slurred. Response to commands may reveal inability to concentrate, impaired judgment, or muscle coordination deficits. Hyperactivity related to CNS disturbances may escalate rapidly. Sleeplessness is common due to loss of sedative effect gained from alcohol usually consumed before bedtime. Sleep deprivation may aggravate disorientation or confusion. Progression of symptoms may indicate impending hallucinations (stage II) or DTs (stage IV).
Determine stage of AWS using CIWA-Ar. Stage I is associated with signs and symptoms of hyperactivity, such as tremors, sleeplessness, nausea, vomiting, diaphoresis, tachycardia, and hypertension; stage II is manifested by increased hyperactivity plus hallucinations and/or seizure activity; stage III symptoms include DTs and extreme autonomic hyperactivity with profound confusion, anxiety, insomnia, and fever.	AWS usually begins 3 to 36 hours after the last drink. Prompt recognition and intervention may halt progression of symptoms and enhance recovery, improving prognosis. In addition, progression of symptoms indicates need for changes in drug therapy and more intense treatment to prevent death. DTs may not present until 2 to 3 days after last alcohol intake, usually lasting 1 to 5 days.
Assist client to identify cause of anxiety. Explain that alcohol withdrawal increases anxiety and uneasiness. Reassess level of anxiety on an ongoing basis.	Persons in acute phase of withdrawal may be unable to identify and/or accept what is happening. Anxiety may be physiologically or environmentally caused. Note: Individuals with alcohol use disorders often also have posttraumatic stress disorder (PTSD) (U.S. Department of Veterans Affairs, 2011).
Encourage SO to stay with client whenever possible.	Promotes recognition of caregivers and a sense of consistency, which may reduce fear.
Note onset of hallucinations and document as auditory, visual, and/or tactile.	Auditory hallucinations are reported to be more frightening and threatening to client. Visual hallucinations occur more at night and often include insects, animals, or faces of friends or enemies. Clients are frequently observed “picking the air.” Yelling may occur if client is calling for help from perceived threat, which is usually seen in stage III of AWS.
Reorient frequently to person, place, time, and surrounding environment, as indicated.	Client may experience periods of confusion, resulting in increased anxiety. May have a calming effect and reduce confusion, prevent or limit misinterpretation of external stimuli.
Provide quiet environment. Speak in calm, quiet voice. Regulate lighting, as indicated. Turn off radio or TV during sleep.	Reduces external stimuli during hyperactive stage. Client may become more delirious when surroundings cannot be seen, but some respond better to quiet, darkened room.
Avoid bedside discussion about client or topics unrelated to the client that do not include the client.	Client may hear and misinterpret conversation, which can aggravate hallucinations.
Provide environmental safety as indicated; for example, place bed in low position, leave doors in full open or closed position, observe frequently, place call light/bell within reach, and remove articles that can harm client.	Client may have distorted sense of reality or be fearful or suicidal, requiring protection from self.
Assist with ambulation and self-care activities, as needed.	Prevents falls, reducing possible injury. May be required when equilibrium and hand-eye coordination problems exist, impacting performance of ADLs.

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**ACTIONS/INTERVENTIONS (continued)**

Observe for and document seizure activity. Maintain patent airway. Provide environmental safety such as padded side rails and bed in low position.

Check deep-tendon reflexes (DTRs). Assess gait, if possible.

Palpate upper arm to discern actual withdrawal versus medication-seeking behavior.

**Collaborative**

Monitor laboratory studies such as electrolytes, magnesium levels, liver function studies, ammonia, BUN, glucose, and ABGs.

Administer medications, as indicated, for example:

Benzodiazepines (BZDs), such as chlordiazepoxide (Librium), diazepam (Valium), lorazepam (Ativan), oxazepam (Serax), or clonidine (Catapess)

Barbiturates, such as phenobarbital, or possibly secobarbital (Seconal) or pentobarbital (Nembutal)

Haloperidol (Haldol)

**RATIONALE (continued)**

Generalized tonic-clonic convulsions are most common and may be related to decreased magnesium levels, hypoglycemia, and elevated blood alcohol and usually occur within 12 to 48 hours of last drink. Note: In absence of history of seizures or other pathology causing them (e.g., head trauma), they usually stop spontaneously or with magnesium replacement (Burns et al, 2017; Hoffman & Weinhouse, 2017).

Reflexes may be depressed, absent, or hyperactive.

Peripheral neuropathies are common, especially in malnourished client. Ataxia is associated with Wernicke's syndrome (thiamine deficiency) and cerebellar degeneration. Three ways to assess whether the client is having actual withdrawal tremors are (1) have the client stick out his or her tongue—it will be tremulous; (2) feel the client's upper arm—withdrawal tremors can be felt bone deep; and (3) have the client visually track a pencil—there will be observable nystagmus.

Changes in organ function may precipitate or potentiate sensory-perceptual deficits. Electrolyte imbalance is common. Liver function is often impaired in the chronic alcoholic, and ammonia intoxication can occur if the liver is unable to convert ammonia to urea. Ketoacidosis is sometimes present without glycosuria; however, hyperglycemia or hypoglycemia may occur, suggesting pancreatitis or impaired gluconeogenesis in the liver. Hypoxemia and hypercarbia are common manifestations in chronic alcoholics who are also heavy smokers.

BZDs are commonly used to control neuronal hyperactivity and promote relaxation and sleep because of their minimal respiratory and cardiac depression and anticonvulsant properties. In addition, drugs that have little effect on dreaming may be desired to allow dream recovery or rapid eye movement (REM) rebound to occur, which has previously been suppressed by alcohol use. Studies have also shown that these drugs can prevent progression to more severe states of withdrawal. Intravenous (IV) or oral (PO) administration is preferred route because intramuscular (IM) absorption is unpredictable. Muscle-relaxant qualities are particularly helpful to client in controlling "the shakes," trembling, and ataxic quality of movements. Note: Lorazepam and oxazepam may be preferred in clients with advanced cirrhosis or acute alcoholic hepatitis due to shorter drug half-life and a decrease in effects if oversedation occurs (Hoffman & Weinhouse, 2017).

These drugs are sometimes used with benzodiazepines to treat or prevent alcohol withdrawal seizures but need to be used with caution because they are respiratory depressants and REM sleep cycle inhibitors and may mask hemodynamic signs of withdrawal, which can precede seizures (Hoffman & Weinhouse, 2017).

Occasionally may be used in conjunction with BZDs for clients experiencing agitation and hallucinations, although should be used with caution as it can lower seizure threshold and interfere with heat dissipation (Hoffman & Weinhouse, 2017).

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Thiamine, glucose	Thiamine deficiency may lead to neuritis, Wernicke's syndrome (abnormal gait and paralysis of eye muscles as well as cognitive deficits), and/or Korsakoff's psychosis (Riddle et al, 2010).
Vitamins C and B complex, multivitamins, and Stresstabs	Vitamins may be depleted because of insufficient intake and malabsorption. Vitamin deficiency, especially thiamine, is associated with ataxia, loss of eye movement and pupillary response, palpitations, postural hypotension, and exertional dyspnea.
Magnesium sulfate	Reduces tremors and seizure activity by decreasing neuromuscular excitability. Process wherein SO and family members, supported by staff, provide information about how client's drinking and behavior have affected each one of them; helps client acknowledge that drinking is a problem and has resulted in current situational crisis.
Provide seclusion and restraints as necessary, adhering to facility policy regarding restraints.	Clients with excessive psychomotor activity, severe hallucinations, violent behavior, and/or suicidal gestures may respond better to seclusion. Physical restraints are usually ineffective and add to client's agitation and increase risk of rhabdomyolysis but occasionally may be required to prevent harm to self/others until adequate chemical sedation is achieved (Hoffman & Weinhouse, 2017).
Arrange "intervention" or confrontation in controlled setting when client has recovered sufficiently from withdrawal to address addiction issues.	Client is more likely to contract for treatment while still hurting and experiencing fear and anxiety from last drinking episode. Motivation decreases as well-being increases and person again feels able to control the problem.
Provide consultation or referral to detoxification or crisis center for ongoing treatment program as soon as medically stable (e.g., oriented to reality).	Direct contact with available treatment resources provides realistic picture of help. Decreases time for client to "think about it," change mind, or restructure and strengthen denial systems.

### NURSING DIAGNOSIS: risk for ineffective Breathing Pattern

#### Possibly Evidenced By

Neuromuscular impairment (e.g., direct effect of alcohol toxicity on respiratory center and/or sedative drugs given to decrease alcohol withdrawal symptoms)

Fatigue

[Tracheobronchial obstruction]

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Respiratory Status: Ventilation NOC

Maintain effective breathing pattern with respiratory rate within normal range, lungs clear, and free of cyanosis or other signs and symptoms of hypoxia.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Respiratory Monitoring NIC</b> <i>Independent</i> Monitor respiratory rate, depth, and pattern as indicated. Note periods of apnea and Cheyne-Stokes respirations.	Frequent assessment is important because toxicity levels may change rapidly. Hyperventilation is common during acute withdrawal phase. Kussmaul's respirations are sometimes present because of acidotic state associated with vomiting and malnutrition. However, marked respiratory depression can occur because of CNS depressant effects of alcohol if acute intoxication is present. This may be compounded by drugs used to control AWS.

(continues on page 928)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Auscultate breath sounds. Note presence of adventitious sounds such as rhonchi, wheezes.	Client is at risk for atelectasis related to hypoventilation and pneumonia.
<b>Airway Management NIC</b> Elevate head of bed.	Decreases potential for aspiration; lowers diaphragm, enhancing lung inflation.
Encourage coughing, deep-breathing exercises, and frequent position changes.	Facilitates lung expansion and mobilization of secretions to reduce complications from atelectasis or pneumonia.
Have suction equipment and airway adjuncts available.	Sedative effects of alcohol potentiate risk of aspiration, relaxation of oropharyngeal muscles, and respiratory depression, requiring intervention to prevent respiratory arrest.
<b>Collaborative</b> Administer supplemental oxygen, if necessary.	Hypoxia may occur with respiratory depression and chronic anemia.
Review serial chest x-rays, arterial blood gases (ABGs), or pulse oximetry, as indicated.	Monitors presence of secondary complications, evaluates effectiveness of respiratory effort, and identifies therapy needs. Note: Right lower lobe pneumonia is common in alcohol-debilitated clients and is often due to chronic aspiration. Chronic lung diseases, such as emphysema or bronchitis, are also common.
Transfer to higher level of care/critical care unit as indicated. (Refer to CP: Respiratory Failure/Ventilatory Assistance.)	May require more aggressive pulmonary therapy/mechanical ventilation if unable to maintain adequate oxygenation.

### NURSING DIAGNOSIS: risk for decreased Cardiac Output

#### Possibly Evidenced By

Altered contractility (e.g., direct effect of alcohol on the heart muscle)  
Altered afterload—systemic vascular resistance  
Alteration in heart rate/rhythm

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Circulation Status NOC

Display vital signs within client's normal range; absence, or reduced frequency, of dysrhythmias.  
Demonstrate an increase in activity tolerance.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Hemodynamic Regulation NIC</b> <i>Independent</i> Monitor vital signs frequently during acute withdrawal.	Hypertension frequently occurs in acute withdrawal phase. Extreme hyperexcitability, accompanied by catecholamine release and increased peripheral vascular resistance, raises BP and heart rate; however, BP may become labile and progress to hypotension. Note: Client may have underlying cardiovascular disease, which is compounded by alcohol withdrawal.
Monitor cardiac rate and rhythm. Document irregularities and dysrhythmias.	Long-term alcohol abuse may result in cardiomyopathy and heart failure (HF). Tachycardia is common because of sympathetic response to increased circulating catecholamines. Dysrhythmias may develop with electrolyte imbalance. All of these may have an adverse effect on cardiac output.
Monitor body temperature.	Elevation may occur because of sympathetic stimulation, dehydration, and/or infections, causing vasodilation and compromising venous return and cardiac output.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor intake and output (I&O). Note 24-hour fluid balance.	Preexisting dehydration, vomiting, fever, and diaphoresis may result in decreased circulating volume that can compromise cardiovascular function. Note: Hydration is difficult to assess in the alcoholic client because the usual indicators are not reliable, and overhydration is a risk in the presence of compromised cardiac function.
Be prepared for and assist in cardiopulmonary resuscitation.	Causes of death during acute withdrawal stages include cardiac dysrhythmias, respiratory depression and arrest, oversedation, excessive psychomotor activity, severe dehydration or overhydration, and massive infections. Mortality for DTs ranges from 5% to 15% (Burns et al, 2017).
<b>Collaborative</b>	
Monitor laboratory studies, such as serum electrolyte levels, RBCs, Hgb and Hct, and platelets.	Potassium and magnesium imbalances potentiate risk of cardiac dysrhythmias. Anemia may be present and platelets can be decreased in late-stage alcoholism due to liver dysfunction.
Administer fluids and electrolytes, as indicated, especially potassium (Riddle et al, 2010).	Severe alcohol withdrawal causes the client to be susceptible to excessive fluid losses associated with diuresis, fever, diaphoresis, and vomiting; electrolyte imbalances, especially potassium and magnesium that can result in life-threatening dysrhythmias (Hoffman & Weinhouse, 2017).
Administer medications, as indicated, for example:	
Clonidine (Catapres) or atenolol (Tenormin)	Although the use of benzodiazepines is often sufficient to control hypertension during initial withdrawal from alcohol, some clients may require more specific therapy. Note: Atenolol and other beta-adrenergic blockers may speed up the withdrawal process and eliminate tremors as well as lower the heart rate, BP, and body temperature but are not useful in preventing seizures or DTs (Burns et al, 2017; Hoffman & Weinhouse, 2017).
Consult with medical toxicologist or regional poison control center as needed.	Useful resources for diagnosis and management of acute/critically ill clients (Hoffman & Weinhouse, 2017).

**POTENTIAL CONSIDERATIONS** following acute care (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

Refer to: Substance Use Disorders (SUDs) plan of care and plans of care for any specific underlying medical condition(s).

## SUBSTANCE USE DISORDERS (SUDs)

### I. Pathophysiology

- a. Considered a continuum of phases incorporating a cluster of cognitive, behavioral, and physiological symptoms, including loss of control over use of the substance and a continued use of the substance to reach a state of feeling high despite adverse consequences—effects on all body systems, relationship problems, financial difficulties, self- or other-directed violence, exposure to criminal element and activities, legal consequences.
- b. All commonly abused drugs stimulate the brain's limbic system, elevating dopamine levels and affecting level of alertness, perceptions, emotions, judgment, attention, movement, and sleep (Ali et al, 2013; Crews, 2011).
- c. Prescription drug abuse is the fastest-growing type of drug abuse in the United States, and deaths from prescription drugs are reaching epidemic proportions (Garcia, 2013; Phillips, 2013).
- d. The following is a recently compiled list of commonly misused substances in descending order according to the number of people affected (National Institute on Drug Abuse [NIDA], 2016):
  - i. Alcohol: An estimated 20 million adults in the United States abuse alcohol. **P** More than half of these alcoholics started drinking heavily when they were teenagers (American Academy of Child and Adolescent Psychiatry, 2012).

(continues on page 930)

- ii. Bath salts (synthetic cathinones): new family of drugs containing one or more manmade chemicals related to cathinone, an amphetamine-like stimulant found naturally in the khat plant. **P** Teens and young adults are gravitating to these easy-to-access drugs, as they incorrectly believe them to be legal and harmless (Lohmann, 2012).
- iii. Club drugs: includes methamphetamines (e.g., “speed, crystal, meth, crank”), methamphetamine-derivative methylenedioxymethamphetamine (MDMA, Ecstasy), and other stimulant drugs such as methylphenidate (Ritalin), phencyclidine (PCP), and ketamine (Special K). **P** Club drugs are not only popular in raves (all-night dance parties with loud, pounding music and flashing lights stimulating vigorous dancing) but are often used in other social settings frequented by adolescents and young adults (Dryden-Edwards, 2017).
- iv. Cocaine: The National Survey on Drug Use and Health (NIDA, 2017a and NSDUH, 2015) report that cocaine use has gone down in the last few years. In 2013, the number of current users aged 12 or older was 1.5 million, down from 1.9 million in 2008.
- v. Heroin: In 2011, 4.2 million Americans aged 12 or older had used heroin at least once in their lives. **P** Although heroin abuse has trended downward during the past several years, its prevalence is still higher than in the early 1990s, especially among school-age youth (NIDA, 2013).
- vi. Inhalants: includes volatile solvents (e.g., paint thinner, nail-polish remover), aerosols (e.g., spray paint, hair or deodorant spray), gases (e.g., butane lighters, nitrous oxide [laughing gas]), and hydrocarbons (e.g., fluorinated hydrocarbons, found in whipped cream dispensers called “whippets”). **P** Data from national and state surveys suggest that inhalant abuse is most common among seventh through ninth graders (NIDA for Teens, 2017).
- vii. K2/Spice (also called synthetic marijuana, fake weed, Yucatan Fire, Skunk, Moon Rocks): wide variety of herbal mixtures that produce experiences similar to marijuana. **P** Of the illicit drugs most used by high school seniors, K2 is secondary only to marijuana (NIDA, 2016).
- viii. LSD (acid) and other hallucinogens such as psilocybin (mushrooms, “shrooms”), phencyclidine (PCP): **P** In 2013, the National Survey on Drug Use and Health (NSDUH) stated that approximately 1.3 million persons aged 12 or older reported using hallucinogens (NSDUH, 2014).
- ix. Marijuana (e.g., pot, grass, weed, reefer, mary jane): **P** In 2012, 6.5% of 12th graders reported using marijuana daily, compared to 5.1% in 2007 (NIDA, 2017).
- x. Tobacco (street names for tobacco delivery methods include “smokes, cigs, chew, dip, snuff”): **P** In 2012, smoking was at historically low levels among young people, according to NIDA’s Monitoring the Future study (reported as 4.9% for 8th graders and 17.1% for 12th graders) (NIDA, 2017).
- xi. Prescription drugs: In 2010, the National Institute on Drug Abuse reported that an estimated 52 million people (20% of those aged 12 and older) have used prescription drugs for nonmedical reasons at least once

in their lifetimes. **P** In 2015, it was reported that in the 12 to 17 age group, data on “past-year” of any prescription psychotherapeutic drug, dependence or abuse is higher than in adults. In this age group, females exceed males in the nonmedical use of all psychotherapeutics, including pain relievers, tranquilizers, and stimulants, and are more likely to be dependent on stimulants (National Institutes of Health [NIH], 2015). These include:

1. Opioids, such as fentanyl (Duragesic), hydrocodone (Vicodin), oxycodone (OxyContin, Percocet), oxymorphone (Opana), propoxyphene (Darvon), hydromorphone (Dilaudid), meperidine (Demerol), morphine (Kadian, Avenza), diphenoxylate (Lomotil)
2. Central nervous system (CNS) depressants, such as pentobarbital sodium (Nembutal), diazepam (Valium), alprazolam (Xanax)
3. Stimulants such as dextroamphetamine (Dexedrine), methylphenidate (Ritalin and Concerta), amphetamines (Adderall)

## II. Etiology

- a. No single theory developed to date explains condition.
- b. Multiple predisposing factors implicated in abuse of substances (Claros & Sharma, 2012):
  - i. Biological—genetic predisposition, chronic pain, illness, trauma
  - ii. Biochemical—properties of psychoactive drugs, individual’s higher threshold for central nervous system (CNS) effects
  - iii. Psychological—depression; psychosis (Charles & Weaver, 2010); personality traits including isolation, low self-esteem, passivity, impulsivity, sexual immaturity, lack of emotional intelligence (Claros & Sharma, 2012); comorbidity with schizophrenia in 50% of cases (Bridgeman, 2013)
  - iv. Sociocultural—unstable home environment, disturbed relationship with parental figures, peer or group pressure, conditioning, availability of substance, childhood sexual abuse (Sartor et al, 2013)
- v. Cultural and ethnic influences—attitudes toward alcohol or drug use, expectation that substance can safely relieve distress

## III. Statistics

- a. Morbidity: Excessive alcohol use, either in the form of heavy drinking or binge drinking, occurred in approximately 17% of the U.S. population in 2013, and 6% reported heavy drinking (CDC, 2015). In the 2014 survey by the Substance Abuse and Mental Health Services Administration (SAMHA) published in 2015, illicit drugs with the highest levels of past-year dependence or abuse were marijuana (an estimated 4.2 million people ages 20 or older), pain relievers (1.9 million), and cocaine (1 million). In 2011, there were 5.1 million drug-related emergency department (ED) visits; about one-half (49%) were attributed to drug misuse or abuse. Among visits involving drug misuse or abuse, 1.4 million visits involved pharmaceuticals and 1.3 million involved illicit drugs (Substance Abuse and Mental Health Services Administration [SAMHSA], 2015). Only 11.2% of people who were found to need substance use treatment received such treatment in a specialty facility (Center for Behavioral Health Statistics and Quality [CBHSQ], 2011).

- b. Mortality: More than 64,000 Americans died from drug overdoses in 2016, including illicit drugs and opioids, almost double in a decade, according to a report published by the National Institute on Drug Abuse (NIDA, 2017).
- c. Cost: According to a survey published in 2011 by the U.S. Department of Justice, use of illicit drugs in 2007 (the most recent year for which data were available) cost \$11 billion

for healthcare and more than \$193 billion overall, with the majority share attributable to lost productivity (U.S. Department of Justice [DOJ], 2011). The National Institute on Drug Abuse (NIDA, 2016) report did not have updated data with one exception: that report estimates in 2013 prescription opioid health care costs of \$26 billion with \$78.5 in overall costs.

## G L O S S A R Y

- Addiction:** Chronic relapsing brain disorder characterized by compulsive drug seeking and use and by long-lasting chemical changes in the brain.
- ATOD:** Stands for alcohol, tobacco, and other drug—acronym used for addressing substance use in interviews.
- CAGE Screening tool:** A questionnaire focusing on individual's attempts to Cut down on drinking (or drug use), and Annoyance with criticism from others regarding use, and Guilt about substance use, and using alcohol (or drug) as an Eye opener or to counter negative effects of withdrawal.
- Cognitive-behavioral therapy:** Assists clients to recognize, avoid, and cope with situations in which they are most likely to use substance.
- Compulsive:** Type of behavior a person exhibits that is overpowering, repeated, and, often, irrational.
- Craving:** Powerful desire for a substance that cannot be ignored.
- Detoxification:** Medically supervised treatment for alcohol or drug addiction designed to purge the body of intoxicating or addictive substances.
- Dual diagnosis:** Co-occurring mental illness and substance abuse.
- Enabling:** Doing for the client what he or she needs to do for self—rescuing. Due to shame and fear, significant others (SOs) and family member(s) often allow the drug or alcohol user to continue disruptive, irrational behavior patterns.

**Harm reduction:** Program that accepts the reality of drug use while attempting to reduce its harmful consequences to individuals and society. An example could be a “clean-needle program” for intravenous (IV) drug users.

**Medication-assisted treatment (MAT):** The use of FDA-approved medications with counseling and behavioral therapies to treat SUDs.

**Motivational incentives/contingency management:** Uses positive reinforcement/tangible rewards to encourage abstinence from substance(s).

**Motivational interviewing:** Nonconfrontational approach assisting client to explore internal motivations for client's behavior and feelings of ambivalence and fear of change in an effort to find motivation to make changes and accomplish treatment goals.

**Multidimensional family therapy:** Developed for adolescents and their families to address a range of influences on the client's substance use patterns and which is designed to improve overall family functioning.

**Peer support:** Structured relationship in which people meet to provide or exchange emotional support with others facing similar challenges. Peer-to-peer groups, such as Alcoholics Anonymous (AA), Narcotics Anonymous (NA), Smart Recovery, and online forums.

**Substance use disorder (SUD):** Condition that is used to describe a person dependent on or abusing alcohol and/or drugs, including the nonmedical use of prescription drugs.

## CARE SETTING

Client is treated inpatient on behavioral unit/residential facility or outpatient in a day program or community agency.

## RELATED CONCERNS

Alcohol: acute withdrawal, page 919

Psychosocial aspects of care, page 835

## CLIENT ASSESSMENT DATABASE

Data depend on substances involved, duration of use, and organs affected.

### MAY REPORT

#### ADDITIONAL DATA REQUIREMENTS

- Family issues—discipline, conflict, attitudes
- Peer and individual—the individual's delinquency, perception of risk, friends' attitudes and use of substances
- History of substances used—type used, length of use; method of use (e.g., snorting, smoking, injecting, or swallowing); amount taken each time
- Family history and genetic makeup

### MAY EXHIBIT

- Family issues—communication
- Community—availability of substances, attitudes regarding use
- Work or school—attendance, performance or grades
- Risk-taking behaviors
- Medical and mental health comorbidities

(continues on page 932)

**CLIENT ASSESSMENT DATABASE** (contd.)**MAY REPORT** (continued)**MAY EXHIBIT** (continued)**TEACHING/LEARNING**

- **Discharge plan considerations:** May need assistance with long-range plan for recovery
- Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES****TEST  
WHY IT IS DONE****WHAT IT TELLS ME****DRUG SCREENS**

- **Drug screens:** Serum, urine, saliva, sweat, and/or hair may be tested.
- **Screening for use or relapse:** Variety of tools may be used, such as Alcohol Use Disorders Identification Test (AUDIT), CAGE survey, Drug Abuse Screening Test (DAST), and brief Michigan Alcoholism Screening Test (MAST).
- **Addiction Severity Index (ASI) assessment tool:** Produces a “problem severity profile” of the client, including chemical, medical, psychological, legal, family and social, and employment and support aspects.
- **Other screening studies (e.g., hepatitis, HIV, tuberculosis [TB], venereal diseases):** Depends on general condition, individual risk factors, and care setting.

Identifies drug(s) being used, including usual drugs of abuse—alcohol, heroin, marijuana, cocaine, and inhalants.

Useful in determining patterns reflecting social, vocational, or family problems associated with alcohol intake or abuse of other drugs. MAST has a geriatric version and P DAST has an adolescent version.

Reveals treatment needs and areas to be addressed.

Reveals organ involvement and presence of comorbidities.

**NURSING PRIORITIES**

1. Provide support for decision to stop substance use and adopt a harm reduction program.
2. Strengthen individual coping skills.
3. Facilitate learning of new ways to reduce anxiety.
4. Promote family involvement in rehabilitation program.
5. Facilitate family growth and development.
6. Provide information about condition, prognosis, and treatment needs.

**DISCHARGE GOALS**

1. Responsibility for own life and behavior assumed.
2. Plan to maintain substance-free life formulated.
3. Family relationships and enabling issues being addressed.
4. Treatment program successfully begun.
5. Condition, prognosis, and therapeutic regimen understood.
6. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS: ineffective Denial****May Be Related To**

Anxiety; threat of unpleasant reality  
Excessive stress  
Ineffective coping strategies  
Threat of unpleasant reality

**Possibly Evidenced By**

Delay in seeking or refusal of healthcare; minimizes symptoms  
Does not admit impact of condition on life

**NURSING DIAGNOSIS:** **ineffective Denial** (continued)

Use of dismissive comments or gestures when speaking of distressing events  
Does not perceive personal relevance of danger

**Desired Outcomes/Evaluation Criteria—Client Will****Acceptance: Health Status NOC**

Verbalize awareness of relationship of substance use to current situation.  
Engage in therapeutic program.  
Verbalize acceptance of responsibility for own behavior.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Behavior Modification NIC</b> <i>Independent</i>	
<b>P</b> Ask client (including pediatric client) about alcohol, tobacco, and other drug (ATOD) use at each contact.	Although client may deny or minimize actions, healthcare provider can open the door to obtaining help and treatment for client by asking broad questions in initial and subsequent interviews. In 2014, an estimated 14.5 million adults aged 26 or older had SUDs. <b>P</b> Note: An estimated 1.3 million adolescents aged 12 to 17 and 5.7 million young adults aged 18 to 25 also had SUDs in 2014 (Substance Abuse and Mental Health Services Administration [SAMHSA], 2015).
Convey attitude of acceptance, separating individual from unacceptable behavior.	Promotes feelings of dignity and self-worth. Demonstrates caring attitude.
Ascertain reason for beginning abstinence and involvement in therapy.	Provides insight into client's willingness to commit to long-term behavioral change and whether client even believes that he or she can change. Note: Denial is one of the strongest and most resistant manifestations of SUD. The decision to quit is an important step to success in therapy.
Review definition of drug dependence and use with categories of symptoms, including risk factors, patterns of use, impairment caused by use, tolerance to substance.	This information helps client make decisions regarding acceptance of problem and treatment choices. <b>P</b> Note: The risk of becoming a drug abuser involves the relationship among the number and type of risk factors (e.g., deviant attitudes and behaviors) and protective factors (e.g., parental support). Early intervention with risk factors (e.g., aggressive behavior and poor self-control) often has a greater impact than later intervention by changing a child's life path (trajectory) away from problems and toward positive behaviors (Hawkins et al, 2008).
Answer questions honestly and provide factual information. Keep your word when agreements are made.	Creates trust, which is the basis of the therapeutic relationship.
Provide information about addictive use versus experimental, occasional use; biochemical and genetic disorder theory—genetic predisposition, use activated by environment; and compulsive desire.	Progression of use continuum ranges from experimental or recreational to addictive use. Comprehending this process is important in combating denial. Education may relieve client's guilt and blame and may help awareness of recurring addictive characteristics.
Discuss current life situation and impact of substance use.	First step in decreasing use of denial is for client to see the relationship between substance use and personal problems.
Confront and examine denial and rationalization in peer group. Use confrontation with caring attitude.	Because denial is the major defense mechanism in addictive disease, confrontation by peers can help the client accept the reality of adverse consequences of behaviors and that drug use is a major problem. Caring attitude preserves self-concept and helps decrease defensive response.
Provide information regarding effects of addiction on mood and personality.	Individuals often mistake effects of addiction and use this to justify or excuse drug use.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Remain nonjudgmental. Be alert to changes in behavior such as restlessness and increased tension.	Confrontation can lead to increased agitation, which may compromise safety of client and staff.
Provide positive feedback for expressing awareness of denial in self and others.	Necessary to enhance self-esteem and to reinforce insight into behavior.
Maintain firm expectation that client attends recovery support and therapy groups regularly.	Attendance is related to admitting need for help, to working with denial, and for maintaining long-term, substance-free existence.
Encourage and support client's taking responsibility for own recovery, such as development of alternative behaviors to drug urge and use. Assist client to learn own responsibility for recovering.	Denial can be replaced with positive action when client accepts the reality of own responsibility.
Be aware of own enabling behaviors. Understand professional boundaries needed to be therapeutic with client experiencing a SUD (Tsai et al, 2010).	Caregiving lends itself to "taking care" of clients that can backfire in substance abuse treatment.

### NURSING DIAGNOSIS: risk for Acute Substance Withdrawal Syndrome

#### Possibly Evidenced By

Developed dependence to alcohol or other addictive substance  
Heavy use of an addictive substance over time  
Sudden cessation of an addictive substance

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Substance Withdrawal Severity NOC

Display stable vital signs and usual orientation, absence of hallucinations and seizure activity.  
Free of agitation or emotional outbursts.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Substance Use Treatment NIC</b>	
<i>Independent</i>	
Note presence of comorbidities—medical conditions/psychiatric disorders and currently prescribed medications.	Suggests additional monitoring and potential treatment needs.
Assess vital signs (VS) and level of consciousness (LOC) as indicated.	VS and LOC can be labile, based on specific substance(s) and length of time since last used, requiring more in-depth evaluation and medical intervention.
Identify stage of alcohol withdrawal syndrome (AWS) using CIWA-Ar. Stage I is associated with signs and symptoms of hyperactivity, such as tremors, sleeplessness, nausea, vomiting, diaphoresis, tachycardia, and hypertension; stage II is manifested by increased hyperactivity plus hallucinations and/or seizure activity; stage III symptoms include DTs and extreme autonomic hyperactivity with profound confusion, anxiety, insomnia, and fever.	AWS usually begins 3 to 36 hours after the last drink. Prompt recognition and intervention may halt progression of symptoms and enhance recovery, improving prognosis. In addition, progression of symptoms indicates need for changes in drug therapy and more intense treatment with possible transfer to higher level of care (refer to CP: Alcohol: Acute Withdrawal).
Monitor for signs of withdrawal relative to other substance(s) used.	Not all clients will have completed the withdrawal process prior to admission, and symptoms and timing of occurrence depend on type of substance(s) used and last dose. For example: Heroin flu-like symptoms begin within 12 hours of last dose, peaks 24 to 48 hours and lasting a week to up to a few months. Prescription painkillers—opiate flu-like symptoms begin within 8 to 12 hours, peak 12 to 48 hours, and last 5 to 10 days. Cocaine depression and restlessness start within hours of last dose, peak in 7 to 10 days, and last 1 to 10 weeks.

## ACTIONS/INTERVENTIONS (continued)

## RATIONALE (continued)

**Collaborative**

Administer medications, as indicated, for example:

Disulfiram (Antabuse)

Benzodiazepines anxiety and/or seizures begin within 1 to 4 days, peaking in a few days and lasting weeks or (in some cases) months (American Addiction Centers, n.d., 2017). Presence and degree of symptoms may require medical evaluation and support.

Medications can be used to manage withdrawal symptoms, prevent relapse, and treat co-occurring conditions (NIDA, 2016; SAMHSA, 2015). Note: There are no FDA-approved medications for treating cannabis, cocaine, or methamphetamine SUDs and **P** medication-assisted treatments (MAT) are rarely used to treat adolescent alcohol use (NIDA, 2016).

Acamprosate (Campral EC)

This drug can be helpful in maintaining abstinence from alcohol while other therapy is undertaken. By inhibiting alcohol oxidation, the drug leads to an accumulation of acetaldehyde with a highly unpleasant reaction if alcohol is consumed.

Helps prevent relapses in alcoholism by lowering receptors for the excitatory neurotransmitter glutamate. This agent may become drug of choice because it does not make the user sick if alcohol is consumed; it has no sedative, antianxiety, muscle-relaxant, or antidepressant properties and produces no withdrawal symptoms.

Buprenorphine (Buprex, Subutex, Suboxone)

Used in the treatment of opioid addiction. At low doses, it produces sufficient agonist effect to enable opioid-addicted individuals to discontinue the misuse of opioids without experiencing withdrawal symptoms. This drug carries a lower risk of abuse, dependence, and side effects compared to full opioid agonists (Liberto & Fornili, 2013). **P** Note: FDA does not recommend Subutex and Suboxone for use in pediatric clients (NIDA, 2016).

Methadone (Dolophine) and levo-acetylmethadol (LAAM)

Methadone is thought to blunt the craving for or diminish the effects of opioids and is used to assist in withdrawal and long-term maintenance programs. It can allow the individual to maintain daily activities and ultimately withdraw from drug use. LAAM, a long-acting synthetic  $\mu$  agonist, is an effective alternative to methadone maintenance and only has to be taken three times a week. Harm reduction needs to be considered versus the possibility of exchanging one addiction for another (Tetrault & Fiellin, 2012).

Naltrexone (Narcan) and nalmefene (Revex)

Used to suppress craving for opioids and may help prevent relapse in the client abusing alcohol. Current research suggests that naltrexone suppresses urge to continue drinking by interfering with alcohol-induced release of endorphins (Tetrault & Fiellin, 2012). Used in emergency situations to prevent death from overdose. Note: Genetic differences may affect how well the drug works in certain clients (NIDA, 2016).

Monitor results of periodic drug testing as appropriate.

Important to identify that return to substance use or change to another drug results in serious consequences.

## NURSING DIAGNOSIS: **ineffective Coping**

### May Be Related To

Situational/maturational crisis; uncertainty  
Inadequate confidence in ability to deal with a situation  
Ineffective tension release strategies  
Inadequate resources; insufficient social support (created by characteristics of relationships)

### Possibly evidenced by

Substance abuse; risk taking; destructive behavior toward self  
Insufficient problem-solving or problem resolution  
Ineffective coping strategies  
Inability to deal with a situation, ask for help

### Desired Outcomes/Evaluation Criteria—Client Will

#### Substance Addiction Consequences NOC

Identify consequences of using substance as a method of coping.

#### Coping NOC

Identify other ineffective coping behaviors.  
Engage in problem-solving using effective coping skills.  
Initiate necessary lifestyle changes.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Substance Use Treatment NIC</b> <i>Independent</i> Review program rules, philosophy, and expectations.	Having information provides opportunity for client to cooperate and function as a member of the group or milieu, enhancing sense of control and sense of success.
Determine understanding of current situation and previous or other methods of coping with life's problems.	Provides information about degree of denial, acceptance of personal responsibility, and commitment to change; identifies coping skills that may be used in present situation. Note: Adolescents are at high risk for drug abuse due to incomplete brain development, which may lead to poor decision making and risk taking (Winters & Arria, 2011).
Set limits and confront efforts to get caregiver to grant special privileges, making excuses for not following through on agreed-upon behaviors and attempting to continue drug use. Avoid use of labels, such as lying.	Client has learned manipulative behavior throughout life and needs to learn a new way of getting needs met. Following through on consequences of failure to maintain limits can help the client to change ineffective behaviors. Use of labels promotes negative attitudes that can impede therapeutic relationships.
Be aware of staff attitudes, feelings, and enabling behaviors.	Lack of understanding and judgmental or enabling behaviors can result in inaccurate data collection and nontherapeutic approaches.
Encourage verbalization of feelings, fears, and anxiety.	May help client begin to come to terms with long-unresolved issues.
Explore alternative coping strategies.	Client may have little or no knowledge of adaptive responses to stress and needs to learn other options for managing time, feelings, and relationships without drugs.
Assist client to learn and encourage use of relaxation skills, guided imagery, and visualizations.	Helps client relax and develop new ways to deal with stress and to problem-solve.
Structure diversional activity that relates to recovery such as social activity within support group, wherein issues of being chemically free are examined.	Discovery of alternative methods of coping with drug hunger can remind client that addiction is a lifelong process and opportunity for changing patterns is available.
Use peer support to examine ways of coping with drug hunger.	Self-help groups, such as Alcoholics Anonymous (AA), Narcotics Anonymous (NA), and Crystal Methamphetamine Anonymous (CMA), are valuable for learning and promoting abstinence in each member by using understanding and support as well as peer pressure.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Identify possible and actual triggers for relapse. Encourage client to use the acronym HALT—"Am I hungry, angry, lonely, or tired?"	Employment and financial stressors, isolation, unhealthy relationships, being around substance-using friends, hearing certain songs, premenstrual syndrome—the list of possibilities depends on the individual. Being aware of the triggers provides an opportunity to plan for ways to avoid and deal with them.
Encourage involvement in therapeutic writing. Have client begin journaling or writing autobiography.	Therapeutic writing or journaling can enhance participation in treatment; serves as a release for grief, anger, and stress; provides a useful tool for monitoring client's safety; and can be used to evaluate client's progress. Autobiographical activity provides an opportunity for client to remember and identify sequence of events in his or her life that relate to current situation.
Discuss client's plans for living without drugs.	Provides opportunity to develop and refine plans. Devising a comprehensive strategy for avoiding relapses helps client into maintenance phase of behavioral change.
<b>Collaborative</b> Collaborate with counselors and provide consistency in treatment approach.	Individual counseling can promote skill building and adherence to a recovery plan through techniques such as cognitive-behavioral therapy, contingency management, and motivational interviewing/incentives therapies (NIDA, 2016).
Encourage involvement with self-help associations such as AA, NA, or CMA. Facilitate visit by a group member/possible sponsor as appropriate.	Puts client in direct contact with support system necessary for managing sobriety and drug-free life.
Refer to community or social resources such as housing assistance, employment agencies, childcare, food stamps, or alternative schooling.	Dealing with life problems in a proactive way enhances coping abilities, reduces sense of isolation and hopelessness, and decreases risk of relapse.

NURSING DIAGNOSIS:	Powerlessness
<b>May Be Related To</b>	Unsatisfactory interpersonal interactions; insufficient social support; social marginalization Ineffective coping strategies; low self-esteem Complex treatment regimen
<b>Possibly Evidenced By</b>	Insufficient sense of control; shame; depression; alienation Dependency (substance use) Inadequate participation in care
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Health Beliefs: Perceived Threat NOC</b>	Admit inability to control drug habit and surrender to powerlessness over addiction. Verbalize acceptance of need for treatment and awareness that willpower alone cannot control abstinence.
<b>Acceptance: Health Status NOC</b>	Demonstrate active participation in care and treatment program. Regain and maintain healthy state with a drug-free lifestyle.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Responsibility Facilitation NIC</b> <i>Independent</i> Use crisis intervention techniques to initiate behavior changes:	May need to use emergency commitments or other legal holds for the client's safety. Client may be more amenable to acceptance of need for treatment at this time. <i>(continues on page 938)</i>

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assist client to recognize problem exists. Discuss in a caring, nonjudgmental manner how drug has interfered with life.	In the precontemplation phase, the client has not yet identified that drug use is problematic. While client is hurting, it is easier to admit substance use has created negative consequences.
Involve client in development of treatment plan, using problem-solving process in which client identifies goals for change and agrees to desired outcomes.	During the contemplation phase, the client realizes a problem exists and is thinking about a change of behavior. The client is committed to the outcomes when the decision-making process involves solutions that are promulgated by the individual.
Discuss alternative solutions.	Brainstorming helps creatively identify possibilities and provides sense of control. During the preparation phase, minor action may be taken as individual organizes resources for definitive change.
Assist in selecting most appropriate alternative.	As possibilities are discussed, the most useful solution becomes clear.
Support decision and implementation of selected alternative(s).	Helps the client persevere in process of change. During the action phase, the client engages in a sustained effort to maintain sobriety and mechanisms are put in place to support abstinence.
Explore support in peer group. Encourage sharing about drug hunger, situations that increase the desire to indulge, and ways that substance has influenced life.	Client may need assistance in expressing self, speaking about powerlessness, and admitting need for help in order to face up to problem and begin resolution.
Assist client to learn ways to enhance health and structure healthy diversion from drug use, including maintaining a balanced diet, getting adequate rest, exercise such as walking, slow or long-distance running, and acupuncture, biofeedback, or deep meditative techniques.	Learning to empower self in constructive ways can strengthen ability to continue recovery. These activities help restore natural biochemical balance, aid detoxification, and manage stress, anxiety, and use of free time. These diversions can increase self-confidence, thereby improving self-esteem. Note: Exercise promotes release of endorphins, creating a feeling of well-being.
Provide information regarding understanding of human behavior and interactions with others, such as transactional analysis.	Understanding these concepts can help the client to begin to deal with past problems and losses and prevent repeating ineffective coping behaviors and self-fulfilling prophecies.
Assist client in self-examination of spirituality and faith.	Although not mandatory for recovery, surrendering to and faith in a power greater than oneself has been found to be effective for many individuals in substance recovery; may decrease sense of powerlessness.
Instruct in and role-play assertive communication skills.	Effective in helping refrain from use, to stop contact with users and dealers, to build healthy relationships, and to regain control of own life.
Provide treatment information on an ongoing basis.	Helps client know what to expect and creates opportunity for client to be a part of what is happening and make informed choices about participation and outcomes.
<b>Collaborative</b>	
Refer to, or assist with making contact with, programs for ongoing treatment needs—partial hospitalization drug treatment programs; NA, AA, CMA, or peer support groups.	Continuing treatment is essential to positive outcome. Follow-through may be easier once initial contact has been made.

## NURSING DIAGNOSIS: imbalanced Nutrition: less than body requirements

### May Be Related To

Insufficient dietary intake—psychological, physiological, or insufficient finances

### Possibly Evidenced By

Weight loss; body weight below norm for height and body build

Alteration in taste sensation; food intake less than recommended daily allowance; insufficient interest in food

Insufficient muscle tone; sore buccal cavity

[Laboratory evidence of protein and vitamin deficiencies]

**NURSING DIAGNOSIS:** **imbalanced Nutrition: less than body requirements** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Nutritional Status NOC**

Demonstrate progressive weight gain toward goal with normalization of laboratory values and absence of signs of malnutrition.

**Knowledge: Treatment Regimen NOC**

Verbalize understanding of effects of substance abuse and reduced dietary intake on nutritional status.

Demonstrate behaviors or lifestyle changes to regain and maintain appropriate weight.

**ACTIONS/INTERVENTIONS****RATIONALE****Nutrition Therapy NIC****Independent**

Assess height, weight, age, body build, strength, and activity and rest levels. Note condition of oral cavity.

Provides information on which to base individual caloric needs and dietary plan. Type of foods may be affected by condition of mucous membranes and teeth.

Take anthropometric measurements, such as midarm muscle circumference, triceps skinfold, and percentage of body fat, when available.

Calculates subcutaneous fat and muscle mass to aid in determining dietary needs.

Note total daily calorie intake. Recommend client maintain a diary of intake, as well as times and patterns of eating.

Information will help identify nutritional deficiencies.

Evaluate energy expenditure (e.g., pacing or sedentary), and establish an individualized exercise program.

Activity level affects nutritional needs. Exercise enhances muscle tone and may stimulate appetite.

Provide opportunity to choose foods and snacks to meet dietary plan.

Enhances sense of control, may promote resolution of nutritional deficiencies, and helps evaluate client's understanding of dietary teaching.

Recommend monitoring weight weekly.

Provides information regarding effectiveness of dietary plan.

**Collaborative**

Consult with dietitian.

Useful in establishing individual dietary needs and plan and provides additional resource for learning.

Review laboratory studies as indicated, such as glucose, serum albumin or prealbumin, and electrolytes.

Identifies anemias, electrolyte imbalances, and other abnormalities that may be present, requiring specific therapy.

Refer for dental consultation as necessary.

Teeth are essential to good nutritional intake, and oral hygiene and dental care are often a neglected area in this population.

**NURSING DIAGNOSIS:** **chronic low Self-Esteem****May Be Related To**

Repeated failures, negative reinforcement

Receiving insufficient affection; inadequate respect from others

Psychiatric disorder

Cultural incongruencies

**Possibly Evidenced By**

Underestimation of ability to deal with situation

Repeatedly unsuccessful in life events

Rejection of positive feedback; exaggerates negative feedback about self

**Overly conforming; passivity****Desired Outcomes/Evaluation Criteria—Client Will****Self-Esteem NOC**

Identify feelings and underlying dynamics for negative perception of self.

Verbalize acceptance of self as is and an increased sense of self-worth.

Set goals and participate in realistic planning for lifestyle changes necessary to live without drugs.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Self-Esteem Enhancement NIC</b>	
<i>Independent</i>	
Provide opportunity for and encourage verbalization and discussion of individual situation.	Client often has difficulty expressing self, even more difficulty accepting the degree of importance substance has assumed in life and its relationship to present situation.
Assess mental status. Note presence of other psychiatric disorders.	Many clients use substances in an attempt to obtain relief from depression or anxiety, which may predate use and/or be the result of substance use. Approximately 60% of substance-dependent clients have underlying psychological problems or a dual diagnosis, and treatment for both is imperative to achieve and maintain abstinence.
Spend time with client. Discuss client's behavior and use of substance in a nonjudgmental way. Note cultural, racial/ethnic, religious, gender issues.	The nurse's presence conveys acceptance of the individual as a worthwhile person. Based on personal issues, client may be dealing with stigma of condition, discrimination, and scarcity of community resources necessitating additional support.
Provide grief counseling, as indicated.	Discussion provides opportunity for insight into the problems substance abuse has created for the client. Life losses secondary to alcohol or other drug use problems need to be addressed to enable client to move forward with rehabilitation.
Provide reinforcement for positive actions and encourage client to accept this input.	Failure and lack of self-esteem have been problems for this client, who needs to learn to accept self as an individual with positive attributes.
Observe family interactions and SO dynamics and level of support.	Substance abuse is a family disease, and how the members act and react to the client's behavior affects the course of the disease and how client sees self. Many unconsciously become "enablers," helping the individual to cover up the consequences of the abuse. (Refer to ND: dysfunctional Family Processes, following.)
Encourage expression of feelings of guilt, shame, and anger.	The client often has lost respect for self and believes that the situation is hopeless. Expression of these feelings helps client begin to accept responsibility for self and take steps to make changes.
Help client acknowledge that substance use is the problem and that problems can be dealt with without the use of drugs. Confront the use of defenses—denial, projection, and rationalization.	When drugs can no longer be blamed for the problems that exist, client can begin to deal with the problems and live without substance use. Confrontation helps client accept the reality of the problems as they exist.
Ask client to list and review past accomplishments and positive happenings.	There are things in everyone's life that have been successful. Often when self-esteem is low, it is difficult to remember these successes or to view them as successes.
Use techniques of role rehearsal.	Assists client to practice developing skills to cope with new role as a person who no longer uses or needs drugs to handle life's problems.
<i>Collaborative</i>	
Involve client in group therapy.	Group sharing helps encourage verbalization because other members of the group are in various stages of abstinence from drugs and can address the client's concerns or denial. The client can gain new skills, hope, and a sense of family or community from group participation.
Engage in motivational enhancement therapy.	Assists individuals with SUDs to build motivation and commit to specific treatment plans and seek recovery.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Formulate plan to treat other mental illness problems.	Clients who seek relief for other mental health problems through drugs will continue to do so once discharged. Both the substance use and the mental health problems need to be treated together to maximize abstinence potential. Treatment may be difficult because of difficulty of taking initiative, thinking realistically, and problem-solving. Behavioral methods seem to be most helpful.
Administer antipsychotic medications, such as quetiapine (Seroquel) or olanzapine (Zyprexa or Zydis), as necessary.	Prolonged or profound psychosis following lysergic acid diethylamide (LSD) or phencyclidine (PCP) use can be treated with these drugs because it is probably the result of an underlying functional psychosis that has now emerged. Methamphetamine psychosis often does not reverse. Note: Avoid the use of phenothiazines because they may decrease seizure threshold and cause hypotension in the presence of LSD or PCP use.
Monitor for diabetes, weight gain, and dyslipidemia.	Atypical antipsychotics (e.g., Zyprexa) are associated with these effects and should be monitored closely for changes in glucose control. Measurement of fasting blood glucose at the beginning of therapy and periodical monitoring during therapy are recommended.

### NURSING DIAGNOSIS: dysfunctional Family Processes

#### May Be Related To

Substance misuse; addictive personality  
Ineffective coping strategies; insufficient problem-solving skills  
Family history of substance misuse, resistance to treatment  
Genetic predisposition to substance misuse

#### Possibly Evidenced By

Feelings: anxiety, anger, shame, embarrassment, emotional isolation, loneliness, vulnerability, repressed emotions  
Roles and responsibilities: disturbance in family dynamics, closed communication system, ineffective communication with partner, change in role function, disruption in family roles, inconsistent parenting  
Behaviors: manipulation, dependency, criticizing, rationalization, denial of problems, enabling maintenance of substance use pattern, refusal to get help, inability to receive help appropriately

#### Desired Outcomes/Evaluation Criteria—Family Will

#### Family Coping NOC

Verbalize understanding of dynamics of enabling behaviors.  
Participate in individual family programs.  
Identify ineffective coping behaviors and consequences.  
Initiate and plan for necessary lifestyle changes.  
Take action to change self-destructive behaviors and alter behaviors that contribute to partner's/SO's addiction.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Substance Use Treatment NIC</b>	
<b>Independent</b>	
Review family history and explore roles of family members, circumstances involving drug use, strengths, and areas for growth.	Determines areas for focus and potential for change.
Explore how the SO has coped with the client's habit—use of denial, repression, rationalization, projection, feelings of hurt, and loneliness.	The person who enables also suffers from the same feelings as the client and uses ineffective methods for dealing with the situation, necessitating help in learning new, more effective coping skills.
Determine understanding of current situation and previous methods of coping with life's problems.	Provides information on which to base present plan of care.

(continues on page 942)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess current level of functioning of family members. Determine extent of enabling behaviors being evidenced by family members and explore with each individual and client.	Affects individual's ability to cope with situation. People want to be helpful and do not want to feel powerless to help their loved one stop substance use and change the behavior that is so destructive. However, the substance user often relies on others to rescue them by covering up own inability to cope with daily responsibilities.
Provide information about enabling behavior, addictive disease characteristics for both user and nonuser.	Awareness and knowledge of behaviors such as avoiding and shielding, taking over responsibilities, rationalizing, and subservience provide opportunity for individuals to begin the process of change.
Identify and discuss sabotage behaviors of family members.	Even though family member(s) may verbalize a desire for the individual to become substance-free, the reality of interactive dynamics is that they may unconsciously not want the individual to recover because this would affect their own role in the relationship. Additionally, they may receive sympathy and attention from others—secondary gain.
Encourage participation in therapeutic writing, such as journaling (narrative) or guided or focused writing.	Serves as a release for feelings such as anger, grief, and stress and helps move individuals forward in treatment process.
Provide factual information to client and family about the effects of addictive behaviors on the family and what to expect after discharge.	Many clients and SOs are not aware of the nature of addiction. If client is using legally obtained drugs, he or she may believe this does not constitute abuse.
Encourage family members to be aware of their own feelings and look at the situation with perspective and objectivity. They can ask themselves, "Am I being conned? Am I acting out of fear, shame, guilt, or anger? Do I have a need to control?"	When the enabling family members become aware of their own actions that perpetuate the addict's problems, they need to decide to change themselves. If they change, the client can then face the consequences of his or her own actions and may choose to get well.
Provide support for enabling partner(s). Encourage group work.	Families and SOs need support to produce change as much as the person who is addicted.
Assist the client's partner to become aware that client's abstinence and drug use are not the partner's responsibility.	Partners need to learn that user's habit may or may not change despite partner's involvement in treatment.
Help the recovering partner who is enabling to distinguish between destructive aspects of behavior and genuine motivation to aid the user.	Enabling behavior can be partner's attempts at personal survival.
Note how partner relates to the treatment team.	Determines enabling style. A parallel exists between how partner relates to user and to staff, based on partner's feelings about self and situation.
Explore conflicting feelings the enabling partner may have about treatment, such as feelings similar to those of abuser—blend of anger, guilt, fear, exhaustion, embarrassment, loneliness, distrust, grief, and possibly relief.	Useful in establishing the need for therapy for the partner. This individual's own identity may have been lost; she or he may fear self-disclosure to staff and may have difficulty giving up the dependent relationship.
Involve family in discharge referral plans.	Drug abuse is a family illness. Because the family has been so involved in dealing with the substance use behavior, family members need help adjusting to the new behavior of sobriety and abstinence. Incidence of recovery is almost doubled when the family is treated along with the client.
Be aware of staff's enabling behaviors and feelings about client and enabling partners.	Lack of understanding of enabling can result in nontherapeutic approaches to clients and their families.
<b>Collaborative</b>	
Involve in substance abuse prevention or treatment plan, as indicated.	Can be voluntary, court ordered, or via the Department of Human Services (DHS) involvement. <b>P</b> Prevention programs should address all forms of drug use, alone or in combination, including the underage use of legal drugs (e.g., tobacco or alcohol), the use of illegal drugs (e.g., marijuana [real and counterfeit] such as 9K2, Spice), meth, cocaine, other designer drugs, including Ecstasy, and the

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
P Promote involvement of all members in multidimensional family therapy.	inappropriate use of legally obtained substances (e.g., inhalants), prescription medications, or over-the-counter drugs (Johnston et al, 2002).
Encourage involvement with self-help associations, AA or NA, Al-Anon, Alateen, and professional family therapy.	Program developed for adolescents with SUDs and their families to address the various influences on client's drug abuse patterns, which is designed to improve overall family functioning by fostering family competency and collaboration with other systems such as school and juvenile justice (SAMHSA, 2015).

NURSING DIAGNOSIS: Sexual Dysfunction
<b>May Be Related To</b>
Alteration in body function (e.g., neurological damage, debilitating effects of drug use—particularly alcohol and opiates) Vulnerability; presence of abuse Value conflict (gender identity, sexual preferences) Insufficient knowledge, misinformation
<b>Possibly Evidenced By</b>
Decrease in sexual desire Alteration in sexual activity, satisfaction Undesired change in sexual function
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>
<b>Substance Addiction Consequences NOC</b> Verbally acknowledge effects of drug use on sexual functioning and reproduction.
<b>Sexual Functioning NOC</b> Identify interventions to correct and overcome individual situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Sexual Counseling NIC</b> <i>Independent</i>	
Ascertain client's beliefs and expectations. Have client describe problem in own words.	Determines level of knowledge, identifies misperceptions, level of concern regarding sexually transmitted infections (STIs), level of risk reduction, and specific learning needs.
Encourage and accept individual expressions of concern.	Most people find it difficult to talk about this sensitive subject and may not ask directly for information.
Provide educational opportunities such as pamphlets or consultation with appropriate persons regarding effects of drug on sexual functioning.	Much of denial and hesitancy to seek treatment may be reduced as a result of sufficient and appropriate information.
Provide information about individual's condition.	Sexual functioning may have been affected by the drug itself and/or by psychological factors, such as stress or depression. Information can assist client to understand own situation and identify actions to be taken.
Assess drinking and drug history of pregnant client. Provide information about effects of substance abuse on the reproductive system and fetus, including increased risk of premature birth, brain damage, and fetal malformation.	Awareness of the negative effects of alcohol and other drugs on reproduction may motivate client to stop using substance. When client is pregnant, identification of potential problems aids in identifying concerns and planning for future fetal needs.
Discuss prognosis for sexual dysfunction, such as impotence or low sexual desire.	Impotence may be reversed with abstinence from drug(s) for many individuals; however, for some, erectile dysfunction will be permanent.

(continues on page 944)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Collaborative</b> Refer for sexual counseling, if indicated.	Couple may need additional assistance to resolve more severe problems or situations. Client may have difficulty adjusting if drug has improved sexual experience, such as heroin, which decreases dyspareunia in women and premature ejaculation in men. Furthermore, the client may have engaged enjoyably in bizarre, erotic sexual behavior under influence of the stimulant drug; client may have found no substitute for the drug, may have driven a partner away, and may have no motivation to adjust to sexual experience without drugs.
Review results of sonogram if pregnant.	Assesses fetal growth and development to identify possibility of fetal alcohol syndrome or other harmful drug effects and future needs. There are concerns about placental abruption with the use of methamphetamine and cocaine.

**NURSING DIAGNOSIS:** **deficient Knowledge regarding condition, prognosis, treatment, self-care, and discharge needs**

**May Be Related To**

Insufficient information, insufficient knowledge of resources  
Alteration in cognitive functioning

**Possibly Evidenced By**

Insufficient knowledge; insufficient interest in learning  
Inaccurate follow-through of instructions  
Inappropriate behavior

**Desired Outcomes/Evaluation Criteria—Client Will**

**Knowledge: Substance Abuse Control NOC**

Verbalize understanding of own condition or disease process, prognosis, and potential complications.  
Verbalize understanding of therapeutic needs.  
Identify and initiate necessary lifestyle changes to remain drug-free.  
Participate in treatment program including plan for follow-up and long-term care.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Learning Facilitation NIC</b>	
<b>Independent</b>	
Be aware of and deal with anxiety of client and family members.	Anxiety can interfere with ability to hear and assimilate information.
Provide an active role for the client and SO in the learning process using discussions, group participation, and role-playing.	Learning is enhanced when persons are actively involved.
Provide written and verbal information as indicated. Include list of articles, books, Internet resources, and special TV programs related to client and family needs and encourage reading and discussing what they learn.	Helps client and SO make informed choices about future and can be a useful addition to other therapeutic approaches.
Assess client's knowledge of own situation, including disease process (including comorbidities), prognosis, complications, and needed changes in lifestyle.	Assists in planning for long-range changes necessary for maintaining sobriety and drug-free status. Client may have street knowledge of the drug but be ignorant of medical facts.
Pace learning activities to individual needs.	Facilitates learning because information is more readily assimilated when timing is considered.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
<b>Teaching: Disease Process NIC</b> Review condition, prognosis, and future expectations.	Provides knowledge base from which client can make informed choices.
Discuss relationship of drug use to current situation.	Often client has misperception or denial of real reason for admission to the medical or psychiatric care setting.
Educate about effects of specific drug(s) used; for example, PCP is deposited in body fat and may reactivate, causing flashbacks even after long interval of abstinence; alcohol use may result in mental deterioration and liver involvement or damage; cocaine can damage postcapillary vessels and increase platelet aggregation, promoting thromboses and infarction of skin or internal organs, causing localized atrophie blanche or sclerodermatos lesions.	Information will help client understand possible long-term effects of drug use.
Discuss potential for reemergence of withdrawal symptoms in stimulant abuse as early as 3 months or as late as 9 to 12 months after discontinuing use.	Even though intoxication may have passed, client may manifest denial, drug hunger, and periods of "flare-up," wherein there is a delayed recurrence of withdrawal symptoms such as anxiety, depression, irritability, sleep disturbance, or compulsiveness with food, especially sugars.
Inform client of effects of disulfiram (Antabuse) in combination with alcohol intake and importance of avoiding use of alcohol-containing products such as cough syrups, foods, candy, mouthwash, aftershave, and cologne.	Interaction of alcohol and Antabuse results in nausea and hypotension, which may produce fatal shock. Individuals on Antabuse are sensitive to alcohol on a continuum, with some being able to drink while taking the drug and others having a reaction with only slight exposure. Reactions also appear to be dose related.
Review specific aftercare needs; for example, PCP user should drink cranberry juice and continue use of ascorbic acid; alcohol abuser with liver damage should refrain from drugs, anesthetics, or use of household cleaning products that are detoxified in the liver.	Promotes individualized care related to specific situation. Cranberry juice and ascorbic acid enhance clearance of PCP from the system. Substances that have the potential for liver damage are more dangerous in the presence of an already damaged liver.
Discuss variety of helpful organizations and programs that are available for assistance or referral such as AA, Dual Recovery Anonymous (DRA), or NA.	Long-term support is necessary to maintain optimal recovery. Psychosocial needs and other issues may need to be addressed.

**POTENTIAL CONSIDERATIONS** following acute care (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

- **ineffective Health Management/ineffective family Health Management**—decisional conflicts, excessive demands made on individual or family, family conflict, perceived seriousness/benefits
- **ineffective Coping**—situational crises, inadequate level of confidence in ability to cope, inadequate level of perception of control
- **readiness for enhanced family Coping**—significant person moves in direction of health promotion, chooses experiences that optimize wellness

Physical needs depend on substance effect on organ systems—refer to appropriate medical plans of care for additional considerations.

## CANCER—GENERAL CONSIDERATIONS

### I. Pathophysiology

- a. General term describing a disturbance of cellular growth and referring to a group of 150 different known diseases or types
- b. Genetic and genomic factors underlie the etiology of all cancer. The alteration of genes manifests in abnormal

cellular proliferation. Genes and genomic alterations often occur due to multifactorial genetic, infectious, radiation, environmental, hormonal, or lifestyle factors (Santos et al, 2013).

- c. The metastatic behavior or "natural history" of cancer varies according to the primary site of diagnosis—

(continues on page 946)

metastatic pattern for primary breast cancer may be from the breast to the bone, lung, liver, and/or brain.

## II. Classification

- a. Four main classifications of cancer according to tissue type:
  - i. Lymphomas: cancers originating in infection-fighting organs
  - ii. Leukemias: cancers originating in blood-forming organs
  - iii. Sarcomas: cancers originating in bones, muscle, or connective tissue
  - iv. Carcinomas: cancers originating in epithelial cells
- b. Within these broad categories, a cancer is classified by histology, stage, and grade (tumor profiling).

## III. Etiology

- a. Cellular disease that can arise from any body tissue with manifestations that result from failure to control the proliferation and maturation of cells
- b. Multiple risk factors or cancer-causing agents:
  - i. Chemicals
  - ii. Radiation
  - iii. Viruses
  - iv. Human behaviors and lifestyles that affect cancer risk
  - v. Tobacco use
  - vi. Poor nutrition
  - vii. Inactivity, obesity
  - viii. Sun exposure

- ix. Workplace or occupational exposure
  - x. Pollution—air, water, soil
- c. Biological factors that may increase or reduce risk:
    - i. Inflammation
    - ii. DNA repair mechanisms
    - iii. Immunologic responses
    - iv. Heredity
      1. 75% of cancers are sporadic or manifest in one body organ at an expected age.
      2. 10% to 15% are familial, or two or more siblings are diagnosed with the same cancer at a specific age.
      3. 5% to 10% of cancers are hereditary or the result of a single gene expression (Santos et al, 2013).

## IV. Statistics

- a. Morbidity: In 2018, the American Cancer Society (ACS) projected 1,735,350 new cancer cases in the United States. In 2010, cancer was the first-listed diagnosis in 1.2 million hospital discharges (CDC, 2010b).
- b. Mortality: The American Cancer Society (ACS) estimates almost 610,000 deaths from all types of cancer in 2018.
- c. Cost: The National Cancer Institute (NCI) reports that national expenditures for cancer care in 2016 were an estimated \$63.8 billion just for the top 5 cancers of 18 listed types (breast, colorectal, prostate, lymphoma, and lung) (NCI, 2017).

## G L O S S A R Y

**Adenocarcinoma:** Cancer arising in gland-forming tissue. An example is breast cancer.

**Adjuvant therapy:** Treatment given in addition to the primary treatment.

**Alopecia:** Hair loss.

**Biotherapy:** Treatment to boost or restore the ability of the immune system to fight cancer. Also used to decrease the side effects caused by some cancer treatments. Agents used in biotherapy include monoclonal antibodies, growth factors, and vaccines.

**Cachexia:** Loss of body weight and muscle mass as a result of anorexia, nausea and vomiting, or hypermetabolism.

**Cancer-related fatigue (CRF):** Persistent and subjective sense of tiredness that can occur with cancer or cancer treatment, which interferes with usual functioning and can drastically affect the client's quality of life.

**Carcinogen:** Any substance that causes cancer.

**Carcinoma:** Cancer that begins in the lining or covering of an organ.

**Desquamation:** Shedding of the skin as a reaction to radiotherapy. In its mildest form, it is "dry" when the skin flakes in a powdery form. In a more severe form ("wet"), the deeper layers of the skin are exposed.

**Genome:** The expanded study of genetics that no longer focuses on specific genes but on a person's entire genetic content and interacting factors that regulate or modify gene expression (Santos et al, 2013).

**Holistic Needs Assessment (HNA):** Specific terminology to describe assessing all aspects of the life of a client diagnosed with cancer (Taylor et al, 2012). In the United States, this term is synonymous with palliative needs assessment.

**Metastasis:** Spread of cancer to another organ, usually through the bloodstream.

**Mucositis:** A complication of some cancer therapies in which the lining of the digestive system becomes inflamed; often seen as sores in the mouth.

**Nadir:** Period of time following chemotherapy treatment when blood counts generally are at their lowest levels and client is at greatest risk of developing infection and other blood-related side effects.

**Palliative care:** "An approach that improves the quality of life of patients and their families facing the problems associated with life-limiting illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual" (World Health Organization [WHO], 2002).

**Peripheral progenitor cell (stem cell) transplant:** Method of replacing blood-forming cells destroyed by cancer treatment. Immature blood cells (stem cells) in the circulating blood that are similar to those in the bone marrow are given to the client after treatment.

**Radiation dermatitis:** Skin condition that is a common side effect of radiation therapy. The affected skin becomes painful, red, itchy, and blistered.

**Staging:** Classification of the primary tumor (T), lymph node involvement (N), combined with tests to see if the cancer has metastasized (M).

**Stomatitis:** Inflammation of the mucous membranes of the mouth.

**Superior vena cava syndrome (SVCS):** Condition in which a tumor presses against the superior vena cava—the large vein that carries blood from the head, neck, arms, and

**G L O S S A R Y** (continued)

- chest to the heart. This pressure blocks blood flow to the heart and may cause coughing, difficulty in breathing, and swelling of the face, neck, and upper arms.
- Tumor:** An abnormal mass of tissue, either benign (noncancerous) or malignant (cancerous).
- Tumor marker:** Substance detectable in the blood or urine that suggests the presence of cancer.
- Vein flare:** Painless local allergic reaction identified by redness along the vein used to infuse chemotherapeutic agent; urticaria or hives may also be present. Usually subsides within 30 to 60 minutes without treatment.

**Weight-related distress (WDR) and/or eating-related distress (ERD):** Syndrome, common in advanced cancer, and characterized by resistance to eating, poor and capricious appetite, a disconnection of oral intake and ability to gain weight, or continuous efforts to eat. The client's SOs may have feelings of deep concern, frustration, and insufficiency in their efforts to prepare appealing food and be more concerned about client's weight loss than is the client (also sometimes known as "anorexia-cachexia syndrome") (Hopkinson et al, 2013).

**CARE SETTING**

Cancer centers may focus on staging and major treatment modalities for complex cancers. Treatment for managing adverse effects, such as malnutrition and infection, may take place in short-stay, ambulatory, or community setting. More cancer clients are receiving care at home because of personal choice and healthcare costs. **P** *Cancer treatment needs to be age and life stage appropriate. Over 70% of children diagnosed with cancer mature into adulthood and present with special nursing needs (McInally & Cruickshank, 2013).*

**RELATED CONCERNs**

- Adult leukemias, page 569
- Adult lymphomas, page 582
- Hysterectomy, page 666
- Lung cancer: postoperative care, page 159
- Mastectomy, page 675
- Palliative/end-of-life care—hospice, page 970
- Pediatric considerations, page 993
- Prostatectomy, page 694
- Psychosocial aspects of care, page 835
- Sepsis/septic shock, page 772
- Total nutritional support: parenteral/enteral feeding, page 525
- Urinary diversions/urostomy (postoperative care), page 645

**CLIENT ASSESSMENT DATABASE**

Data depend on organs or tissues involved and stage of disease. A holistic needs assessment (HNA) should be completed for every client/family diagnosed with cancer to prioritize care (Taylor et al, 2012). Refer to appropriate plans of care for additional assessment information.

**DIAGNOSTIC DIVISION  
MAY REPORT****ACTIVITY/REST**

- Weakness and fatigue (most prevalent problems reported by clients with advanced cancer) (Girgis et al, 2006)
- Changes in rest pattern and usual hours of sleep per night
- Presence of factors affecting sleep, such as pain, anxiety, night sweats, more frequent elimination needs
- Limitations of participation in hobbies, exercise, usual activities

**CIRCULATION**

- Palpitations
- Chest pain on exertion

**EGO INTEGRITY**

- Stress factors—financial, job, role changes
- Ways of handling stress—smoking, drinking, delay in seeking treatment, religious or spiritual crisis

**MAY EXHIBIT**

- Inability to maintain usual routines or desired level of activity or work
- Lack of energy
- Disinterest in surroundings
- Compromised concentration

- Changes in blood pressure (BP)
- Fluctuations in heart rate

- Denial, withdrawal, anger
- Depression

(continues on page 948)

**CLIENT ASSESSMENT DATABASE (contd.)****MAY REPORT (continued)**

- Concern about changes in body image (e.g., alopecia, disfiguring lesions, surgery, profound weight loss, edema, weight gain, or rash)
- Denial of diagnosis
- Feelings of powerlessness, hopelessness, helplessness, worthlessness, guilt, loss of control
- Eating-related distress (ERD) or weight-related distress (WRD): Client and caregivers may express feelings of frustration, hopelessness, pressure, failure to meet expectations (Hopkinson et al, 2013).

**ELIMINATION**

- Changes in bowel pattern—blood in stools, pain with defecation, constipation, or diarrhea
- Changes in urinary elimination—pain or burning on urination, hematuria, frequent urination or nocturia

**FOOD/FLUID**

- Poor dietary habits,
- Anorexia, resistance to eating, poor, or capricious appetite (ERD, WRD)
- Altered sense of taste
- Nausea and vomiting
- Difficulty swallowing, mouth sores
- Food intolerances

**NEUROSENSORY**

- Dizziness, syncope
- Lack of coordination, unstable balance
- Numbness or tingling of extremities
- Sensation of coldness
- Difficulty performing fine motor skills such as buttoning shirt

**PAIN/DISCOMFORT**

- Varying degrees of pain from mild discomfort to severe pain. Younger age (<65) may be associated with a higher prevalence of pain and may also be associated with severity of pain (Girgis et al, 2006).
- Pain localized in a specific area
- Quality or description
  - Stabbing, throbbing, dull, aching (somatic pain often present with surgery or metastases in bone)
  - Pressure-like, cramping, gnawing, squeezing—visceral pain that may be referred from one site to another
  - Sharp, burning, shooting pain; may be accompanied by numbness and tingling in extremities—neuropathic pain caused from damage to nervous system

**RESPIRATION**

- Dyspnea with exertion
- History of chronic respiratory disease
- Smoking—tobacco, marijuana
- Living with someone who smokes
- Asbestos or dust exposure—coal, sandstone, silica, and the like

**SAFETY**

- Occupational, professional, or environmental exposure to toxic chemicals, carcinogens
- Excessive or prolonged sun exposure

**MAY EXHIBIT (continued)**

- Changes in bowel sounds
- Abdominal distention
- Diarrhea
- Dysuria, frequency, incontinence

- Changes in weight, severe weight loss, cachexia
- Wasting of muscle mass
- Changes in skin moisture or turgor
- Edema
- Ulcerations of oral mucosa

- Guarding behaviors, positioning to avoid pain
- Facial mask
- Sleep disturbance
- Restlessness, moaning, crying, irritability, lethargy
- Self-focusing; narrowed focus
- Reduced interaction with others
- Depression

- Skin rashes, ulcerations
- Dry, leather-like skin

**MAY REPORT (continued)****MAY EXHIBIT (continued)****SEXUALITY**

- Sexual concerns such as impact on relationship, change in level of satisfaction, impotence, menopausal symptoms
- Nulligravida greater than 30 years of age, multigravida
- Multiple sex partners, early sexual activity, genital herpes
- Exposure to human papillomavirus (HPV)

**SOCIAL INTERACTION**

- Inadequate or weak support system
- Marital history regarding in-home satisfaction, support, or help
- Concerns about role function and responsibility

**TEACHING/LEARNING**

- Family history of cancer, for example, multiple family members—mother, grandmother, aunt, or sister—with breast cancer (Santos et al, 2013)
- Primary site, date discovered or diagnosed
- Metastatic disease—additional sites involved (if none, natural history of primary will provide important information for looking for metastasis)
- Treatment history—previous treatment for cancer—place and treatments given

**DISCHARGE PLAN CONSIDERATIONS**

- May require assistance with finances, medications, treatments, wound care and supplies, transportation, food shopping and preparation, self-care, homemaker or maintenance tasks, provision for child care, changes in living facilities, or hospice

► Refer to section at end of plan for postdischarge considerations.

**DIAGNOSTIC STUDIES**

Test selection depends on history, clinical manifestations, and index of suspicion for a particular cancer.

TEST WHY IT IS DONE	WHAT IT TELLS ME
<b>BLOOD TESTS</b> <ul style="list-style-type: none"> <li>• <b>Tumor markers:</b> Substances produced and secreted by tumor cells and found in serum; for example, carcinoembryonic antigen (CEA), prostate-specific antigen (PSA), alpha-fetoprotein (AFP), human chorionic gonadotropin (hCG), CA15-3, CA19-9, and CA125.</li> <li>• <b>Hormone receptors:</b> Estrogen and progesterone receptor assay done on breast tissue.</li> <li>• <b>Her-2/neu amplification:</b> Cellular proto-oncogene that stimulates cell growth.</li> <li>• <b>Gene mutations:</b> BRCA-1 and BRCA-2 function as tumor suppressor genes.</li> </ul>	<p>Helpful in diagnosing cancer but more useful as prognostic indicator and/or therapeutic monitor. For example, CA125 levels are monitored in ovarian cancer, with levels often high prior to surgery but should be lower after surgery or with a response to chemotherapy. If the cancer begins to grow, the CA125 level will usually begin to increase before any other signs or symptoms are evident.</p> <p>Provides information about whether or not hormonal manipulation can be therapeutic in breast cancer treatment.</p> <p>Amplification (a large number of these receptors found on the cell surface) results in more aggressive breast cancers and, usually, a worse prognosis with earlier appearance of metastatic disease.</p> <p>If these genes are mutated, there may be an increased lifetime risk of acquiring breast, ovarian, prostatic, and possibly other cancers.</p> <p>(continues on page 950)</p>

## DIAGNOSTIC STUDIES (contd.)

WHY IT IS DONE (continued)	WHAT IT TELLS ME (continued)
<ul style="list-style-type: none"><li><b>Immunohistochemistry (IHC) tumor profiling:</b> Staining of cells/biopsied tissues with specific antibodies.</li><li><b>Complete blood count (CBC):</b> Battery of screening tests, which typically includes hemoglobin (Hgb); hematocrit (Hct); red blood cell (RBC) count, morphology, indices, and distribution width index; platelet count and size; and white blood cell (WBC) count and differential.</li></ul>	<p>IHC is helpful in determining the stage and grade of a tumor, as well as cell type and origin of metastasis to identify primary site (American Cancer Society, 2013).</p> <p>May reveal anemia, changes in RBCs and WBCs, and reduced or increased platelets.</p>
<b>OTHER DIAGNOSTIC STUDIES</b> <ul style="list-style-type: none"><li><b>Scans—magnetic resonance imaging (MRI), computed tomography (CT), positron emission tomography (PET), or ultrasound:</b> May be done for diagnostic purposes, identification of metastasis, and evaluation of response to treatment.</li><li><b>Biopsy—fine-needle aspiration (FNA), needle core, incisional or excisional:</b> May be taken from various sites, such as bone marrow (e.g., leukemia), skin, or organ.</li></ul>	<p>Knowledge of the etiology and natural history or pattern of metastasis of a cancer type is important in planning the client's care and in evaluating the client's progress, prognosis, and physical complaints.</p> <p>Differentiates diagnosis and delineates treatment options.</p>

## NURSING PRIORITIES

1. Support adaptation and independence.
2. Promote comfort.
3. Maintain optimal physiological functioning.
4. Prevent complications.
5. Provide information about disease process, condition, prognosis, and treatment needs.

## DISCHARGE GOALS

1. Dealing with current situation realistically.
2. Pain alleviated or controlled.
3. Homeostasis achieved.
4. Complications prevented or minimized.
5. Disease process, condition, prognosis, and therapeutic choices and regimen understood.
6. Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: **Fear/Anxiety [specify level]**

### May Be Related To

Situational crisis  
Major change (e.g., health status, economic status, role function)  
Threat of death  
Separation from support systems  
Interpersonal transmission or contagion

### Possibly Evidenced By

Increase in tension, shakiness; apprehensiveness, distressed, fear  
Worried about change in life event; restlessness, insomnia  
Feeling inadequate; decrease in self-assurance  
Changes in BP, pulse, respirations

### Desired Outcomes/Evaluation Criteria—Client Will

#### **Fear [or] Anxiety Self-Control NOC**

Display appropriate range of feelings and lessened fear.  
Appear relaxed and report anxiety is reduced to a manageable level.  
Demonstrate use of effective coping mechanisms and active participation in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction NIC</b>	
<b>Independent</b>	
Review client's and significant other's (SO's) previous experience with cancer. Determine what the doctor has told client and what conclusion client has reached.	Clarifies client's perceptions; assists in identification of fear(s) and misconceptions based on diagnosis and experience with cancer.
Encourage client to share thoughts and feelings.	Provides opportunity to examine realistic fears and misconceptions about diagnosis.
Provide open environment in which client feels safe to discuss feelings or to refrain from talking.	Helps client feel accepted in present condition without feeling judged and promotes sense of dignity and control.
Maintain frequent contact with client. Talk with and touch client, as appropriate.	Provides assurance that the client is not alone or rejected; conveys respect for and acceptance of the person, fostering trust.
Be aware of effects of isolation on client when required by immunosuppression or radiation implant. Limit use of isolation clothing, as possible.	Sensory deprivation may result when sufficient stimulation is not available and may intensify feelings of anxiety, fear, and alienation.
Assist client and SO in recognizing and clarifying fears to begin developing coping strategies for dealing with these fears.	Coping skills are often stressed after diagnosis and during different phases of treatment. Support and counseling are often necessary to enable individual to recognize and deal with fear and to realize that control and coping strategies are available.
Provide accurate, consistent information regarding diagnosis and prognosis. Avoid arguing about client's perceptions of situation.	Can reduce anxiety and enable client to make decisions and choices based on realities. Challenging client's views may increase anxiety and damage working relationship with staff.
Permit expressions of anger, fear, and despair without confrontation. Give information that feelings are normal and are to be appropriately expressed.	Acceptance of feelings helps client feel safe and allows client to begin to deal with situation.
Explain the recommended treatment, its purpose, and potential side effects. Help client prepare for treatments.	The goal of cancer treatment is to destroy malignant cells while minimizing damage to normal ones. Treatment may include curative, preventive, or palliative surgery as well as chemotherapy, internal or external radiation, or newer, organ-specific treatments such as whole-body hyperthermia or biotherapy. Bone marrow or peripheral progenitor cell transplant may be recommended for some types of cancer.
Explain procedures, providing opportunity for questions. Respond truthfully, providing honest answers reflecting client's age/developmental level.	Accurate information allows client to deal more effectively with reality of situation, thereby reducing anxiety and fear of the unknown. Note: The focus of client's fears/concerns can be affected by the individual's age, gender, values, and beliefs.
Stay with client during anxiety-producing procedures and consultations and provide physical comfort as appropriate.	Physical contact (e.g., holding hand of adult/adolescent, hugging or rocking a child) helps to soothe fears and provide reassurance.
Provide primary and consistent caregivers whenever possible.	May help reduce anxiety by fostering therapeutic relationship and facilitating continuity of care.
Provide calm, quiet environment.	Facilitates rest, conserves energy, and may enhance coping abilities.
Identify stage and degree of grief client and SO are currently experiencing. (Refer to ND: Grieving, following.)	Choice of interventions is dictated by stage of grief and negative coping behaviors, such as anger, withdrawal, and denial.
Note ineffective coping such as poor social interactions, helplessness, giving up everyday functions and usual sources of gratification.	Identifies individual problems and provides support for client and SO in using effective coping skills. Note: Studies have found that clients with unmet needs in physical symptom control, occupational functioning, nutrition, sleep, and personal care demonstrate higher symptom distress and psychological distress (Girgis et al, 2006).

(continues on page 952)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Be alert to signs of denial or depression, such as withdrawal and anger or making inappropriate remarks. Determine presence of suicidal ideation and assess potential on a scale of 1 to 10.	Client may use defense mechanism of denial and express hope that diagnosis is inaccurate. Feelings of guilt, spiritual distress, physical symptoms, or lack of cure may cause the client to become withdrawn and believe that suicide is a viable alternative.
Encourage and foster client interaction with support systems, including counselors, spiritual leader, and local cancer resources.	Reduces feelings of isolation. If family support systems are not available, outside sources may be needed immediately.
Provide reliable and consistent information and support for SO.	Allows for better interpersonal interaction and reduction of anxiety and fear.
Include SO as indicated and client desires when major decisions are to be made.	Provides a support system for the client and allows the SO to be involved appropriately.
<b>Collaborative</b> Administer antianxiety medications, such as lorazepam (Ativan) or alprazolam (Xanax), as indicated.	May be useful for brief periods of time to help client handle feelings of anxiety related to diagnosis or situation during periods of high stress, to assist client with diagnostic procedures, such as lying still during scan, and/or to minimize nausea.
Refer to additional resources for counseling and support as needed.	May be useful from time to time to assist client and SO in dealing with anxiety.

## NURSING DIAGNOSIS: **Grieving**

### May Be Related To

Anticipated loss of significant object—body part and processes of body, job, status, home  
Potential of death

### Possibly Evidenced By

Pain; suffering  
Alteration in activity level, sleep pattern  
Despair; anger; blaming

### Desired Outcomes/Evaluation Criteria—Client Will

#### **Grief Resolution NOC**

Identify and express feelings appropriately.  
Continue normal life activities, looking toward and planning for the future, one day at a time.  
Verbalize reality and acceptance of situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Grief Work Facilitation NIC</b>	
<b>Independent</b>	
Expect initial shock and disbelief following diagnosis of cancer and/or traumatizing procedures such as disfiguring surgery, colostomy, and amputation.	Few clients are fully prepared for the reality of the changes that can occur.
Assess client and SO for stage of grief currently being experienced. Explain process, as appropriate.	Knowledge about the grieving process reinforces the normalcy of feelings and reactions being experienced, helping client deal more effectively with them.
Provide open, nonjudgmental environment. Use therapeutic communication skills of active-listening, acknowledgment, and so on.	Promotes and encourages realistic dialogue about feelings and concerns.
Encourage verbalization of thoughts and concerns, accepting expressions of sadness, anger, and rejection. Acknowledge normalcy of these feelings.	Client may feel supported in expression of feelings by the understanding that deep and often conflicting emotions are normal and experienced by others in this difficult situation.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Be aware of mood swings, evidence of conflict, expressions of anger or hostility, and other acting-out behavior. Set limits on inappropriate behavior and redirect negative thinking.	May be client's way of expressing or dealing with feelings of despair and spiritual distress, reflecting ineffective coping and need for additional interventions. Preventing destructive actions enables client to maintain control and sense of self-esteem.
Note signs of debilitating depression. Ask client direct questions about state of mind. Listen for statements of despair, guilt, and hopelessness, such as "There's nothing to live for."	Studies show that clients with physical illnesses are at higher risk for suicide (Aiello-Laws, 2010; Taur et al, 2013). They are especially vulnerable when recently diagnosed and/or discharged from hospital.
Reinforce teaching regarding disease process and treatments. Be honest; avoid giving false hope while providing emotional support.	Client and SO benefit from factual information. Honest answers promote trust and provide reassurance that correct information will be given.
Review past life experiences, role changes, and coping skills.	Opportunity to identify skills that may help individuals cope with grief of current situation more effectively.

**Hope Instillation NIC**

Identify positive aspects of the situation.	Possibility of remission and slow progression of disease and/or new therapies can offer hope for the future.
Discuss ways client and SO can plan together for the future. Encourage setting of realistic goals.	Having a part in problem-solving and planning can provide a sense of control over anticipated events.
Assist client and SO to identify strengths in self, situation, and support systems.	Recognizing these resources provides opportunity to work through feelings of grief.
Encourage participation in care and treatment decisions.	Allows client to retain some control over life.
<b>Collaborative</b>	
Refer to visiting nurse, home health agency as needed, or hospice program, if appropriate.	Provides support in meeting physical and emotional needs of client and SO and can supplement the care family and friends are able to give.
Refer to appropriate counselor as needed, such as psychiatric clinical nurse specialist, social worker, hospice counselor, psychologist, and clergy.	Can help alleviate distress or palliate feelings of grief to facilitate coping and foster growth.

Refer to CP: Palliative/end-of-life care—hospice; ND: Grieving/Death Anxiety for additional interventions.

**NURSING DIAGNOSIS: risk for situational low Self-Esteem****Possibly Evidenced By**

Physical illness  
Alteration in body image; functional impairment  
Decrease in control over environment

**Desired Outcomes/Evaluation Criteria—Client Will****Self-Esteem NOC**

Verbalize understanding of body changes, acceptance of self in situation.  
Begin to develop coping mechanisms to deal effectively with problems.  
Demonstrate adaptation to changes and events that have occurred as evidenced by setting of realistic goals and active participation in work, play, and personal relationships, as appropriate.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Chemotherapy [or] Radiation Therapy Management NIC</b> <i>Independent</i>	Aids in defining concerns to begin problem-solving process.

(continues on page 954)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Verify client's concept of self in relation to cultural/religious beliefs.	Cultural and religious influences during the individual's life affect beliefs about self, measure of worth, and ability to deal with current situation.
Review anticipated side effects associated with a particular treatment, such as alopecia or disfiguring surgery, including possible effects on sexual activity and sense of attractiveness or desirability. Tell client that not all side effects occur and that others may be minimized.	Anticipatory guidance can help client and SO begin the process of adaptation to new state and to prepare for some side effects, such as buying a wig before radiation and scheduling time off from work, as indicated. (Refer to ND: risk for Sexual Dysfunction.)
Engage in prechemotherapy group sessions led by nurses.	Group information sessions are improving cancer treatment experiences and outcomes, ensuring consistent information is provided and establishing an early support system for clients and families (Sullivan et al, 2013).
Encourage discussion of and problem-solve concerns about effects of cancer or cancer treatments on role as home-maker, wage earner, or parent.	May help reduce problems that interfere with acceptance of treatment or aggravate progression of disease.
Acknowledge difficulties client may be experiencing. Give information that counseling is often important in the adaptation process.	Validates reality of client's feelings and gives permission to take whatever measures are necessary to cope with what is happening.
Evaluate support structures available to and used by client and SO.	Helps with planning for care while hospitalized and after discharge.
Provide emotional support for client and SO during diagnostic tests and treatment phase.	Although some clients adjust to cancer effects or side effects of therapy, many need additional support during this period.
Use touch during interactions, if acceptable to client, and maintain eye contact.	Affirmation of individuality and acceptance is important in reducing client's feelings of insecurity and self-doubt.
<b>Collaborative</b>	
Refer client and SO to supportive group programs, such as I Can Cope, Reach to Recovery, Man to Man Prostate Cancer Group, or Leukemia/Lymphoma Society.	Group support is usually very beneficial for both client and SO, providing contact with other clients with cancer at various levels of treatment and/or recovery, validating feelings, and assisting with problem-solving.
Refer for professional counseling as indicated.	May be necessary to regain and maintain a positive psychosocial structure, if client and SO support systems are deteriorating.

## NURSING DIAGNOSIS: acute/chronic Pain

### May Be Related To

Biological agent (e.g., neoplasm)

Physical agents (e.g., compression or destruction of nerve tissue, inflammation, metastasis to bones)

Chemical agent (e.g., chemotherapy, radiation therapy)

### Possibly Evidenced By

Self-report of pain characteristics/intensity using standardized pain instrument/scale

Expressive behavior—restlessness, irritability; positioning to ease pain

Self-focused; narrowed focus

Alteration in ability to continue previous activities (ADLs); appetite change; alteration in sleep pattern

Changes in vital signs (acute pain)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Pain Level NOC

Report maximal pain relief or control with minimal interference with activities of daily living (ADLs).

#### Pain Control NOC

Follow prescribed pharmacological regimen.

Demonstrate use of relaxation skills and diversional activities as indicated for individual situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute/Chronic</b> <b>NIC</b>	
<b>Independent</b>	
Determine pain history, for example, location of pain, frequency, duration, and relief measures used.	Information provides baseline data to evaluate need for, and effectiveness of, interventions. Pain of more than 6 months' duration constitutes chronic pain, which may affect therapeutic choices. Recurrent episodes of acute pain can occur within chronic pain, requiring increased level of intervention.
Assess pain intensity using a tool appropriate to client's age/developmental level and condition. Believe client's report.	Using appropriate assessment tool (e.g., rating scale of 0 to 10 or verbal rating scale—"no pain" to "excruciating pain," <b>P</b> <b>facial expression or Wong-Baker faces pain scale [pediatric, nonverbal], adolescent pediatric pain tool [APPT]</b> ; pain assessment scale for seniors with limited ability to communicate [PACSLAC], behavioral pain scale [BPS]) is necessary to provide true picture of client's pain. Note: The pain experience is an individualized one composed of both physical and emotional responses.
Determine timing and precipitants of "breakthrough" pain when using around-the-clock agents, whether oral, intravenous (IV), topical, transmucosal, epidural, or patch medications.	Pain may occur near the end of the dose interval, indicating need for higher dose or shorter dose interval. Pain may be precipitated by identifiable triggers or occur spontaneously, requiring use of short half-life agents for rescue or supplemental doses.
Evaluate painful effects of particular therapies, such as surgery, radiation, chemotherapy, or biotherapy. Provide information to client and SO about what to expect.	A wide range of discomforts are common, such as incisional pain, burning skin, low back pain, mouth sores, or headaches, depending on the procedure or agent being used. Pain is also associated with invasive procedures to diagnose or treat cancer.
<b>P</b> Encourage presence of parent or caregiver during painful procedures as appropriate.	Provides reassurance and comfort to child.
Provide nonpharmacological comfort measures, such as massage, repositioning, and back rub, as well as diversional activities, such as music, reading, TV, videos, computer games, age-appropriate play therapy.	Promotes relaxation and helps refocus attention.
Encourage use of stress management skills and complementary therapies, such as relaxation techniques, visualization, guided imagery, biofeedback, laughter, music, aromatherapy, and Therapeutic Touch.	Enables client to participate actively in nondrug treatment of pain and enhances sense of control. Pain produces stress and, in conjunction with muscle tension and internal stressors, increases client's focus on self, which in turn increases the level of pain.
Provide cutaneous stimulation, such as heat and cold packs, or massage.	May decrease inflammation, muscle spasms, reducing associated pain.
Be aware of barriers to cancer pain management related to client (e.g., under reporting of pain, age and cultural expectations, misconceptions about medication use) as well as to the healthcare system.	Clients may be reluctant to report pain for reasons such as fear that disease is worse; worry about unmanageable side effects of pain medications; belief that pain has meaning, such as "God wills it," and they should overcome it; or that pain is merited or deserved for some reason (Clinical Oncology, 2017). Healthcare system problems include factors such as inadequate assessment of pain, concern about controlled substances or client addiction, inadequate reimbursement, and cost of treatment modalities.
Evaluate pain relief at regular intervals. Adjust medication regimen as necessary.	Goal is maximum pain control with minimum interference with ADLs.
Inform client and SO of the expected therapeutic effects and discuss management of side effects.	This information helps establish realistic expectations and confidence in own ability to handle what happens.
<b>Collaborative</b>	
Discuss use of alternative or complementary therapies, such as acupuncture, if client desires.	May provide reduction or relief of pain without drug-related side effects.

(continues on page 956)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Develop individualized pain management plan with the client and physician. Provide written copy of plan to client, family/SO, caregivers, and care providers.	An organized plan beginning with the simplest dosage schedules and least invasive modalities improves chance for pain control. Particularly with chronic pain, client and SO must be active participants in pain management, and all care providers need to be consistent.
Administer analgesics, as indicated, for example:	A wide range of analgesics and associated agents may be employed around the clock to manage the complex nature of cancer pain (e.g., inflammatory, neuropathic, ischemic and compression) (Clinical Oncology, 2017). Note: Addiction to or dependency on drug is not a valid concern/excuse for poor pain management.
Opioids such as codeine, morphine (MSContin, Kadian), oxycodone (oxycontin), hydrocodone (Vicodin), hydromorphone (Dilaudid), methadone (Dolophine), fentanyl (Duragesic, Actiq, Fentora), or oxymorphone (Numorphan, Opana)	Effective for localized and generalized moderate to severe pain, with long-acting or controlled-release forms available. Routes of administration include oral, transmucosal, transdermal, nasal, rectal, and subcutaneous, IV, epidural, and intrathecal infusions, which may be delivered via patient-controlled analgesia (PCA). Fentanyl citrate (Oralet) is available as a transmucosal agent that is absorbed through the mucosa of the inner cheek. Note: Intramuscular (IM) route is not recommended for pain medications because absorption is not reliable, in addition to being painful and inconvenient.
Acetaminophen (Tylenol) and NSAIDs, including aspirin, ibuprofen (Motrin, Advil), piroxicam (Feldene), or indomethacin (Indocin)	Adjuvant drugs are useful for mild to moderate pain and can be combined with opioid and other modalities.
Neuraxial techniques (intrathecal or epidural) or nerve blocks (neurolytic techniques)	These techniques are used to target the pathophysiologic origin of pain that is not relieved by conventional pain relief methods (McHugh et al, 2012).
Corticosteroids, such as dexamethasone (Decadron) or prednisone	May be effective in controlling pain associated with inflammatory process, including metastatic bone pain, acute spinal cord compression, and neuropathic pain.
Anticonvulsants, such as phenytoin (Dilantin), valproic acid (Depakote), clonazepam (Klonopin), gabapentin (Neurontin), or pregabalin (Lyrica)	Useful for peripheral pain syndromes associated with neuropathic pain, especially shooting pain, postherpetic neuralgia.
Antidepressants, such as amitriptyline (Elavil), imipramine (Tofranil), doxepin (Sinequan), trazodone (Desyrel), or duloxetine (Cymbalta)	Effective for neuropathic pain (e.g., tingling, burning pain) and pain resulting from surgery, chemotherapy, or nerve infiltration.
Antihistamines, such as hydroxyzine (Atarax, Vistaril)	Mild anxiolytic agent with sedative and analgesic properties. May produce additive analgesia with therapeutic doses of opioids and may be beneficial in limiting opioid-induced nausea or vomiting.
Radioisotopes, such as strontium-89 (Metastron) or Samarium SM 153 Ixidronam (Quadramet)	Effective in treating pain resulting from osteoblastic metastatic bone lesions. Drug onset is about 1 week with duration of 2 to 4 months. May help reduce dosage of opioid analgesics. Note: Bone marrow, WBC, and platelet counts may be suppressed for up to 8 weeks after administration of the drug.
Bisphosphonates, such as pamidronate (Aredia) or zoledronic acid (Zometa)	Specific inhibitors of osteoclastic activity that treat hypercalcemia and reduce bone pain and fractures, especially in multiple myeloma, breast, and prostate cancers.
Provide and instruct in use of PCA, as appropriate.	Provides for timely drug administration, preventing fluctuations in intensity of pain, often at lower total dosage than would be given by conventional methods.
Instruct in use of electrical stimulation (e.g., transcutaneous electrical nerve stimulation [TENS]) unit.	TENS blocks nerve transmission of pain stimulus, providing reduction and relief of pain without drug-related side effects. Can be used in combination with other modalities.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide information for medical cannabis when/where appropriate.	Early studies suggest cannabis may be useful in combatting anorexia, chemotherapy-induced nausea and vomiting, pain, insomnia, and depression (Abrams & Guzman, 2015). Cannabinoids could be synergistic with opioids in the relief of pain, resulting in dose reduction of schedule II to IV medications (Stith et al, 2018).
Prepare for and assist with procedures such as nerve blocks, cordotomy, commissural myelotomy, or radiation therapy.	May be used in severe, intractable pain unresponsive to other measures. Note: Radiation is especially useful for bone metastasis and may provide fast onset of pain relief even with only one treatment.
Refer to structured support group, psychiatric clinical nurse specialist, psychologist, or spiritual advisor for counseling, as indicated.	May be necessary to reduce anxiety and enhance client's coping skills, decreasing level of pain. Note: Hypnosis can heighten awareness and help to focus concentration to decrease perception of pain for some individuals.

<b>NURSING DIAGNOSIS:</b> <b>imbalanced Nutrition: less than body requirements</b>	
<b>May Be Related To</b>	
Biological factors (e.g., hypermetabolic state, fatigue)	
Inability to ingest food (e.g., anorexia, gastric irritation, taste distortions, nausea)	
Psychological disorder (e.g., depression)	
<b>Possibly Evidenced By</b>	
Food intake less than recommended daily allowance (RDA)	
Alteration in taste sensation; insufficient interest in food; food aversion	
Body weight 20% or more below ideal weight range	
Abdominal cramping; sore buccal cavity	
[Abnormal lab values (e.g., decreased albumin, total protein; electrolyte imbalances)]	
<b>Desired Outcomes/Evaluation Criteria—Client Will</b>	
<b>Nutritional Status NOC</b>	
Demonstrate stable weight or progressive weight gain toward goal.	
Display normalization of laboratory values and be free of signs of malnutrition.	
<b>Adherence Behavior: Healthy Diet NOC</b>	
Verbalize understanding of individual interferences to adequate intake.	
Participate in specific interventions to stimulate appetite and increase dietary intake.	

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Therapy NIC</b>	
<b>Independent</b>	
Monitor daily food intake and have client keep food diary, as indicated. Note pediatric concerns/needs related to growth phase, metabolic, or malabsorption problems.	Identifies nutritional strengths and deficiencies.
Measure height, weight, and skinfold thickness or other anthropometric measurements, as appropriate. Ascertain amount of recent weight loss. Weigh daily or as indicated.	If these measurements fall below minimum standards, client's chief source of stored energy, fat tissue, is depleted.
Assess skin and mucous membranes for pallor, delayed wound healing, and enlarged parotid glands.	Helps in identification of protein-calorie malnutrition, especially when weight and anthropometric measurements are less than normal.
Encourage client to eat high-calorie, nutrient-rich diet, with adequate fluid intake. Provide finger foods and age-appropriate choices. Encourage use of supplements and frequent, smaller meals spaced throughout the day.	Hypermetabolic state and treatment requires increased nutrients and fluids to promote healing and elimination of toxins. Supplements can play an important role in maintaining adequate caloric and protein intake. Note: Early studies regarding eating-related distress indicate there is currently no evidence that people with advanced

(continues on page 958)

**ACTIONS/INTERVENTIONS (continued)****RATIONALE (continued)**

Recommend avoiding processed and grilled meats.	cancer can improve their survival or quality of life by changing what they eat. Therefore, the goal of psycho-social intervention may need to change from optimizing nutritional intake to mitigating weight- and eating-related distress when the focus of treatment and care shifts from achieving cure to optimizing quality of life (Amano et al, 2016; Hopkinson et al, 2006).
Create pleasant dining atmosphere; encourage client to share meals with family and friends.	Processed and grilled/barbecued or smoked meats may contain polycyclic aromatic hydrocarbon carcinogens (Yian, 2015).
Encourage open communication regarding anorexia and cachexia.	Makes mealtime more enjoyable, which may enhance intake. Often a source of emotional distress, especially for SO who wants to feed client frequently. When client refuses to eat, SO may feel rejected or frustrated or that client has "given up."

**Chemotherapy Management NIC**

Adjust diet before and immediately after treatments (e.g., clear, cool liquids; light or bland foods; candied ginger; dry crackers; toast; and carbonated drinks). Offer liquids 1 hour before or 1 hour after meals.	The effectiveness of diet adjustment is individualized in relief of posttherapy nausea. Client must experiment to find best solution and combinations. Avoiding fluids during meals minimizes becoming "full" too quickly.
Control environmental factors, such as strong or noxious odors and noise.	Can trigger nausea and vomiting response.
Avoid overly sweet, fatty, or spicy foods.	May prevent onset or reduce severity of nausea, decrease anorexia, and enable client to increase oral intake.
Encourage use of relaxation techniques, visualization, guided imagery, and moderate exercise before meals.	Psychogenic nausea and vomiting occurring before chemotherapy generally does not respond to antiemetic drugs. Change of treatment environment or client routine on treatment day may be effective.
Identify the client who experiences anticipatory nausea or vomiting, and take appropriate measures.	Individuals respond differently to all medications. First-line antiemetics may not work, requiring alteration in or use of combination drug therapy.
Evaluate effectiveness of antiemetic agents.	Certain therapies, such as antimetabolites, inhibit renewal of epithelial cells lining the gastrointestinal (GI) tract, which may cause changes ranging from mild erythema to severe ulceration with bleeding.
Hematest stools and gastric secretions.	
<b>Collaborative</b>	
Review laboratory studies, as indicated, such as total lymphocyte count, serum transferrin, and albumin or prealbumin.	Helps identify the degree of biochemical imbalance or malnutrition and influences choice of dietary interventions. Note: Anticancer treatments can also alter nutrition studies, so all results must be correlated with the client's clinical status.
Administer medications, as indicated, for example:	
5-HT3 receptor antagonists, such as ondansetron (Zofran), granisetron (Kytril), dolasetron (Anzemet), and palonosetron (Aloxi); NK-1 receptor antagonist aprepitant (Emend); phenothiazines, such as prochlorperazine (Compazine) and thiethylperazine (Torecan); antidopaminergics, such as metoclopramide (Reglan); antihistamines, such as diphenhydramine (Benadryl); and cannabinoids, such as dronabinol (Marinol)	Most antiemetics act to interfere with stimulation of true vomiting center, and chemoreceptor trigger zone agents also act peripherally to inhibit reverse peristalsis. These medications are often prescribed routinely before, during, and after chemotherapy to prevent nausea and vomiting.
Corticosteroids, such as dexamethasone (Decadron); benzodiazepines, such as lorazepam (Ativan); and butyrophenones, such as haloperidol (Haldol) or droperidol (Inapsine)	Combination therapy such as Compazine with Decadron and/or Ativan is often more effective than single agents.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Vitamins, especially A, D, and B <sub>6</sub>	Prevents deficit related to decreased absorption of fat-soluble vitamins. Deficiency of B <sub>6</sub> can contribute to or exacerbate depression, irritability, and neuropathy. Note: Some medical providers recommend avoiding such antioxidants as E and C because they may interfere with chemotherapy and radiation.
Antacids and/or proton pump inhibitors, such as esomeprazole (Nexium), lansoprazole (Prevacid), or pantoprazole (Protonix)	Minimizes gastric irritation, decreases nausea, and reduces risk of mucosal ulceration.
Administer antiemetic on a regular schedule before or during and after administration of antineoplastic agent and radiation, as appropriate.	Nausea and vomiting are frequently the most disabling and psychologically stressful side effects of chemotherapy.
Provide support and psychosocial interventions to deal with WRD and ERD experienced by clients and families.	Psychosocial interventions are beginning to be used to directly deal with eating- and weight-related distress manifestations experienced by 80% of clients with advanced cancer disease (Hopkinson et al, 2013). For many clients, mitigation of distress is likely to be achieved by supporting them in optimizing their nutritional intake within the confines of their small appetite and other obstacles to eating (considered to be a psychosocial intervention) (Hopkinson et al, 2013).
Provide oral care (e.g., doxepin oral rinse, lidocaine-based mouthwash).	Useful in alleviating pain associated with radiotherapy-related oral mucositis (Mulcahy, 2016).

**Nutrition Therapy NIC**

Refer to dietitian or nutritional support team.

Insert and maintain nasogastric (NG) or feeding tube for enteric feedings or central line for total parenteral nutrition (TPN), if indicated.

Provides for specific dietary plan to meet individual needs and reduce problems associated with protein or calorie malnutrition and micronutrient deficiencies.

In the presence of severe malnutrition, when the client is not currently terminal (e.g., loss of 25% to 30% body weight), or if client has been nothing-by-mouth status (NPO) for 5 days and is unlikely to be able to eat for another week, tube feeding or TPN may be necessary to meet nutritional needs.

**NURSING DIAGNOSIS: risk for deficient Fluid Volume****Possibly Evidenced By**

Excessive losses through normal routes—vomiting, diarrhea; abnormal routes—indwelling tubes, wounds, fistulas

Factors influencing fluid needs (e.g., hypermetabolic state)

Deviations affecting intake of fluids (e.g., nausea)

**Desired Outcomes/Evaluation Criteria—Client Will****Hydration NOC**

Display adequate fluid balance as evidenced by stable vital signs, moist mucous membranes, good skin turgor, prompt capillary refill, and individually adequate urinary output.

**ACTIONS/INTERVENTIONS****RATIONALE****Fluid/Electrolyte Management NIC****Independent**

Monitor intake and output (I&O) and specific gravity. Include all output sources, such as emesis, diarrhea, or draining wounds, weigh continence briefs/diapers. Calculate 24-hour balance.

Continued negative fluid balance, decreasing renal output, and concentration of urine suggest developing dehydration and need for increased fluid replacement.

Weigh, as indicated.

Sensitive measurement of fluctuations in fluid balance.

(continues on page 960)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor vital signs. Evaluate peripheral pulses and capillary refill.	Reflects adequacy of circulating volume.
Assess skin turgor and moisture of mucous membranes. Note reports of thirst.	Indirect indicators of hydration status and degree of deficit.
Encourage increased fluid intake as individually appropriate and tolerated.	Assists in maintenance of fluid requirements and reduces risk of harmful side effects such as hemorrhagic cystitis in client receiving cyclophosphamide (Cytoxan).
Offer fluids on regular basis to infants, young children, and the elderly.	The very young and the elderly may not sense or be able to report thirst.
Observe for bleeding tendencies, such as oozing from mucous membranes or puncture sites and presence of ecchymosis or petechiae.	Early identification of problems that may occur as a result of cancer and/or therapies allows for prompt intervention.
Minimize venipunctures such as combining IV starts with blood draws. Encourage client to consider central or peripheral venous catheter placement.	Reduces potential for hemorrhage and infection associated with repeated venous puncture.
Avoid trauma and apply pressure to puncture sites.	Reduces potential for bleeding and hematoma formation.
<b>Collaborative</b>	
Provide IV fluids as indicated.	Given for general hydration and to dilute antineoplastic drugs and reduce adverse side effects—nausea, vomiting, or nephrotoxicity.
Administer antiemetic therapy. (Refer to ND: imbalanced Nutrition: less than body requirements.)	Alleviation of nausea and vomiting decreases gastric losses and allows for increased oral intake.
Monitor laboratory studies, such as CBC, electrolytes, and serum albumin.	Provides information about level of hydration and corresponding deficits. Note: Malnutrition and effects of decreased albumin levels potentiate fluid shifts or edema formation.
Administer transfusions, as indicated:	
RBCs	May be needed to restore blood count and prevent manifestations of anemia often present in cancer clients, such as tachycardia, tachypnea, dizziness, and weakness.
Platelets	Thrombocytopenia may occur as a side effect of chemotherapy, radiation, or cancer process, increasing the risk of bleeding from mucous membranes and other body sites. Spontaneous bleeding may occur with platelet count of 5000.
Avoid use of aspirin, gastric irritants, platelet inhibitors, or herbs such as ginseng, green tea, garlic, ginger, ginkgo, or willow bark.	These substances can negatively affect clotting mechanism and/or potentiate risk of bleeding.

## NURSING DIAGNOSIS: Fatigue

### May Be Related To

Anemia; malnutrition  
Anxiety; depression  
[Altered body chemistry—side effects of pain and other medications, chemotherapy, radiation therapy, biotherapy]

### Possibly Evidenced By

Insufficient energy; tiredness; impaired ability to maintain usual routines or physical activities  
Decreased performance, alteration in concentration  
Lethargy; listlessness; disinterest in surroundings

### Desired Outcomes/Evaluation Criteria—Client Will

#### Endurance NOC

Report improved sense of energy.  
Perform ADLs and participate in desired activities at level of ability.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Energy Management NIC</b>	
<b>Independent</b>	
Have client rate fatigue, using a numeric scale, such as the Multidimensional Fatigue Inventory (MFI), if possible, and the time of day when it is most severe.	Helps in developing a plan for managing CRF to improve client's quality of life (Horneber et al, 2012).
Plan care to allow for rest and uninterrupted sleep periods. Schedule activities for periods when client has most energy. Involve client and SO in schedule planning.	Frequent rest periods and/or naps are needed to conserve and restore energy. Planning will allow client to be active during times when energy level is higher, which may restore a feeling of well-being and a sense of control.
Establish realistic activity goals with client.	Provides for a sense of control and feelings of accomplishment.
Assist with self-care needs when indicated; keep bed in low position and pathways clear of furniture and assist with ambulation.	Weakness may make ADLs difficult to complete or place the client at risk for injury during activities.
Encourage client to do whatever possible, such as self-bathing, sitting up in chair, and walking. Increase activity level as individual is able.	Enhances strength and stamina and enables client to become more active without undue fatigue.
Encourage aerobic exercise, as client is able, with goal of 30 minutes per day.	Aerobic exercise minimizes fatigue, increases strength and stamina, and stimulates release of natural endorphins, which promotes sense of well-being.
Monitor physiological response to activity, such as changes in BP or heart and respiratory rate.	Tolerance varies greatly depending on the stage of the disease process, nutrition state, fluid balance, and reaction to therapeutic regimen.
Perform pain assessment and provide pain management.	Poorly managed cancer pain can contribute to fatigue.
Encourage nutritional intake. (Refer to ND: imbalanced Nutrition: less than body requirements.)	Adequate intake and use of nutrients is necessary to meet energy needs and build energy reserves for activity.
Encourage adequate fluid intake. (Refer to ND: risk for deficient Fluid Volume.)	Prevents dehydration, which increases fatigue.
<b>Collaborative</b>	
Provide supplemental oxygen, as indicated.	Presence of anemia or hypoxemia reduces O <sub>2</sub> available for cellular uptake and contributes to fatigue.
Refer to physical and occupational therapy.	Programmed daily exercises and activities help client maintain or increase strength and muscle tone and enhance sense of well-being. Use of adaptive devices may help conserve energy.

## NURSING DIAGNOSIS: risk for Infection

### Possibly Evidenced By

Alteration in skin integrity; immunosuppression, pharmaceutical agents  
Malnutrition; chronic illness  
Invasive procedure

### Desired Outcomes/Evaluation Criteria—Client Will

#### Infection Severity NOC

Remain afebrile.  
Achieve timely healing, as appropriate.

#### Knowledge: Infection Control NOC

Identify and participate in interventions to prevent and reduce risk of infection.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Protection NIC</b>	
<i>Independent</i>	
Promote good handwashing procedures by staff and visitors. Screen and limit visitors who may have infections.	Protects client from sources of infection, such as visitors and staff who may have an upper respiratory infection (URI).
Emphasize personal hygiene.	Limits potential sources of infection.
Monitor temperature.	Temperature elevation may occur, if not masked by corticosteroids or anti-inflammatory drugs, because of various factors, including chemotherapy side effects, disease process, or infection. Early identification of infectious process enables appropriate therapy to be started promptly.
Encourage fluids. (Refer to ND: risk for deficient Fluid Volume.)	Adequate fluid intake enhances immune system and aids natural defense mechanisms.
Assess all systems (e.g., skin, respiratory, genitourinary) for signs and symptoms of infection on a continual basis.	Early recognition and intervention may prevent progression to more serious situation such as sepsis.
Reposition frequently; keep linens dry and wrinkle-free.	Reduces pressure and irritation to tissues and may prevent skin breakdown.
Promote adequate rest and exercise periods.	Limits fatigue, yet encourages sufficient movement to prevent stasis complications—pneumonia, pressure injury, or thrombus formation.
Stress importance of good oral hygiene.	Development of stomatitis increases risk of infection and secondary overgrowth.
Avoid or limit invasive procedures, as possible. Adhere to aseptic techniques.	Reduces risk of contamination and limits portal of entry for infectious agents.
<i>Collaborative</i>	
Monitor CBC with differential WBC and granulocyte count and platelets, as indicated.	Bone marrow activity may be inhibited by effects of chemotherapy, the disease state, or radiation therapy. Monitoring status of myelosuppression is important for preventing further complications, such as infection, anemia, or hemorrhage, and scheduling drug delivery. Note: The nadir is usually seen 7 to 10 days after administration of chemotherapy.
Obtain cultures, as indicated.	Identifies causative organism(s) and appropriate therapy.
Administer antibiotics, as indicated. Provide antibiotics within 1 hour, as ordered for neutropenic sepsis (Davis, 2013).	May be used to treat identified infection or given prophylactically in immunocompromised client.

### NURSING DIAGNOSIS: risk for impaired oral Mucous Membrane

#### Possibly Evidenced By

Treatment regimen; chemotherapy; radiation therapy; immunosuppression  
Nil by mouth (NPO) for more than 24 hours; dehydration; malnutrition

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Oral Health NOC

Display intact mucous membranes, which are pink, moist, and free of inflammation or ulcerations.

##### Self-Care: Oral Hygiene NOC

Verbalize understanding of causative factors.  
Demonstrate techniques to maintain or restore integrity of oral mucosa.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Oral Health Maintenance NIC</b>	
<i>Independent</i>	
Assess dental health and oral hygiene periodically.	Identifies prophylactic treatment needs before initiation of chemotherapy or radiation and provides baseline data of current oral health for future comparison.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage client to assess oral cavity daily, noting changes in mucous membrane integrity. Note reports of burning in the mouth, changes in voice quality, ability to swallow, sense of taste, development of thick saliva, or blood-tinged emesis.	Stomatitis generally occurs 7 to 14 days after treatment begins, but signs may be seen as early as day 3 or 4, especially if there are any preexisting oral problems. The range of response extends from mild erythema to severe ulceration and may extend the length of the GI tract, which can be very painful, can inhibit oral intake, and is potentially life-threatening. Early identification enables prompt treatment.
Discuss with client areas needing improvement and demonstrate methods for good oral care.	Good care is critical during treatment to control stomatitis complications.
Initiate and recommend oral hygiene program to include the following:	Products containing alcohol or phenol may exacerbate mucous membrane dryness or irritation.
Avoidance of commercial mouthwashes and lemon or glycerin swabs	May be soothing to the membranes. Rinsing before meals may improve the client's sense of taste. Rinsing after meals and at bedtime dilutes oral acids and relieves xerostomia.
Use of mouthwash made from warm water with salt and baking soda; diluted solution of hydrogen peroxide may be used for bleeding or infected tissue	Prevents trauma to delicate, fragile tissues. Note: Toothbrush should be changed every month.
Brushing with soft toothbrush or foam swab	Removes food particles that can promote bacterial growth. Note: Water under pressure has the potential to injure gums and force bacteria under gum line.
Flossing gently or use WaterPik™ cautiously	Promotes comfort and prevents drying and cracking of tissues.
Keeping lips moist with lip gloss or balm, K-Y Jelly, Chapstick	Stimulates secretions and provides moisture to maintain integrity of mucous membranes, especially in presence of dehydration and reduced saliva production.
Use of mints, other hard candy, or artificial saliva (Ora-Lube, Salivart), as indicated	Severe stomatitis may interfere with nutritional and fluid intake, leading to negative nitrogen balance or dehydration. Dietary modifications may make foods easier to swallow and may feel soothing.
Instruct regarding dietary changes, such as avoiding hot or spicy foods and acidic juices; suggest use of straw; ingest soft or blenderized foods, popsicles, and ice cream, as tolerated.	Adequate hydration helps keep mucous membranes moist, preventing drying and cracking.
Encourage fluid intake as individually tolerated.	May cause further irritation and dryness of mucous membranes.
Discuss effects of smoking and alcohol intake, if indicated, and address concerns.	Early recognition provides opportunity for prompt treatment.
Monitor for, and explain to client, signs of oral super infection such as thrush.	
<b>Collaborative</b>	
Refer to dentist before initiating chemotherapy or head and neck radiation.	Prophylactic examination and repair work before therapy reduce risk of infection.
Culture suspicious oral lesions.	Identifies organism(s) responsible for oral infections and suggests appropriate drug therapy.
Administer medications, as indicated, for example:	
Analgesic rinses, such as GelClair, mixture of Koatin, pectin, diphenhydramine (Benadryl), and topical lidocaine (Xylocaine)	Aggressive analgesia program may be required to relieve intense pain. Note: Rinse should be used as a swish-and-spit rather than a gargle, which could anesthetize client's gag reflex.
Antifungal mouthwash preparation, such as nystatin (Mycostatin) and antibacterial Biotane	May be needed to treat or prevent secondary oral infections, such as <i>Candida</i> , <i>Pseudomonas</i> , and <i>herpes simplex</i> .
Antinausea agents, such as dolasetron (Anzemet), granisetron (Kytril)	When given before beginning mouth care regimen, may prevent nausea associated with oral stimulation, especially when client is receiving a chemotherapy regimen.
Opioid analgesics, such as hydromorphone (Dilaudid) or morphine	May be required for acute episodes of moderate to severe oral pain.

## NURSING DIAGNOSIS: risk for impaired Skin/Tissue Integrity

### Possibly Evidenced By

Pharmaceutical agent (e.g., chemotherapy); radiation  
Immunodeficiency  
Imbalanced nutritional state/inadequate nutrition (e.g., malnutrition; anemia)

### Desired Outcomes/Evaluation Criteria—Client Will

#### Risk Control NOC

Identify interventions appropriate for specific condition.  
Participate in techniques to prevent complications and promote healing, as appropriate.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Chemotherapy [or] Radiation Therapy Management NIC</b> <i>Independent</i>	
Assess skin frequently for side effects of cancer therapy; note breakdown and delayed wound healing. Emphasize importance of reporting open areas to caregiver.	A reddening and/or tanning effect called radiation dermatitis may develop within the field of radiation. Dry desquamation with dryness and pruritus, moist desquamation with blistering, ulceration, hair loss, and loss of dermis and sweat glands may also be noted. In addition, skin reactions—allergic rashes, hyperpigmentation, pruritus, increased risk of sunburn, acne-like skin eruptions, and alopecia—may occur with some chemotherapy agents.
Bathe with lukewarm water and mild soap.	Maintains cleanliness without irritating the skin.
Encourage client to avoid vigorous rubbing and scratching and to pat skin dry instead of rubbing.	Helps prevent skin friction or trauma to sensitive tissues.
Turn or reposition frequently.	Promotes circulation and prevents undue pressure on skin and underlying tissues.
Review skin care protocol for client receiving radiation therapy:  Avoid rubbing or use of soap, lotions, creams, ointments, powders, or deodorants on area; avoid applying heat or attempting to wash off marks or tattoos placed on skin to pinpoint location for radiation therapy.	Designed to minimize trauma to area of radiation therapy.  These factors can potentiate or otherwise interfere with radiation delivery and may actually increase reaction.
Recommend wearing soft, loose cotton clothing; have female client avoid wearing bra if it creates pressure.	Skin is very sensitive during and after treatment, and all irritation should be avoided to prevent dermal injury.
Apply cornstarch, Aquaphor, Lubriderm, Eucerin, or other water-soluble moisturizing gel to area twice daily or more frequently, as needed.	Helps control dampness or pruritus. Maintenance care is required until skin and tissues have regenerated and are back to normal.
Encourage liberal use of sunblock and breathable, protective clothing.	Protects skin from ultraviolet rays and reduces risk of recall reactions.
Review skin care protocol for client receiving chemotherapy:  Use appropriate peripheral or central venous catheter, dilute anticancer drug per protocol, and ascertain that IV is infusing well.	Reduces risk of tissue irritation or extravasation of agent into tissues.
Instruct client to notify caregiver promptly of discomfort at IV insertion site.	Development of irritation indicates need for alteration of rate or dilution of chemotherapy and/or change of IV site to prevent more serious reaction.
Assess skin, IV site, and vein for erythema, edema, tenderness, weltlike patches, itching, burning, swelling, soreness, and blisters progressing to ulceration or tissue necrosis.	Presence of phlebitis or extravasation requires immediate discontinuation of antineoplastic agent and medical intervention. Note: Vein flare, a localized reaction, may resolve without intervention based on individual reaction.
Wash skin immediately with soap and water if antineoplastic agents are spilled on unprotected skin of client or caregiver.	Dilutes drug to reduce risk of skin irritation and chemical burn.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Advise clients receiving 5-fluorouracil (5-FU) and methotrexate to avoid sun exposure. Withhold methotrexate if sunburn is present.	Sun can cause exacerbation of burn spotting, a side effect of 5-FU, or can cause a red “flash” area with methotrexate, which can exacerbate drug’s effect.
Review expected dermatological side effects seen with chemotherapy, such as rash, hyperpigmentation, acne-like eruptions, and peeling of skin on palms.	Anticipatory guidance helps decrease concern if side effects do occur.
Inform client that if alopecia occurs, hair could grow back after completion of chemotherapy but may or may not grow back after radiation therapy.	Anticipatory guidance may help adjustment to, or preparation for, baldness. Men are often as sensitive to hair loss as women. Radiation’s effect on hair follicles may be permanent, depending on radiation dosage.
<b>Collaborative</b>	
Administer appropriate antidote if extravasation of IV should occur, for example:	
Dimethyl sulfoxide (DMSO)	Some studies suggest benefit with topical DMSO for mitomycin and doxorubicin (Adriamycin). Note: Injection of diphenhydramine (Benadryl) may relieve urticaria or vein flare.
Hyaluronidase (Wydase)	Injected subcutaneously for vincristine (Oncovin), vinblastine (Velban), etoposide (VP16), vindesine (Eldisine), vinorelbine (Navelbine), teniposide (Vm26), or paclitaxel (Taxol) infiltration.
Thiosulfate	Injected subcutaneously for nitrogen mustard and large amounts, greater than 20 mL, of concentrated cisplatin.
Apply ice pack or warm compresses per protocol.	Controversial intervention depends on type of agent used. Ice restricts blood flow, keeping drug localized, whereas heat enhances dispersion of neoplastic drug or antidote, minimizing tissue damage.

### NURSING DIAGNOSIS: risk for Constipation/Diarrhea

#### Possibly Evidenced By

Eating habit change; insufficient fiber/fluid intake  
Pharmaceutical agent/treatment regimen; radiation  
Gastrointestinal inflammation; malabsorption

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Bowel Elimination NOC

Maintain usual bowel consistency and pattern.  
Verbalize understanding of factors and appropriate interventions or solutions related to individual situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Bowel Management NIC</b>	
<i>Independent</i>	
Ascertain usual elimination habits.	Data required as baseline for future evaluation of therapeutic needs and effectiveness.
Assess bowel sounds and monitor and record bowel movements (BMs), including frequency and consistency—particularly during first 3 to 5 days of vinca alkaloid therapy and when receiving pain and/or nausea medications.	Defines problem—diarrhea or constipation. Note: Constipation is one of the earliest manifestations of neurotoxicity.
Monitor I&O and weight.	Dehydration, weight loss, and electrolyte imbalance are complications of diarrhea. Inadequate fluid intake may potentiate constipation.

(continues on page 966)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage adequate fluid intake, increased fiber in diet, and regular exercise.	May reduce potential for constipation by improving stool consistency and stimulating peristalsis; can prevent dehydration associated with diarrhea.
Provide small, frequent meals of foods low in residue if not contraindicated, maintaining needed protein and carbohydrates, such as eggs, cooked cereal (oatmeal), or bland cooked vegetables.	Reduces gastric irritation. Use of low-fiber foods can decrease irritability and provide bowel rest when diarrhea present.
Adjust diet as appropriate—avoid foods high in fat, such as butter, fried foods, and nuts; foods with high-fiber content and those known to cause diarrhea or gas, including cabbage, baked beans, and chili; food or fluids high in caffeine; or extremely hot or cold food and fluids.	GI stimulants that may increase gastric motility and frequency of stools.
Check for impaction if client has not had BM in 3 days or if abdominal distention, cramping, and headache are present.	Further interventions and alternative bowel care may be needed.
<b>Collaborative</b>	
Monitor laboratory studies, such as electrolytes, as indicated. Administer the following, as indicated:	Electrolyte imbalances may be the result of, or contribute to, altered GI function.
IV fluids	Prevents dehydration and dilutes chemotherapy agents to diminish side effects.
Antidiarrheal agents	May be indicated to control severe diarrhea.
Stool softeners and laxatives	Prophylactic use may prevent further complications in some clients, such as those who will receive vinca alkaloid, have poor bowel pattern before treatment, or have decreased motility. Note: Enemas and suppositories are to be avoided when possible as they increase the potential for infection and are uncomfortable and unpleasant for the client.

### NURSING DIAGNOSIS: risk for Sexual Dysfunction

#### Possibly Evidenced By

Alteration in body function or structure (e.g., disease process, drugs, surgery, radiation)  
Absence of privacy or significant other (SO)

#### Desired Outcomes/Evaluation Criteria—Client Will

#### Sexual Functioning NOC

Verbalize understanding of effects of cancer and therapeutic regimen on sexuality and measures to correct or deal with problems.  
Maintain sexual activity at a desired level, as possible.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Sexual Counseling NIC</b>	
<b>Independent</b>	
Discuss with client and SO the nature of sexuality and reactions when it is altered or threatened. Provide information about normality of these problems and that many people find it helpful to seek assistance with adaptation process.	Acknowledges legitimacy of the problem. Sexuality encompasses the way men and women view themselves as individuals and how they relate between and among themselves in every area of life.
Advise client of side effects of prescribed cancer treatment that are known to affect sexuality.	Anticipatory guidance can help client and SO begin the process of adaptation to new state.
Provide private time for hospitalized client. Knock on door and receive permission from client and SO before entering.	Sexual needs do not end because the client is hospitalized/in a facility. Intimacy needs continue, and an open and accepting attitude for the expression of those needs is essential.
<b>Collaborative</b>	
Refer to sex therapist, as indicated.	May require additional assistance in dealing with situation.

**NURSING DIAGNOSIS:** **risk for interrupted Family Processes****Possibly Evidenced By**

Situational crises; shift in health status of a family member  
Shift in family roles; change in family finances

**Desired Outcomes/Evaluation Criteria—Family Will****Family Resiliency NOC**

Express feelings freely.  
Demonstrate individual involvement in problem-solving process directed at appropriate solutions for the situation.  
Encourage and allow member who is ill to handle situation in own way.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Family Process Maintenance NIC</b>	
<i>Independent</i>	
Note components of family, presence of extended family, and others, including friends and neighbors.	Helps client and caregiver know who is available to assist with care and provide respite and support.
Identify patterns of communication in family and patterns of interaction between family members.	Provides information about effectiveness of communication and identifies problems that may interfere with family's ability to assist client and adjust positively to diagnosis and treatment of cancer.
Assess role expectations of family members and encourage discussion about them.	Each person may see the situation in own individual manner, and clear identification and sharing of these expectations promote understanding.
Assess energy direction: Are efforts at resolution or problem-solving purposeful or scattered?	Provides clues about interventions that may be appropriate to assist client and family in directing energies in a more effective manner.
Note cultural and religious beliefs.	Affects client and SO reaction and adjustment to diagnosis, treatment, and outcome of cancer.
Listen for expressions of helplessness.	Helpless feelings may contribute to difficulty adjusting to diagnosis of cancer and cooperating with treatment regimen.
Deal with family members in a warm, caring, respectful way. Provide verbal and written information and reinforce, as necessary.	Provides feelings of empathy and promotes individual's sense of worth and competence in ability to handle current situation.
Encourage appropriate expressions of anger avoid reacting negatively to them.	Feelings of anger are to be expected when individuals are dealing with the difficult, potentially fatal illness of cancer. Appropriate expression enhances dealing with the stages of the grieving process.
Acknowledge difficulties of the situation, such as the diagnosis and treatment of cancer or possibility of death.	Communicates acceptance of the reality the client and family are facing.
Identify and encourage use of previously successful coping behaviors.	Most people have developed effective coping skills that can be useful in dealing with current situation.
Emphasize importance of continuous open dialogue between family members.	Promotes understanding and assists family members to maintain clear communication and resolve problems effectively.
<i>Collaborative</i>	
Refer to support groups, clergy, and family therapy, as indicated.	May need additional assistance to resolve problems of disorganization that may accompany diagnosis of potentially terminal illness.

**NURSING DIAGNOSIS:** **readiness for enhanced Health Management****Possibly Evidenced By**

Expresses desire to enhance management of illness/symptoms, prescribed regimens  
Expresses desire to enhance choices of daily living for meeting goals

(continues on page 968)

**NURSING DIAGNOSIS:** **readiness for enhanced Health Management** (continued)**Desired Outcomes/Evaluation Criteria—Client Will****Knowledge: Cancer Management NOC**

Verbalize accurate information about diagnosis, prognosis, and potential complications at own level of readiness.  
Verbalize understanding of therapeutic needs.  
Correctly perform necessary procedures and explain reasons for the actions.  
Initiate necessary lifestyle changes and participate in treatment regimen.  
Identify and use available resources appropriately.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process NIC</b> <i>Independent</i> Review with client and SO understanding of specific diagnosis, treatment alternatives, and future expectations.	Validates current level of understanding, identifies learning needs, and provides knowledge base from which client can make informed decisions.
Determine client's perception of cancer and cancer treatment(s). Ask about client's own or previous experience or experience with other people who have, or had, cancer.	Aids in identification of ideas, attitudes, fears, misconceptions, and gaps in knowledge about cancer.
Provide clear, accurate information in a factual but sensitive manner. Answer questions specifically, but do not bombard with nonessential details.  <b>Use age-appropriate materials such as puppets for children.</b>	Helps with adjustment to the diagnosis of cancer by providing needed information along with time to absorb it. Note: Rate and method of giving information may need to be altered to decrease client's anxiety and enhance ability to assimilate information.
Provide anticipatory guidance with client and SO regarding treatment protocol, length of therapy, expected results, and possible side effects. Be honest with client.	Client has the "right to know" and participate in decisions. Accurate and concise information helps to dispel fears and anxiety, helps clarify the expected routine, and enables client to maintain some degree of control.
Provide written materials about cancer, treatment, and available support systems.	Anxiety and preoccupation with thoughts about life and death often interfere with client's ability to assimilate adequate information. Written materials provide reinforcement and clarification about information as client needs it.
Ask client for verbal feedback, and correct misconceptions about individual's type of cancer and treatment choices.	Misconceptions about cancer may be more disturbing than facts and can interfere with treatments or delay healing.
Review specific medication regimen and use of over-the-counter (OTC) drugs/supplements, herbals.	Enhances ability to manage self-care and avoid potential complications and drug reactions or interactions.
Outline normally expected limitations, if any, on ADLs, including difficulty cooking meals when nauseated or fatigued and loss of work time because of effects of treatments.	Enables client and SO to begin to put limitations into perspective and plan for, or adapt, as indicated.
Address specific home-care needs such as ability to live alone, perform necessary treatments or procedures, and acquire supplies.	Provides information regarding changes that may be needed in current plan of care to meet therapeutic needs.
Do predischarge home evaluation, as indicated.	Aids in transition to home setting by providing information about needed changes in physical layout and the acquisition of needed supplies.
Refer to community resources, as indicated, such as social services, home health agencies, Meals on Wheels, local chapter of American Cancer Society, respite care, hospice center, or other services.	Promotes competent self-care and optimal independence. Maintains client in home or desired setting.
Review with client and SO the importance of maintaining optimal nutritional status.	Promotes well-being, facilitates recovery, and is critical in enabling the client to tolerate treatments.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage diet variations and experimentation in meal planning and food preparation, such as cooking with sweet juices or wine and serving foods cold or at room temperature, as appropriate.	Creativity may enhance flavor and intake, especially when protein foods taste bitter.
Recommend cookbooks that are designed for cancer clients.	Helps provide specific menu and recipe ideas.
Recommend increased fluid intake and fiber in diet, as well as routine exercise.	Improves consistency of stool and stimulates peristalsis.
Instruct client to assess oral mucous membranes routinely, noting erythema or ulceration.	Early recognition of problems promotes early intervention, minimizing complications that may impair oral intake and provide avenue for systemic infection.
Advise client concerning skin and hair care: avoid harsh shampoos, hair dyes, permanents, salt water, and chlorinated water; avoid exposure to strong wind and extreme heat or cold; avoid sun exposure to target area for 1 year after end of radiation treatments; and regularly apply sunblock (SPF 15 or greater).	Prevents additional hair damage and skin irritation and may prevent recall reactions.
<b>Collaborative</b>	
Initiate medical and support referrals for smoking or alcohol cessation program if client desires.	Decreases irritation to mucous membranes, enhances healing, and promotes general well-being.
Review signs and symptoms requiring medical evaluation, such as infection, delayed healing, drug reactions, and increased pain, or swelling of face or hands and arms that may worsen when lying down, dyspnea, cough, headache, and visual disturbances suggestive of SVCS.	Early identification and treatment may limit severity of complications. Note: The use of central venous access devices for various therapies—chemotherapy, TPN, or antibiotic administration—may cause local vein trauma leading to SVCS days, months, or even years after catheter insertion.
Stress importance of continuing medical follow-up.	Provides ongoing monitoring of progression or resolution of disease process and opportunity for timely diagnosis and treatment of complications and early detection of second malignancies. Note: Some complications can develop long after therapy is completed, such as pathological fractures, radiation cystitis, or pneumonitis. Periodic thyroid function tests are indicated for clients with radiation to the neck and upper chest because hypothyroidism may develop.
Encourage periodic review of advance directives. Promote inclusion of family and SO in decision-making process.	Client, family, and SO need to reevaluate choices as condition changes and treatment options become available or are exhausted.
Refer to community palliative/respite care or hospice if needed.	Palliative care will address pain control, long-term support, and end-of-life care if indicated (Leadbeater, 2013).

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, personal resources, and life responsibilities)

**In addition to Potential Considerations in specific plans of care such as leukemia, mastectomy:**

- **ineffective Coping**—situational crises; uncertainty; high degree of threat
- **Self-Care deficit/Impaired Home Maintenance**—disease; pain, discomfort; weakness, impaired functioning; fatigue; insufficient finances; unfamiliarity with neighborhood resources; inadequate support systems
- **risk for caregiver Role Strain**—illness severity of care receiver; presence of situational stressors that normally affect families (e.g., crisis, economic vulnerability); unpredictable illness course; amount/complexity of caregiving tasks
- **acute/chronic Pain**—physical agents (e.g., disease process, compression or destruction of nerve tissue, infiltration of nerves or their vascular supply, obstruction of a nerve pathway, inflammation)
- **ineffective Health Management**—complexity of therapeutic regimen; economic difficulties; decisional conflicts; perceived barriers; powerlessness; social support deficit

# PALLIATIVE/END-OF-LIFE CARE—HOSPICE

**I. Purpose**—Palliative and hospice medicine provide holistic care and support by employing an interdisciplinary team approach that can address the physical, social, emotional, and spiritual needs of the client and family (Bodtke & Ligon, 2016). Palliative care focuses on improving quality of life of individuals and their families facing the problems associated with life-threatening illness (World Health Organization [WHO], n.d.) whose life expectancy is usually longer than 6 months. Hospice care focuses on comfort and quality of life, rather than curative treatments by providing medical treatment of pain and other distressing symptoms associated with serious or life-threatening or progressive illness, but it does not prolong life (Martinez & Berry, 2015). *Note:* Pain relief and other measures intended to improve quality of life and mood may result in extending life (Temel et al., 2010), and on occasion, some clients may improve enough to “graduate” from hospice care for a period of time.

## II. Indications

- a. Palliative care (Martinez & Berry, 2015)
  - i. Terminally ill and need assistance with goals of care
  - ii. Continue to receive active treatment for an incurable illness but who can benefit from support services and symptom management
  - iii.  Children with severe congenital anomalies, severe or life-threatening illness, but are considered to be far from the terminal stage
- b. Hospice (Centers for Medicare and Medicaid Services, 2017)
  - i. Hospice physician and primary care physician must both certify terminal illness.
  - ii. Life expectancy of 6 months or less regardless of age, sex, or race
- c. Care of the dying person encompasses several dimensions (Malloy et al, 2008)
  - i. Management of pain and other physical symptoms—nausea, vomiting, fatigue, anorexia, functional decline
  - ii. Psychological and spiritual support
    - 1. Provide client and family the opportunity to consider the meaning of their lives.
    - 2. Encourage participation in making plans and shaping the course of their living while preparing for death.
  - iii. Bereavement support after death for family

## III. Trajectories of Death Appropriate for Hospice Care (Glaser & Strauss, 1968; Lunney, 2007)

- a. Steady decline, short terminal phase, as may occur with certain cancers
- b. Slow decline with periodic crises and then death, as may occur with chronic obstructive pulmonary disease (COPD), heart or kidney failure
- c. Lingering, expected death as expected in frail elderly, dementias, stroke, Parkinson’s disease

## IV. Barriers to Using Palliative/Hospice Services (Malloy et al, 2008)

- a. Influence of managed care on end-of-life care
  - i. Lack of understanding of hospice goals and services provided
  - ii. Delay in referral to services (including physician discomfort with end-of-life conversations, fear of depriving client of hope, or causing harm by failing to do something [McAtee & Wellbery, 2013])
- b. Client’s or family member’s denial or avoidance of death; negative perception of hospice (e.g., belief one is giving up; perception that care is being rationed [McAtee & Wellbery, 2013])
- c. Access to care
  - i. Limitations of insurance coverage
  - ii. Medicare payment source requires care be provided by a Medicare-certified hospice program.
- d. Lack of continuity of care across care settings
- e. Caregiver fatigue (psychological and physical) that can compromise the care provided in the home

## V. Statistics (National Hospice and Palliative Care Organization [NHPCO], 2016)

- a. Program availability: in 2012, there were approximately 5800 operational hospice programs in all 50 states, District of Columbia, Puerto Rico, Guam, and U.S. Virgin Islands (Martinez & Berry, 2015). In 2014, the number increased to approximately 6100 programs.
- b. Mortality: There were 2.7 million deaths in the United States in 2015 (CDC, 2017), with an estimated 1.38 million individuals receiving hospice services (NHPCO, 2016).
- c. Cost: In 2015, Medicare expenditures for hospice services were \$15.9 billion (NHPCO, 2016).

## G L O S S A R Y

**Advance directives:** Used to give other people, including healthcare providers, information about client’s wishes for medical care at a time when client is not physically or mentally able to speak for self. The most common types of advance directives are the living will and the durable power of attorney for healthcare.

**End-of-life care:** General term that refers to the comprehensive care given in the advanced or terminal stages of illness.

**Holistic care:** Philosophy of care that is based on healing the whole person; of living and being that is grounded in caring, relationship, and interconnectedness (Klebanoff, 2013).

**Hospice care:** Type of care designed to help clients and their families during the final stages of a terminal illness. Hospice treatment is concentrated primarily on maintaining comfort.

**Locus of control:** The site of control in an individual—internal or external.

**Mindfulness:** Method of staying in the moment.

**Palliative care:** Philosophy of care with the goal of improving the quality of life of clients and their families facing life-threatening illness, through the prevention and relief from suffering. This type of care can encompass treatment of disease processes; provides more than comfort care.

**CARE SETTING**

Although much of the care of the dying is still provided by nurses in hospitals (primarily in oncology and critical care areas), palliative care is generally community based. Hospice care is most common in the home, assisted living, extended-care facilities, or hospice inpatient units.

**RELATED CONCERNS**

Cancer, general considerations, page 945  
Extended/long-term care, page 896  
Psychosocial aspects of care, page 835

**CLIENT ASSESSMENT DATABASE**

Data depend on underlying life-limiting condition, involvement of other body systems, and progression of disease/stage of dying process. Refer to care plan(s) reflecting underlying pathology of condition for specific assessments related to that condition.

**DIAGNOSTIC DIVISION  
MAY REPORT****MAY EXHIBIT****ACTIVITY/REST**

- Fatigue
- General weakness
- Sleep disturbances

**ELIMINATION**

- Abdominal discomfort

***End stage:***

- Constipation (effect of opioids, decreased fluids)
- Dark urine, oliguria

**EGO INTEGRITY**

- Inability to care for self and decision to accept hospice services
- Feelings of helplessness, hopelessness, sorrow, anger; choked feelings
- Fear of the dying process, loss of physical and/or mental abilities
- Concern about impact of death on significant other (SO) and family; difficulty coping—client and/or family
- Inner conflict about beliefs, meaning of life and death; moral distress
- Financial concerns, lack of preparation (e.g., will, power of attorney, funeral)

- Deep sadness, crying, anxiety
- Apathy, social isolation, withdrawal
- Grieving
- Spiritual distress

**FOOD/FLUID**

- Decreasing appetite
- Nausea
- Anorexia

- Weight loss
- Decreased muscle mass, subcutaneous fat
- Poor skin turgor, dry mucous membranes
- Difficulty swallowing

**NEUROLOGICAL**

- ***End stage:***
- Decreasing level of consciousness (LOC)
- Agitation, restlessness
- Terminal delirium

**PAIN/DISCOMFORT**

- Acute or chronic pain

- Muscle tension, restlessness
- Facial grimacing

**RESPIRATION**

- ***End stage:***
- Adventitious breath sounds—rhonchi, wheezes
- Abnormal breathing patterns

(continues on page 972)

**CLIENT ASSESSMENT DATABASE (contd.)****MAY REPORT (continued)****MAY EXHIBIT (continued)****SAFETY**

- Erythema over body prominences
- Skin breakdown, pressure injuries
- Perineal infection—candidiasis

**SOCIAL INTERACTION**

- Apprehension about caregiver's ability to provide care
- Changes in family roles and usual patterns of responsibility
- Loneliness
- Deep sadness
- Apathy, withdrawal

- Altered communication pattern
- Difficulty adapting to changes imposed by condition and dying process
- Family coping concerns

**NURSING PRIORITIES**

1. Control pain.
2. Prevent or manage complications.
3. Maintain quality of life as possible.

4. Plans in place to meet client and family last wishes such as care setting, advance directives, will, and funeral.

**Refer to chronic condition plan of care for health management interventions.**

**NURSING DIAGNOSIS: acute/chronic Pain****May Be Related To**

Physical agents (e.g., disease process; chronic physical disability)  
Emotional distress; fatigue

**Possibly Evidenced By**

Self-report of pain intensity/characteristics using standardized scale/instrument  
Facial expression of pain; restlessness, irritability  
Appetite change; anorexia; alteration in sleep pattern  
Positioning to ease pain  
Changes in vital signs (acute pain)

**Desired Outcomes/Evaluation Criteria—Client Will****Pain Control NOC**

Report pain is relieved or controlled, using self-report pain tool.  
Demonstrate reduction in pain-related behaviors if unable to provide self-report.  
Identify and use nonpharmacological methods that provide relief.  
Follow prescribed pharmacological regimen.

**Family/SO(s) Will**

Cooperate in pain management program.

**ACTIONS/INTERVENTIONS****RATIONALE****Pain Management: Acute/Chronic NIC****Independent**

Perform a comprehensive pain evaluation, including location, characteristics, onset, duration, frequency, quality, severity using 0 to 10, or similar coded scale, and precipitating or aggravating factors. Note cultural issues impacting reporting and expression of pain. Determine client's acceptable comfort-function level.

Provides baseline information from which a realistic plan can be developed, keeping in mind that verbal and behavioral cues may have little direct relationship to the degree of pain perceived. If self-report is not possible, behavior or physical responses may be helpful (Bjoro & Herr, 2008). Note: Often client does not feel the need to be completely pain-free but is able to be more functional when pain is at lower level on the pain scale.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Determine possible pathophysiological and psychological causes of pain, such as may be caused by inflammation, fractures, cancer process, surgery, grief, fear, anxiety, or delirium.	Pain is associated with many factors that may be interactive and increase the degree of pain experienced and affect choice of interventions.
Assess client's perception of pain, being aware of client's cognitive status along with behavioral and psychological responses. Determine client's attitude toward, and use of, pain medications and locus of control—internal or external.	Helps identify client's needs, ability to adequately express self, and pain control methods found to be helpful or not helpful in the past. Note: Individuals with external locus of control may take little or no responsibility for pain management.
Encourage client and family to express feelings and concerns about opioid use.	Inaccurate information regarding drug use, fear of addiction, or oversedation could impair pain management efforts.
Verify current and past analgesic and drug use, including alcohol.	May provide insight into what has or has not worked in the past or may impact therapy plan.
Assess degree of personal adjustment to diagnosis, such as anger, irritability, withdrawal, and acceptance.	These factors are variable and often affect the perception of pain, ability to cope, and pain management success.
Discuss with SO(s) ways in which they can assist client and reduce precipitating factors.	Promotes involvement in care and belief that there are things they can do to help.
Instruct client in specific signs and symptoms and changes in pain intensity/characteristics requiring notification of primary care provider.	Unrelieved pain may be associated with progression of disease process or with complications that require medical management.
Involve caregivers in identifying effective comfort measures for client, such as use of nonacidic fluids, oral swabs, lip salve, and suctioning; skin and perineal care; and use of laxatives. Instruct in use of any needed equipment, such as suction and oxygen.	Managing troubling symptoms, such as nausea, dry mouth, dyspnea, and constipation, can reduce client's suffering and family anxiety, thus improving quality of life and allowing client and family to focus on other issues.
Demonstrate and encourage use of relaxation techniques, such as guided imagery, music, and meditation.	Can supplement analgesic therapy, especially during periods when client desires to minimize sedative effects of medication.
Monitor for, and discuss possibility of, changes in mental status, such as agitation, confusion, and restlessness.	Although causes of deterioration are numerous in terminal stages, early recognition and management of the psychological component are integral parts of pain management.
<b>Collaborative</b>	
Establish pain management plan with client, family, and healthcare providers, with options for management of breakthrough pain and including holistic options such as aromatherapy or Therapeutic Touch in plan as appropriate.	Inadequate pain management remains one of the most significant deficiencies in the care of the dying client. A stepwise plan or analgesic ladder developed in advance increases client's level of trust that comfort will be maintained, reducing anxiety.
Schedule and administer analgesics, as indicated, to maximal dosage. Use various modalities such as patch, lollipop, sublingual, or combinations of medications, as indicated.	Helps maintain "acceptable" level of pain. Various drugs, dosages, and combinations allow for smaller doses and fewer side effects.
Plan for aggressive pain management, as indicated. Notify physician if regimen is inadequate to meet pain control goal.	Primary goal is for client to be comfortable. Sometimes frequent alterations are required in achieving this, but medications and comfort measures must be sufficient to ensure that client is not suffering.
Instruct client, family, and caregiver in use of sustained-release formulations, around-the-clock dosing, and breakthrough pain management and technology, such as pump or patient-controlled analgesia (PCA) for pain control.	By understanding and managing these factors, pain relief can be enhanced and quality of life improved.
Review medicinal options to treat constipation.	Various "cocktails" are available to manage constipation associated with use of opioid pain medications, reduced peristalsis, and lack of food intake. This is a frequent problem that must be managed to reduce client discomfort.

Refer to CP: Cancer; ND: acute/chronic Pain for additional interventions.

## NURSING DIAGNOSIS: Fatigue

### May Be Related To

Illness; anemia; malnutrition  
Stressors; anxiety; depression; exposure to negative life event

### Possibly Evidenced By

Tiredness; nonrestorative sleep pattern  
Insufficient energy; lethargy; drowsiness; increase in rest requirement  
Decreased performance; impaired ability to maintain usual routines  
Disinterest in surroundings; introspection

### Desired Outcomes/Evaluation Criteria—Client Will

#### Energy Conservation NOC

Identify negative factors affecting performance and eliminate or reduce their effects when possible.  
Adapt lifestyle to energy level.  
Verbalize understanding of potential loss of ability in relation to existing condition.

#### Fatigue Level NOC

Maintain or achieve slight increase in activity tolerance evidenced by manageable level of fatigue or weakness.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Energy Management NIC</b> <i>Independent</i> Assess severity of fatigue on 0 to 10 or similar coded scale.	The fatigue experienced by the terminally ill can arise from both physical and psychological causes. This fatigue has multiple components, including symptoms of tiredness, a general lack of energy not relieved by rest, diminished mental capacity, and subjective weakness associated with difficulty in performing activities of daily living (Portenoy et al, 1999; Grgis et al, 2006).
Assess sleep pattern and note changes in thought processes and behaviors.	Multiple factors can aggravate fatigue, including sleep deprivation, emotional distress, cognitive impairment (may be related to effects or side effects of medications/therapies, or progression of disease process).
Recommend scheduling activities for periods when client has most energy. Adjust activities as necessary, reducing intensity level or discontinuing activities, as indicated.	Prevents overexertion and allows for some activity within client's ability.
Encourage client to do whatever possible, for example, self-care, sit in chair, or visit with family and friends. Plan for shorter activities.	Provides for sense of control and feeling of accomplishment.
Instruct client, family, and caregiver in energy conservation techniques. Emphasize necessity of allowing for frequent rest periods following activities.	Enhances performance while conserving limited energy and preventing increase in level of fatigue.
Plan family and friend visits around client's increased sleep time and shorter periods of alertness.	Client may become tired easily and will sleep more. In addition, client may have periods of unresponsiveness or confusion or seem to be in a dream state. This may be distressing to families/visitors.
Demonstrate proper performance of/assist with activities of daily living (ADLs), ambulation, and position changes. Emphasize safety measures such as use of assistive devices, temperature of bath water, and keeping pathways clear of furniture.	Protects client and caregiver from injury during activities.
Encourage nutritional intake and use of supplements, as appropriate.	Client may or may not want to eat, but food can be offered, if client is able to eat. Easy-to-digest foods that client enjoys may help meet energy needs for activity.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss future plans regarding food and fluid, as indicated. Help client's family understand that forced eating and drinking may harm instead of help.	As the body starts the natural process of dying, the need for food and fluids decreases due to the shutdown of body systems. At this point, dehydration associated with the dying process actually causes analgesic effects (Allen, 2008). Intravenous (IV) fluids and enteral feedings do not prolong life of the dying person. In fact, they may increase discomfort and hasten death. For example, IV fluids can cause edema, increased pain from inflammation, and fluid overload, whereas enteral feedings can cause pulmonary congestion and pneumonia (Suter et al, 2008).
Document cardiopulmonary response to activity—weakness, fatigue, dyspnea, arrhythmias, and diaphoresis.	Can provide guidelines for participation in activities and changes in the plan of care and level of assistance required.
Monitor breath sounds. Note feelings of panic or air hunger.	Hypoxemia increases sense of fatigue and impairs ability to function.
<b>Collaborative</b> Collaborate in identifying causes of fatigue that can be treated (e.g., medication effects, electrolyte levels, anemia, pain, depression).	If an etiology for fatigue can be determined, the condition should be treated appropriately.
Provide supplemental oxygen as indicated and monitor response.	Increases oxygenation, may decrease work of breathing, reducing anxious feelings. Evaluates effectiveness of therapy.

## NURSING DIAGNOSIS: Grieving/Death Anxiety

### May Be Related To

Anticipation of pain, suffering; anticipatory loss of body processes  
 Anticipation of impact of death on others  
 Confronting the reality of terminal disease; perceived imminence of death  
 Uncertainty about the existence of/encountering a higher power

### Possibly Evidenced By

Fear of pain/suffering related to dying  
 Negative thoughts related to death and dying  
 Worried about the impact of one's own death on significant other  
 Anger; despair; blaming; psychological distress

### Desired Outcomes/Evaluation Criteria—Client Will

#### Grief Resolution NOC

Verbalize understanding of the dying process.  
 Discuss spiritual concerns or unresolved conflicts.

#### Dignified Life Closure NOC

Identify and express feelings appropriately.  
 Participate in decisions regarding basic care and dying process.  
 Verbalize sense of control over remaining time.

### Family Will

#### Grief Resolution NOC

Ventilate conflicts and feelings related to illness and death.  
 Verbalize understanding of, and progress through, the stages of grief and loss.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Grief Work Facilitation NIC</b> <i>Independent</i> Facilitate development of a trusting relationship with client and family.	Trust is necessary before client and family can feel free to open personal lines of communication with the care team and address sensitive issues.

(continues on page 976)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assess client and SO for stage of grief currently being experienced. Explain process, as appropriate.	Knowledge about the grieving process reinforces the normalcy of feelings and reactions being experienced and can help client deal more effectively with them.
Provide open, nonjudgmental environment. Use therapeutic communication skills of active-listening clarifying statements, inviting questions, and acknowledgment.	Promotes and encourages realistic dialogue about feelings and concerns. Empowers effective communication.
Encourage verbalization of thoughts and concerns. Accept expressions of sadness, anger, and rejection. Acknowledge normalcy of these feelings.	Client may feel supported in expression of feelings by the understanding that deep and often conflicting emotions are normal and experienced by others in this difficult situation (Otis-Green, 2008b).
Be aware of mood swings, hostility, and other acting-out behavior. Set limits on inappropriate behavior and redirect negative thinking.	Indicators of ineffective coping and need for additional interventions. Preventing destructive actions enables client to maintain control and sense of self-esteem.
Monitor for signs of debilitating depression such as statements of hopelessness, desire to "end it now." Ask client direct questions about state of mind.	Client may be especially vulnerable when recently diagnosed with end-stage disease process and/or when discharged from hospital. Fear of loss of control or concerns about managing pain effectively may cause client to consider suicide.
Reinforce teaching regarding disease process and provide information as requested and appropriate about dying. Be honest; do not give false hope while providing emotional support.	Client and SO benefit from factual information. Individuals may ask direct questions about death, and honest answers promote trust and provide reassurance that correct information will be given.
Review past life experiences, role changes, sexuality concerns, and coping skills. Promote an environment conducive to talking about things that interest client.	This is an opportunity to identify skills that may help individuals cope with grief of current situation more effectively. Note: Issues of sexuality remain important at this stage, such as feelings of masculinity or femininity, giving up caretaker or provider role within family, and ability to maintain sexual activity or closeness, if desired.
Investigate evidence of conflict, expressions of anger, and statements of despair, guilt, hopelessness, and inability to grieve.	Interpersonal conflicts and angry behavior may be client's and SO's way of expressing or dealing with feelings of despair or spiritual distress, necessitating further evaluation and support.
Determine way that client and SO understand and respond to death—cultural expectations, learned behaviors, experience with death of close family members or friends, and beliefs about life after death, spirituality, or faith in a higher power.	These factors affect how each individual faces death and influences how he or she may respond and interact.
Assist client and SO to identify strengths in self or situation and support systems.	Recognizing these resources provides opportunity to work through feelings of grief.
Be aware of own feelings about death. Accept whatever methods client and SO have chosen to help each other through the process.	Caregiver's anxiety and unwillingness to accept reality of possibility of own death may block ability to be helpful to client and SO, necessitating enlisting the aid of others to provide needed support.
<b>Dying Care NIC</b> Provide open environment for discussion with client and SO, when appropriate, about desires and plans pertaining to death, including making a will, burial arrangements, tissue donation, death benefits, insurance, time for family gatherings, and how to spend remaining time.	If client and SO are mutually aware of impending death, they may more easily deal with unfinished business or desired activities. Having a part in problem-solving and planning can provide a sense of control over anticipated events.
Encourage participation in care decisions.	Allows client to retain some control over life.
Visit regularly and provide physical contact as appropriate and desired, or provide frequent phone support as appropriate for setting. Arrange for care provider or support person to stay with client, as needed.	Helps reduce feelings of isolation and abandonment. Provides respite and time for SO and family to meet own needs and complete required activities.
Allow SO to be physically close, giving permission, instruction, and opportunities to touch the client.	Family and SO may need encouragement to touch the client, which is therapeutic to both the patient and the SO.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide time for acceptance, final farewell, and arrangements for memorial or funeral service according to individual spiritual, cultural, and ethnic needs.	Accommodation of personal and family wishes helps reduce anxiety and may promote sense of peace.
<b>Collaborative</b> Determine spiritual needs and/or conflicts and refer to appropriate team members, including clergy or spiritual advisor and parish nurse.	Providing for spiritual needs, forgiveness, prayer, devotional materials, or sacraments as requested can relieve spiritual pain and provide a sense of peace. (Refer to ND: risk for Spiritual Distress.)
Refer to appropriate counselor, as needed, such as psychiatric clinical nurse specialist, social worker, psychologist, and pastoral support.	Compassion and support can help alleviate distress or palliate feelings of grief to facilitate coping and foster growth.
Refer to visiting nurse or home-health agency if hospice services not available.	Provides support in meeting physical and emotional needs of client and SO and can supplement the care family and friends are able to give.
Identify need for and appropriate timing of antidepressants or antianxiety medications.	May alleviate distress and enhance coping, especially for clients not requiring analgesics.

### NURSING DIAGNOSIS: compromised family Coping

#### May Be Related To

Exhaustion of supportive person's capacity  
Insufficient understanding of information by a support person  
Family disorganization; insufficient reciprocal support

#### Possibly Evidenced By

Assistive behaviors by support person produce unsatisfactory results  
Client concern about support person's response to health problem  
Limitation in communication between support person and client; support person withdraws from client  
Protective behavior by support person incongruent with client's abilities/need for autonomy

#### Desired Outcomes/Evaluation Criteria—Family Will

#### Family Coping NOC

Express feelings freely among family members.  
Use available support system/community resources.  
Engage in decision making for resolution of identified problems.  
Share responsibility for family duties and care tasks as appropriate.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Family Involvement Promotion NIC</b> <i>Independent</i> Assess level of anxiety present in family and SO.	Anxiety level needs to be dealt with before problem-solving can begin. Individuals may be so preoccupied with own reactions to situation that they are unable to respond to another's needs.
Establish rapport and acknowledge difficulty of the situation for the family.	Listening intently helps SO/family feel they have been heard. May assist SO to accept what is happening and be willing to share problems with healthcare providers.
Determine level of coping impairment. Evaluate current behaviors that may be interfering with the care of client.	Information about family problems such as divorce or separation, alcoholism, other drug use, or abusive situation will be helpful in determining options and developing an appropriate plan of care.
Note client's emotional and behavioral responses resulting from increasing weakness and dependency, such as depression, withdrawal, hostility, hallucinations, and delusions.	Approaching death is most stressful when client and family coping responses are strained, resulting in increased frustration, guilt, and anguish.

(continues on page 978)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss underlying reasons for client behaviors with family.	When family members know why client is behaving differently, it may help them understand, accept, and deal with unusual behaviors.
Assist family and client to understand “who owns the problem” and who is responsible for resolution. Avoid placing blame or guilt.	When these boundaries are defined, each individual can begin to take care of own self and stop taking care of others in inappropriate ways.
Determine current knowledge and perceptions of the situation.	Provides information on which to begin planning care and making informed decisions. Lack of information or unrealistic perceptions can interfere with individual's responses to illness situation.
Assess current actions of SO and how they are received by client.	SO may be trying to be helpful, but actions are not perceived as such by client. SO may be withdrawn or too protective.
Facilitate family conference; include all family members, as appropriate. Provide and reinforce information about terminal illness, death, and future family needs. Involve SO/family with client in planning care.	Knowledge can help the family prepare for eventualities and deal with the actual death process. Increases understanding of necessary activities and steps to be taken to deal with funeral preparations, legal and financial concerns, and survivor issues.

#### *Collaborative*

Refer to appropriate resources for assistance, as indicated, including family counseling, psychotherapy, community support groups, and respite care.

May need additional assistance in resolving family issues, making peace, and maintaining personal well-being.

## NURSING DIAGNOSIS: risk for Spiritual Distress

### Possibly Evidenced By

Anxiety; stressors; depression  
Separation from support systems  
Barrier to experiencing love; low self-esteem; inability to forgive

### Desired Outcomes/Evaluation Criteria—Client Will

### Spiritual Health NOC

Identify meaning and purpose in own life.  
Report sense of connectedness with self/others.  
Verbalize feelings of peacefulness or spiritual contentment.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Spiritual Support NIC</b>	
<i>Independent</i>	
Listen to client's and SO's reports and expressions of anger or concern.	May reveal many conflicting thoughts and beliefs, for example, that illness or situation is a punishment for wrongdoing or that death is desirable or feared. Dying client faces momentous losses of physical control and function, of independence, of relationships, of possibilities, and ultimately of life itself. To family members and friends, the loss of a loved one causes great stress and temporarily impairs concentration, decision making, and work performance.
Determine client's religious or spiritual orientation, current involvement, and presence of conflicts in current circumstances.	Provides insight as to where client currently is and what hopes for the future may be. Note: Individuals reporting high spirituality were less hopeless, had less desire to hasten their deaths, and had less suicidal ideation.
Assess sense of self-concept, worth, and ability to enter into or maintain loving relationships.	Necessary to provide firm foundation for growth and guiding client and family through life closure and completion tasks.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Explore interpretation and relationship of spirituality, concept of life, and death and illness to client's spiritual centeredness.	Identifying the meaning of these issues may be helpful in forming or stating a belief system that enables client to move forward. Comfort can be gained when family and friends share client's beliefs and support search for spiritual knowledge.
Explore ways that spirituality or religious practices, such as music, prayer, meditation, and rituals, have affected client's life.	Allows client to explore spiritual needs and decide what fits own view and provides support for dealing with current situation.
Determine support systems available to and used by client and SO.	May help identify strengths and weaknesses in relationship dynamics that the client and SOs may want to address, such as expressing love, forgiveness, and support.
Encourage client to be introspective in search for peace and harmony.	Finding peace within will carry over to relationships with others and one's outlook on life and death.
Establish environment that promotes free expression of feelings and concerns.	May help identify the real need of the day. For example, the dying person may not hope for cure or postponement of death but rather that on the next day, he or she will feel better with fewer physical and emotional discomforts.
Have client and SO identify and prioritize current and immediate needs regarding faith, influence, and community.	Helps client and SO focus on what needs to be done and identify manageable steps to take.
Make time for nonjudgmental discussion of cultural and philosophical issues and questions about spiritual impact of illness and/or impending death.	Spiritual or religious practices, customs, and rituals often play important roles, especially at a time of such significant transition in life.
Discuss difference between grief and guilt and help client to identify and deal with each, assuming responsibility for own actions.	Identifies persons at risk for complicated grief and bereavement and its associated depression and complications. May provide opportunities for resolution.
Use therapeutic communication skills of gentle stillness, reflection, conveying respect through tone of voice and body language, and active-listening.	Encourages client and SO to identify and express end-of-life concerns, hopes, fears, and expectations openly and honestly in a caring milieu.
Review coping skills used and their effectiveness in current situation.	Helps client and SO remember and call upon strengths that have been helpful in other situations. May free the client to be "more" creative, loving, and into the experience of well-being.
Suggest use of storytelling, journaling, or taping thoughts.	Helps client explore and find own solutions to concerns. Identifies strengths to incorporate into plan and techniques needing revision.
Determine how involved in physical care the family members want to be. Establish with client and SO wishes for the moment of death.	Clarification of specific wishes can be helpful in reducing stress and allow for needed differences in response.
<b>Collaborative</b>	
Encourage participation in desired religious activities, prayer, meditation, or contact with minister, spiritual advisor, or grief counselor.	May prove beneficial to both client and family members in reflecting on life and death issues. Can assist in clarifying values and ideas, recognizing and resolving feelings, and promoting comfort. Validating one's beliefs in an external way can support and strengthen the inner self.

Refer to CP: Psychosocial Aspects of Care; ND: risk for impaired Religiosity for additional interventions.

NURSING DIAGNOSIS: <b>risk for caregiver Role Strain</b>
<b>Possibly Evidenced By</b>
Complexity of caregiving activities; extended duration of caregiving required Ineffective coping strategies; ineffective family adaptation Partner is caregiver; insufficient respite for caregiver
(continues on page 980)

**NURSING DIAGNOSIS:** **risk for caregiver Role Strain** (continued)**Desired Outcomes/Evaluation Criteria—Caregiver Will****Caregiver Role Endurance NOC**

Demonstrate mastery of direct/indirect care tasks.  
Share responsibility for caregiving tasks with family members/support system.  
Engage in appropriate leisure activities/respite.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Caregiver Support NIC</b>	
<i>Independent</i>	
Determine caregiver's health, level of commitment, responsibility, and involvement in care. Use assessment tool, such as Burden Interview, to further clarify caregiver's abilities, when appropriate.	Terminal care taxes caregiver and may alter ability to meet client's and own needs (Otis-Green, 2008a).
Ascertain caregiver's understanding and acceptance of client's wishes and advance directives.	If caregiver is not in total agreement with client's wishes, role strain may be intensified as specific decisions are made regarding care and termination of therapies.
Involve SO in information giving, problem-solving, and care of client, as appropriate. Instruct in medication administration techniques, needed treatments, and appropriate complementary therapies, such as massage, herbs, aromatherapy, and relaxation techniques. Ascertain adeptness with required equipment.	Information can reduce feelings of helplessness and uselessness. Helping a client and family find comfort is often more important than adhering to strict routines. However, family caregivers need to feel confident with specific care activities and equipment. Note: Use of complementary medicine is increasing for pain and symptom relief with lessened side effects.
Provide positive feedback for efforts.	Helps caregiver recognize and feel valued for contribution to care.
Emphasize importance of self-nurturing, personal needs, and social contacts.	Taking time for self can help lessen risk of being overwhelmed by situation.
Identify and schedule alternative care resources, such as family, friends, sitter, and respite services, as needed.	As client's condition worsens, primary caregiver will require additional help from other sources to maintain client at home as desired while still meeting own needs for rest and personal time.
<i>Collaborative</i>	
Refer to community resources to address specific needs, as indicated, such as insurance/financial services and hospice/respite care.	May need additional assistance to facilitate client's wishes for end-of-life care and to support caregiver's well-being.
Arrange for appropriate prescriptions for SO (e.g., sedative, hypnotic).	Mild medication may be beneficial in reducing anxiety and promoting sleep, which, in turn, can enhance coping ability.

## DISASTER CONSIDERATIONS

**I. Problem**

- a. The bigger the disaster or catastrophe, the greater the number of people involved and the wider the effect.
- b. Physical effects of a catastrophic event can vary depending on the type of disaster.
  - i. Explosive devices, transportation accidents, hurricanes, earthquakes, tornados, or floods—burns, traumatic brain and crush injuries, amputations
  - ii. Release of chemical agents—burns, pulmonary or other organ damage, neurological impairment
  - iii. Biological weapons or infections/disease outbreaks (e.g., avian flu or pandemic influenza)
  - iv. Radioactive contamination or exposure—burns, radiation sickness, cancer (long-term concern)

**c. Disaster classifications and examples:**

- i. Time limited—tornado
- ii. Evolving—wildfires, floods, hurricanes
- iii. Prolonged—drought
- iv. Recurrent—wildfire followed by spring flood

**II. Consequences**

- a. Following any disaster, those involved—victims, rescuers, and the surrounding community—suffer from a variety of responses.
- a. Disaster or extreme events can have indirect health-related effects.
  - i. Exacerbation of chronic condition, such as heart or respiratory problems.

## G L O S S A R Y

- ii. Precipitation of emergent conditions such as premature births, seizures, or mental health conditions.
- c. Psychological ramifications
  - i. Immediate stressors may cause anxiety or panic disorders.

- ii. The playing and replaying of the events in one's mind may lead to suicidal thoughts and posttraumatic stress disorder (PTSD).
- iii. Repeated media coverage can magnify the effects; people far removed from the scene may also suffer.

**Acute stress disorder (ASD):** Development of specific fear behaviors that last from 3 days to 1 month after exposure to traumatic event. May progress to PTSD if symptoms persist beyond 1 month.

**Acute stress reaction (ASR):** Refers to a range of transient conditions that develop in response to a traumatic event. Onset of some signs and symptoms may occur within minutes of the event and in most cases will disappear within days or even hours.

**Biological agents:** Viruses (smallpox), bacteria (anthrax, *Salmonella*), other agents including toxins (botulism) that can cause illness or death.

**Chemical agents:** Poisonous gases, liquids, or solids, including nerve agents (sarin), biotoxins (ricin), choking or pulmonary agents (chlorine, ammonia), blood agents (cyanide), caustics (hydrofluoric acid), vesicants or blister agents (lewisite, mustard gas), or long-acting anticoagulants (super warfarin) that can cause serious injury or death.

**Disaster:** Generally refers to a catastrophic natural or manmade event affecting a large population resulting in injury, death, and destruction of property that overwhelms local resources.

**Eye movement desensitization and reprocessing (EMDR):**

Information-processing psychotherapy technique integrating elements of psychodynamic, cognitive-behavioral, interpersonal, experiential, and body-centered therapies to assist individuals to deal with anxious feelings and stress associated with traumatic memories (EMDR Institute, n.d.).

**Posttraumatic stress disorder (PTSD):** Intense physical and psychological distress that ensues following a traumatic event, manifested by horrifying memories, reexperiencing the event or flashbacks, recurring fears, and feelings of helplessness. May be acute—beginning within 6 months and not lasting longer than 6 months; chronic—lasting longer than 6 months; or delayed—period of latency of 6 months or more.

**Psychological first aid:** An evidence-based set of skills to help children, adolescents, adults, and families immediately following a disaster event to reduce the associated distress and to foster short- and long-term adaptive coping by providing information, support, comfort, and safety. It is the behavioral health correlation to physical first aid with the goal being to “stop the bleeding” (Brymer et al, 2006).

## CARE SETTING

Wherever disaster occurs and includes triage areas, aid stations, clinics, hospital and emergency centers, and community shelters.

## RELATED CONCERNs

Burns: thermal, chemical, and electrical—acute and convalescent phases, page 740

Craniocerebral trauma—acute and rehabilitation phases, page 226

Fractures, page 702

Pediatric considerations, page 993

Pneumonia, page 147

Psychosocial aspects of care, page 835

Sepsis/septic shock, page 772

## CLIENT ASSESSMENT DATABASE

Data depend on specific injuries incurred and presence of chronic conditions (refer to specific plans of care for appropriate data, such as burns, multiple trauma, cardiac and respiratory conditions, etc.), psychological response to event, and timing of presentation for care.

### DIAGNOSTIC DIVISION MAY REPORT

#### ACTIVITY/REST

- Sleep disturbances—recurrent intrusive dreams of the event, nightmares, difficulty in falling or staying asleep; hypersomnia with intrusive thoughts, flashbacks
- Fatigue

### MAY EXHIBIT

- Listlessness

(continues on page 982)

**CLIENT ASSESSMENT DATABASE** (contd.)**MAY REPORT** (continued)**MAY EXHIBIT** (continued)**CIRCULATION**

- Palpitations
- Hot flashes or chills

- Tachycardia
- Sweating
- Cold, clammy hands
- Elevated blood pressure (BP) (anxiety)
- Decreased BP (dehydration, hypovolemia)

**EGO INTEGRITY**

- Excessive worry about event
- Avoidance of circumstances or locations associated with incident
- Sense of inner turmoil
- Dry mouth, upset stomach, lump in throat
- Perceived threat to physical integrity or self-concept
- Questioning of God's purpose, abandonment

- Facial expression in keeping with level of anxiety—furrowed brow, strained face, eyelid twitch
- Labile emotions
- Inappropriate humor
- • P May show fear of strangers, or scared to leave parent(s)
- • P Fussy, irritable, aggressive, extreme temper-tantrums; impulsiveness and aggressive behavior more likely in adolescents (Hamblen & Barnett, 2016)
- • P Regression in habits (e.g., sucking thumb)

**ELIMINATION**

- Frequent urination
- Diarrhea

- • P Peds Regression in learned skills (e.g., toileting)

**FOOD/FLUID**

- Lack of interest in food, dysfunctional eating pattern—decreased or increased intake
- Nausea, vomiting, gastric distress

**NEUROSENSORY**

- Lightheadedness, dizziness
- Anticipation of misfortune to self or others
- Feeling stuck
- Absence of other mental disorder

- Confusion, memory loss
- Motor tension, shakiness, jitteriness, trembling, easily startled
- Apprehensive expectation, rumination
- Excessive vigilance, hyperattentiveness
- • P Time skew (missequencing trauma-related events when recalling the memory)
- • P Omen formation (belief that there were warning signs predicting trauma and if child is alert enough they will avoid future traumas) (Hamblen, 2016)
- Distractibility, difficulty concentrating or making decisions, shortened attention span
- Irritability, impatience
- Psychic numbing

**PAIN/DISCOMFORT**

- Muscle aches, tension headaches, chest pain
- Pain related to physical injuries or comorbid conditions

- Guarding or distraction behaviors

**RESPIRATORY**

- Shortness of breath
- Smothering sensation

- Increased respiratory rate

**SAFETY**

- Increased smoking, substance use or abuse
- Fear of harm to self or others

**SEXUALITY**

- Decreased libido

**MAY REPORT (continued)****MAY EXHIBIT (continued)****SOCIAL INTERACTIONS**

- Concern for well-being of others
- Questioning own actions, survival
- Difficulty participating in social settings
- Reluctance to engage in usual activities, work

- Withdrawal

**TEACHING/LEARNING**

- ***Discharge plan considerations:*** Dependent on individual situation, level of support, and available resources

**DIAGNOSTIC STUDIES**

Dependent on injuring agent and exposure and availability of resources for testing and procedures.

**NURSING PRIORITIES**

1. Prevent or treat life-threatening conditions.
2. Prevent further injury and spread of infection.
3. Support efforts to cope with situation.
4. Facilitate integration of event.
5. Assist community in recovery process and preparing for future occurrences.

**DISCHARGE GOALS**

1. Free of preventable complications.
2. Anxiety reduced to a manageable level.
3. Beginning to cope effectively with situation.
4. Plan in place to meet needs after discharge.
5. Community preparedness enhanced.

**NURSING DIAGNOSIS: risk for Injury/physical Trauma****Possibly Evidenced By**

Unsafe environment

Exposure to toxic chemical (chemical pollutants, poisonous agents), corrosive product, radiation; contamination of food or water

Immunization level within community; exposure to pathogen

**Desired Outcomes/Evaluation Criteria—Client/Caregivers Will****Physical Injury Severity |NOC**

Minimize degree of and prevent further injury.

**Personal Safety Behavior |NOC**

Verbalize understanding of condition and specific needs.

Identify interventions appropriate to situation.

Demonstrate behaviors necessary to protect self from further injury.

Accept responsibility for own care and follow up as individually able.

**ACTIONS/INTERVENTIONS****RATIONALE****Triage: Disaster |NIC****Independent**

Acquire information about nature of emergency, accident, or disaster.

Identifies basic resource needs and helps to prepare staff for appropriate level of response based on customary injuries and healthcare needs usually associated with specific event.

Prepare area and equipment; check and restock supplies.

Assists in providing safe medical and nursing care in anticipation of emergency need.

(continues on page 984)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assist in prioritizing (triaging) clients for treatment, including decontamination. Monitor for and treat life-threatening injuries.	Promotes efficient care of those who can be medically treated and maximizes use of resources. Note: In routine emergency situations, the goal is to do the best for each individual. However, in a disaster, the focus of treatment shifts to do the greatest good for the greatest number.
Determine primary needs and specific complaints of client. Check for medical alert tag.	Information necessary for triaging to appropriate services. <b>P</b> Note: Pediatric clients are better able to compensate during early hypovolemic shock than adults, creating a false impression of normalcy (American Academy of Pediatrics [AAP], 2006).
Obtain additional medical information, including preexisting conditions, allergies, and current medication. Perform more in-depth assessment as time allows and condition warrants.	Provides for assessment and treatment of conditions that might not be evident initially.
Determine client's developmental level, decision-making ability, level of cognition, and competence.	Affects treatment plan regarding issues of informed consent, self-care, client teaching, and discharge.
Evaluate individual's response to event, mood, coping abilities, and personal vulnerability.	People react to traumatic situations in many ways and may exhibit a wide range of responses—from no visible response to wild emotions. This may result in carelessness or increased risk taking without considerations of consequences or inability to act on own behalf, including protecting self.
Ascertain knowledge of needs and injury prevention and motivation to prevent further injury.	Indicator of need for information and assistance with making positive changes, promoting safety and sense of security.
Discuss importance of self-monitoring of conditions and emotions that can contribute to occurrence of injury—shock state, ignoring basic needs, fatigue, anger, and irritability.	Recognizing these factors and dealing with them appropriately, including seeking support and assistance, can reduce individual risks.
Note socioeconomic status and availability and use of resources.	May determine ability to access help for identified problems.
<b>Collaborative</b> Work with other agencies, such as law enforcement, fire department, Red Cross, and ambulance and EMTs, as indicated. Follow prearranged roles when participating in a community disaster plan.	During a disaster, many people are involved with care of victims. Most communities have disaster plans in which nurses will participate.
<b>Triage: Emergency Care NIC</b> Identify and manage life-threatening situations—airway problems, bleeding, and diminished consciousness.	Stabilization of medical condition is necessary before proceeding with additional therapies. <b>P</b> Note: Children are at greater risk than adults when exposed to chemical agents/poisonous gases because of (1) higher minute volume, (2) increased skin permeability, (3) greater body surface to weight ratio, (4) less intravascular volume increasing risk of hypovolemic shock, (5) shorter stature increasing exposure to greatest gas vapor density at ground level (Foltin et al, 2008).
Obtain and assist with diagnostic studies, as indicated.	Choice of studies is dependent on individual situation and availability of resources.
Provide therapeutic interventions as individually appropriate. (Refer to specific CPs; e.g., Burns, Fractures, Craniocerebral Trauma, Myocardial Infarction, Chronic Obstructive Pulmonary Disease, Respiratory Failure/Ventilatory Assistance.)	Specific needs of client and the level of care available at a particular site determine response.
Provide written instructions and list of resources for later review.	Client and significant other(s) (SO[s]) are generally not able to assimilate information at time of crisis and may need reinforcement or want additional information.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Identify community resources, including shelter, neighbors, friends, and government agencies available for assistance.	May need assistance or ongoing monitoring postdischarge to deal with self-care needs as well as safe housing and other life requirements. Note: Release of client without active support increases personal risk because of possibility of unrecognized or subacute injury or delayed psychological response.
Refer to other resources, as indicated, such as counseling and psychotherapy.	Immediate “debriefing” or counseling is beneficial for dealing with crisis to enhance ability to meet own needs.

### NURSING DIAGNOSIS: **risk for Infection**

#### Possibly Evidenced By

Exposure to disease outbreak; inadequate vaccination  
Alteration in skin integrity; invasive procedures  
Chronic illness, malnutrition

#### Desired Outcomes/Evaluation Criteria—Client Will

##### Risk Control NOC

Verbalize understanding of individual exposure and risk factor(s).  
Identify interventions to prevent and reduce risk of infection.

##### Infection Severity NOC

Be free of or demonstrate resolution of infection.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Infection Control NIC</b>	
<b>Independent</b>	
Note risk factors for occurrence of infection—environmental exposure (including other individuals sharing close quarters such as shelter residents), compromised host, traumatic injury, loss of skin integrity. Determine client’s proximity to incident. Be aware of incubation period for various diseases/likely exposure. (Refer to local public health department or the cdc.gov website for information specific to exposure.)	Understanding nature and properties of infectious agents and individual’s exposure determines choice of therapeutic intervention. Note: Those upwind of an aerosol release of a biological agent may have little or no exposure to the agent.
Observe for signs and symptoms of infective agent and systemic infection—fever, chills, diaphoresis, altered level of consciousness (LOC), and positive blood cultures. Investigate presence of rash.	Initial symptoms of some agents include fever, fatigue, joint aches, and headache similar to influenza. The infection may even be misdiagnosed as an influenza-like infection (ILI), unless healthcare providers maintain an index of suspicion and obtain additional diagnostic studies. <b>P</b> Note: The immature immunological system of children places them at higher risk for developing infections (AAP, 2006).
Practice and demonstrate proper hand hygiene.	First-line defense to limit spread of infections.
Provide for infection precautions or isolation, as indicated—standard precautions of gown, gloves, face shield or goggles, respiratory mask or filter, and reverse or negative pressure room, when available.	Reduces risk of cross-contamination to staff, visitors, and other clients.
Group or cohort individuals in facility/shelter with same diagnosis or exposure as resources require.	Limited resources may dictate open ward-like environment but need to control spread of infection still exists.
Monitor visitors/shelter residents, caregivers, and volunteers for infectious diseases.	Prevents exposure of client to further infection and may reveal additional cases.
Review individual nutritional needs, appropriate exercise program, and need for rest.	Essential for well-being and recovery.

(continues on page 986)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Instruct client/SO(s) in techniques to prevent spread of infection (e.g., hand hygiene, covering coughs, management of secretions), protect the integrity of skin, and care for wounds or lesions.	Self-care activities that may provide protection for client and others.
Emphasize necessity of taking antibiotics as directed, especially dosage and length of therapy.	Premature discontinuation of treatment when client begins to feel well may result in return of infection. However, unnecessary use of antibiotics may result in development of secondary infections or resistant organisms.
Monitor cleanliness of environment/shelter, food storage and preparation. <b>P</b> Provide for safe infant feeding/care. Designate quiet places to breastfeed, provide ready-to-use formula that requires no special mixing in disposable bottles that don't require cleaning if not breastfeeding (DeYoung, 2017).	Proper food-handling/feeding techniques and disposal of waste/diapers and incontinent pads/briefs as well as medical waste such as dressings reduce risk of spread of infection.
Involve community/shelter residents in education programs geared to increasing awareness of spread and prevention of communicable diseases.	Helps to reduce incidence of disease in the community as well as manage the dissemination of information.
<b>Collaborative</b>	
Obtain appropriate specimens for observation and culture and sensitivities testing—nose and throat swabs, sputum, blood, urine, or feces.	Provides information to diagnose infection and determine appropriate therapeutic interventions.
Assist with medical procedures, such as incision and drainage of abscess, bronchoscopy, or wound care, as indicated.	Helps determine causative factors for appropriate treatment and facilitates recovery.
Administer and monitor medication regimen (e.g., antimicrobials, topical antibiotics) and note client's response.	Determines effectiveness of therapy and presence of side effects.
Provide passive protection such as immune globulin, active protection (e.g., vaccination), or chemoprophylaxis, as appropriate.	May prevent development of infection following exposure or reduce the likelihood of acquiring disease in the future.
Alert proper authorities to presence of specific infectious agent and number of cases.	Diseases that could be caused by biological releases or that spread rapidly through populations have reporting requirements to local, state, and national agencies, such as the state health department or the Centers for Disease Control and Prevention (CDC). These agencies, in turn, have responsibilities for the public safety and welfare.

## NURSING DIAGNOSIS: [severe/panic] Anxiety

### May Be Related To

Threat to current status; threat of death  
Interpersonal contagion/transmission (e.g., of concerns or fears)  
Unmet needs; value conflict  
Situational crisis; exposure to toxins

### Possibly Evidenced By

Distress, apprehensiveness, irritability, worried about change in life event, self-focused, fear  
Scanning behavior, hypervigilance, restlessness  
Cardiovascular excitation; changes in vital signs  
Alteration in attention/concentration; rumination

### Desired Outcomes/Evaluation Criteria—Client Will

#### Anxiety Self-Control NOC

Acknowledge and discuss feelings.  
Verbalize accurate knowledge of current situation and potential outcomes.  
Identify healthy ways to successfully deal with stress.  
Report anxiety is reduced to a manageable level.  
Demonstrate problem-solving skills appropriate for individual situation.  
Use resources and support systems effectively.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Crisis Intervention NIC</b> <i>Independent</i> Perform screening/needs assessment for all individuals following event.	Initial reactions following event are varied, complex, and can be unstable. Acute stress reaction (ASR) is a transient condition developing within minutes or hours and although usually resolving within 2 to 3 days, early intervention (such as psychological first aid) may reduce progression to a more serious stress disorder (Department of Veterans Affairs and Department of Defense [VA/DoD], 2010).
Determine degree of anxiety or fear present; associated behaviors, such as laughter, crying, calm or agitation, excited or hysterical behavior; expressions of disbelief and/or self-blame; and reality of perceived threat.	Clearly understanding client's perception is pivotal to providing appropriate assistance in dealing with anxiety. Individual may be agitated or totally overwhelmed. Severe anxiety increases risk for client's own safety as well as the safety of others in the environment. <b>P</b> Note: Children are affected by their own reaction to the event as well as the transmission of anxiety or fear being experienced by parents and care providers, thus magnifying the psychological impact on the child (AAP, 2006).
Note cultural factors that may influence anxiety and response to event.	Individual responses are influenced by cultural values and beliefs and culturally learned patterns of one's family of origin impacting how the individual expresses emotions and attitudes toward assistance from others/government agencies or counseling services (Brymer et al, 2006). Note: Cultural or religious affiliations may impact responses of others client comes in contact with.
Note degree of disorganization.	Client may be unable to handle activities of daily living (ADLs) or work requirements and may need more intensive evaluation and intervention. <b>P</b> Children may regress—girls may express anxiety and sadness, whereas boys are more likely to display behavioral problems (AAP, 2006).
Maintain and respect client's personal space boundaries—approximately 4-foot circle around client.	Entering client's personal space without permission or invitation could result in an overwhelming anxiety response and, possibly, an overt act of violence. Respecting personal space helps client to feel safe, which is an important factor in client regaining or maintaining pre-event status (VA/DoD, 2010).
Create quiet area as able. Maintain a calm, confident manner. Speak in even tone using short, simple sentences. <b>P</b> Encourage parents to provide a calming presence, reassure child they are safe and share feelings as a family (Moreno, 2017).	Decreases sense of confusion, overstimulation, and enhances sense of safety. Helps client focus on what is said and reduces transmission of anxiety.
Develop trusting relationship with client.	Trust is the basis of a therapeutic nurse-client relationship and enables them to work together effectively.
Identify whether incident has reactivated preexisting or coexisting situations—physical or psychological.	Concerns or psychological issues will be recycled every time trauma is reexperienced and affect how the client views the current situation.
Determine presence of physical symptoms, such as numbness, headache, chest tightness, nausea, and pounding heart.	Physical problems need to be differentiated from anxiety symptoms so that appropriate treatment can be given.
Identify psychological responses—anger, shock, acute anxiety, panic, confusion, and denial. Record emotional changes.	Although these are normal responses at the time of the trauma, they will recycle again and again until they are dealt with adequately.
Discuss with client perception of what is causing anxiety or panic.	Increases ability to connect symptoms to subjective feeling of anxiety, providing opportunity to gain insight and control, and make desired changes.

(continues on page 988)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Assist client to correct any distortions being experienced.	Provides opportunity to clarify misperceptions, including possibility of survivor's guilt. Perceptions based on reality will help to decrease fearfulness.
<p><b>P</b> Use developmentally appropriate language to discuss event and its meaning to child. Have parents ask child what they already know, solicit questions, and answer honestly, focusing on basics and avoiding speculation (Moreno, 2017).</p>	Younger children usually have less understanding of abstract concepts and benefit from direct and simple language. Approaching adolescents "adult-to-adult" reinforces that you respect their feelings and concerns (Brymer et al, 2006).
Explore with client and SO the manner in which the client has coped with anxiety-producing events before the trauma.	May help client regain sense of control and recognize significance of trauma.
Engage client in learning new coping behaviors, such as progressive muscle relaxation and thought stopping.	Replacing maladaptive behaviors can enhance ability to manage and deal with stress. Interrupting obsessive thinking allows client to use energy to address underlying anxiety, while continued rumination about the incident can actually retard recovery. <b>P</b> One influence on child's well-being after disaster is how well parents hold themselves together. Note: Phenomenon of intergenerational transmission of trauma has been documented (Patterson, 2006).
Demonstrate and encourage use of techniques to reduce or manage stress and vent emotions such as anger and hostility.	Reduces likelihood of eruptions that can result in abusive behavior.
Give positive feedback when client demonstrates better ways to manage anxiety and is able to calmly and/or realistically appraise own situation.	Provides acknowledgment and reinforcement, encouraging use of new coping strategies. Enhances ability to deal with fearful feelings and gain control over situation, promoting future successes.
Engage client in simple tasks and advance responsibilities as appropriate.	Encourages individual to focus attention other than on self, enhancing sense of control and self-worth.
<b>Collaborative</b> Administer medications, as indicated, for example: Antianxiety agents, such as diazepam (Valium), buspirone (BuSpar), alprazolam (Xanax), and oxazepam (Serax)	Provides temporary relief of anxiety symptoms, enhancing client's ability to cope with situation. Also useful for alleviating feelings of panic and intrusive nightmares.
Antidepressants, such as fluoxetine (Prozac), paroxetine (Paxil), and bupropion (Wellbutrin)	Used to decrease anxiety, lift mood, aid in management of behavior, and ensure rest until client regains control of own self. Helpful in suppressing intrusive thoughts and explosive anger.
Refer for additional therapies, such as hypnosis, EMDR, or thought reprocessing therapy, as appropriate.	When used by trained therapist, these short-term therapies are particularly effective with individuals who have been traumatized or who have problems with anxiety and depression. Systematic desensitization, reframing, and reinterpretation of memories may be achieved through hypnosis.
Coordinate release or discharge to family, friend, or emergency services, as indicated.	Triaging and maximum use of resources may limit time allotted for care, and client may not be ready to meet own needs or assume full responsibility for self.
Educate survivors and public about risks and steps being taken to deal with problem. Include other members of healthcare team, stressing risks to themselves. Refer to such resources as the CDC or specific websites.	Nurses have a role in community education because they are close to the individuals affected. Providing accurate information and credible resources helps limit level of concern and transmission of anxiety. Current, timely information regarding biological concerns and healthcare needs can be accessed through such websites as www.cdc.gov, www.hhs.gov, and www.fbi.gov.

**NURSING DIAGNOSIS:** risk for Spiritual Distress**Possibly Evidenced By**

Exposure to natural disaster; environmental/life change  
Anxiety; stressors; depression  
Separation from support system; loss

**Desired Outcomes/Evaluation Criteria—Client Will****Spiritual Health NOC**

Verbalize increased sense of self-concept and hope for future.  
Discuss beliefs and values about spiritual issues.  
Verbalize acceptance of self as being worthy.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Spiritual Support NIC</b>	
<i>Independent</i>	
Determine client's religious or spiritual orientation, current involvement, and presence of conflicts.	Provides baseline for planning care and accessing appropriate resources.
Establish environment that promotes free expression of feelings and concerns. Provide calm, peaceful setting when possible.	Promotes awareness and identification of feelings so they can be dealt with.
Listen to client's and SO's reports or expressions of anger, concern, alienation from God, and/or belief that situation is a punishment for wrongdoing.	Helpful to understand client's and SO's point of view and how they are questioning their faith in the face of tragedy.
Note sense of futility, feelings of hopelessness and helplessness, and lack of motivation to help self.	These thoughts and feelings can result in the client feeling paralyzed and unable to move forward to resolve the situation.
Listen to expressions of inability to find meaning in life or reason for living. Evaluate for suicidal ideation.	May indicate need for further intervention to prevent suicide attempt.
Determine support systems available to client and SO(s).	Presence or lack of support systems can affect client's recovery.
Ask how you can be most helpful. Convey acceptance of client's spiritual beliefs and concerns.	Promotes trust and comfort, encouraging client to be open about sensitive matters.
Make time for nonjudgmental discussion of philosophical issues or questions about spiritual impact of events and current situation.	Helps client to begin to look at basis for spiritual confusion. Note: There is a potential for care provider's belief system to interfere with client finding own way. Therefore, it is most beneficial to remain neutral and not espouse own beliefs.
Discuss difference between grief and guilt and help client to identify and deal with each, assuming responsibility for own actions and expressing awareness of the consequences of acting out of false guilt.	Blaming self for what has happened impedes dealing with the grief process and needs to be discussed and dealt with.
Use therapeutic communication skills of reflection and active-listening.	Helps client find own solutions to concerns.
Discuss use of, and provide opportunities for, client and SO to experience meditation, prayer, and forgiveness. Provide information that anger with God is a normal part of the grieving process.	Can help to heal past and present pain.
Assist client to develop goals for dealing with life situation.	Enhances commitment to goal, optimizing outcomes and promoting sense of hope.
<i>Collaborative</i>	
Identify and refer to resources that can be helpful, such as pastoral or parish nurse, religious counselor, crisis counselor, psychotherapy, and Alcoholics or Narcotics Anonymous.	Specific assistance to resolve life stressors such as relationship problems, substance use, or suicidal ideation is important to advance recovery process.
Encourage participation in support groups.	Discussing concerns and questions with others can help client resolve feelings.

## NURSING DIAGNOSIS: risk for Post-Trauma Syndrome

### Possibly Evidenced By

Event outside the range of usual human experience; perceives event as traumatic  
Exposure to disaster, epidemic, event involving multiple deaths  
Serious threat or injury to self or loved ones  
Displacement from/destruction of one's home  
Exaggerated sense of responsibility; survivor role

### Desired Outcomes/Evaluation Criteria—Client/Caregivers Will

#### Personal Resiliency NOC

Express own feelings and reactions openly, avoiding projection.  
Demonstrate ability to deal with emotional reactions in an individually appropriate manner.

#### Anxiety Level NOC

Report absence of physical manifestations such as pain, nightmares, flashbacks, or fatigue associated with the event.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Crisis Intervention NIC</b> <i>Independent</i> Determine involvement in event—survivor, SO, and family, rescue or aid worker, healthcare provider, or family member of responder.	All those concerned with a traumatic event are at risk for emotional trauma and have needs related to their situation and involvement in the event. Note: Close involvement with victims or survivors affects individual responses and may prolong emotional suffering.
Evaluate life factors and stressors currently or recently occurring, such as displacement from home due to catastrophic event—illness, injury, natural disaster, or terrorist attack. Identify how client's past experiences may affect current situation.	Affects client's reaction to current event and is basis for planning care and identifying appropriate supports and resources.
Listen for comments of taking on responsibility such as "I should have been more careful . . . or gone back to get her."	Indicators of "survivor's guilt" and blaming self for actions that can delay recovery and impair general well-being.
Identify client's current coping mechanisms.	Noting positive or negative skills provides direction for care.
Determine availability and usefulness of client's support systems—family, social, and community.	Family and others close to the client may also be at risk and require assistance to cope with the trauma.
Provide information about signs and symptoms of post-trauma response, especially if individual is involved in a high-risk occupation.	Awareness of these factors helps individual identify need for assistance when they occur.
Identify and discuss client's strengths as well as vulnerabilities.	Provides information to build on for coping with traumatic experience.
Evaluate individual's perceptions of events and personal significance, for example, a rescue worker trained to provide lifesaving assistance but recovering only dead bodies.	Events that trigger feelings of despair and hopelessness may be more difficult to deal with and require long-term interventions.
Provide emotional and physical presence by sitting with client and SO and offering solace.	Strengthens coping abilities.
Encourage expression of feelings. Note whether feelings expressed appear congruent with events experienced.	Initially client may feel need to talk about the incident repeatedly. Incongruencies may indicate deeper conflict and can impede resolution.
Note presence of nightmares, reliving the incident, loss of appetite, irritability, numbness and crying, and family or relationship disruption.	These responses are normal in the early postincident time frame. If prolonged and persistent, they may indicate need for more intensive therapy.
Provide a calm, safe environment.	Helps client deal with the disruption in personal life.
Encourage and assist client in learning stress management techniques.	Promotes relaxation and helps individual exercise control over self and what has happened.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Monitor coworkers and volunteers for secondary traumatic stress and compassion fatigue. Model positive coping skills, optimism, appropriate humor.	Recognition of stress response in care providers/volunteers allows for timely promotion of techniques to support resilience and the ability to positively respond to adversity, facilitating one's healthy adjustment after trauma (Charney, 2004; Turner, 2014).
<b>Collaborative</b>	
Recommend participation in debriefing sessions that may be provided following major disaster events.	Dealing with the stresses promptly may facilitate recovery from event and prevent exacerbation.
Identify employment and community resource groups to support individual resilience	Provides opportunity for ongoing support to deal with recurrent feelings related to the trauma.
Administer medications, as indicated, such as the following: Antipsychotics, for example, phenothiazines such as chlorpromazine (Thorazine) and haloperidol (Haldol)  Carbamazepine (Tegretol)	Low doses may be used for reduction of psychotic symptoms when loss of contact with reality occurs, usually for clients with especially disturbing flashbacks.  Used to alleviate intrusive recollections and flashbacks, impulsivity, and violent behavior.

## NURSING DIAGNOSIS: **ineffective community Coping**

### May Be Related To

Exposure to disaster (e.g., earthquakes, floods, wild fires, reemerging infectious agents, terrorist activity)  
Insufficient community resources (e.g., housing, healthcare, clean water, transportation)  
Inadequate resources for problem-solving (e.g., disaster planning systems)

### Possibly Evidenced By

Deficient community participation; community does not meet expectations of its members  
Perceived community vulnerability/powerlessness; excessive community conflict  
Excessive stress  
Elevated community illness rate

### Desired Outcomes/Evaluation Criteria—Community Will

#### Community Competence NOC

Recognize negative and positive factors affecting community's ability to meet its own demands or needs.  
Identify alternatives to inappropriate activities for adaptation and problem-solving.  
Report a measurable increase in necessary or desired activities to improve community functioning.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Community Disaster Preparedness NIC</b>	
<b>Independent</b>	
Evaluate community activities as related to meeting collective needs within the community itself and between the community and the larger society. Note immediate needs, including healthcare, food, shelter, and funds.	Provides a baseline to determine community needs in relation to current concerns or threats.
Note community reports of functioning, including areas of weakness or conflict.	Provides a view of how the community itself sees these areas.
Identify effects of related factors on community activities.	In the face of a current threat, local or national, community resources need to be evaluated, updated, and given priority to meet the identified need.
Determine availability and use of resources. Identify unmet demands or needs of the community.	Information necessary to identify what else is needed to meet the current situation.
Determine community strengths.	Promotes understanding of the ways in which the community is already meeting the identified needs.
Encourage community members and groups to engage in problem-solving activities.	Promotes a sense of working together to meet the needs.
Participate in developing a plan jointly with the members of the community to address immediate needs.	Deals with deficits in support of identified goals.

(continues on page 992)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Create plans managing interactions within the community itself and between the community and the larger society.	Meets collective needs when the concerns or threats are shared beyond a local community.
Make information accessible to the public. Provide channels for dissemination of information to the community as a whole, including print media, radio and television, community bulletin boards, social media, Internet resources, speakers bureau, reports to committees, councils, or advisory boards.	Readily available accurate information can help citizens make informed decisions to deal with the situation.
Make information available in different modalities and geared to differing educational levels and cultures within the community.	Using languages other than English and making written materials accessible to all members of the community will promote understanding.
Seek out and evaluate needs of underserved populations.	The homeless and those residing in lower-income areas may have special needs requiring additional resources.

### NURSING DIAGNOSIS: **readiness for enhanced community Coping**

#### Possibly Evidenced By

Expresses desire to enhance problem-solving for identified issues  
 Expresses desire to enhance communication among community members and between groups and larger community  
 Expresses desire to enhance community planning for predictable stressors

#### Desired Outcomes/Evaluation Criteria—Community Will

##### Community Competence NOC

Identify positive and negative factors affecting management of current and future problems or stressors.  
 Have an established plan in place to deal with various contingencies.  
 Report a measurable increase in ability to deal with potential events.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Program Development NIC</b>	
<i>Independent</i>	
Review community plans to monitor for and deal with untoward events.	Provides a baseline for comparison of preparedness with other communities and developing plan to address concerns.
Assess effects of related factors on management of problems or stressors.	Identifies areas that need to be addressed to enhance community coping.
Determine community strengths and weaknesses. Identify limitations in current pattern of community activities that can be improved through adaptation and problem-solving.	Plan can be built on strengths, and areas of weakness can be addressed.
Evaluate community activities as related to management of problems or stressors within the community itself and between the community and the larger society.	Disasters occurring in the community or the country affect the local community and need to be recognized and addressed.
Define and discuss current needs and anticipated or projected concerns.	Agreement on scope and parameters of needs is essential for effective planning.
Identify and prioritize community goals.	Helps to bring the community together to meet a common concern or threat. Helps maintain focus and facilitates accomplishment.
Promote community awareness about the problems of design of buildings, equipment, transportation systems, and workplace practices that may compound disaster or impact disaster response.	Provides opportunity for making changes that promote safety.
Identify available resources—persons, groups, financial, governmental, as well as other communities.	Important to work together to meet goals. Major catastrophes affect more than local community, and communities need to work together to deal with and accomplish recovery.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Seek out and involve underserved and at-risk groups within the community.	Supports communication and commitment of community as a whole.
Assist the community to form partnerships within the community and between the community and the larger society.	Promotes long-term developmental growth of the community.
Establish mechanism for self-monitoring of community needs and evaluation of efforts.	Facilitates proactive rather than reactive responses by the community.
Participate in exercises and activities to test preparedness.	Provides opportunities to verify appropriateness of plans and problem-solve deficiencies.
Use multiple formats—TV, radio, print media, billboards, computer bulletin boards, social media, speakers bureau, and reports to community leaders and groups on file that are accessible to the public.	Keeps the community informed and involved regarding plans, needs, and outcomes of tests of the plans.

## PEDIATRIC CONSIDERATIONS

### I. Challenges

- a. Undergoing medical treatment can be emotionally and psychologically difficult for the child (infant through adolescent) and his or her family.
- b. Children are not “small adults” and require child-friendly care with adaptation of interventions dependent on maturation of body systems and organ function and the child’s age and developmental level (London, 2007).
  - i. Growth—generally follows a predictable pattern influenced by gender, heredity, environmental factors (such as nutrition), and cultural practices
  - ii. Development—each child’s maturational pattern is unique; however, the sequence for acquisition of skills is uniform in children, essentially proceeding from the head down and from the center of the body out to the extremities.
- c. Special approaches are required to meet the physical, emotional, social, spiritual, and cultural needs of the hospitalized child and his or her family.
  - i. Child-sized equipment
  - ii. Diversional activities—age-appropriate play rooms, games, arts, recreation
  - iii. Learning opportunities—age-appropriate print and visual teaching tools, tutoring during prolonged hospitalization
  - iv. Family-centered care—inclusion of all members, as appropriate, with consideration of sociocultural and spiritual factors

### II. Developmental Factors Relating to Hospitalization (The Children’s Hospital of Philadelphia, n.d.; Morgan Stanley Children’s Hospital of New York Presbyterian, 2008)

- a. Infant—birth to 12 months
  - i. Just learning to make sense of the world; child can become very unsettled when cared for by multiple or different providers.
  - ii. Cannot understand how various procedures and treatments that he or she perceives to “hurt” can actually produce recovery or make them well.
  - iii. From about age 6 months and older, child can become very afraid if parents leave him or her.

- b. Toddler—12 to 36 months
  - i. Issues of separation, rather than being ill, can be the major stress for child if required to stay in hospital without parent or familiar caregiver.
  - ii. Has no concept or understanding of what is happening when they are ill
  - iii. Does not understand time and space so all this can be very frightening for them
- c. Preschool—3 to 5 years
  - i. Fear of the unknown and being left alone are major concerns.
  - ii. Have limited ability to distinguish fantasy from reality
  - iii. Tend to misunderstand words they hear, leading to misconceptions
  - iv. May view hospitalization as a punishment—fearing needles, body mutilation, or loss of function
- d. School-age child—6 to 11 years
  - i. Almost all school-age children will have seen and heard about illness and hospitals on TV.
  - ii. May have seen people “die” in hospital and know about cancer and other illnesses that can cause children to die
  - iii. Need to know what will happen to them and that they will not die from this illness—may be too frightened to ask about this themselves
  - iv. Often misunderstand what they overhear; require opportunities to ask questions
- e. Adolescent—12 to 18 years
  - i. Understands what causes illness and how it affects the body
  - ii. Fears separation from peers and group activities
  - iii. Hospitalization represents a loss of control over almost all areas of life, even the most basic aspects—when the teen eats, sleeps, or uses the bathroom, coupled with a loss of privacy at a time when self-consciousness is peaking.
  - iv. May express anger or indifference to mask feelings of fear
  - v. May feel bothered by frequent examinations by different professionals

(continues on page 994)

- vi. Hospitalization represents a challenge to all teens, especially teens from ethnic, religious, or cultural minority groups.

### III. Statistics

- a. Nearly 5.9 million children in the United States aged 0 to 17 were hospitalized in 2012, of which 3.9 million were neonatal stays and 104,700 were maternal stays for teens. (Healthcare Cost and Utilization Project [HCUP], 2014). In 2014, the top 5 admission diagnoses were mood disorders, asthma, pneumonia, acute bronchitis, and epilepsy/convulsions (McDermott et al, 2017).

For additional information concerning pediatric concerns, see Pediatric Pearls (PP) in the following care plans: Appendectomy; Brain Infections: Meningitis and Encephalitis; Burns; Chronic Obstructive Pulmonary Disease (COPD) and Asthma; Diabetes Mellitus and Diabetic Ketoacidosis; Disaster Considerations; Eating Disorders: Anorexia Nervosa/Bulimia Nervosa; Obesity; Fractures; Inflammatory Bowel (IBD); Ulcerative Colitis, Crohn's Disease; Pneumonia; Seizure Disorders; Substance Use Disorders; and Sickle Cell Crisis.

## G L O S S A R Y

**Development:** The qualitative increase in a child's capabilities or function, attainment or mastery of skills.

**Growth:** Increase in physical size and internal development as measured by multiple factors, such as height, weight, blood pressure, and sexual maturation, as well as the number of words in vocabulary.

**Major Theories of Development (London, 2007):**

**Behaviorism:** The research of animal behaviorists was applied to children and demonstrated that behaviors can be elicited by positive reinforcement or extinguished by negative reinforcement. Application of theory to hospitalization—repetition of desired behaviors can be encouraged by providing positive reinforcement for child's efforts.

**Ecologic theory:** Although controversy exists about heredity (nature) versus environment (nurture) and which one has more influence in human development, this theory recognizes the effect of both through mutual interactions between the child and the various levels of the environment (from close to remote) in all of life's settings. Application of theory to hospitalization—use of tool based on this theory to assess child's interface with varied levels of the environment identifies areas of strength that can help with addressing individual challenges or areas that are nonsupportive.

**Erikson's theory of psychosexual development:** Describes psychosocial stages during eight periods of human life with a particular challenge that is needed for healthy development to occur. Application of theory to hospitalization—interrupts usual support provided by family and peers and adds a situational crisis to the normal developmental crisis experienced by the child.

**Freud's theory of psychosexual development:** Early childhood experiences form the unconscious motivation for actions in later life. Application of theory to hospitalization—defensive mechanisms, such as regression and repression, may be used by the child to cope with excess anxiety, and the crisis of illness can interfere with normal developmental processes.

**Kohlberg's theory of moral development:** Using Piaget's cognitive theory as a basis for moral development, three levels of moral reasoning—preconventional, conventional, and postconventional—were identified with associated age ranges. Application of theory to hospitalization—based

on stage of development, decisions made by the child may reflect a desire to avoid punishment, to please others, or to present a sense of social responsibility. This provides some direction to care providers as they present information to the child to assist them in the decision-making process.

**Piaget's theory of cognitive development:** The child's view of the world is influenced largely by age and maturational ability and matures naturally. Application of theory to hospitalization—level of cognitive development and thought processes affects choice of approaches when providing appropriate stimulation and creating teaching plans for the child.

**Resiliency theory:** A child's characteristics and how these traits interact with the environment determine his or her resiliency or ability to use healthy responses even in adverse situations. In the face of a crisis, the child and the family have protective characteristics that provide strength and risk factors or characteristics that magnify challenges. Application of theory to hospitalization—providing positive reinforcement for protective characteristics—encourages continuation of desired behaviors that can be used to support the period of adjustment and facilitate adaptation to change. Identification of risk factors provides an opportunity to target interventions and teaching activities to assist family and child to deal more effectively with the challenge and increase their resiliency.

**Social learning theory:** Children learn attitudes, beliefs, customs, and values through their social contacts with adults and other children, and they model the behavior they see. Application of theory to hospitalization—the provision of positive role model, such as a peer experiencing a similar situation, facilitates learning and child's cooperation with interventions.

**Temperament theory:** The child both influences, and is influenced by, the environment and has innate qualities of personality or certain patterns of temperament that he or she brings to daily life. Application of theory to hospitalization—understanding the child's temperament—provides opportunities to alter or manipulate the environment to meet the child's needs and maximize the experience.

**CARE SETTING**

Any setting in which nursing contact with children occurs and care is provided.

**CLIENT ASSESSMENT DATABASE**

Data depend on the specific pathology necessitating therapeutic interventions.

\*\*\*\*Assessment Factors—in addition to routine assessment of current condition or comorbidities

SUBJECTIVE	OBJECTIVE
<b>INDIVIDUAL</b> <ul style="list-style-type: none"> <li>Perception of body and its functions in health, illness, and in this situation</li> <li>Emotional reactions in feeling or sensory terms; for example, client states, “I feel scared.”</li> <li>Food and eating concerns</li> <li>Sleep patterns</li> <li>Lifestyle concerns requiring consideration—dietary preferences and problems; sexual identity and activity; beliefs and practices surrounding alcohol, tobacco, and other drugs; other community (e.g., school, religious environment, home of record [e.g., nuclear family, foster care, homeless])</li> </ul>	<ul style="list-style-type: none"> <li>Age, developmental level, gender identity</li> <li>Personality, temperament</li> <li>Patterns of communication with significant others (SOs)</li> <li>Behavior when anxious, afraid, impatient, withdrawn, or angry</li> <li>Emotional response to current treatment or hospitalization</li> <li>How child experiences illness versus reality of situation</li> </ul>
<b>SIGNIFICANT OTHERS</b> <ul style="list-style-type: none"> <li>Nuclear family, extended family; peer group, friends</li> <li>Family developmental cycle</li> <li>Child's role in family tasks and functions</li> <li>How are SOs affected by the illness and prognosis?</li> </ul>	<ul style="list-style-type: none"> <li>Interaction processes within the family</li> </ul>
<b>SOCIOECONOMIC</b>	<ul style="list-style-type: none"> <li>Social class, value system</li> <li>Social acceptability of current situation</li> </ul>
<b>CULTURAL</b> <ul style="list-style-type: none"> <li>Ethnic background, heritage, and residence</li> <li>Family beliefs regarding caring and curing</li> <li>Family health-seeking behaviors, illness referral system</li> <li>Family values related to health and treatment</li> <li>Cultural factors related to illness in general and to pain response</li> </ul>	
<b>DISEASE/CONDITION</b> <ul style="list-style-type: none"> <li>Past experience with illness, hospitalization, healthcare systems and providers</li> <li>Family and child expectations if illness is terminal</li> </ul>	<ul style="list-style-type: none"> <li>Response of child and family to situation or condition requiring treatment</li> <li>Nature of condition—acute, chronic, recurrent</li> <li>Emotional response to current treatments</li> <li>Availability and use of resources</li> </ul>

**NURSING PRIORITIES**

- Enhance level of comfort and minimize pain.
- Reduce anxiety and fear.
- Provide growth-promoting environment for child and parent(s).
- Prevent or minimize complications.

**DISCHARGE GOALS**

- Pain relieved or controlled.
- Child and family dealing appropriately with current situation.
- Safe environment maintained.
- Plan in place to meet needs after discharge.

## NURSING DIAGNOSIS: acute/chronic Pain

### May Be Related To

Injuring agents—biological, chemical, physical

### Possibly Evidenced By

Self-report of pain intensity/characteristics using standardized scale/instrument; evidence of pain using standardized pain behavior checklist for those unable to communicate verbally  
Expressive behavior (e.g., restlessness, moaning, crying, irritability)  
Appetite change, anorexia; alteration in sleep pattern  
Positioning to ease pain  
Change in physiological parameter (acute pain)

### Desired Outcomes/Evaluation Criteria—Child Will

#### Pain Level NOC

Report or indicate pain is relieved or controlled.  
Manifest decreased restlessness and irritability.  
Demonstrate age-appropriate blood pressure (BP), pulse, and respiratory rates.

#### Pain Disruptive Effects NOC

Participate in usual activities within level of ability.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management: Acute/Chronic NIC</b> <i>Independent</i>	
Perform routine comprehensive pain assessment, including location, characteristics, onset, duration, frequency, quality, and severity using some type of rating scale, such as numbers or visual analog, facial expressions, or color scale.	Assessment of children involves observational skills and may require enlisting the aid of parent or caregiver to clarify cues and verbalizations. Choice of rating scale is dependent on age and developmental level (Suresh, 2009).
Accept child's description of pain, noting precipitating, exacerbating, and relieving factors.	Pain is subjective and cannot be experienced by others. Note: In presence of chronic pain situation, use of a pain diary may be appropriate for adolescents (Suresh, 2009).
Investigate changes in frequency or description of pain.	May signal worsening of condition or development of complications.
Observe for guarding, rigidity, crying, and restlessness.	Nonverbal expressions, body movement, and behavioral state may signal pain or changes in pain severity, especially in infants and younger children (Suresh, 2009).
Monitor heart rate, BP using correctly sized cuff, and respiratory rate, noting age-appropriate normals and variations.	Changes in autonomic responses may indicate increased pain before child verbalizes. Note: Autonomic responses change with acute pain, not chronic pain. BP may be lower than normal or higher than normal.
Note location and type of surgical incisions or trauma.	Influences degree and severity of pain manifestations.
Provide comfort measures, such as holding, repositioning, back rub, and use of breathing or guided visualization relaxation techniques, as indicated.	Nonpharmacological pain management promotes relaxation; may reduce level of pain and enhance coping.
Identify ways to avoid or minimize pain, such as splinting surgical incisions during coughing, sleeping on a firm mattress, or wearing brace on sprains.	Many factors may reduce pain intensity based on specific situation. Child can quickly learn and use such pain management techniques, enhancing sense of control as well as comfort.
Encourage sleep and rest periods.	Helps reduce fatigue and enhances coping ability.
Encourage diversional activities such as TV, music, reading, playing computer/video or table games, and texting friends.	Helps distract child's attention from pain and reduces tension.
Review procedures and expectations and tell child when it will hurt. Provide distraction during painful procedures, such as deep breathing or counting, or looking at something that interests child.	Although the procedure may still be stressful, child will find it easier to handle if he or she knows what to expect and has developed coping strategies.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Encourage expression of feelings about pain.	Can relieve anxiety and help reduce intensity of pain.
Suggest parent and caregiver be with child during procedures, as possible.	Provides comforting presence.
<b>Collaborative</b>	
Collaborate in treatment of underlying conditions or disease process.	Treating cause, when possible, can eliminate pain.
Administer medications, such as opioid and nonsteroidal analgesics, as indicated. Use multiple routes to deliver analgesia, such as oral, nebulized, transdermal, or patient-controlled analgesia (PCA), as indicated by current situation.	Depending on the cause and type of pain, as well as its chronicity, various means of pain management may be needed to overcome or control pain.

NURSING DIAGNOSIS: Anxiety/Fear
<b>May Be Related To</b>
Stressors; interpersonal transmission or contagion Threat to current status/death; unmet needs Separation from support system; unfamiliar setting
<b>Possibly Evidenced By</b>
Apprehensiveness; distress; feeling of fear Restlessness; increase in tension; poor eye contact Worried about change in life event; decrease in self-assurance Alteration in sleep pattern; fatigue; nausea, anorexia Changes in vital signs
<b>Desired Outcomes/Evaluation Criteria—Child Will</b>
<b>Anxiety Level [or] Fear Level: Child NOC</b>
Appear relaxed and report or demonstrate relief from somatic manifestations of anxiety. Demonstrate a decrease in somatic complaints and physical symptoms when faced with stressful situations such as impending separation from SO.
<b>Anxiety Self-Control NOC</b>
Engage in age-appropriate activities in absence of parent or primary caregiver without fear or distress noted.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Anxiety Reduction NIC</b>	
<b>Independent</b>	
Establish an atmosphere of calmness, trust, and genuine positive regard.	Trust and unconditional acceptance are necessary for satisfactory therapeutic relationship. Calmness is important because anxiety is easily transmitted from one person to another, and children are often adept at sensing changes in the moods of adults around them.
Prepare child for activities and procedures. Provide explanations in language appropriate for age. Use terms familiar to child, such as for care activities—"walk" instead of "ambulate"—or procedures—"take a picture" instead of "fluoroscope." Provide opportunity for client to ask questions, observe or touch equipment as appropriate.	Accurate and age-appropriate communication promotes trust and creates an atmosphere where child feels free to ask questions. Based on child's developmental level, tour of facility or surgical suite and observation of "machinery" in action may help reduce concerns regarding the unknown. Note: Children may become frightened of things they cannot articulate.
Ensure child of his or her safety and security—listen to child, identify needs, and be available for support.	Strange people and surroundings, changes in routine, and loss of control in situation create anxiety and can be very frightening. Children may believe that situation is punishment for some wrongdoing—imagined or real—on their part. Providing information and being available can be reassuring.

(continues on page 998)

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Be honest with child and parents/caregiver by saying, "Yes, this will hurt and I will help you manage it."	Promotes trust and belief that child will not be left alone to deal with situation.
Refrain from conversations unrelated to child in his or her presence or failing to include child in conversations regarding him or her.	Ignoring the child or talking about, instead of to, the child or allowing child to overhear partial or unrelated conversations may be very stressful and result in child imagining things that are incorrect.
Maintain home routines whenever possible. Encourage child and parents to bring transitional object from home, such as familiar toys, handheld computer games or digital music player, special pillow or blanket, some favorite pictures, or posters, if hospitalized.	Use of age-appropriate object enhances sense of security when child or adolescent is hospitalized or in treatment setting.
Provide consistency of care providers.	Becoming acquainted with care provider enhances sense of security, facilitates communication, and lessens anxiety.
Promote child and family contact and interaction. Encourage parents, and child as appropriate, to participate in care planning and care provision.	Family involvement in activities promotes continuity of family unit, provides opportunity to learn and practice new skills, and enhances coping skills.
Emphasize importance of staff and family giving verbal prompts in anticipation of absences. Provide honest information about leaving and returning.	Avoidance of these issues increases the likelihood of anxiety responses when separation occurs.
Help family support child emotionally by being available and active-listening.	Conveys acceptance of child and confidence in ability to cope with situation.
Encourage contact with peers via phone, texting, social network sites, online chats, or visits, as appropriate.	Helps child stay connected with friends and life outside hospital.
Provide child with age-appropriate choices, when possible.	Promotes sense of control, demonstrates regard for individual.
Schedule ample time for play and age-appropriate diversions. Use play materials, such as puppets, doll house, doctor/nurse kits, fairytale stories, clay, coloring book, and so on.	Promotes normalcy and helps divert attention from situation. Play therapy enables child to explore conflicts, express fears, and release tension.
Engage in exercise program as appropriate to situation.	Provides physical outlet for energy, releasing tension. May stimulate release of endorphins, decreasing anxiety and enhancing child's ability to deal with illness and situation.

#### **Collaborative**

Administer medications, as indicated.

Mild sedation can be effective in ameliorating symptoms of anxiety and enhancing child's receptiveness to therapeutic regimen.

## NURSING DIAGNOSIS: **Activity Intolerance**

#### **May Be Related To**

Immobility; physical deconditioning  
Imbalance between oxygen supply/demand

#### **Possibly Evidenced By**

Fatigue, generalized weakness; exertional discomfort or dyspnea  
Abnormal heart rate or BP response to activity

#### **Desired Outcomes/Evaluation Criteria—Child Will**

#### **Endurance NOC**

Participate in customary activities at desired level.  
Report or display absence of fatigue.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Activity Therapy [NIC]</b>	
<i>Independent</i>	
Note presence of acute or chronic illness (e.g., heart failure, pulmonary disorders, anemias, cancers).	Conditions associated with increased risk of impaired tolerance for activity related to oxygen supply and demand, resulting in weakness and fatigue.
Ascertain child's usual level of activity, taking into account age and developmental level.	Establishes baseline in order to determine needed interventions and to assess progress of recovery.
Determine usual sleep and rest routine and any bedtime rituals or security objects. Plan care with adequate rest periods.	Attempting to maintain usual sleep routines promotes rest and maximizes energy and endurance.
Adjust activities, reducing intensity level or discontinuing activities, as needed. Assist with activities of daily living (ADLs) and promote exercise, as indicated.	Protects child from injury and enhances ability to participate in activity to improve strength.
Promote participation in individually appropriate recreational and diversional activities.	Enhances sense of well-being and expectation of return to usual activities.
Promote optimal mobility, providing safe transport such as wagon, child-size wheelchair, or walker.	Provides normalcy to child, who is not accustomed to inactivity, and will help reduce complications associated with immobility.
Monitor response to activity, including BP, pulse, respiratory rate, skin color, and behavior.	Helps identify and monitor degree of fatigue and potential for complications.
<i>Collaborative</i>	
Collaborate in treatment of underlying condition.	Treating or curing underlying condition can restore child's energy and ability to carry on desired activities.
Provide and monitor response to oxygen administration via appropriate route and effects of medication.	Oxygen may be needed to improve tolerance to activity and treat underlying cause for fatigue. High-flow oxygen via nonrebreather mask is ideal if child can tolerate it. Blow-by oxygen can provide some benefit if child refuses to wear mask.
Refer to physical and occupational therapists.	Helpful to develop activity and exercise programs to meet individual and family needs.

### NURSING DIAGNOSIS: **risk for delayed Development [Growth]**

#### Possibly Evidenced By

Chronic illness; otitis media; substance misuse  
Economically disadvantaged; inadequate nutrition; maladaptive feeding behaviors  
Congenital disorder; prematurity  
Insufficient prenatal care  
Behavior disorder; brain injury; lead poisoning; seizure disorder; presence of abuse

#### Desired Outcomes/Evaluation Criteria—Child Will

##### **Child Development: [specify age group] NOC**

Perform motor, social, and/or expressive skills typical of age group within scope of present capabilities.  
Demonstrate weight and growth stabilization or progress toward age-appropriate size.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Development Enhancement: Child [or] Adolescent [NIC]</b>	
<i>Independent</i>	
Determine existing factors or condition(s) that could contribute to growth or development deviation, such as chronic illness, substance use or abuse, familial history of pituitary tumors, Marfan's syndrome, and genetic anomalies.	Plan of care will be based on individual factors present, immediacy of threat, and potential long-term complications. Note: Use of tobacco, alcohol, or other drugs are major healthcare concerns for children.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Determine child's birth weight and length and compare present growth with norms.	Identifies the child's status compared with other children of the same age.
Note chronological age and familial factors, such as body build and stature, stage of sexual maturity. Review expectations for current height and weight percentiles and degree of deviation.	Aids in determining growth expectations.
Measure developmental level using age-appropriate tests, such as the Denver Developmental Screening Test. Note reported losses or alterations in functional level.	Provides comparative baseline and basis for choosing developmentally appropriate interventions.
Determine child's cognitive and perceptual level, such as grade level in school. Note behavioral reaction to environment and stimuli, such as withdrawal or aggression.	Illness or injury can lead to a temporary increase in level of dependency and a decline in functional level. Although this may not be of major concern for the short term, chronic and recurrent conditions may delay acquisition of important developmental milestones.
Note severity and pervasiveness of situation. For example, is the child showing effects of long-term physical or emotional abuse or neglect versus experiencing recent-onset situational disruption or inadequate resources during period of crisis or transition?	Problems existing over a long period may have more severe effects and require longer course of treatment to reverse.
Determine occurrence and frequency of significant stressful events in the child's life, including losses, separation, and environmental changes, such as abandonment, divorce, death of parent or sibling, and relocation.	Lack of resolution or repetition of stressor can have a cumulative effect over time and result in regression in, or deterioration of, functional level.
Discuss nature and effectiveness of parenting and caregiving activities, noting inadequate, inconsistent, unrealistic, or insufficient expectations as well as lack of stimulation, limit setting, or responsiveness.	Assessment of parenting and potential for conflict and negative interaction between parent or caregiver and child identifies interventions needed to maximize care.
Provide parents with information regarding normal growth and development, as appropriate, including pertinent reference materials.	Helps parents understand potential changes in relation to current illness or problem.
Identify realistic goals with child and parents. Discuss actions to take to avoid or minimize preventable complications.	Provides anticipatory guidance. Increases probability of reaching goals and managing situation more effectively. Can enhance sense of control and independence.
Encourage self-care activities, as appropriate, such as feeding, grooming, and playing. Provide privacy when desired and when privacy is safe for child.	Promotes independence and maintenance of self-esteem.
<b>Collaborative</b> Assist with therapy to treat or correct underlying conditions, such as Crohn's disease, cardiac problems, or renal disease; endocrine problems, such as hypothyroidism, type 1 diabetes mellitus, or growth hormone abnormalities; and genetic or intrauterine growth retardation, infant feeding problems, or nutritional deficits.	Illness, hospitalization, treatments, and separation from parents and family have a negative effect on physical and psychological growth and development.
	Multidisciplinary team involvement increases likelihood of a well-rounded plan of care that meets child's special and varied needs.
	Although acute situations may be readily resolved with limited support and few ill effects, chronic or recurrent conditions require many resources to maximize growth potential of child and family.
	Prevents child from falling behind in studies and provides sense of normalcy during prolonged illness or hospitalization.

**NURSING DIAGNOSIS:** risk for imbalanced Nutrition: less than body requirements**Possibly Evidenced By**

Insufficient dietary intake  
Inability to ingest or digest food or absorb nutrients because of biological, psychological, or economic factors

**Desired Outcomes/Evaluation Criteria—Child Will****Nutritional Status NOC**

Ingest nutritionally adequate diet for age, activity level, and metabolic demands.  
Demonstrate stable weight or progressive weight gain toward goal.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Nutrition Management NIC</b>	
<i>Independent</i>	
Identify child at risk for malnutrition, such as with intestinal surgery, hypermetabolic states, restricted intake, and/or prior nutritional deficiencies, food refusal.	Provides opportunity for timely intervention.
Determine ability to chew, swallow, and taste. Note presence of conditions affecting food intake, such as nausea and vomiting; food intolerances or allergies; lactose intolerance, cystic fibrosis, diabetes, inflammatory bowel diseases, or eating disorders (including anorexia and overeating).	These factors can affect specific dietary choices, desire to eat, and/or ingestion and digestion of nutrients.
Ascertain child's oral health, noting presence and condition of teeth, impairment of oral mucous membranes (e.g., painful lesions, enlarged tonsils), or problems with facial structures (e.g., facial/jaw trauma, cleft palate, presence of ET tube).	Various conditions of the mouth and facial structures can impair child's ability and desire to ingest food.
Determine child's current nutritional status using age-appropriate measurements, including weight and body build, strength, activity level, and sleep and rest cycles.	Identifies individual nutritional needs and provides comparative baseline.
Auscultate bowel sounds. Note characteristics of stool, including color, amount, and frequency of bowel movements.	Provides information about digestion and bowel function and may affect choice and timing of feeding.
Elicit information from child/parent regarding typical daily food intake, determining foods and beverages normally consumed. Note types of snacks. Discuss eating habits and food preferences—likes and dislikes.	Baseline information to determine adequacy of intake. Knowledge of child's specific likes and dislikes may be helpful in meeting child's nutritional needs during a time when appetite is suppressed or child has no interest in food.
Determine whether infant is breastfed or formula-fed and typical pattern of feedings during a 24-hour period. Note type and amounts of solid foods infant or toddler eats.	Providing usual and typical feedings is important to infant well-being and early growth.
Determine psychological factors and cultural or religious desires or influences on dietary choices.	Dietary beliefs, such as vegetarianism, can affect nutritional intake. Usual ethnic food choices can improve a child's intake when appetite is poor.
Review drug regimen, noting potential side effects and possible interactions with other medications, over-the-counter (OTC) drugs, and herbs.	Timing of medication doses and interaction with certain foods can alter effect of medication or digestion and absorption of nutrients.
Discuss with parent what types of snacks (e.g., candy, other sweets, fruits/vegetables, and beverages) child eats or drinks.	Identifies what child eats in a typical day and can provide opportunity for teaching about healthy snacks when that is needed/desired.
Emphasize importance of well-balanced meals. Provide information regarding individual nutritional needs and ways to meet these needs within financial constraints. Avoid arguing over food choices.	Although nutritious intake is important, arguing over food is counterproductive. Providing age-appropriate guidelines to children as well as to parents or care provider may help them in making healthy choices. Note: Childhood obesity with associated long-term physical and psychological effects is a potential concern regardless of current weight.

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ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Clarify caregiver access to and use of resources, such as Supplemental Nutrition Assistance Program (SNAP); budget counseling; Women, Infants, and Children (WIC) program; community food bank; and/or other appropriate assistance programs.	May be necessary to improve child's intake and/or availability of food to meet nutritional needs.
<b>Collaborative</b>	
Establish a nutritional plan (with monitoring, when needed) that meets individual needs incorporating or limiting specific foods.	Certain medical conditions (e.g., diabetes, cancer, gluten allergy, malabsorption syndrome, anorexia) require special dietary considerations to manage symptoms or bring about healing.
Consult dietitian or nutritional team, as indicated.	Helps determine individual nutritional needs and therapeutic diet.
Review laboratory studies, such as serum albumin or prealbumin, transferrin, amino acid profile, iron, blood urea nitrogen (BUN), nitrogen balance studies, glucose, liver function, electrolytes, and total lymphocyte count.	Indicators of nutritional health and effects of nutrients in organ function.
Refer for dental hygiene care, nutritional counseling, or psychiatric or family therapy, as indicated.	May be needed to provide assistance, support, and direction for meeting nutritional needs not only in the present but for achieving long-term goals as well.
Refer to home-care resources when indicated by specific condition or illness.	Assists with initiation and supervision of home nutrition therapy when used.

### NURSING DIAGNOSIS: risk for Injury, physical Trauma, Suffocation, Poisoning

#### Risk Factors May Include

Extremes of age; alteration in cognitive functioning; emotional disturbance  
Disease or injury process; struggling with restraints or safety devices; absence of call-for-aid device  
Popped bottle in infant's crib; pacifier around infant's neck  
Insufficient knowledge of safety/poisoning precautions  
Immune or autoimmune dysfunction; malnutrition; exposure to pathogens

#### Possibly Evidenced By

(Not applicable, presence of signs and symptoms establishes an actual diagnosis)

#### Desired Outcomes/Evaluation Criteria—Child Will

#### Risk Control NOC

Be free of injury.

#### Caregiver/Parent—Will

Verbalize understanding of individual risk factors that contribute to possibility of injury.  
Take steps to correct identified risks and protect child from hazards.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Risk Surveillance NIC</b>	
<b>Independent</b>	
Note client's and SO's age, developmental stage, level of cognition, decision-making ability.	These factors are critical in assessing safety needs and evaluating client's or caregiver's ability to meet client's needs as discharge planning begins.
Identify individual risk factors in child's healthcare setting, including (1) physical needs (e.g., airway patency, therapeutic use of potentially toxic medications, invasive lines or procedures, exposure to latex products), (2) medical conditions (e.g., impaired cognitive, developmental, psychological, or neurological status), (3) environmental factors (e.g., exposure to safety hazards in healthcare setting [e.g., immobility, use of restraints/braces/casts], home, or community [including violence and substance use]).	Provides opportunity to modify environment and eliminate factors that place child at risk.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Provide healthcare within a culture of safety (e.g., adherence to nursing standards of care and facility safe-care policies):	Prevents errors resulting in child injury, promotes safety, and models safety behaviors to client/SO.
Provide appropriate level of supervision.	Promotes child's well-being and allows for timely intervention, when needed.
Initiate safety precautions as individually appropriate, such as bed in low position, padded side rails, infection precautions, floors clear of hazards, supervised use of mobility aids.	Preventing injuries and complications is a prime responsibility of parents and care providers.
Have age-appropriate equipment available, including properly sized BP cuff, intravenous (IV) catheters, airway adjuncts, and oxygen mask or hood; suction equipment, ventilator bag, low-flow IV pump, or warming devices.	Prevents treatment-related injuries and ensures availability of age- or size-appropriate life-saving equipment.
Monitor medication administration closely, paying careful attention to allergies, dosage measurements and conversions, side effects, and potential adverse effects. Use pediatric concentrations of medications when available.	Provides for effective therapeutic management, prevents overdose, and reduces risk for toxic reactions.
Note history of latex allergies or dermatitis. Avoid latex products while in facility care and instruct client/SO in ways to avoid recurrent exposure to latex products, including gloves, catheters, and tubing, when client requires those for postdischarge care.	Repeat exposure increases risk of developing sensitivity or serious adverse reactions to latex products.
Review home situation for safety hazards, especially when child has sustained some type of injury related to unsafe home environment.	Provides opportunity for teaching about factors that could promote a safer home environment or might identify need for more intensive interventions.
Ascertain client and caregiver knowledge of safety needs and injury prevention in child's play and sports setting.	Specific attention needs to be focused on childhood recreational and sports injuries, including impact of repeated concussions, which is often underestimated.
Provide written resources for parent or caregiver and age-appropriate handouts for child, including information about safety issues, such as immunizations, obesity, smoking, substance use, and safer sex practices.	Provides information for later review and self-paced learning.
Encourage parent/caregiver to learn cardiopulmonary resuscitation (CPR) and individually appropriate procedures or emergency interventions and responses, such as carrying an EpiPen.	Being prepared for emergencies promotes confidence for adults and children in their own ability to deal with their situation.
<b>Collaborative</b> Refer to home-care assistance, medical supplies, community safety and education programs, and resources, such as Family Effectiveness Training, as indicated.	Can provide additional opportunities for support for child safety, for improving parenting skills, and obtaining necessary equipment.

### NURSING DIAGNOSIS: **risk for imbalanced Fluid Volume**

#### Possibly Evidenced By

Extremes of age/weight; factors influencing fluid needs (e.g., vomiting, diarrhea, burns, sepsis)  
Treatment regimen (rapid or excessive fluid replacement); insufficient fluid intake/barrier to accessing fluid

#### Desired Outcomes/Evaluation Criteria—Child Will

##### Hydration NOC

Demonstrate adequate fluid balance as evidenced by stable vital signs, palpable pulses of good quality, normal skin turgor, moist mucous membranes; individually appropriate urinary output; lack of excessive weight fluctuation—loss or gain; and absence of edema.

##### Parent/Caregiver Will

##### Risk Control NOC

Verbalize understanding of child's fluid needs.  
Promote adequate age-appropriate fluid intake.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Fluid Management NIC</b>	
<b>Independent</b>	
Note potential sources of fluid loss and intake, presence of conditions such as diabetes or burns, recurrent blood draws, and use of total parenteral nutrition (TPN).	Causative and contributing factors for fluid imbalances.
Note child's age, size, weight, and cognitive abilities.	Affects ability to tolerate fluctuations in fluid level and ability to respond to fluid needs.
Monitor vital signs; color of palms, soles of feet, and mucous membranes; weight; skin turgor; breath sounds; urinary and gastric output; and hemodynamic measurements.	Indicators of hydration status. Note: Hypotension indicative of developing shock may not be readily observed in child until very late in the clinical course because of vasoconstriction.
Review child's intake of fluids.	Children often do not take in enough oral fluids to meet hydration needs.
Determine child's normal pattern of elimination and whether child is toilet trained.	Provides information for baseline and comparison. If child is in diapers, output may be determined by weighing diapers.
Determine whether child has problems with urination, such as urine retention, bedwetting, burning, or holding.	Evaluation of these issues is important for determining cause and treatment of underlying problem.
Note use of drainage devices such as nasogastric (NG) tube or wound drain and use of laxatives, enemas, or suppositories.	May increase fluid and electrolyte losses.
<b>Collaborative</b>	
Administer IV fluids via control device.	Because smaller volumes are administered, close monitoring and regulation are required to prevent fluid overload while correcting fluid balance.
Replace electrolytes, as indicated, by oral route whenever possible.	Replacement solutions formulated for children are often safer and better tolerated when given orally if time and condition allow. Note: Child with mild dehydration not caused by trauma may respond well to oral rehydration starting with 5 to 10 mL by mouth every 15 to 20 minutes and increasing according to tolerance.
Monitor laboratory results, such as hemoglobin/hematocrit (Hgb/Hct), BUN, urine osmolality, and specific gravity.	Indicators of adequacy of hydration and effectiveness of therapeutic interventions.
Arrange with laboratory to combine common tests and draw smallest amount of blood that is necessary to perform required studies.	Excessive or repetitive blood draws may markedly reduce Hgb and Hct levels in pediatric client.

### NURSING DIAGNOSIS: **interrupted Family Processes**

#### May Be Related To

Situational transition and/or crisis  
Shift in health status of a family member  
Change in family finances or social status

#### Possibly Evidenced By

Change in communication pattern; decrease in available emotional support  
Change in participation for problem-solving  
Change in family conflict resolution

#### Desired Outcomes/Evaluation Criteria—Parent/Caregiver Will

#### Family Functioning NOC

Verbalize positive feelings about parenting abilities.  
Be involved in problem-solving solutions for current situation.  
Develop skills to deal with present situation.  
Strengthen parenting skills.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Family Support NIC</b>	
<b>Independent</b>	
Determine existing situation and parental perception of the problems, noting presence of specific factors such as psychiatric or physical illness and disabilities of child or parent.	Identification of the individual factors will aid in focusing interventions and establishing a realistic plan of care.
Identify developmental stage of the family—first child, new infant, school-age or adolescent children, or stepfamily.	These factors affect how family members view current problems and choices of solutions.
Determine cultural and religious influences on parenting and expectations of self and child.	This information is crucial to helping the family identify and develop a treatment plan that meets its specific needs, enhancing likelihood of success.
Assess parenting skill level, considering intellectual, emotional, and physical strengths and limitations.	Identifies areas of need for further education, skill training, and factors that might interfere with ability to assimilate new information.
Note attachment behaviors between parent and child(ren), recognizing cultural background. Encourage parent(s) to hold and spend time with child, particularly newborn or infant.	Lack of eye contact and touching may indicate bonding problems. Failure to bond effectively with newborn is thought to affect subsequent parent-child interaction.
Observe interactions between parent(s) and child(ren).	Identifies relationships, communication pattern/skills, and feelings about one another.
Note presence and effectiveness of extended family support systems.	Provides role models for parent(s) to help them develop own style of parenting. Note: Role models may be negative and/or controlling.
Emphasize positive aspects of situation, maintaining a positive attitude toward parent's capabilities and potential for improving.	Helping parent(s) to feel accepting about self and individual capabilities will promote growth.
Involve all members of the family in learning activities.	Learning new skills is enhanced when everyone is participating and interacting.
Encourage parent(s) to identify positive outlets for meeting own needs, such as going to a movie or out to dinner. Discuss use of home-care and respite services, as appropriate.	Parent often believes it is "selfish" to do things for own self, that children are primary. However, parents are important, children are important, and the family is important. As a rule, when parents take care of themselves, their coping abilities are enhanced and they are better parents. Note: Siblings also require time with parents to attend to their needs and to have positive interactions.
Discuss issues of step-parenting and ways to achieve positive relationships in a blended family.	Blending two families can be a very demanding task, and preconceived ideas can be counterproductive.
<b>Collaborative</b>	
Refer to resources such as books, parenting classes, and support groups.	Providing information and/or role models can help people learn to negotiate and develop skills for parenting and living together.

### NURSING DIAGNOSIS: **risk for ineffective Thermoregulation**

#### Risk Factors May Include

Extremes of age or weight; dehydration  
Fluctuating/extremes of environmental temperature  
Illness, trauma, sepsis; alteration in metabolic rate

#### Desired Outcomes/Evaluation Criteria—Child Will

#### Thermoregulation NOC

Regain or maintain appropriate body temperature for age and size.

#### Parent/Caregiver Will

#### Risk Control NOC

Provide proper environmental controls and safeguards.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Temperature Regulation</b> <small>NIC</small>	
<i>Independent</i>	
Note conditions promoting fevers—Infection, inflammation, hot environment, and dehydration.	Determines choice of interventions.
Measure and monitor child's temperature, using properly functioning thermometer.	Inaccurate measurement can result in inappropriate treatment.
Discuss variables in temperature measurements for age of child and where temperature is measured.	Knowledge of normal ranges for age of child—newborn through adolescent—is critical to knowing when a fever requires treatment. Temperature may be measured orally, rectally, and at the axillary space, with rectal measurement being on average approximately 1 degree higher than oral, and axillary being 1 degree lower than oral. Note: Temperature of 100.4°F (38°C) or greater in newborns and infants needs immediate attention. For toddlers and older children, temperatures up to 104°F (40°C) may be tolerated unless accompanied by other signs, such as poor color, breathing problems, severe lethargy, headache, or stiff neck (Cincinnati Children's Hospital Medical Center [CCHMC], 2010).
Be aware of heat loss related to age and body mass.	Newborn is more vulnerable to heat loss than older child because of body surface area, higher metabolic rate, and sensitivity to environmental conditions.
Observe for seizure activity. Provide safety precautions, as indicated.	Higher fevers may trigger febrile seizures in susceptible children.
Adjust bedclothes, linens, and environment. Apply cool cloth to head and bathe in lukewarm bath.	Limiting linens and use of room fan can help lower body temperature. Note: Use of alcohol sponge bath is contraindicated—can be inhaled or alcohol absorbed through skin (Kids Health for Parents, 2013).
<i>Collaborative</i>	
Administer antipyretics, for example, acetaminophen (Tylenol) 10 to 15 mg/kg every 4 hours or ibuprofen (Motrin) 10 to 15 mg/kg every 6 hours, as indicated. Avoid use of aspirin.	Some degree of fever may be useful for fighting infection; however, excessive levels may have adverse effects and require intervention. Aspirin is believed to be associated with the onset of Reye's syndrome (London, 2007).

## NURSING DIAGNOSIS: risk for ineffective Health Maintenance

### Possibly Evidenced By

Inability to take responsibility for meeting basic health practices  
Insufficient resources/social support; ineffective [family] coping strategies  
Insufficient knowledge about basic health practices

### Desired Outcomes/Evaluation Criteria—Parent/Caregiver Will

#### Health-Seeking Behavior

Identify necessary health maintenance activities.  
Verbalize understanding of factors contributing to current situation.  
Develop plan to meet specific needs.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Health System Guidance</b> <small>NIC</small>	
<i>Independent</i>	
Explore with parents how child's health status is maintained—nutrition (especially if child is over- or underweight), exercise, sleep and rest, immunization status, and social/environmental issues such as child care setting and homelessness.	Identifies strengths; may reveal problems requiring immediate intervention.

ACTIONS/INTERVENTIONS (continued)	RATIONALE (continued)
Discuss mother's health status when pregnant, such as exposure to toxic agents, substance use, and complications of pregnancy or birth.	Helps identify issues, such as fetal alcohol syndrome, that may arise in child's future health status.
Ascertain frequency of routine health exams, including eye and dental care, monitoring by primary care provider, and immunizations. Note availability and use of resources. Problem-solve barriers to meeting healthcare needs.	Identifies areas of child's healthcare that may be lacking and provides parents with information about areas that need to be monitored and care provided to promote optimum health. Note: Financial issues, such as being under- or uninsured, having high insurance copays, or a lack of transportation, may restrict ability to follow through on needed or routine care.
Note desire and level of ability to meet health maintenance needs, as well as self-care ADLs.	Care providers and children who can provide much of their own care may have areas of need, either because of illness or other stressors.
Develop plan with parent or caregiver for child's care.	Allows for incorporating existing strengths or limitations and assistance in adapting and organizing care, as necessary.
Provide time to listen to concerns of parent or caregiver.	Long-term care for chronically ill child or acute care for a child can be very challenging to parent's physical, emotional, and financial resources.
Provide anticipatory guidance for periods of wellness, and identify ways parent can adapt when progressive illness or long-term health problems occur.	Information and support is vital for maintaining and managing effective health practices.
Provide for communication and coordination between the healthcare facility team and community healthcare providers.	Promotes continuity of care and continuation of goals.
Monitor adherence to prescribed medical regimen. Determine causes for deviations.	Additional education or problem-solving may be required for success of therapeutic plan.
Provide information about individual healthcare needs. Identify signs and symptoms requiring further evaluation and follow-up.	Provides for prevention of complications and early intervention in times of illness.
<b>Collaborative</b>	
Provide contact number for case manager following discharge home.	Provides resource to answer questions and assist with navigation through complex healthcare systems.
Make referral as needed for community support services such as homemaker, skilled nursing care, well-baby clinic, and respite care.	Provides for child care and parental support in home setting to enhance coping with therapeutic regimen.
Refer to social services, as indicated.	May need assistance with financial, housing, or legal concerns.
Arrange for palliative or hospice services, if needed.	May be indicated when illness is prolonged or terminal.

**POTENTIAL CONSIDERATIONS** following acute hospitalization (dependent on client's age, physical condition and presence of complications, and family resources).

Refer to primary diagnosis for specific concerns.

- **ineffective Health Management**—perceived seriousness; economic difficulties; complexity of therapeutic regimen; excessive demands made on family; family patterns of healthcare
- **delayed [Growth] and Development**—effects of physical disability; prescribed dependence; environmental or stimulation deficiencies.



# Definitions for NANDA-I Nursing Diagnoses Used in This Text

## A

Activity intolerance: Insufficient physiological or psychological energy to endure or complete required or desired daily activities.

Acute substance withdrawal syndrome: Serious, multifactorial sequelae following abrupt cessation of an addictive compound.

Acute substance withdrawal syndrome, risk for: Susceptible to serious, multifactorial sequelae following abrupt cessation of an addictive compound, which may compromise health.

Adaptive capacity, risk for decreased intracranial: Compromise in intracranial fluid dynamic mechanisms that normally compensate for increases in intracranial volumes, resulted in repeated disproportionate increases in intracranial pressure (ICP) in response to a variety of noxious and non-noxious stimuli.

Airway clearance, ineffective: Inability to clear secretions or obstructions from the respiratory tract to maintain a clear airway.

Anxiety: Vague, uneasy feeling of discomfort or dread accompanied by an autonomic response (the source is often nonspecific or unknown to the individual); a feeling of apprehension caused by anticipation of danger. It is an alerting sign that warns of impending danger and enables the individual to take measures to deal with the threat.

Aspiration, risk for: Susceptible to entry of gastrointestinal secretions, oropharyngeal secretions, solids, or fluids to the tracheobronchial passages, which may compromise health.

Autonomic Dysreflexia, risk for: Susceptible to life-threatening, uninhibited response of the nervous system post-spinal shock, in an individual with spinal cord injury or lesion at the 6<sup>th</sup> thoracic vertebra (T6) or above (has been demonstrated in patients with injuries at the 7<sup>th</sup> thoracic vertebra (T7) and the 8<sup>th</sup> thoracic vertebra (T8), which may compromise health.

## B

Bleeding, risk for: Susceptible to a decrease in blood volume, which may compromise health.

Blood glucose level, risk for unstable: Susceptible to variation in serum levels of glucose from the normal range, which may compromise health.

Blood pressure, risk for unstable: Susceptible to fluctuating forces of blood flowing through arterial vessels, which may compromise health.

Body image, disturbed: Confusion in mental picture of one's physical self.

Bowel incontinence: Involuntary passage of stool.

Breathing pattern, ineffective: Inspiration and/or expiration that does not provide adequate ventilation.

## C

Cardiac output, decreased: Inspiration and/or expiration that does not provide adequate ventilation.

Cardiac output, risk for decreased: Susceptible to inadequate blood pumped by the heart to meet metabolic demands of the body, which may compromise health.

Comfort, impaired: Perceived lack of ease, relief, and transcendence in physical, psychospiritual, environmental, cultural, and/or social dimensions.

Communication, impaired verbal: Decreased, delayed, or absent ability to receive, process, transmit, and/or use a system of symbols.

Confusion, acute: Reversible disturbances of consciousness, attention, cognition, and perception that develop over a short period of time, and which last less than 3 months.

Confusion, chronic: Irreversible, progressive, insidious, and long-term alteration of intellect, behavior and personality, manifested by impairment in cognitive functions (memory, speech, language, decision making, and executive function), and dependency in execution of daily activities.

Constipation: Decrease in normal frequency of defecation accompanied by difficult or incomplete passage of stool and/or passage of excessively hard, dry stool.

Constipation, risk for: Susceptible to a decrease in normal frequency of defecation accompanied by difficult or incomplete passage of stool, which may compromise health.

Coping, compromised family: A usually supportive primary person (family, significant other, or close friend) provides insufficient, ineffective, or compromised support, comfort, assistance, or encouragement that may be needed by the client to manage or master adaptive tasks related to his or her health challenge.

Coping, ineffective: A pattern of invalid appraisal of stressors, with cognitive and/or behavioral efforts, that fails to manage demands related to well-being.

Coping, ineffective community: A pattern of community activities for adaptation and problem-solving that is unsatisfactory for meeting the demands or needs of the community.

Coping, readiness for enhanced community: A pattern of community activities for adaptation and problem-solving for meeting the demands or needs of the community, which can be strengthened.

Coping, readiness for enhanced family: A pattern of management of adaptive tasks by primary person (family, significant other, or close friend) involved with the client's health challenge, which can be strengthened.

Coping, disabled family: Behavior of primary person (family, significant other, or close friend) that disables his or her capacities to effectively address tasks essential to either person's adaptation to the health challenge.

## D

Death anxiety: Vague, uneasy feeling of discomfort or dread generated by perceptions of a real or imagined threat to one's existence.

Decisional conflict: Uncertainty about course of action to be taken when choice among competing actions involves risk, loss, or challenge to values and beliefs.

Denial, ineffective: Conscious or unconscious attempt to disavow the knowledge or meaning of an event to reduce anxiety and/or fear, leading to detriment of health.

Development, risk for delayed: Susceptible to delays of 25% or more in one or more of the areas of social or self-regulatory behavior, or in cognitive, language, gross, or fine motor skills, which may compromise health.

Diarrhea: Passage of loose, unformed stools.

Diversional activity engagement, decreased: Reduced stimulation, interest, or participation in recreational or leisure activities.

Dry eye, risk for: Susceptible to eye discomfort or damage to the cornea and conjunctiva due to reduced quantity or quality of tears to moisten the eye, which may compromise health.

## E

Eating dynamics, ineffective adolescent: Altered eating attitudes and behaviors resulting in over- or under-eating patterns that compromise nutritional health.

Electrolyte imbalance, risk for: Susceptible to changes in serum electrolyte levels, which may compromise health.

Elimination, impaired urinary: Dysfunction in urine elimination.

## F

Family processes, dysfunctional: Family functioning which fails to support the well-being of its members.

Family processes, interrupted: Break in the continuity of family functioning which fails to support the well-being of its members.

Fatigue: An overwhelming sustained sense of exhaustion and decreased capacity for physical and mental work at the usual level.

Fear: Response to perceived threat that is consciously recognized as a danger.

Fluid volume, deficient: Decreased intravascular, interstitial, and/or intracellular fluid. This refers to dehydration, water loss alone without change in sodium.

Fluid volume, excess: Surplus intake and/or retention of fluid.

Fluid volume, risk for deficient: Susceptible to experiencing decreased intravascular, interstitial, and/or intracellular fluid volumes, which may compromise health.

Fluid volume, risk for imbalanced: Susceptible to a decrease, increase, or rapid shift from one to the other of intravascular, interstitial, and/or intracellular fluid volumes, which may compromise health. This refers to body fluid loss, gain, or both.

## G

Gas exchange, impaired: Excess or deficit in oxygenation and/or carbon dioxide elimination at the alveolar-capillary membrane.

Grieving: A normal complex process that includes emotional, physical, spiritual, social, and intellectual responses and behaviors by which individuals, families, and communities incorporate an actual, anticipated, or perceived loss into their daily lives.

## H

Health behavior, risk-prone: Impaired ability to modify lifestyle and/or actions in a manner that improves the level of wellness.

Health maintenance, ineffective: Inability to identify, manage, and/or seek out help to maintain well-being.

Health management, ineffective: Pattern of regulating and integrating into daily living a therapeutic regimen for the treatment of illness and its sequelae that is unsatisfactory for meeting specific health goals.

Home maintenance, risk for impaired: Inability to independently maintain a safe growth-promoting immediate environment.

Hyperthermia: Core body temperature above the normal diurnal range due to failure of thermoregulation.

## I

Incontinence, bowel: Involuntary passage of stool.

Infection, risk for: Susceptible to invasion and multiplication of pathogenic organisms, which may compromise health.

Injury, risk for: Susceptible to physical damage due to environmental conditions interacting with the individual's adaptive and defensive resources, which may compromise health.

Insomnia: A disruption in amount and quality of sleep that impairs functioning.

## K

Knowledge, deficient: Absence of cognitive information related to a specific topic, or its acquisition.

## L

Lifestyle, sedentary: A habit of life that is characterized by a low physical activity level.

Liver function, risk for impaired: Susceptible to a decrease in liver function, which may compromise health.

## M

Memory, impaired: Persistent inability to remember or recall bits of information or skills.

Metabolic imbalance syndrome, risk for: Susceptible to a toxic cluster of biochemical and physiological factors associated with the development of cardiovascular disease arising from obesity and type 2 diabetes, which may compromise health.

Mobility, impaired physical: Limitation in independent, purposeful movement of the body or of one or more extremities.

Mucous membrane integrity, impaired oral: Injury to the lips, soft tissue, buccal cavity, and/or oropharynx.

## N

Nausea: A subjective phenomenon of an unpleasant feeling in the back of the throat and stomach, which may or may not result in vomiting.

Neurovascular dysfunction, risk for peripheral: Susceptible to disruption in the circulation, sensation, and motion of an extremity, which may compromise health.

Nutrition, less than body requirements, imbalanced: Intake of nutrients insufficient to meet metabolic needs.

## O

Obesity: A condition in which an individual accumulates excessive fat for age and gender that exceeds overweight.

Overweight: A condition in which an individual accumulates excessive fat for age and gender.

Overweight, risk for: Susceptible to excessive fat accumulation for age and gender, which may compromise health.

## P

Pain, acute: Unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (International Association for the Study of Pain); sudden or slow onset of any intensity from mild to severe with an anticipated or predictable end, and with a duration of less than 3 months.

Pain, chronic: Unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (International Association for the Study of Pain); sudden or slow onset of any intensity from mild to severe, constant or recurring without an anticipated or predictable end, and with a duration of greater than 3 months.

Parenting, impaired: Inability of primary caregiver to create, maintain, or regain an environment that promotes the optimum growth and development of the child.

Perioperative positioning injury, risk for: Susceptible to inadvertent anatomical and physical changes as a result of posture or positioning equipment used during an invasive/surgical procedure, which may compromise health.

Poisoning, risk for: Susceptible to accidental exposure to, or ingestion of, drugs or dangerous products in sufficient doses, which may compromise health.

Post-trauma syndrome, risk for: Susceptible to sustained maladaptive response to a traumatic, overwhelming event, which may compromise health.

Powerlessness: The lived experience of lack of control over a situation, including a perception that one's actions do not significantly affect an outcome.

## R

Religiosity, risk for impaired: Susceptible to an impaired ability to exercise reliance on religious beliefs and/or participate in rituals of a particular faith tradition, which may compromise health.

Relocation stress syndrome, risk for: Susceptible to physiological disturbance following transfer from one environment to another, which may compromise health.

Retention, urinary: Inability to empty bladder completely.

Role performance, ineffective: A pattern of behavior and self-expression that does not match the environmental context, norms, and expectations.

Role strain, risk for caregiver: Susceptible to difficulty in fulfilling care responsibilities, expectations, and/or behaviors for family or significant others, which may compromise health.

## S

Self-care deficit [specify]: Inability to eat independently, independently complete cleansing activities, put on or remove clothing, perform tasks associated with bowel and bladder elimination.

Self-care, readiness for enhanced: A pattern of performing activities for oneself to meet health-related goals, which can be strengthened.

Self-esteem, chronic low: Negative evaluations and/or feelings about one's own capabilities, lasting at least 3 months.

Self-esteem, situational low: Development of a negative perception of self-worth in response to a current situation.

Sensory perception, disturbed (specify): Change in the amount or patterning of incoming stimuli accompanied by a diminished, exaggerated, distorted, or impaired response to such stimuli.

Sexual dysfunction: A state in which an individual experiences a change in sexual function during the sexual response phases of desire, arousal, and/or orgasm, which is viewed as unsatisfying, unrewarding, or inadequate.

Shock, risk for: Susceptible to an inadequate blood flow to the body's tissues that may lead to life-threatening cellular dysfunction, which may compromise health.

Skin integrity, impaired: Altered epidermis and/or dermis.

Skin integrity, risk for impaired: Susceptible to alteration in epidermis and/or dermis, which may compromise health.

Sleep deprivation: Prolonged periods of time without sustained natural, periodic suspension of relative consciousness that provides rest.

Sleep pattern, disturbed: Time-limited awakenings due to external factors.

Social interaction, impaired: Insufficient or excessive quantity or ineffective quality of social exchange.

Social isolation: Aloneness experienced by the individual and perceived as imposed by others and as a negative or threatening state.

Spiritual distress: A state of suffering related to the impaired ability to experience meaning in life through connections with self, others, the world, or a superior being.

Suffocation, risk for: Susceptible to inadequate air availability for inhalation, which may compromise health.

Surgical site infection, risk for: Susceptible to invasion of pathogenic organism at surgical site, which may compromise health.

Swallowing, impaired: Abnormal functioning of the swallowing mechanism associated with deficits in oral, pharyngeal, or esophageal structure or function.

## T

Thermoregulation, risk for ineffective: Susceptible to temperature fluctuation between hypothermia and hyperthermia, which may compromise health.

Thromboembolism, risk for venous: Susceptible to the development of a blood clot in a deep vein, commonly in the thigh, calf, or upper extremity, which can break off and lodge in another vessel, which may compromise health.

Tissue integrity, impaired: Damage to the mucous membrane, cornea, integumentary system, muscular fascia, muscle, tendon, bone, cartilage, joint capsule, and/or ligament.

Tissue perfusion, ineffective peripheral: Decrease in blood circulation to the periphery, which may compromise health.

Tissue perfusion, risk for decreased cardiac: Susceptible to a decrease in cardiac circulation, which may compromise health.

Tissue perfusion, risk for ineffective cerebral: Susceptible to a decrease in cerebral tissue circulation, which may compromise health.

Tissue perfusion, risk for ineffective peripheral: Susceptible to a decrease in blood circulation to the periphery, which may compromise health.

Trauma, risk for physical: Susceptible to physical injury of sudden onset and severity which require immediate attention.

**U**

Unilateral neglect: Impairment in sensory and motor response, mental representation, and spatial attention of the body, and the corresponding environment, characterized by inattention to one side and overattention to the opposite side. Left-side neglect is more severe and persistent than right-side neglect.

**V**

Ventilation, impaired spontaneous: Inability to initiate and/or maintain independent breathing that is adequate to support life.

Ventilatory weaning response, dysfunctional: Inability to adjust to lowered levels of mechanical ventilator support that interrupts and prolongs the weaning process.

Violence, risk for other-directed: Susceptible to behaviors in which an individual demonstrates that he or she can be physically, emotionally, and/or sexually harmful to others.

Violence, risk for self-directed: Susceptible to behaviors in which an individual demonstrates that he or she can be physically, emotionally, and/or sexually harmful to self.

# Index of Nursing Diagnoses

Activity intolerance: anemias—iron deficiency, anemia of chronic disease, pernicious, aplastic, hemolytic and, 547; angina, chronic/stable and risk for, 69; chronic heart failure and, 46; hypertension: severe and, 32; myocardial infarction and risk for, 82; pediatric considerations and, 998; renal failure: chronic kidney disease/end-stage renal disease and risk for, 616

Acute substance withdrawal syndrome: substance use disorders and risk for, 934

Airway clearance, ineffective: burns: thermal, chemical, electrical (acute/convalescent phases) and risk for, 746; chronic obstructive pulmonary disease and, 137; lung cancer: postoperative care and, 165; pneumonia and, 151; pulmonary tuberculosis and, 210; respiratory failure/ventilatory assistance and, 195; seizure disorders and risk for, 222

Anxiety: benign prostatic hyperplasia and, 692; cancer and, 950; dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 862; disaster considerations and, 986; hyperthyroidism/thyrotoxicosis/thyroid storm and, 478; inflammatory bowel disease and, 363; lung cancer: postoperative care and, 167; mastectomy and, 679; myocardial infarction and, 82; pediatric considerations and, 997; peritonitis and, 398; renal dialysis and, 630; respiratory failure/ventilatory assistance and, 197; surgical interventions and, 878; upper gastrointestinal bleeding and, 349

Anxiety, death: acquired immunodeficiency syndrome and, 819; palliative/end-of-life care/hospice and, 975

Aspiration, risk for: total nutritional support: parenteral/enteral feeding and, 536

Autonomic dysreflexia, risk for: spinal cord injury (acute care/rehabilitative phase) and, 309

Bleeding, risk for: acquired immunodeficiency syndrome and, 810; aortic aneurysms and, 116; cirrhosis of liver and, 505; hepatitis and, 490; prostatectomy and, 697; renal failure: chronic kidney disease/end-stage renal disease and risk for, 617; total joint replacement and, 733

Blood glucose level, unstable: diabetes mellitus/diabetic ketoacidosis and, 461; pancreatitis and risk for, 521

Body image, disturbed: cirrhosis of liver and, 509; eating disorders: anorexia nervosa/bulimia nervosa and, 424; fecal diversions and, 370; obesity and risk for, 438; renal dialysis and, 632; urostomy: postoperative care and, 649

Body temperature. *See* Hyperthermia; Hypothermia; Thermoregulation

Bowel incontinence: dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 867; multiple sclerosis and risk for, 322; spinal cord injury (acute care/rehabilitative phase) and, 302

Breathing pattern, ineffective: acquired immunodeficiency syndrome and risk for, 808; alcohol, acute withdrawal and risk for, 927; bariatric surgery and, 445; cardiac surgery: postoperative care and risk for, 106; cholecystectomy and, 408; cirrhosis of liver and risk for, 504; coronary artery bypass graft and risk for, 106; craniocerebral trauma and risk for, 237; peritoneal dialysis and risk for, 640; pneumothorax/

hemotorax, 173; respiratory failure/ventilatory assistance, 192; spinal cord injury (acute care/rehabilitative phase) and risk for, 292; spinal surgery and risk for, 281; surgical interventions and, 886

Cardiac output, decreased: acute coronary syndrome and risk for, 61; acute kidney injury (acute renal failure) and, 603; alcohol, acute withdrawal and risk for, 928; cardiac surgery: postoperative care and risk for, 102; chronic heart failure and, 43; coronary artery bypass graft and risk for, 102; dysrhythmias and risk for, 90; hypertension: severe and risk for, 30; hyperthyroidism/thyrotoxicosis/thyroid storm and risk for, 475; myocardial infarction and risk for, 79; renal failure: chronic kidney disease/end-stage renal disease and risk for, 614

Caregiver role strain, risk for: dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 871; multiple sclerosis and, 327; palliative/end-of-life care/hospice and, 979

Comfort, impaired: brain infections: meningitis/encephalitis and, 273

Communication, impaired: cerebrovascular accident and, 257

Communication, impaired verbal: extended/long-term care and, 905;

respiratory failure/ventilatory assistance and, 196

Confusion, acute: acquired immunodeficiency syndrome and risk for, 817; cirrhosis of liver and risk for, 507; craniocerebral trauma and risk for, 238; renal dialysis and risk for, 630; renal failure: chronic kidney disease/end-stage renal disease and risk for, 618; sepsis/septic shock and risk for, 782

Confusion, chronic: acquired immunodeficiency syndrome and risk for, 817; dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 858; Parkinson's disease and risk for, 338

Constipation: spinal cord injury (acute care/rehabilitative phase) and, 302

Constipation, risk for: cancer and, 965; extended/long-term care and, 912; fecal diversions and, 377; hysterectomy and, 669; multiple sclerosis and, 322; renal dialysis and, 629; total joint replacement and, 737

Coping, compromised family: dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 869; extended/long-term care and, 903; multiple sclerosis and risk for, 326; palliative/end-of-life care/hospice and, 977; psychosocial aspects of care and, 839

Coping, ineffective: cerebrovascular accident and, 261; diabetes mellitus and, 466; hypertension: severe and, 34; inflammatory bowel disease and, 365; multiple sclerosis and risk for, 323; psychosocial aspects of care and, 837; substance use disorders and, 936

Coping, ineffective community: disaster considerations and, 991

Coping, readiness for enhanced community: disaster considerations and, 992

Coping, readiness for enhanced family: eating disorders: anorexia nervosa/bulimia nervosa and, 427; psychosocial aspects of care and, 840

Death anxiety: acquired immunodeficiency syndrome and, 819;

palliative/end-of-life care/hospice and, 975

Decisional conflict: psychosocial aspects of care and, 838

- Denial, ineffective: substance use disorders and, 932
- Development, risk for delayed: pediatric considerations and, 999
- Diarrhea: bariatric surgery and, 451; cancer and risk for, 965; extended/long-term care and risk for, 912; fecal diversions and risk for, 377; inflammatory bowel disease and, 359
- Dry eye, risk for: hyperthyroidism (Graves' disease, thyrotoxicosis) and, 480
- Eating dynamics, ineffective child/adolescent: eating disorders: anorexia nervosa/bulimia nervosa and, 420
- Electrolyte imbalance: renal failure: chronic kidney disease/end-stage renal disease and risk for, 613
- Family processes, dysfunctional: substance use disorders and, 941
- Family processes, interrupted: cancer and risk for, 967; craniocerebral trauma and, 244
- Fatigue: acquired immunodeficiency syndrome and, 816; cancer and, 960; HIV-positive client and, 790; hyperthyroidism/thyrotoxicosis/thyroid storm and, 477; leukemias and, 578; multiple sclerosis and, 315; palliative/end-of-life care/hospice and, 974
- Fear: cancer and, 950; pediatric considerations, 997
- Fluid volume, deficient: diabetes mellitus and, 459; inflammatory bowel disease and, 361; pancreatitis and, 517; upper gastrointestinal bleeding and, 344
- Fluid volume, excess: chronic heart failure, 47; renal/urinary tract disorders and, 601
- Fluid volume, risk for deficient: acquired immunodeficiency syndrome and, 807; acute kidney injury (acute renal failure) and, 604; appendectomy and, 386; bariatric surgery and, 447; benign prostatic hyperplasia and, 691; burns: thermal, chemical, electrical (acute/convalescent phases) and, 747; cancer and, 959; cholecystectomy and, 409; cholelithiasis and, 404; eating disorders: anorexia nervosa/bulimia nervosa and, 423; fecal diversions and, 375; hemodialysis and, 643; hepatitis and, 490; leukemias and, 575; peritoneal dialysis and, 636; pneumonia and, 157; renal/urinary tract disorders and, 604; sepsis/septic shock and, 781; sickle-cell crisis and, 564; surgical interventions and, 889; urinary stones (calculi) and, 663
- Fluid volume, risk for excess: cirrhosis of liver and, 500; hemodialysis and, 644; peritoneal dialysis and, 635
- Fluid volume, risk for imbalanced: acute lung injury, 183; pediatric considerations and, 1003; total nutritional support: parenteral/enteral feeding and, 537
- Gas exchange, impaired: acute lung injury and, 181; chronic heart failure and risk for, 49; chronic obstructive pulmonary disease and, 140; fractures and risk for, 711; lung cancer: postoperative care and, 163; lymphomas and risk for, 587; pancreatitis and risk for, 523; pneumonia and, 153; pulmonary tuberculosis and risk for, 211; sepsis/septic shock and risk for, 783; sickle-cell crisis and, 559; venous thromboembolism and, 128
- Glucose level, unstable blood: diabetes mellitus/diabetic ketoacidosis and, 461; pancreatitis and risk for, 521
- Grieving: amputation and, 726; cancer and, 952; dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 863; extended/long-term care and, 900; hysterectomy and, 672; palliative/end-of-life care/hospice and, 975; psychosocial aspects of care and, 845; spinal cord injury (acute care/rehabilitative phase) and, 299
- Growth and development, delayed: pediatric considerations and risk for, 999
- Health behavior, risk-prone: HIV-positive client and, 788
- Health maintenance, ineffective: dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 870; pediatric considerations and risk for, 1006
- Health management, ineffective: acquired immunodeficiency syndrome and, 822; angina: chronic/stable and, 70; aortic aneurysms and, 119; chronic heart failure and, 51; chronic obstructive pulmonary disease and, 143; cirrhosis of liver and, 509; diabetes mellitus and, 467; dysrhythmias and, 96; eating disorders: anorexia nervosa/bulimia nervosa and, 429; HIV-positive client and, 798; hypertension: severe and, 35; inflammatory bowel disease and, 366; obesity and, 441; pancreatitis and, 523; psychosocial aspects of care and, 848; pulmonary tuberculosis and risk for, 214; renal dialysis and risk for, 633; renal failure: chronic kidney disease/end-stage renal disease and, 620; rheumatoid arthritis and risk for, 832; sickle-cell crisis and, 566; wounds/wound care and risk for, 770
- Health management, readiness for enhanced: cancer and, 967; extended/long-term care and, 917; multiple sclerosis and, 328; seizure disorders and, 224; surgical interventions and, 895
- Hyperthermia: sepsis/septic shock and, 778; surgical interventions and risk for, 885
- Hypothermia: surgical interventions and risk for, 885
- Incontinence, bowel: dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 867; multiple sclerosis and risk for: constipation, 322; spinal cord injury (acute care/rehabilitative phase) and, 302
- Infection, risk for: acquired immunodeficiency syndrome and, 805; acute kidney injury (acute renal failure) and, 605; amputation and, 724; anemias—iron deficiency, anemia of chronic disease, pernicious, aplastic, hemolytic and, 550; appendectomy and, 385; bariatric surgery and, 450; burns: thermal, chemical, electrical (acute/convalescent phases) and, 751; cancer and, 961; cirrhosis of liver and, 502; diabetes mellitus and, 464; disaster considerations and, 985; fecal diversions and, 374; fractures and, 715; hepatitis and, 492; leukemias and, 574; pancreatitis and, 522; peritoneal dialysis and, 639; peritonitis and, 392; pneumonia and, 154; prostatectomy and, 698; pulmonary tuberculosis and, 208; renal/urinary tract disorders and, 605; respiratory failure/ventilatory assistance and, 199; sepsis/septic shock and, 776; sickle-cell crisis and, 566; spinal surgery and, 283; surgical interventions and, 883; total joint replacement and, 734; total nutritional support: parenteral/enteral feeding and, 534; urostomy: postoperative care and, 651; wounds/wound care and, 769
- Injury, risk for: dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 856; disaster considerations and, 983; fractures and, 706; hemodialysis and, 642; perioperative positioning, 880; seizure disorders and, 220; spinal surgery and, 280; surgical interventions and, 881; total nutritional support: parenteral/enteral feeding and, 535
- Insomnia. *See* Sleep deprivation; Sleep, disturbed pattern of
- Intracranial adaptive capacity, risk for decreased: brain infections and, 272; craniocerebral trauma and, 233
- Knowledge, deficient: acute coronary syndrome and, 63; acute kidney injury (acute renal failure) and, 606; amputation and, 728; anemias—iron deficiency, anemia of chronic disease, pernicious, aplastic, hemolytic and, 551; appendectomy and, 388; bariatric surgery and, 452; benign prostatic hyperplasia and, 693; brain infections and, 275; burns: thermal, chemical, electrical (acute/convalescent phases) and, 760; cardiac surgery: postoperative care and, 108; cerebrovascular accident and, 265; cholecystectomy and, 411; cholelithiasis and, 406; craniocerebral trauma and, 245; fecal diversions and, 380; fractures and, 716; HIV-positive client and, 793; hyperthyroidism/thyrotoxicosis/thyroid storm and, 481; hysterectomy and, 673; leukemias and, 580; lung cancer: postoperative care and, 167; lymphomas and, 592; mastectomy and, 684; myocardial infarction and, 83; peritonitis and, 398; pneumonia and, 157; pneumothorax/hemothorax and, 176; prostatectomy and, 700; renal/urinary tract disorders and, 606; respiratory failure/ventilatory assistance and, 203; sepsis/septic shock and, 784; spinal cord injury (acute care/rehabilitative phase) and, 306; spinal surgery and, 286; substance use disorders and, 944; surgical interventions and, 877; total joint replacement and, 738; total nutritional support: parenteral/enteral feeding and, 538; upper gastrointestinal bleeding and, 351; urinary stones (calculi) and, 664; urostomy: postoperative care and, 654; venous thromboembolism and, 130
- Knowledge, readiness for enhanced: pneumothorax/hemothorax and, 176; surgical interventions and, 877
- Lifestyle, sedentary: obesity and, 437
- Liver function, impaired: hepatitis and, 486

- Memory, impaired: extended/long-term care, 901
- Mobility, impaired physical: amputation and, 725; burns: thermal, chemical, electrical (acute/convalescent phases) and, 756; cerebrovascular accident and, 255; extended/long-term care and, 914; fractures and, 712; mastectomy and risk for, 683; Parkinson's disease and, 333; rheumatoid arthritis and, 829; sickle-cell crisis, 564; spinal cord injury (acute care/rehabilitative phase) and, 295; spinal surgery and, 283; total joint replacement and, 736
- Nausea: lymphomas and, 590
- Neglect, unilateral: cerebrovascular accident and, 264
- Nutrition: less than body requirements, imbalanced: acquired immunodeficiency syndrome and, 811; anemias—iron deficiency, anemia of chronic disease, pernicious, aplastic, hemolytic and, 549; bariatric surgery and risk for, 448; burns: thermal, chemical, electrical (acute/convalescent phases) and, 755; cancer, 957; cancer and risk for, 957; chronic obstructive pulmonary disease and, 142; cirrhosis of liver and, 498; craniocerebral trauma and, 241; dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and risk for, 866; eating disorders: anorexia nervosa/bulimia nervosa and, 420; extended/long-term care and, 907; fecal diversions and, 376; hepatitis and, 489; HIV-positive client and, 791; hyperthyroidism/thyrototoxicosis/thyroid storm and risk for, 478; inflammatory bowel disease and, 361; pancreatitis and, 519; pediatric considerations and risk for, 1001; pulmonary tuberculosis and, 212; renal dialysis and, 625; respiratory failure/ventilatory assistance and, 198; substance use disorders and, 938; total nutritional support: parenteral/enteral feeding and, 530; wounds/wound care and, 769
- Obesity: as nursing diagnosis related to obesity, 343
- Oral mucous membrane, impaired: acquired immunodeficiency syndrome and, 815; cancer and, 962; renal failure: chronic kidney disease/end-stage renal disease and risk for, 620; respiratory failure/ventilatory assistance and, 198
- Overweight: hypertension: severe and, 33
- Pain, acute: acute coronary syndrome and, 58; amputation and, 721; angina: chronic/stable and, 67; aortic aneurysms and, 117; appendectomy and, 387; benign prostatic hyperplasia and, 691; burns: thermal, chemical, electrical (acute/convalescent phases) and, 749; cancer and, 954; cardiac surgery: postoperative care and, 104; cholecystitis with cholelithiasis and, 403; coronary artery bypass graft and, 104; fecal diversions and, 371; fractures and, 707; hypertension: severe and, 32; leukemias and, 577; lung cancer: postoperative care and, 166; lymphomas and, 588; mastectomy and, 681; myocardial infarction and, 77; palliative/end-of-life care/hospice and, 972; pancreatitis and, 516; pediatric considerations and, 996; peritoneal dialysis and, 638; peritonitis and, 396; pneumonia and, 156; prostatectomy and, 699; rheumatoid arthritis and, 827; sickle-cell crisis and, 560; spinal cord injury (acute care/rehabilitative phase) and, 298; spinal surgery and, 281; surgical interventions and, 890; total joint replacement and, 731; upper gastrointestinal bleeding and, 350; urinary stones (calculi) and, 660; urostomy: postoperative care and, 650; venous thromboembolism and, 127; wounds/wound care and, 767
- Pain, chronic: cancer and, 954; chronic heart failure and, 50; extended/long-term care and, 915; lymphomas and, 588; palliative/end-of-life care/hospice and, 972; pediatric considerations and, 996; rheumatoid arthritis and, 827; sickle-cell crisis and, 560; venous thromboembolism and, 127; wounds/wound care and, 767
- Panic, severe: disaster considerations and, 986
- Perioperative positioning injury, risk for: surgical interventions and, 880
- Peripheral neurovascular dysfunction, risk for: burns: thermal, chemical, electrical (acute/convalescent phases) and, 754; fractures and, 709; spinal surgery and, 279; total joint replacement and, 735
- Poisoning, risk for: (digoxin toxicity) dysrhythmias and, 94; (drug toxicity) extended/long-term care and, 904; pediatric considerations, 1002
- Post-trauma syndrome, risk for: burns: thermal, chemical, electrical (acute/convalescent phases) and, 759; disaster considerations and, 990
- Powerlessness: multiple sclerosis and risk for, 324; substance use disorders and, 937
- Pressure ulcer, risk for: fractures and, 714; spinal cord injury (acute care/rehabilitative phase) and, 305
- Religiosity, impaired: psychosocial aspects of care and risk for, 847
- Relocation stress syndrome: dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 872; extended/long-term care and, 898
- Role performance, ineffective: rheumatoid arthritis and risk for, 830
- Self-care deficit: cerebrovascular accident and, 260; dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 865; extended/long-term care and, 909; multiple sclerosis and, 318; renal dialysis and, 628; rheumatoid arthritis and, 832
- Self-esteem, chronic low: eating disorders: anorexia nervosa/bulimia nervosa and, 425; mastectomy and risk for, 682; multiple sclerosis and risk for, 324; seizure disorders and risk for, 223; spinal cord injury (acute care/rehabilitative phase) and risk for, 301; substance use disorders and risk for, 939
- Self-esteem, situational low, risk for: cancer and, 953; hepatitis and, 491; psychosocial aspects of care and, 843; seizure disorders and, 223
- Sensory perception, disturbed: cerebrovascular accident and, 258; craniocerebral trauma and, 239; dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 861; diabetes mellitus and, 465; spinal cord injury (acute care/rehabilitative phase) and, 297; surgical interventions and, 887
- Sexual dysfunction: cancer and risk for, 966; dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and risk for, 868; extended/long-term care and risk for, 916; fecal diversions and risk for, 378; hysterectomy and, 671; lymphomas and, 591; prostatectomy and risk for, 700; substance use disorders and, 943; urostomy: postoperative care and risk for, 653
- Shock, risk for: peritonitis and, 395; sepsis and, 779; upper gastrointestinal bleeding and, 348
- Skin integrity, impaired: bariatric surgery, 449; burns: thermal, chemical, electrical (acute/convalescent phases) and, 757; cardiac surgery: postoperative care, 107; cholecystectomy and, 410; wounds/wound care and, 765
- Skin integrity, risk for impaired: acquired immunodeficiency syndrome and, 814; cancer and, 964; chronic heart failure and, 50; cirrhosis of liver and, 503; eating disorders: anorexia nervosa/bulimia nervosa and, 428; extended/long-term care and, 910; fecal diversions and, 372; fractures and, 714; renal dialysis and, 627; renal failure: chronic kidney disease/end-stage renal disease and, 619; sickle-cell crisis and, 565; urostomy: postoperative care and, 647
- Sleep deprivation: dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 864
- Sleep, disturbed pattern of: dementias—Alzheimer's type/vascular dementia/Lewy body disease/frontotemporal dementia and, 864; extended/long-term care and, 906; fecal diversions and, 378
- Social isolation: acquired immunodeficiency syndrome and, 820; HIV-positive client and risk for, 797; obesity and, 440
- Spiritual distress, risk for: disaster considerations and, 989; palliative/end-of-life care/hospice and, 978
- Substance withdrawal syndrome, acute: substance use disorders and risk for, 934
- Suffocation: pediatric considerations and risk for, 1002
- Swallowing, impaired: cerebrovascular accident and risk for, 262; Parkinson's disease and, 336
- Thermoregulation, ineffective: pediatric considerations and risk for, 1005
- Tissue integrity, impaired: bariatric surgery, 449; cardiac surgery: postoperative care, 107; mastectomy and, 680; presurgical interventions and, 892; spinal cord injury (acute care/rehabilitative phase) and risk for, 305; wounds/wound care and, 765
- Tissue perfusion, ineffective peripheral: amputation and risk for, 723; venous thromboembolism and, 125
- Tissue perfusion, inefficient cerebral: cerebrovascular accident and, 252

- Tissue perfusion, risk for decreased cardiac: acute coronary syndrome and, 60; myocardial infarction and, 78
- Tissue perfusion, risk for ineffective: aortic aneurysms and, 115; bariatric surgery and, 447; hysterectomy and, 670; sickle-cell crisis and, 562; surgical interventions and, 894
- Trauma, risk for physical: craniocerebral trauma and, 243; disaster considerations, 983; pediatric considerations, 1002; peritoneal dialysis and, 637; spinal cord injury (acute care/rehabilitative phase) and, 294
- Unilateral neglect: cerebrovascular accident and, 264
- Urinary elimination, impaired: extended/long-term care and risk for, 911; multiple sclerosis and, 320; prostatectomy and, 696; spinal cord injury (acute care/rehabilitative phase) and, 303; urinary stones (calculi) and, 661; urostomy: postoperative care, 652
- Urinary retention: acute/chronic: benign prostatic hyperplasia, 689; hysterectomy and risk for, 668; spinal surgery and risk for, 285
- Ventilation, impaired spontaneous: respiratory failure/ventilatory assistance and, 192
- Ventilatory weaning response, dysfunctional: respiratory failure/ventilatory assistance and risk for, 201
- Violence, self-/other-directed: psychosocial aspects of care and risk for, 849
- Walking, impaired: Parkinson's disease and, 333

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## CHAPTER 4

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## CHAPTER 5

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## CHAPTER 14

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