

## **Module 4 – Clinical Judgement and Nursing Process**

- Characteristics of the nursing process:
  - Systematic: part of an ordered sequence of activities
  - Dynamic: great interaction and overlapping among the five steps
  - Interpersonal: human being is always at the heart of nursing
  - Outcome oriented: nurses and patients work together to identify outcomes
  - Universally applicable: a framework for all nursing activities
- The nursing process consists of 5 steps
  1. **Assessment** is the first step. Data is collected during this step so that the rest of the nursing process may be efficiently carried out
    - Nursing assessments focus on the patient's responses to health problems, not the data based from the patient's diagnosis
    - Initial Assessment – vague, overall assessment, performed by the nurse shortly after the patient is admitted to a facility. This assessment typically follows the guidelines set by the standards of the facility and establishes a baseline database for the patient. Allows the nurse to gather health data and identify health problems to set priorities for further focused assessments.
    - Focused Assessment – nurse gathers data about a problem that has already been identified, focuses on specific health problems
      - ✓ What are your signs and symptoms?
      - ✓ When did they first start?
      - ✓ What makes it better/worse?
    - Emergency Assessment – quick, one when a psychological or physiological crisis occurs to identify what life-threatening problems are occurring to avoid death
    - Time-Lapsed Assessment - this is a scheduled assessment to compare a patient's current condition with their baseline condition. Most residents in long-term health care have time-lapsed assessments scheduled periodically (A1C, HIV/AIDS, cancer)
    - Priorities to set during assessment include health orientation, developmental stage, culture and the patients need for nursing
    - Always validate assessment data before using it for diagnosing
  2. **Diagnosis** is the second step. Data gathered from the assessment are utilized to form a judgement about the patients' health. The purposes of diagnosing are:
    - ✓ Identify how a person, group, community, responds to an actual or potential health and life process
    - ✓ Identify the factors that contribute to or cause the health problem
    - ✓ Identify resources and strengths that that person or community can draw on to help resolve or prevent the problem
  - During the diagnosing step of the nursing process the nurse clarifies the exact nature of the patient's problems and risks that must be addressed to achieve the patient's outcome of care. Conclusions made during this step affects selected interventions and the entire plan of care.
  - **NANDA** – North American Nursing Diagnosis Association
    - ✓ “Nursing diagnosis is a clinical judgement about personal, family or community responses to actual or potential health problems/life processes. Nursing diagnosis provides the basis of selecting nursing interventions to achieve outcomes for which the nurse is accountable.”
  - Nursing diagnoses are written to describe patient problems that the nurse can treat independently.

- Collaborative problems are the nurse's primary responsibility and are managed using physician-prescribed and nurse interventions to minimize the complications of the even. Unlike nursing diagnoses the prescription for treatment comes from nursing, medicine and other disciplines. Collaborative problems include diagnosis documented by the nurse that may require intervention of other medical professionals
  - ✓ PC: Potential pneumonia related to impaired physical mobility
- Actual nursing diagnosis – diagnosis that represents problems that have already been validated (These types of diagnosis include a label, definition, defining characteristics and related factor)
- Risk diagnosis – clinical judgements that a person, family or community is more vulnerable to developing a problem than others in the same or similar situations
  - Hereditary, habits, race, gender, underlying conditions
- Possible nursing diagnosis – a suspected problem needing more data is needed to confirm or rule out the diagnosis
- Wellness diagnosis – clinical judgements that state that a person, family, or community is ready to advance from one level of health to another
  - Two components that must be present are a desire for a higher level of wellness and an effective present status or function
    - ✓ Readiness for enhanced.... (family coping, health maintenance, self-esteem, ect.)
- Syndrome nursing diagnosis – compromised of a cluster of actual or risk nursing diagnosis predicted to be present because of a specific situation or certain event. (PTSD)
- Common errors in writing nursing diagnoses
  - ✓ Writing diagnosis in terms of needs and response
  - ✓ Making legally inadvisable statements
  - ✓ Identifying as a problem a patient response that is not necessarily unhealthy
  - ✓ Identifying as a problem signs and symptoms of illness
  - ✓ Identifying as a patient problem or etiology what cannot be changed
  - ✓ Identifying environmental factors rather than patient factors as a problem
  - ✓ Reversing clauses
  - ✓ Having both clauses say the same thing
  - ✓ Including value judgments in the nursing diagnosis
  - ✓ Including the medical diagnosis in the diagnostic statement
- Formulation of a nursing diagnosis
  - ✓ Problem—identifies what is unhealthy about patient
  - ✓ Etiology—identifies factors maintaining the unhealthy state
  - ✓ Defining characteristics—identify the subjective and objective data that signal the existence of a problem

**3. Planning** is the third step, during planning the nurse identifies outcomes and formulates goals for the patient, family, or community. Outcomes should be specific, measurable, attainable, reasonable and time-specific (S.M.A.R.T)

- Informal planning may occur at any time such as an emergency or simply when a nursing is thinking about how they could better help their patient. Informal planning if formal planning without documentation
- Outcome identification and planning allows the nurse to set priorities, identify expected patient outcomes, select necessary interventions to achieve these outcomes and communicate the plan of care among the patient, family and other staff involved in the patients care
  - Long-term outcomes require a longer period to be achieved and may be used as discharge goals (within one week or longer)

- o Short-term outcomes may be accomplished in a specified period of time (within a few hours to a few days)
- Initial planning – performed by the nurse along with the initial assessment. A comprehensive plan that addresses each problem listed in the prioritized nursing diagnoses and identifies appropriate patient goals and the related nursing care
- Ongoing planning – This planning is completed each time the nurse interacts with the patient. Data is collected to ensure the plan or care is kept up to date to resolve identified health problems, manage risk factors and promote function. During ongoing planning nursing diagnosis may be clarified or modified and new planning may be implemented
- Discharge planning – Ensures that the patient and family outcomes and needs are met as the patient moves from a care setting to home, or from one care setting to another. Education about continuity of care at home or in another health care setting is provided by the nurse upon discharge
- Care planning - may include standardized templates set on the EHR, concept mapping, ISBARR during patient hand-off, and clinical pathways
  - o Care plans that do not reflect individual needs are pointless

4. **Intervention/Implementation** is the fourth step in which the nurse carries out actions that were set for the patient in the planning step of the nursing process
  - During implementation, the nurse carries out the plan, assesses how the patient is responding to it, documents and modifies it to achieve the outcome. Be sure your interventions are supported by evidence-based practice
  - Alfaros rule = Assess, re-asses and record
  - During implementation determine the patients new/continuing need for nursing, promote their self-care and assist the patient and their family to achieve health outcomes
5. **Evaluation** includes the nurse and the patient and/or their family working together to determine how well the patient outcomes have been achieved. Is there a need for a new plan of care? Continuity of care? Or has the outcome been successfully met?
  - There are five elements to evaluation:
    - ✓ Identify evaluative standards and criteria
    - ✓ Collect data to determine if the standards and criteria were met
    - ✓ Interpret and summarize the findings
    - ✓ Document your nursing judgement
    - ✓ Terminate, continue, or modify your plan of care
  - There are different outcomes that are set for the patient to meet, these are psychomotor outcomes, cognitive outcomes, affective outcomes, and physiologic outcomes
    - Cognitive: describes increases in patient knowledge or intellectual behaviors
      - o i.e.-Within 1 day after teaching, patient will list 3 benefits of continuing to apply moist compresses to leg ulcer after d/c
    - Psychomotor: describes patient's achievement of new skills
      - o i.e.-By next week, the patient will correctly demonstrate application of wet to dry dressing on left leg ulcer
    - Affective: describes changes in patient values, beliefs, and attitudes
      - o i.e.-By next week, patient will verbalize valuing health sufficiently to practice new health behaviors to prevent recurrence of leg ulcer--- patient needs to be motivated in order to have good outcomes

- Evaluative outcomes are documented as: Outcome met/partially met/not met. If the outcome is only partially met plan of care should continue, if the outcome is not at all met the plan of care should be modified
- Patient variables (willingness to follow plan of care), nursing variables (burnout) and health care system variables (staffing) all affect how the outcome is met
- Quality assurance is a part of the evaluation of the patients care. (HCAHPS)

➤ Collecting data

- Methods of collecting data – patient interview, physical assessment, nursing HX, objective and subjective data can be utilized
- Objective - Observed / Subjective - Spoken
- Cue – The subjective and objective data you identify
  - "the patient does not respond when I speak to him on his left side" is a cue that something may be wrong
- Inference – the judgment you reach about the cue
  - the patient's hearing may be impaired on his left side is an inference
- Primary source of data – observing, interviewing, examining
- Secondary source of data – medical record, family members

➤ NANDA nursing diagnoses related to:

- Oxygenation and gas exchange
  - Ineffective airway clearance: Defining characteristics are thick yellow secretions, ineffective cough, pale skin with cyanosis
  - Impaired gas exchange: Defining characteristics are cyanosis, using pursed-lip breathing, altered blood gases showing respiratory alkalosis, reports shortness of breath
  - Ineffective breathing pattern: Defining characteristics are hyperventilating, tachypnea
- Infection
  - Risk for Infection r/t
  - Chronic disease
  - Deficient knowledge to avoid exposure to pathogens
  - Inadequate primary defenses, change in pH of secretions, decrease in ciliary action, premature rupture of amniotic membranes, smoking, stasis of body fluids
- Inflammation
  - Acute pain r/t
  - Pain arising from medical problems
  - Pain due to diagnostic procedures, medical interventions, and treatments
  - Emerging from trauma
- Thermoregulation
  - Ineffective thermoregulation r/t aging, fluctuating, environmental temperatures, illness, immaturity, infection, trauma, stress, medications
- Tissue integrity
  - Impaired Tissue Integrity r/t altered circulation, chemical irritants, fluid deficit, fluid excess, impaired physical mobility, knowledge deficit, mechanical factors, nutritional factors, radiation, temperature extremes

- Prioritizing Nursing Diagnosis (Looking at Maslow's needs)
  - High priority: greatest threat to patient well-being (at risk for aspiration)
  - Medium priority: nonthreatening diagnoses (impaired mobility)
  - Low priority: diagnoses not specifically related to current health problem
- SMART Goals
  - Specific: states exactly what you want to accomplish (who, what, where, why?)
  - Measurable: how will you determine and evaluate the extent to which the goal has been met?
  - Achievable: stretch and challenging goals within ability to achieve outcome. What is the action-oriented verb?
  - Relevant: how does the goal tie into your key responsibilities? How is it aligned to objectives?
  - Time-bound: set 1 or more target dates, the “by when” to guide your goal to successful and timely completion (include deadlines, dates, and frequency)

## **Module 5 – Oxygenation and Gas Exchange**

- Vocabulary to know:
  - Apnea – Periods during which there is no breathing
  - Dyspnea – Difficult or labored breathing
  - Tachypnea – Rapid or increased respiratory rate. May increase with fever or during hyperventilation in relation to CO<sub>2</sub> overload
  - Bradypnea – Slow or decrease in respiratory rate. Occurs with some pathologic conditions or an increase in IC pressure. Central nervous system depressants such as opioids can cause respiratory depression
  - Orthopnea – difficulty breathing while lying down
  - Cyanosis – Bluish or grayish discoloration of the skin in response to inadequate oxygenation
  - Anemia – A decrease in the amount of red blood cells. Results in insufficient hemoglobin and hypoxemia
  - Pallor – Paleness of the skin often resulting from a decrease in the amount of circulating blood or hemoglobin in relation to inadequate oxygenation of the body tissues
  - Perfusion – the process by which oxygenated capillary blood passes through body tissues
- Factors essential to normal functioning of the respiratory system
  - Integrity of the airway system to transport air to and from lungs
  - Properly functioning alveolar system in lungs
    - Oxygenates venous blood
    - Removes carbon dioxide from blood
  - Properly functioning cardiovascular and hematologic systems
    - Carry nutrients and wastes to and from body cells
- Upper airway
  - Function: warm, filter, humidify inspired air
  - Components:
    - Nose
    - Pharynx
    - Larynx
    - Epiglottis
- Lower airway/tracheobronchial tree
  - Function: conduction of air, mucociliary clearance, production of pulmonary surfactant
  - Components:
    - Trachea
    - Right and left mainstem bronchi
    - Segmental bronchi
    - Terminal bronchioles
- Anatomy of the lungs
  - Main organs of respiration
  - Extend from the base of the diaphragm to the apex above the first rib
  - The right lung has three lobes; the left lung has two
  - The lungs are composed of elastic tissue (alveoli, surfactant, pleura)
- Cardiovascular system

- Vital for exchange of gases
- Composed of the heart and the blood vessels
  - The heart is a cone shaped, muscular pump, divided into four hollow chambers
- The upper chambers, the atria (singular, atrium), receive blood from the veins (the superior and inferior vena cava and the left and right pulmonary veins)
- The lower chambers, the ventricles, force blood out of the heart through the arteries (the left and right pulmonary arteries and the aorta)

➤ Pulmonary ventilation

- Inspiration: the active phase of ventilation
  - Involves movement of muscles and the thorax to bring air into the lungs
- Expiration: the passive phase of ventilation
  - Movement of air out of the lungs

➤ Process of ventilation

- The diaphragm contracts and descends, lengthening the thoracic cavity
- The external intercostal muscles contract, lifting the ribs upward and outward
- The sternum is pushed forward, enlarging the chest from front to back
- Increased lung volume and decreased intrapulmonic pressure allow air to move from an area of greater pressure (outside lungs) to lesser pressure (inside lungs)
- The relaxation of these structures results in expiration

➤ Gas exchange (respiration)

- Refers to the intake of oxygen and release of carbon dioxide
- Made possible by respiration and perfusion
- Occurs via diffusion - movement of oxygen and carbon dioxide between the air (in the alveoli) and blood (in the capillaries)
- Gases move passively from an area of higher concentration to an area of lower concentration
- At the end of the terminal bronchioles, there are clusters of alveoli that are the site of gas exchange. The wall of each alveolus is made of a single-cell layer of squamous epithelium
  - This thin wall allows for exchange of gases within the capillaries covering the alveoli
- Key functions for gas exchange:
  - Ventilate – taking a breath; diaphragm moving in and out
  - Transport – hemoglobin transporting the oxygen; anemia = low hemoglobin
  - Perfuse – perfusing the oxygenated blood throughout the body
- Effects these body systems:
  - Pulmonary
  - Cardiovascular
  - Neurological
  - Musculo-skeletal

➤ Factors influencing diffusion of gases in the lungs

- Change in surface area available
- Thickening of alveolar-capillary membrane
- Partial pressure (causes pulmonary arterioles to dilate, increasing blood flow)
- Solubility and molecular weight of the gas

➤ Transport of respiratory gases

- Oxygen is carried in the body via plasma and red blood cells

- Most oxygen (97%) is carried by red blood cells in the form of oxyhemoglobin
- Hemoglobin also carries carbon dioxide in the form of carboxyhemoglobin
- Internal respiration between the circulating blood and tissue cells must occur

➤ Alterations in respiratory function

- Hypoxia – inadequate amount of oxygen available to the cells
  - Most common symptoms: dyspnea (difficulty breathing), elevated BP, increased respiratory and pulse rate, pallor, cyanosis
  - Anxious, restless, confusion, drowsiness
  - Caused by hypoventilation
  - How do we assess in a patient with dark skin tone? Discoloration of gray/white under tone - in light skin? Bluish tint
- Hypoxemia – abnormal low level of oxygen in the blood
- Dyspnea – difficulty breathing
- Hypoventilation – decreased rate and depth of air movement into the lungs
- Hyperventilation – increased rate in depth of air movement into the lungs
- Atelectasis – collapse of the alveoli; happens with pneumonia and pulmonary edema

➤ Alterations in the cardiovascular system

- Dysrhythmia or arrhythmia
- Myocardial ischemia – reduced blood flow to the heart
- Angina – pain caused by the MI
- Myocardial infarction – ischemia in the heart
- Heart failure – blood flow issues, shortness of breath

➤ Factors affecting cardiopulmonary functioning and oxygenation

- Level of health
  - Kidney disease
  - Scoliosis influences breathing pattern
  - Fluid overload (pulmonary edema)
- Developmental considerations
  - Infants born before 34 weeks with insufficient surfactant
  - Normal respiratory rate for infants < 1 years old is 30-52
  - Children are at risk for asthma (usually related to secondary smoke)
- Medication considerations
  - Opioids/pain meds suppress respiratory system
- Lifestyle considerations
  - Smoking can lead to COPD
- Environmental considerations
  - Stress
  - Allergic reactions and air pollution
  - High altitude
  - Heat and cold
  - Occupational exposures
- Psychological health considerations
  - Stress = hyperventilation

➤ Respiratory functioning in the older adult

- Bony landmarks are more prominent due to loss of subcutaneous fat

- Kyphosis contributes to appearance of leaning forward
- Barrel chest deformity may result in increased anteroposterior diameter
- Tissues and airways become more rigid; diaphragm moves less efficiently
- Older adults have an increased risk for disease, especially pneumonia

➤ Cardiovascular assessment

- Lab testing:
  - Cholesterol total (<200 mg/dl)
  - Lipid Panel:
    - HDL >55 mg/dl (alpha lipoprotein) protein with a small amount of cholesterol
    - LDL 60 -180 mg/dl (beta lipoprotein mostly cholesterol)
    - VLDL 7-32mg/dl (prebeta lipoprotein) mostly triglycerides
    - Triglycerides 40 -160mg/dl (a form of fat in the blood)
  - Blood sugar 80-100mg/dl
  - Risk factors
    - Family history, smoking, diet, exercise
  - Physical exam
    - Assess pain, fatigue, dyspnea, and peripheral circulation (skin temp, color, and capillary refill)

➤ Assessing for edema

- If edema is present, note the location, degree, and type of swelling. If you observe edema in the lower leg, how far up the leg does it extend? If pitting edema is present, you will see a depression in the skin
- Grading System:
  - Trace: Minimal depression with pressure
  - +1: 2-mm depression; rapid return of skin to position
  - +2: 4-mm depression that disappears in 10–15 sec
  - +3: 6-mm depression that lasts 1–2 min. Area appears swollen
  - +4: 8-mm depression that persists for 2–3 min. Area is grossly edematous
- Anasarca: generalized edema

➤ Breath sounds (Normal)

- Vesicular: low-pitched, soft sound during expiration heard over most of the lungs
  - Inspiration longer than expiration
- Bronchial: high-pitched and longer, heard primarily over the larynx and trachea
  - Expiration are longer than inspiration
- Bronchovesicular: medium pitch and sound during expiration, heard over the upper anterior chest and intercostal area
  - Inspiration equal to expiration

➤ Promoting comfort

- Positioning
- Maintaining adequate fluid intake
- Providing humidified air
- Performing chest physiotherapy

➤ Promoting proper breathing

- Deep breathing

- Using incentive spirometry
- Pursed-lip breathing
- Diaphragmatic breathing

➤ Managing chest tubes

- Used for patients with fluid (pleural effusion), blood (hemothorax), or air (pneumothorax) in the pleural space; used to drain these substances and allow the compressed lung to re expand
- Assist with insertion and removal of the chest tube
- Monitor the patient's respiratory status and vital signs
- Check the dressing
- Maintain the patency and integrity of the drainage system

➤ Pulse oximetry ( $\text{SpO}_2$  or pulse ox)

- Pulse Oximeter provides an indirect measurement of Arterial O<sub>2</sub> Saturation, it is non-invasive
- Normal = is usually greater than 95%
- The photodetector detects amount of O<sub>2</sub> bound to Hgb molecules
- Reliable when saturation is over 70%
- Remember, earlobe probes have greater accuracy at lower saturations
- Nail polish, dirt, oil, and artificial nails can interfere with passage of light waves
- Can be used for ongoing assessment → monitor skin (irritation from adhesive)

➤ Assessing oxygenation status

- Sputum collection (appearance, odor)
- Skin Testing (TB, Allergy)
- Pulse Oximetry (estimate of arterial O<sub>2</sub>)
- Capnography (measures CO<sub>2</sub>)
- Spirometry (measures Lung Volumes)
- Arterial blood gases (ABGs)

➤ Environmental factors affecting oxygenation:

- A-Altitude
- B-Heat
- C-Cold
- D-Air pollution
- E-Health status
- F-Narcotics

➤ Lifestyle factors affecting oxygenation:

- A-Nutrition
- B-Physical Exercise
- C-Smoking
- D-Substance abuse
- E-Anxiety

➤  $\text{SaO}_2$  is the amount of O<sub>2</sub> bound to hemoglobin in arterial blood; measures tissue perfusion (indirect measure/pulse oximetry =  $\text{SpO}_2 > 95\%$ )

➤  $\text{PaO}_2$  is the amount of O<sub>2</sub> dissolved in the plasma; measures oxygen in the blood (80-100)

➤ Who benefits from O<sub>2</sub> use?

- Oxygen therapy is indicated for patients at risk for developing hypoxia:

◦  $\text{PaO}_2 < 60$  or  $\text{SaO}_2 < 90\%$

**o Help with removal of blocked air in the chest (pneumothorax)**

- Patients who are recovering from surgery and may be in pain or still sedated
- Patients who have a respiratory illness that causes excessive secretions to accumulate in the lungs or conditions that reduce the circulation of blood through the lungs
- Many patients with cardiac conditions are also at risk of developing hypoxia and benefit from oxygen therapy
- **Note:** When patients with COPD receive oxygen at too high a flow rate, carbon dioxide narcosis (a complication that causes confusion, tremors, convulsions, and coma) can result. Spo<sub>2</sub> for severe COPD 88-92% "normal"

➤ Nasal cannula

- Flow: 1-6 L (most often used device)
- Check the gauge indicating the level of oxygen in the tank to make sure there is an adequate amount remaining
- Always double check flow meter to adjust prescribed rate of O<sub>2</sub>
- 6L max!
- Protect skin around tubing
- Consider humidified air if flow rate >4L/min
- Must obtain an order from the provider before adjusting the flow rate (O<sub>2</sub> is a medication!)
- Tubing usually 7-14 ft long!! Fall risk!!

➤ Simple face mask

- Flow: 5 to 8 L
- Used for patients who require a moderate flow rate for a short period of time
- Because carbon dioxide can build up in the mask at low flow rates, do not use a flow rate lower than 6 L/min with this type of mask
- When using this mask, consider humidification to keep the patients' mucous membranes from becoming dry

➤ Nonrebreather face mask

- Flow rate: 10-15 L
- Used to deliver high flow rates and high concentrations of oxygen
- Short-term use
- For critically ill patients

➤ Precautions for oxygen administration

- Avoid open flames in the patient's room
- Place "no smoking" signs in conspicuous places
- Check to see that electrical equipment in the room is in good working order
- Avoid wearing and using synthetic fabrics (builds up static electricity)
- Avoid using oils in the area (oils ignite spontaneously in oxygen)

➤ Types of artificial airways

- Oral airway (oropharyngeal and nasopharyngeal airway)
  - o Prevents obstruction of the trachea by displacement of the tongue into the oropharynx**

- Airways post-op to keep tongue from falling back
  - Measure from lips to mandible
  - Monitor
  - Nasal (nasal trumpet) can be used for suctioning (use lube)
- Endotracheal tube
  - **Short-term use to ventilate, relieve upper airway obstruction, protect against aspiration, clear secretions**
  - Can be hooked to ventilator
  - Used for surgery or if patient can't breathe on own
  - Can intubate nasally if necessary (sometimes for specific procedures so surgeon has room)
  - Can be cuffed or uncuffed- Usually cuffed
- Tracheostomy tube
  - **Long-term assistance, surgical incision made into trachea and a tracheostomy tube is inserted**
  - Put in through a created stoma in neck into trachea
  - Temporary or permanent
  - Has an outer cannula and an inner. Inners can be disposable. Obturator is like a stylet; keeps it firm during insertion and then is removed
  - Cuffed or uncuffed. Cuffed trachs may need to be deflated while eating to prevent pressure on esophagus
  - Lots of secretions!
  - Site requires care. Neck straps require changing. Slotted gauze
  - Sterile suctioning as needed. Hyperoxygenate before and after. **Hold your breath** while suctioning and stop before you run out of air. 10-20 sec tops. Insert until they gag or cough, then pull out using intermittent suction. Can twirl it to get better removal.
  - Trachs can be capped, and patients can speak, if they can tolerate
- Administering cardiopulmonary resuscitation (CAB)
  - **Chest Compressions:** Check the pulse. If the victim has no pulse, initiate chest compressions to provide artificial circulation
  - **Airway:** Tilt the head and lift the chin; check for breathing. The respiratory tract must be opened so that air can enter
  - **Breathing:** If the victim does not start to breathe spontaneously after the airway is opened, give two breaths lasting 1 second each
  - **Defibrillation:** Apply the AED as soon as it is available
- **A normal respiratory rate is 12-20 breaths per minute.** Or one respiration for every four heartbeats. **Pulse ox readings should range between 95-100%.** Values <90% are considered abnormal and indicate inadequate oxygenation. The patient should be investigated for potential hypoxia
- Proper method for auscultation of the lungs
  - Equipment required is a stethoscope, sphygmomanometer, and a quiet environment
  - Have patient sitting upright or in semi-fowlers position. (About 30 degrees)
  - Place the warmed diaphragm of the stethoscope over the thoracis landmarks and auscultate breath sounds in a sequential pattern
  - Ask the patient to breathe slowly and deeply through their open mouth (NOT NOSE)
  - Document breath sounds

- Move side to side, comparing as you go; listen to full inspiration/expiration
- Abnormal (adventitious) lung sounds:
  - Crackles – bubbling, crackling, or popping sounds; intermittent sounds occurring when air moves through airways that contain fluid; opening of deflated small airways
    - Classified as fine, medium, or coarse
    - Usually heard on inspiration
    - Occur due to inflammation or congestion associated with pneumonia, heart failure, bronchitis, and COPD
  - Wheezing – musical or squeaking; continuous sounds occurring indicative of air passing through obstruction or narrowed airways constricted by swelling, secretions, or tumors
    - Classified as sibilant or sonorous
    - Usually heard on expiration
    - Occur in patients with asthma, tumors, or a buildup of secretions
  - Rhonchi – low pitched, continuous gurgling sounds; secretions in large airways
    - May clear up with coughing
- NIC/NOC nursing interventions and corresponding outcomes related to maximizing oxygen and carbon dioxide exchange in the lungs.
  - Interventions
    - ✓ Maintain patent airway.
    - ✓ Auscultate breath sounds, noting areas of decrease or absent ventilation and presence of adventitious sounds.
    - ✓ Initiate and maintain supplemental oxygen, as prescribed.
    - ✓ Ambulate three to four times a day, as appropriate.
    - ✓ Teach pursed-lip breathing techniques
    - ✓ Monitor respiratory and oxygenation status.
  - Outcomes
    - ✓ Respiratory status: Gas exchange
    - ✓ Tissue perfusion: Pulmonary
    - ✓ Respiratory status: Ventilation
    - ✓ Vital Signs
    - ✓ Tissue perfusion: Cellular

## Oxygen therapy

### Signs and symptoms of hypoxia

#### ► Early

- restlessness
- confusion
- anxiety
- elevated blood pressure
- increased heart rate
- increased respiratory rate
- dyspnea

#### ► Late

- decreased level of consciousness
- decreased activity level
- hypotension
- bradycardia
- metabolic acidosis
- cyanosis

#### ► Chronic

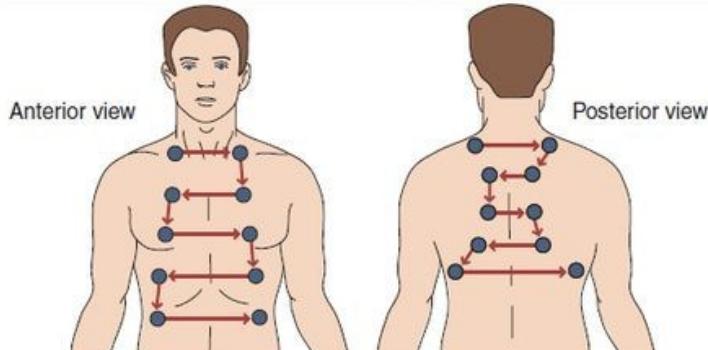
- clubbing of the fingers and toes
- peripheral edema
- right-sided heart failure
- respiratory acidosis
- oxygen saturation <87%

© 2008 Assessment Technologies Institute™, LLC

#### REFERENCES

- Gore, P. M., & Okie, J. R. (2007). *Medical Terminology* (4th ed.). Philadelphia: Lippincott Williams & Wilkins, p. 398.
- Perry, A. G., & Potter, P. A. (2008). *Caring: Nursing Made Simplicity* (6th ed.). St. Louis, MO: Elsevier/Mosby, pp. 733-734.
- Shattock, S. F., Ouellet, D. J., & Martin, B. C. (2004). *Clinical Nursing Skills: Tools to Assess and Manage*. Upper Saddle River, NJ: Pearson Education, Inc., pp. 370 & 371.

## Order of Auscultating Lung Sounds



## Respiratory Patterns

Normal (eupnea)	Regular and comfortable at 12–20 breaths/minute.
Tachypnea	20 breaths/minute.
Bradypnea	<12 breaths/minute.
Hyperventilation	Rapid, deep respiration >20 breaths/minute.
Apneustic	Neurological—sustained inspiratory effort.
Cheyenne-Stokes	Neurological—alternating patterns of depth separated by brief periods of apnea.
Kussmaul's	Rapid, deep, and labored—common in DKA.
Air trapping	Difficulty during expiration—emphysema.

- Incentive spirometry measures lung expansion in inhalation through mouth, provides a visual reinforcement for deep breathing by the patient. Deep-breathing exercises can be used to overcome hypoventilation. Incentive spirometry also encourages the patient to maximize lung inflation which in turn reduces atelectasis.
  - Check prescription; explain function
  - Assist patient to upright (fowlers) position
  - Instruct to exhale then place mouth tightly around mouthpiece
  - Instruction patient to inhale slowly and maintain steady flow
  - Repeat every hour if possible while awake
  - Remove mouthpiece but hold breath for 2-3 seconds and then exhale slowly through pursed lips
- Rationale and technique for **pursed-lip breathing**
  - Pursed-lip breathing can assist in reducing dyspnea and feelings of panic; effectively slows and prolongs expiration which is thought to prevent the collapse of small airways
  - Exhaling through pursed lips creates a smaller opening for air movement, effectively slowing and prolonging expiration
  - Pursed-lip breathing helps the patient to control the rate and depth of respiration
  - While sitting up-right the patient inhales through the nose while counting to three, then exhales slowly and evenly against pursed lips while tightening the abdominal muscles
- Importance of **coughing**
  - Coughing is a cleansing mechanism of the body, it helps clear the airway of secretions and other debris
  - Phlegm and sputum are respiratory secretions that are expelled by coughing. If these secretions stay in the lungs an infection may occur
  - Expectorants are drugs that facilitate removal of secretions by reducing their viscosity so that it is easier to expel by coughing
  - Teaching a patient to cough voluntarily is an important aspect preoperative and postoperative care
  - Coughing is more effective when used with deep breathing
- Types of cough medications
  - Cough suppressants
  - Expectorants
  - Lozenges
- Importance of deep breathing
  - Deep-breathing exercises can be used to overcome hyperventilation
  - Instruct the patient to make each breath deep enough to move the bottom ribs inspiring through the nose and expiring though the mouth
  - Should be done hourly while awake four times daily
- Common diagnostic methods to assess cardiopulmonary function
  - Cardiac coronary catheterization
  - Cardiac exercise stress testing
  - Echocardiogram
  - Endoscopic studies
  - Holter monitor
  - Lung scan
  - Skin tests (TB test)
  - Radiography

- Values measured from pulmonary function tests (PFT): show how well the lungs are working; evaluate the status of someone's respiratory functions or evaluate how they respond to therapy; normal values for PFT's vary from person to person
  - Tidal Volume (TV) – total amount of air inhaled and exhaled in 1 breath
  - Vital Capacity (VC) – max amount of air exhaled after max inspiration
  - Forced Vital Capacity (FVC) – max amount of air that can be forcefully exhaled after a full inspiration
  - Forced Expiratory Volume (FEV) – amount of air exhaled in the 1 second after a full expiration
  - Total Lung capacity (TLC) – amount of air contained within the lungs at max inspiration
  - Residual Volume (RV) – amount of air left in lungs at maximum expiration
  - Peak Expiratory Flow Rate (PEFR) – max flow attained during the forced expiratory maneuver; a portable inexpensive, hand-held device used to measure how air flows from the lungs; measures the ability to push air out of the lungs; usually used for asthma
  
- Signs and symptoms of respiratory distress
  - Increased respiratory rate
  - Orthopnea - dyspnea when lying flat
  - Cyanosis
  - Grunting - noisy difficult breathing heard on expiration as air is forced against a closed epiglottis
  - Nasal flaring
  - Retractions
  - Sweating
  - Paroxysmal Nocturnal Dyspnea: sudden awakening due to extreme dyspnea causing anxiety and panic and sitting straight up to relieve
  - Conversational Dyspnea
  - Stridor: high pitched harsh crowing caused by a partial obstruction of trachea or larynx (voice box)--usually an emergency
  - Wheezing: musical air as it is pushed through partially obstructed small airways such as in asthma or lung congestion
  - Diminished or absent breath sounds
  
- Medications that can cause **respiratory distress** (<9 breaths/minute)
  - Anesthesia
  - Antibiotic in the mycin group may cause respiratory paralysis when used in conjunction with muscle relaxants
  - Opioids
  - Any narcotic or sedative
  
- Inhaled medications
  - Bronchodilators: open narrowed airways
  - Nebulizers: disperse fine particles of liquid medication into the deeper passages of the respiratory tract
  - Meter-dose inhalers: deliver a controlled dose of medication with each compression of the canister
  - Dry powder inhalers: breath-activated delivery of medications

- **Infectious agents** are:
  - Bacteria – can be gram positive, gram negative, aerobic, or anaerobic
    - treatment is an antibacterial and the type used depends on the classification of the organism; most significant and most prevalent in hospital settings
    - Spherical (cocci), rod shaped (bacilli), corkscrew shaped (spirochetes)
    - Gram positive or gram negative—based on reaction to Gram stain
    - Aerobic or anaerobic—based on need for oxygen
  - Virus – not treatable by antibacterial medications
    - the smallest of the microorganisms, antivirals can be given during the prodromal stage of illness to shorten the length of infection
  - Fungi – plant-like organisms such as molds and yeasts
    - present in the soil, air, and water
    - may be treated with antifungal medications, however many fungi are resistant (these include ringworm, yeast infections and tinea capitis/corpus/pedis)
  - Parasites – Organisms that live in or on a host and rely on it for nourishment
    - include ticks, helminths, malaria, etc.
- Components of the infection cycle
  - **Virulence:** an organism's ability to cause disease
  - **Endemic:** occurs with predictability within one specific region or population can appear in a different geographic location
  - **Colonization:** an organism resides inside of a person's body, but does not produce any clinical signs or symptoms of infection
  - **Infectious agent:** bacteria, viruses, fungi, normal flora that becomes pathogenic
  - **Reservoir:** natural habitat of the organism
    - Other people, animals, soil, food, water, milk, or inanimate objects
  - **Portal of exit:** point of escape for the organism
    - Body fluids, skin, the respiratory tract, GI tract and GU tract
  - **Means of transmission:** direct contact, indirect contact, airborne route
    - Direct – proximity between the susceptible host and the reservoir
      - kissing, touching, fecal-oral, sexual intercourse
    - Indirect – personal contact with an inanimate object
      - scrubs, telephone, door handle
  - **Portal of entry:** point at which organisms enter a new host
    - Eyes, nares, mouth, vagina, surgical site, drainage tubes, bites
    - Sometimes can be the same as portal of exit
  - **Susceptible host:** must overcome resistance mounted by host's defenses
    - Person with inadequate defenses to the skin or mucous membrane or compromised immune system
    - Usually happens with hospital patients (weakened immune system from illness)
    - Immunosuppression, diabetes, surgery, burns, cardiopulmonary
- Antigen: material or protein the body recognizes as foreign and mounts an immune response against
- Antibody: produced by the body in response to an antigen
- Asepsis: all activities preformed to prevent or interrupt chain of infection
- Nosocomial: infection caught in a health care setting
- Latrogenic: infection resulting from a procedure or treatment
- Afebrile: without fever/at normal body temperature
- Pyrexia: fever/febrile; an elevation in normal body temperature

- How can we break the chain of infection?
  - Immunizations
  - Follow safe injection practice
  - Washing your hands
  - Cover mouth when coughing/sneezing
  - Wear proper PPE
  - Cleaning a disinfecting environment and equipment
- Body's defense against infection
  - Body's normal flora
  - Inflammatory response
  - Immune response
- Stages of infection
  - Incubation period – interval between the pathogen's invasion of the body and the appearance of symptoms of infection
    - organisms growing and multiplying
    - length of this time varies depending on the infectious agent that is present
  - Prodromal Stage – stage in which the infected person is considered infectious
    - early signs and symptoms may be present but are often non-specified
    - symptoms that are limited are referred to as localized symptoms; manifested throughout entire body are considered systemic symptoms. (fever, pain, fatigue)
  - Full stage of illness – specific signs and symptoms are present
    - may be localized or systems, the length of this stage is determined by the infectious agent and the host's susceptibility
  - Convalescent period – period of recovery from the infection, this stage may vary according to the severity of the infection and the patient's condition
    - the signs and symptoms disappear, and a normal state of health is returned
- Acute infection: rapid onset of short duration (common cold)
  - Increased pulse, resp rate, lethargic
- Chronic infection: slow development, long duration (osteomyelitis)
- Latent infection: infection present with no discernible symptoms (TB, herpesvirus, chickenpox, HIV/AIDS)
  - May live within the cell and not cause disease for a long time
- Signs and symptoms of acute infection are:
  - Redness (erythema)
  - Heat
  - Swelling
  - Pain
  - Loss of function
  - Edema
  - Drainage
  - Fever/increased WBC
- Lab data indicative of infection includes:
  - Elevated white blood cell (WBC): normal is 5,000 – 10,000/mm<sup>3</sup>
  - Increase in specific types of white blood cells – differential count (% of each cell type)

- Neutrophils (normal is 60-70%) – increased in acute infections that produce pus; risk for acute bacterial infection if decreased; may also be increased in response to stress
    - Lymphocytes (normal is 20-40%) – increased in chronic bacterial and viral infections
    - Monocytes (normal is 2-8%) – increased in severe infections; function as a scavenger or phagocyte
    - Eosinophil (normal is 1-4%) – may be increased in allergic reaction and parasitic infection
    - Basophil (normal is 0.5-1%) – usually unaffected by infections
  - Elevated erythrocyte sedimentation rate – red blood cells settle more rapidly to the bottom of a tube of whole blood when inflammation is present
  - Presence of pathogen in cultures of urine, sputum, or other wound drainage
- Body temperature may be measured using multiple devices
- Electronic and digital thermometers measure oral, rectal or axillary temperature in 1-60 seconds
  - Tympanic thermometers detect heat given off by the tympanic membrane. Inserted into the ear with the end pointing towards the nose of the patient. Take 1-3 seconds. Accuracy is debated.
  - Disposable single-use thermometers register temperature within seconds. Eliminate danger of cross-infection
  - Temporal artery thermometers capture heat emitted over the temporal artery. One of the more accurate choices
  - Automated monitoring devices measure body temperature, pulse, respirations, and blood pressure all at once. Typically found with patients requiring frequent monitoring
- Methods of obtaining a patient's temperature vary by route and device used. Routes for collecting data about a patient's temperature are oral, tympanic, axillary and rectal.
- When assessing oral temp wait 15-30 minutes if patient has eaten, smoked, is chewing gum or drinking hot or cold fluids. Readings should range from 96.4F-99.5F
  - When assessing tympanic membrane temperature do not touch the thermometer to the skin. This method should not be used in patients with ear drainage, ear pain or ear infection. The readings are similar to oral temperature readings.
  - When assessing an axillary temperature keep in mind readings are approximately one degree lower than oral.
  - When assessing a rectal temperature keep in mind the readings are about one degree higher than oral. This temperature is considered a core temperature. This method is contraindicated in newborns, patients with heart disease or post-op cardiac surgery, children with diarrhea, newborns or neutropenic patients.
- Infection in a patient may alter their vital signs
- Elevation in temperature
  - Elevation in heart rate
  - Elevation in respirations due to increased metabolic rate
  - Elevation of blood pressure in relation to pain and/or increased metabolic rate may occur
- Main categories responsible for hospital-acquired infections (HAI's)
- Catheter-associated urinary tract infection (CAUTI)
  - Surgical site infection (SSI)
  - Central-line associated bloodstream infection (CLABSI)

- Ventilator-associated pneumonia (VAP)
- Infection control measures include adherence to recommended best practices or bundles

➤ Personal protective equipment (PPE)

- Donning PPE: \*HINT: put your hands in the air and work your way up from the ground!
  - Perform hand hygiene
  - Gown
  - Mask/ Respiratory protection
  - Eye protection
  - Gloves
- Doffing PPE: \*HINT: take it off in alphabetical order!
  - Gloves
  - Goggles (if used)
  - Gown
  - Mask
  - Perform hand hygiene

➤ Transmission-based precautions:

- Contact precautions (gloves, mask, eye protection, face shield if care causes splashing or spraying of bodily fluids)
  - Pathogen is spread by direct contact
  - Sources of infection: draining wounds, secretions, supplies
  - Precautions include
    - Possible private room
    - Clean gown and glove use
    - Disposal of contaminated items in room
    - Double-bag linen and mark
- Droplet precautions (mask)
  - Pathogen is spread via moist droplets
  - Diseases: streptococcal pharyngitis, pneumonia, scarlet fever, pertussis, mumps, sepsis
  - Coughing, sneezing, touching contaminated objects
  - Precautions include
    - Same as those for contact
    - Addition of mask and eye protection within 3 ft of client (or while in the room)
- Airborne precautions
  - Pathogen is spread via air currents
  - Diseases: rubeola (measles), TB, varicella
  - Transmission via ventilation systems, shaking sheets, sweeping
  - Precautions include
    - Same as those for contact, with addition of special room (negative air pressure room), special mask (N-95 respirator), and mask for patient when transported

➤ Thermoregulation: system to maintain temperature starts in the brain at the hypothalamus

- How does the hypothalamus help the body to cool down? The hypothalamus detects a rise in temperature and signals the vascular system to respond
- Through selective vasodilatation, blood is shunted toward the surface to cool by heat transfer and sweating

➤ Treatment of hyperthermia: high body temperature

- Increase patient comfort and prevent complications
- Antipyretic (fever-reducing) drugs such as aspirin, ibuprofen, or acetaminophen may be administered in certain circumstances
- Modifications of the external environment (cool sponge bath, cool packs, cooling blankets)
- Increase oral fluids; monitor I&O
- Simple carbs in diet to prevent tissue breakdown

➤ Physical effects of hyperthermia: (above 99.68)

- increased pulse rate and respirations
- hot, dry skin
- flushed face
- thirst
- muscle aches
- fatigue
- loss of appetite
- headache

➤ Treatment of hypothermia: low body temperature

- Rewarming the patient by covering with additional clothing and blankets
- Heating blankets and pads
- Warm fluids can be administered either orally or through IV

➤ Physical effects of hypothermia: (below 97.16)

- Increased respirations
- respirations increase
- pulse becomes weak and irregular, with lowering blood pressure
- poor coordination
- slurred speech
- poor judgement
- amnesia
- hallucinations
- stupor

➤ Factors affecting body temperature

- Circadian rhythms-- temp higher in late afternoon to early evening
- Age and gender-- older adult and infants lose heat faster
- Physical activity-- increases temperature
- State of health-- elevated in illness
- Environmental temperature-- hypothermia or hyperthermia

## **Module 7 – Glucose Regulation and Tissue Integrity**

- The skin changes as the body goes through different developmental stages. Hygiene practices and age influence how the skin is
- In toddler < 2 years of age, skin is thinner and weaker

- Infant's skin is easily injured and subject to infection
- The skin of older adults is thin and easily injured due to prolonged maturation of epidermal cells

➤ Nourishment is an important factor in prevention of wound formation. Well-nourished and hydrated cells are resistant to injury. Dehydration makes the skin appear loose and flabby, making it more vulnerable to injury.

- Wound healing requires adequate proteins, carbohydrates, fats, vitamins and minerals
- Calories and protein are necessary to rebuild cells and tissues
- Vitamin A and C are essential for epithelialization and collagen synthesis
- Zinc plays a role in proliferation of cells
- Fluid balance is necessary for optimal cell function

➤ Principles of wound healing

- Intact skin is the first line of defense against microorganisms
- Careful hand hygiene is used in caring for a wound
- The body responds systematically to trauma of any of its parts
- An adequate blood supply is essential for normal body response to injury
- Normal healing is promoted when the wound is free of foreign material
- The extent of damage and the person's state of health affect wound healing
- Response to wound is more effective if proper nutrition is maintained

➤ Factors affecting wound healing

- Pressure
- Desiccation (dehydration)
- Maceration (overhydration)
- Trauma
- Edema
- Infection
- Excessive bleeding
- Necrosis (death of tissue)
- Presence of biofilm (thick grouping of microorganisms)

➤ Systemic factors affecting wound healing

- Age: children and healthy adults heal more rapidly
- Circulation and oxygenation: adequate blood flow is essential
- Nutritional status: healing requires adequate nutrition
- Wound etiology: specific condition of the wound affects healing
- Health status: chronic illness or immunosuppression
- Medication use: chemo., corticosteroid drugs and postoperative radiation therapy delay healing; prolonged antibiotics leading to secondary infection
- Adherence to treatment plan

➤ Wound complications

- Infection
- Hemorrhage
- Dehiscence
- Evisceration
- Fistula formation

- Types of wound healing
  - Regeneration
    - In epidermal wounds (partial thickness)
    - No scar
  - Primary intention
    - Clean surgical incision/edges approximated
    - Minimal scarring
  - Secondary intention
    - Wound edges not approximated
    - Tissue loss
    - Heals from inner layer to surface
    - Pressure ulcers and infected wounds
  - Tertiary intention (delayed primary closure)
    - Granulating tissue (new tissue that forms during healing process) brought together after time
    - Delayed closure of wound edges
    - Less scarring than secondary but more healing than primary
    - Wounds left open for several days to allow edema or infection to resolve or fluid to drain, and then are closed
- Phases of wound healing
  - Hemostasis
    - ✓ Occurs immediately after injury
    - ✓ A liquid called exudate is made up of plasma and blood components leak out into the injured area causing swelling and pain
    - ✓ Increased perfusion results in heat and redness
    - ✓ Blood vessels constrict
  - Inflammatory phase
    - ✓ Follows hemostasis and lasts about 2-3 days
    - ✓ WBCs move to the wound to ingest debris and release growth factor to initiate tissue proliferation
    - ✓ Macrophages enter the wound area and remain for an extended period
    - ✓ They ingest debris and release growth factors that attract fibroblasts to fill in the wound
    - ✓ The patient has a generalized body response
    - ✓ During this phase the patient has a mildly elevated body temperature and an increase in plasma WBCs
  - Proliferation phase
    - ✓ Lasts several weeks
    - ✓ New tissue is built to fill the wound space through the action of fibroblasts
    - ✓ Capillaries grow across the wound
    - ✓ A thin layer of epithelial cells forms across the wound
    - ✓ Granulation tissue forms a foundation for scar tissue development
    - ✓ Collagen synthesis and accumulation continue based on the size of the wound
    - ✓ Connective tissue forms over time
    - ✓ During this phase adequate nutrition and oxygenation are important patient care considerations
  - Maturation phase
    - ✓ The final stage of healing begins about 3 weeks after the injury occurrence

- ✓ Collagen is remodeled and strengthened
- ✓ New collagen tissue is deposited
- ✓ A scar forms and becomes a flat, thin, white line

➤ Vocabulary to know:

- Dehiscence – The partial or total separation of wound layers because of excessive stress on wounds that are not healed
- Evisceration – A complication of wound dehiscence. The wound completely separates with a protrusion of viscera through the incisional area

➤ Factors affecting pressure injury development

- Immobility
- Nutrition & Hydration
- Moisture
- Mental Status
- Age

➤ Stages of pressure ulcers

- Stage 1 – Skin is intact but reddened and non-blanchable. Localized area typically over a bony prominence. The affected area may be cooler, warmer, painful or soft to the touch.
- Stage 2 – Partial thickness loss of dermis. Visually a shallow open area.
- Stage 3 – Full thickness loss of tissue. Subcutaneous fat may be visible, but bone, tendon or muscle is not exposed. May include undermining or tunneling.
- Stage 4 – Full thickness loss of tissue with bone, tendon or muscle being visible. Sough or eschar may be present, this wound often includes undermining or tunneling.
- Unstageable pressure ulcers – The base of the ulcer is covered by slough or eschar in the wound bed and must be removed before the wound can properly be staged. Stable eschar should not be removed

➤ Nursing strategies to address age-related changes in skin

- Do not apply tape unless necessary
- Check skin frequently (assess any skin breakdown)
- Reposition as needed (at least every 2 hours if unable to reposition self)
- Pad bony prominences as needed
- Check pressure points frequently for any redness
- Clean perineal area daily but do not bathe full body daily
- Apply lotions PRN
- Encourage adequate hydration

➤ Causes of skin alterations

- Very thin and very obese people are more susceptible to skin injury
- Fluid loss during illness causes dehydration
- Skin appears loose and flabby
- Excessive moisture
- Jaundice causes yellowish, itchy skin
- Diseases of the skin, such as eczema and psoriasis, may cause lesions that require special care

➤ Pressure injury assessment

- Risk assessment
- Mobility

- Nutritional status
- Moisture and incontinence
- Appearance of existing pressure injury
- Pain assessment

➤ Skin color assessment

- Redness= Erythema
- Bluish= Cyanosis
- Yellowish= Jaundice
- Paleness= Pallor
- Vitiligo= Whitish patchy areas on the skin
- Tanned or Brown= Sun-exposed areas

➤ Wound assessment

- Inspection for sight and smell
- Palpation for appearance, drainage, and pain
  - Serous drainage
  - Sanguineous drainage
  - Serosanguineous drainage
  - Purulent drainage
- Sutures, drains or tubes, and manifestation of complications

➤ Presence of infection

- Wound is swollen
- Wound is deep red in color
- Wound feels hot on palpation
- Drainage is increased and possibly purulent
- Foul odor may be noted
- Wound edges may be separated, with dehiscence present

➤ Cleaning pressure injury/wound

- Clean with each dressing change
- Use new gauze for each wipe and clean from top to bottom and/or from the center to the outside
- Use 0.9% normal saline solution to irrigate and clean the injury
- Once the wound is cleaned, dry the area using a gauze sponge in the same manner
- Report any drainage or necrotic tissue

➤ Types of drainage systems

- Open systems
  - Penrose drain
- Closed systems
  - Chest tubes
  - Jackson-Pratt drain
  - Hemovac drain
  - T-tube

➤ Dysphagia: difficulty swallowing

- Signs: coughing, abnormal movements during swallowing, change in voice quality
- Complications: ASPIRATION (can be "silent")
  - Aspiration pneumonia

- Dehydration/malnourishment
- Administering enteral nutrition
  - Assess skin surface – nares or abdomen
  - Fluid balance
  - Weight
  - Frequency and consistency of bowel movements
  - Bowel Sounds and Abdominal Distension
  - Serum Electrolytes, urine for sugar and acetone, hematocrit, urine specific gravity, BUN and Sodium
  - Skin Turgor
- Nursing interventions:
  - Teaching nutritional information
  - Monitoring nutritional status
  - Stimulating appetite
  - Assisting with eating
  - Providing oral nutrition
  - Providing long-term nutritional support
- Diabetes Mellitus
  - Deficiency of pancreatic hormone insulin
  - Results in failure to metabolize sugars and starch
  - Sugars accumulate in the blood and urine
  - By products of alternative fat metabolism disturb acid-base balance causing risks
- Risk Factors of DM
  - Older age (>45 years old)
  - Obesity
  - Family history of diabetes
  - History of gestational diabetes
  - Impaired glucose metabolism
  - Physical inactivity
  - Race/ethnicity
    - African Americans, Hispanics/Latinos, American Indians, some Asians, and Native Hawaiians or other Pacific Islanders are at particularly high risk of diabetes
- Signs and symptoms
  - Increased thirst or hunger
  - Frequent urination
  - Weakness
  - Fatigue
  - Blurry vision
  - Tingling in the hands or feet
  - Sores that are slow to heal
- Complications of DM
  - Skin infections
  - Gum disease
  - Retinopathy
  - Depression

- Stroke
- Blindness
- Nerve damage (neuropathy)
- Foot amputation
- Kidney disease
- Heart failure
- Diabetic ketoacidosis
- Coma
- Death

➤ Hypoglycemia: signs and symptoms

- Confusion
- Dizziness
- Diaphoresis
- Feeling shaky
- Hunger
- Headaches
- Irritability
- Pounding heart; racing pulse
- Pale skin
- Blood sugar less than 70 mg/dL

➤ Hyperglycemia: signs and symptoms

- Increased thirst
- Headaches
- Difficulty concentrating
- Blurred vision
- Frequent urination
- Fatigue (weak, tired feeling)
- Weight loss
- Blood sugar more than 180 mg/dL
- Remember: 3 P's:
  - Polydipsia (excessive thirst)
  - Polyuria (excessive passage of urine)
  - Polyphagia (excessive hunger)

POTENTIAL COMPLICATION	PREVENTIVE INTERVENTIONS
Aspiration	<ul style="list-style-type: none"> <li>• Use appropriate measures to check tube placement.</li> <li>• Elevate head of bed at least 30–45 degrees during feeding and for 1 hour afterward.</li> <li>• Give small, frequent feedings.</li> <li>• Avoid oversedation of patient.</li> <li>• Check residual volume per policy.</li> </ul>
Clogged tube	<ul style="list-style-type: none"> <li>• Flush tube before and after feeding, every 4 hours during continuous feeding, and after withdrawing aspirate.</li> <li>• Sterile water should be used for tube flushes in immunocompromised or critically ill patients (Allen, 2015; Bankhead et al., 2009).</li> <li>• Instill 30 mL of warm water with 50- or 60-mL syringe to attempt to unclog tube.</li> </ul>
Nasal erosion with nasogastric or nasointestinal tubes	<ul style="list-style-type: none"> <li>• Check nostrils every shift for signs of pressure.</li> <li>• Clean and moisten nares every 4–8 hours.</li> <li>• Start feeding at slow rate.</li> </ul>
Diarrhea	<ul style="list-style-type: none"> <li>• Prevent contamination in both open and closed systems.</li> <li>• Change delivery set every 12 to 24 hours according to facility policy.</li> <li>• Refrigerate opened cans of formula and discard after 24 hours.</li> <li>• Limit hang time to 4 hours when using open system.</li> <li>• Use aseptic technique for patients who are immunosuppressed or acutely ill.</li> <li>• Assess for fecal impaction.</li> </ul>
Other GI symptoms (nausea, vomiting, distention)	<ul style="list-style-type: none"> <li>• Check residual prior to intermittent feedings and every 4 hours during continuous feedings.</li> <li>• Avoid oversedating patient (delays gastric emptying).</li> <li>• Administer GI motility medications (metoclopramide), as ordered.</li> </ul>
Unplanned extubation	<ul style="list-style-type: none"> <li>• Anchor tube adequately with commercial device, elastic net, or tape.</li> <li>• Check on patient frequently.</li> <li>• Measure external length of tubing at regular intervals.</li> </ul>
Stoma infection	<ul style="list-style-type: none"> <li>• Clean skin every shift with soap and warm water. Dry thoroughly.</li> <li>• Use topical antibiotics and/or antifungals, as ordered.</li> <li>• Assess for signs of infection.</li> <li>• Request a consult with a wound care specialist, as needed.</li> </ul>

**Focus on the Older Adult****NURSING STRATEGIES TO ADDRESS AGE-RELATED CHANGES AFFECTING NUTRITION**

<b>Age-Related Changes</b>	<b>Nursing Strategies</b>
Altered ability to chew related to loss of teeth, ill-fitting dentures, and gingivitis	<ul style="list-style-type: none"><li>• Encourage and instruct patient to care for and retain own teeth and dentures.</li><li>• Encourage proper tooth brushing and use of special toothpaste if gums and teeth are sensitive.</li><li>• Chop, shred, or puree foods that are difficult to chew.</li><li>• Select ground meat, fish, or poultry as protein sources more easily chewed.</li></ul>
Loss of senses of smell and taste	<ul style="list-style-type: none"><li>• Serve food that is attractive and at proper temperature.</li><li>• Serve one food at a time rather than mixing foods.</li><li>• Serve foods with different textures and aromas.</li></ul>
Decreased peristalsis in the esophagus	<ul style="list-style-type: none"><li>• Avoid cold liquids.</li><li>• Avoid emotional upsets and stress-producing situations.</li><li>• Take anticholinergic drugs as ordered by physician.</li></ul>
Gastroesophageal reflux	<ul style="list-style-type: none"><li>• Avoid overeating.</li><li>• Avoid juices, chocolate, and fat.</li><li>• Avoid alcohol and smoking.</li><li>• Elevate the head of the bed 30 to 40 degrees when sleeping.</li><li>• Lose weight if necessary.</li><li>• Avoid bending over.</li><li>• Take antacids or other medications as ordered by physician.</li><li>• Avoid eating right before bedtime.</li></ul>
Decreased gastric secretions	<ul style="list-style-type: none"><li>• Chew food thoroughly.</li><li>• Eat meals on a regular schedule.</li><li>• Use antacids or other medications as prescribed by physician.</li><li>• Be alert for symptoms of deficiency of nutrients, particularly iron, calcium, fat, protein, and vitamin B<sub>12</sub>.</li></ul>
Slowed intestinal peristalsis	<ul style="list-style-type: none"><li>• Eat a high-fiber diet.</li><li>• Remain as active as possible.</li><li>• Increase fluid intake.</li><li>• Avoid laxative use.</li><li>• Eat meals at a regular time.</li><li>• Drink prune juice or eat prunes every morning.</li></ul>
Lowered glucose tolerance	<ul style="list-style-type: none"><li>• Eat more complex carbohydrates.</li><li>• Avoid sugar-rich foods.</li></ul>
Reduction in appetite and thirst sensation	<ul style="list-style-type: none"><li>• Offer fluids at regular intervals and at preferred temperature.</li><li>• Be alert for symptoms of dehydration and electrolyte imbalance.</li><li>• Offer small meals at frequent intervals.</li></ul>
Nutritional deficiencies related to alcohol intake	<ul style="list-style-type: none"><li>• Encourage diet high in protein and carbohydrates.</li><li>• Offer small, frequent meals to maintain caloric intake.</li><li>• Restrict sodium and fluids if edema is present.</li><li>• Take multivitamin supplements, as ordered by physician.</li></ul>
Loss of appetite associated with depression and loneliness	<ul style="list-style-type: none"><li>• Promote mealtime as a social event.</li><li>• Set an attractive table in a pleasant setting.</li><li>• Eat outdoors whenever possible.</li><li>• Invite guests as often as possible.</li><li>• Participate in special programs for senior citizens.</li></ul>
Physical disability	<ul style="list-style-type: none"><li>• Open cartons and assist with setup of meal.</li><li>• Arrange for home-delivered meals.</li><li>• Conserve energy when preparing meals (sit on a stool, etc.).</li><li>• Provide transportation and assistance to obtain food.</li></ul>
Low income	<ul style="list-style-type: none"><li>• Buy specials when available at food store.</li><li>• Use generic brands.</li><li>• Use coupons.</li><li>• Cook larger quantities than necessary and freeze the leftovers for future use.</li><li>• Substitute eggs, skim milk powder, and beans for meat.</li><li>• Check for any community resources available to older adult.</li></ul>
Malnutrition	<ul style="list-style-type: none"><li>• Eat essential foods first.</li><li>• Select nutrient-dense foods.</li><li>• Monitor for signs of nutritional deficiencies.</li><li>• Encourage eating by planning special events.</li></ul>
Increased risk for drug-nutrient interactions	<ul style="list-style-type: none"><li>• Avoid unnecessary drugs; monitor for polypharmacy.</li><li>• Be aware of drug actions and interactions.</li><li>• Check with pharmacist to determine if medication may or may not be taken with food.</li><li>• Assess for confusion and inability to manage medication regimen.</li></ul>

### **Practice Questions**

1. Standard precautions should be used when caring for a noninfectious, postoperative patient who is vomiting blood.

- A. True
- B. False

2. A patient can stop taking an antibiotic when they start feeling better again.

- A. True
- B. False

3. Which of the following is the most significant and commonly found infection-causing agent in health care institutions?

- A. Bacteria
- B. Fungi
- C. Viruses
- D. Mold

4. During which stage of infection is the patient most contagious?

- A. Incubation period
- B. Prodromal stage
- C. Full stage of illness
- D. Convalescent period

5. Soaps and detergents (nonantimicrobial agents) are considered adequate for routine mechanical cleansing of the hands and removal of most transient microorganisms.

- A. True
- B. False

6. Where is the thermoregulatory center of the body?

- A. Thyroid
- B. Neurons
- C. Hypothalamus
- D. Atrioventricular node

7. Which infection or disease may be spread by touching a contaminated inanimate article?

- A. Rabies
- B. Giardia
- C. E. coli
- D. Influenza

8. The nurse concludes that person is experiencing hyperthermia. Which assessment precipitated this conclusion?

- a. Mental confusion
- b. Increased appetite
- c. Decreased heart rate
- d. Rectal temperature of 101 degrees F

9. The nurse is interviewing a newly admitted patient. Which patient statement indicates the onset of fever? "I feel..."

- a. "Cold"
- b. "Warm"
- c. "Sweaty"
- d. "Thirsty"

10. The nurse identifies that a patient has an inflammatory response. Which local patient adaptation supports this conclusion?

- a. Fever
- b. Erythema
- c. Bradypnea
- d. Tachycardia

11. A patient is positive for Clostridium Difficile (C-diff). The nurse should institute the isolation precaution known as:

- a. Droplet
- b. Contact
- c. Reverse
- d. Airborne

12. The nurse is caring for a group of hospitalized patients. What should the nurse do first to prevent patient infections?

- a. Provide small bedside bags to dispose tissues
- b. Encourage staff to avoid coughing near patients
- c. Administer antibiotics as ordered
- d. Identify patients at risk

13. Which nursing action protects the patient as a susceptible host in the chain of infections?

- a. Wearing personal protection equipment
- b. Administering childhood immunizations
- c. Recapping a used needle before discarding
- d. Disposing of soiled gloves in a waste container