Fundamentals HESI Study Guide

Fundamentals of nursing (Duquesne University)

Fundamentals HESI Study Guide

Vital Signs:

August 22

- Temperature, pulse, respiration, blood pressure, pulse ox
- Temperature: lower in the morning, highest in the evening, 98.6 F-100.4 F, 36-38 C
- Pulses: carotid, brachial, radial, ulnar, femoral, popliteal, dorsalis pedis, posterior tibial
- Loudest heart sounds heard at apical pulse
- Normal heart rate:
  - Infants: 120-160
  - Toddler: 90-140
  - Adolescent: 60-90
  - Adult: 60-100
- Tachycardia vs. bradycardia
  - Tachycardia: greater than 100
  - Bradycardia: less than 60
- Strength of pulse: 0: absent, 1: weak, 2: normal, 3: full, 4: bounding
- Amplitude: volume of blood pushed against the wall of an artery during ventricular contraction
- Ox saturation: usually 95% to 100%
- Systolic: force exerted as left ventricle **contracts** and pumps blood into aorta → MAX PRESSURE
- Diastolic: force exerted during ventricular **relaxation**, when heart is filling → MINIMUM PRESSURE
- Blood pressure ranges
  - Normal: <120, <80
  - Prehypertension: 120-139, 80-89
  - Stage 1 Hypertension: 140-159, 90-99
  - Stage 2 Hypertension: >160, >100
- Blood pressure cuff…
  - Too wide: false low
  - Too narrow: false high

Patient Safety and Quality:

August 22

- Fall risk: age, medication, post op, confusion, previous history, repeated falls, bone fractures, etc.
- Make sure patient is aware of environment → items at reach, call light, phone, etc.
- Restraint:
    - Last resort – try all other options first ** all other possibilities have been tried and failed, benefits outweigh the risks
    - Behaviors that result: wandering, restlessness, violence, agitation, pulling out tubes, resisting care
    - Alternatives: treat pain, rule out physical causes for agitation, involve family, reduce stimulation, noise, light, environmental factors, use therapeutic touch, discontinue bothersome treatment
    - NEED ORDER WITHIN 1 HOUR AFTER APPLICATION
    - RENEWED EVERY 24 HOURS
    - Only one restraint at a time (physical or chemical – no two at once)
    - REMOVE EVERY 2 HOURS FOR ASSESSMENT AND NEEDS (skin integrity, ROM, circulation)
- Fire Safety
    - RACE
        - Rescue, alert, contain, extinguish
    - PASS
        - Pull, aim, squeeze, sweep

Hygiene:

August 24

- Wash legs from distal to proximal to promote venous return
- Observe skin for warmth, redness, swelling, rashes, tenderness, pain, etc. while bathing
- Do not massage reddened areas on client's skin
- Wear gloves when: washing perineum, anal areas, skin infections, skin not intact, open wounds, draining, oozing skin, performing oral care
- Female: front to back
- Male: retract foreskin, wash from urethral meatus and outward, return foreskin to natural position
- Apply lotion → skin barriers especially on pressure points

- Empty urine drainage bag at least every 8 hours
- Keep catheter bag lower than patient to prevent backflow of urine
- Condom catheter: check for skin irritation, change in 24 HOURS

Infection Prevention and Control

August 24

- Infectious agent → reservoir → portal of exit → mode of transmission → portal of entry → susceptible host
- Susceptible host for germs: strength in numbers, impaired nutritional status, chronic disease, trauma
- Blood borne pathogens: HEP B, HEP C, HIV
- Transmission: accidental injuries (needle pricks, sharps, blood/fluid splashes), sharing needles, blood and blood product transfusion, sexual contact
- Universal precaution → treat all patients as if they were infectious
- Hand hygiene: wash for 15 seconds, GLOVES DO NOT TAKE PLACE OF HAND HYGIENE
- PPE:
    - PUT ON: 1: gown, 2: mask, 3: goggles, 4: gloves
    - TAKE OFF: 1: gown, 2: gloves, 3: goggles, 4: mask, 5: wash hands
- Precautions:
    - Airborne
        - Mask
        - Negative pressure (door shut)
        - Common: TB, measles
    - Droplet
        - Mask
        - Gloves
        - Common: meningitis, pneumonia, influenza, rubella
    - Contact
        - Gown
        - Gloves
        - Common: MRSA, VRE, lice, major draining wounds, e-coli

- Contact (C. Diff)
  - Gown
  - Gloves
  - WASH HANDS → NO HAND SANITIZER
- Airborne/Contact
  - Mask
  - Gown
  - Gloves
  - Common: varicella, herpes, SARS, small pox
- Droplet/Contact
  - Gown
  - Gloves
  - Mask
  - Common: flu, MRSA, pneumococcus, VRSA, ESBL

Nutrition

August 29

- Digestion: begins in mouth ends in small and large intestine
- Absorption: small intestine is primary site
- Enteral tube feeding:
  - Orogastric → mouth to stomach
  - Nasogastric → nose to stomach
  - Nasointestinal → nose to intestines
  - Gastrostomy → stomach tube from outside
  - Jejunostomy → intestine tube from outside
- NG Tube: measure from nose to ear lobe to xiphoid process
- NG tube placement: pH of 1 to 4 is good indication
- Continuous feeding: always going
- Intermittent or bolus feeding: nurse gives food at certain time through tube
- Complications
  - Clogged tube: flush 30 mL of water every 4 hours after checking residual volume, flush → med → flush
  - Develops nausea and vomiting: withhold feeding, notify physician, check patency of tube, aspirate for gastric residual, for cramping and nausea, decrease the administration rate
  - Gastric residual exceeds normal volume: notify physician, elevate to at least 30 degrees, reassess

residual volume after 1 hour you stop the feeding to see if volume has changed
    - Hyperglycemia: measure glucose every 6 hours
    - Develops diarrhea 3+ times in 24 hours: notify physician, report type, status of tube, patient tolerance, adverse effects, etc.
- Placing an NG tube:
    - 1: verify order
    - 2: place patient into high fowlers
    - 3: measure intended length
    - 4: lubricate the tube tip with water soluble lube
    - 5: direct the tube upward and backward along the floor of the nose
    - 6: instruct the patient to place chin to chest
    - 7: advance the tube while patient swallows

Sleep

August 29

- Stage I, II, III, IV, REM
- Common: insomnia, sleep apnea, narcolepsy, sleep deprivation
- Epworth Sleepiness Scale: score 0-3 on likeliness for an activity to happen
- Pittsburgh Sleep Quality Index: score 0-3 on how common it is to do such activity
- Improving sleep: routine, pharmacological approaches, stress reduction, control environment

Immobility

August 31

- Mobility assessment focuses on: ROM, gait, exercise, activity tolerance, body alignment
- Supine: laying upwards
- Prone: laying downwards
- High fowlers: 90
- Mid fowlers: 45
- Low fowlers: 30
- Active ROM: client moves all joints unassisted

- Passive ROM: client unable to move independently, nurse moves joint through ROM
- Center of gravity near hips, line of gravity in the middle of body
- Consequences of immobility:
    - *** renal calculi, altered metabolic function
    - Metabolic
        - Decreased rate, negative nitrogen and calcium balance, anorexia
    - Respiratory
        - Decreased movement, pooling of secretions, atelectasis, hypostatic pneumonia
    - Cardiovascular
        - Diminished cardiac reserve, increased heart rate, orthostatic hypotension, venous vasodilation, stasis (dependent edema, thrombus formation)
    - Musculoskeletal changes
        - Decrease in muscular strength
    - Elimination
        - Urinary stasis, renal calculi, retention, infection, constipation
    - Integumentary
        - Reduced skin turgor, skin breakdown
    - Psychosocial
        - Lowering self-esteem, withdrawn, angry, aggressive
- Care for immobilized patient
    - High protein, high caloric diet with vitamin B and C, fluids, veggies, fiber
    - Cough and deep breath every 1-2 HOURS
    - Chest physiotherapy
    - Slow progression when client is ready
    - Passive/active ROM
    - Reposition every 1-2 hours
    - Adequate hydration
    - Routine and informal socialization
- Lifting: close to body, bend at knees, tuck pelvis → WORKPLACE INJURY

- Do not drag patient across bed → shear skin
- If more than 35 pounds, use assistive devices

Therapeutic Communication

August 31

- Communication barriers: bias, culture, education
- Nonverbal communication: appearance, posture, gait, facial expressions, eye contact, gestures, sounds
- Active listening: being attentive to verbal and nonverbal
- Open ended questions
- One question at a time
- Best communicators = develop critical thinking skills

Non-therapeutic Communication

August 31

- False reassurance, rejecting, minimizing, probing, defending, sympathizing, changing the subject, advising, stereotyping, socializing, judging, closed-ended questions, why questions

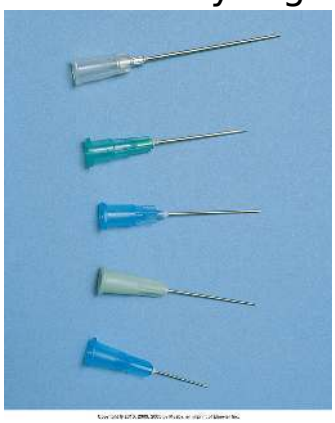
Medication Administration

September 7

- Drug names
  - Chemical: provides description of medication composition, ex. n-acetyl-p-amino-phenol
  - Generic: assigned name, ex. acetaminophen
  - Trade: brand name, ex. Tylenol
- FORM DETERMINES ROUTE
- Pharmacokinetics: study of medications and what they do in the body
- Absorption, distribution, metabolism, excretion
- Absorption: passage of medication molecules **into the blood** from site of admin
- Factors that affect ABSORPTION:
  - Route of administration
  - Ability to dissolve
  - Blood flow to site
  - Body surface area
- Distribution: occurs within the body to tissues, organs, and specific sites from the **blood to the tissues**

- Factors that affect DISTRIBUTION:
  - Circulation
  - Membrane permeability
  - Ex. person with heart problems does not have good circulation = slower distribution
- Metabolism: meds are metabolized into **a less potent or inactive form**
- Factors that affect METABOLISM:
  - Enzymes that detoxify, break down, and remove active chemicals
  - Liver, kidney, blood, intestines, lungs
- Excretion: **med out of the body**
- Factors that affect EXCRETION:
  - Kidney, liver, bowel, lungs, exocrine glands
  - ** chemical makeup of medications determines the organ of excretion!
- Biotransformation = DETOXIFY
- Idiosyncratic reaction = overreacting or underreacting to meds
- Medication interactions: when one med modifies the action of another
- Medication errors: report, PATIENT SAFETY IS TOP PRIORITY
- Routes: oral (sublingual under tongue, buccal side of mouth), topical, inhalation, parenteral (ID, sub-q, IM, IV), intraocular
- Always check with pharmacy before crushing pills
- Do NOT give water after cough meds, mouth rinses, or antacids
- VERBAL orders: write down, read back, confirms
- Medication reconciliation: review meds with what patient should take and decrease the amount of unintended med interactions
- Topical meds: use gloves, use sterile gloves if patient has open wound, clean skin first
- Adult: pinna up and outward
- Child: pinna down and back
- DO NOT DELEGATE NURSES ROLE FOR MED ADMINISTRATION
- Syringes

- A: 5 mL syringe
- B: 3 mL syringe
- C: Tuberculin syringe (PPD)
- D: Insulin syringe



- Top 1: 19 gauge, 1 ½ inch length
- 2: 20 gauge, 1 inch length
- 3: 21 gauge, 1 inch length
- 4: 23 gauge, 1 inch length
- 5: 25 gauge, 1 inch length

- Parts of a syringe: plunger (avoid touching), barrel, tip
- Parts of a needle: bevel, shaft, hub, gauge number
- Guage: thickness
- Measurement: length
- INJECTIONS
  - Intramuscular (IM): into the muscle, 90 degree
    - Faster absorption than subq route
    - Mank risks
    - ASPIRATE: if blood, remove and repeat
    - Needles: **21-23 gauge**
    - Z-track method: take one hand and pull skin back with side of hand (use when sensitive) → SPREAD SKIN
    - Patient BMI affect needle size selection

        - VENTROGLUTEAL, VASTUS LATERALIS, DELTOID
    - Subcutaneous (Sub-Q): into the subq tissue, 45 or 90 degree
        - Slower absorption than IM injections (blood supply is not as rich in the fat)
        - PINCH SKIN
        - Body weight indicates depth of fat layer → choose length and angle of needle insertion based on patient weight
        - Blood thinners (heparin): do NOT aspirate, administer at least 2 inches from umbilicus or any scar tissue, do NOT rub injection site
        - Needles: **25-27 gauge**
        - OUTER POSTERIOR OF ARMS, UPPER BACK, DORSAL GLUTEAL, ABDOMEN, ANTERIOR ASPECTS OF THIGHS
    - Subcutaneous → Insulin: injected because GI tract breaks down and destroys oral form of insulin
        - 100-unit syringe
        - ** know onset, peak, and duration of ordered insulin doses
        - do not mix insulins unless approved by prescriber
        - inject rapid-acting insulins 15 minutes before a meal
        - MIXING: draw up CLEAR (fast acting) before CLOUDY (long acting!!! NPH) to prevent contamination
        - Air in cloudy, air in clear, draw up clear, draw up cloudy
    - Intradermal (ID): into skin (dermis), 15 degrees
        - Used for TB, allergies
        - Need to see injection site clearly for changes or reactions
        - Slow absorption
        - Needle: **27 gauge**

Math:

September 12

- Practice problems

Oxygenation:

September 14

- Blood is oxygenated through ventilation, perfusion, and transport of respiratory gases
- Ventilation: the process of moving gases in and out of the lungs
- Inspiration/expiration: active/passive process stimulated by receptors in the aorta
- Pulmonary circulation: blood to capillaries → deoxygenated blood, blood away from capillaries → oxygenated blood
- Hyperventilation: breathing in excess to eliminate carbon dioxide
- Hypoventilation: inadequate breathing to meet oxygen demands of the body
- Hypoxia: not enough oxygen to the tissues → may appear restless, get anxious, agitated, treated with OXYGEN THERAPY
- Assessment:
    - Dyspnea
    - Wheezing, coughing
    - Pain
    - Hx of respiratory infections
    - Smoking, environmental exposures
    - Allergies
    - Medications
- Examination: inspection, palpation, percussion, auscultation
    - Inspection: color, LOC, breathing patterns, chest wall movement
    - Palpation: any areas of tenderness, abnormal masses
    - Percussion: presence of abnormal fluid
    - Auscultation: abnormal lung sounds → posterior, anterior, lateral
- Incentive spirometer encourages voluntary deep breathing, lung expansion
- Chest physiotherapy: rhythmically clapping on the chest wall to drain secretions from lungs
    - Respiratory therapist's job

    - Not painful
- Dyspnea: heavy breathing
- Types of oxygen therapy:
    - Nasal cannula: 1-6 liters, limited, short term use
    - Simple face mask: provides up to 60% concentration (6-10 liters)
    - Partial rebreather mask: two way valve to stimulate breathing by rebreathing exhaled air, provides 65-75% concentration (6-10 liters) and HAS reservoir bag (keep inflated at all times)
    - Non-rebreaher mask: has vents to allow exhaled air to escape, delivers 60-95% concentration (10-15 liters), HAS reservoir bag (keep inflated)
    - Venturi mask: percentage of oxygen is delivered from what is set on machine
- **** NON REBREATHER HAS ONE WAY VALVES
- Oxygen is combustible!!!!!!!
- Caring for chest tubes:
    - Keep system closed and below chest
    - Tube should be secured to chest wall
    - Watch for slow and steady bubbling in the suction control chamber
    - Keep it filled with sterile water at prescribed level
    - Water seal chamber is filled → BUBBLING IN WATER SEAL CHAMBER IS BAD, LEAKAGE IN DRAINAGE SYSTEM
    - Mark the level of drainage
    - No kinked tubing
    - Frequent repositioning
    - Do not clamp tube
- Artificial airways:
    - Oral: prevents obstruction of trachea by displacing tongue → comatose patient?

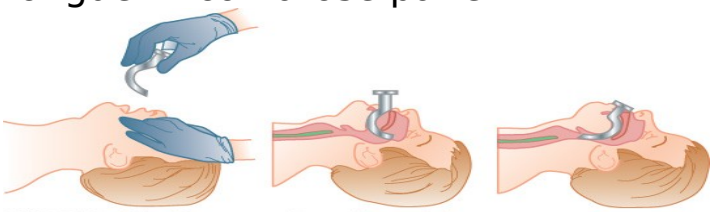
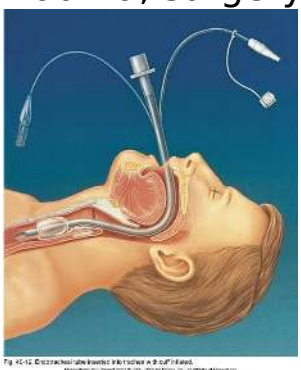


FIGURE 9-15. Maintaining a patent airway with an oral airway.
(From Durbin, C. G. [2004]. Airway management. In J. M. Cairo & S. P. Pilbeam (Eds.), Mosby's respiratory care equipment [7th ed., p. 157]. St. Louis: Mosby.)

- Endotracheal: short term use to ventilate or relieve upper airway obstruction → use when risk of aspiration, difficult breathing, swelling of oral cavity, airway, trauma, surgery, etc. → high risk of infection



- Tracheostomy: surgical insertion into trachea and short artificial airway is inserted → long term, emergency insertion

- Suctioning: remove junk from airway → patient needs STAT suctioning when gurgling sound is heard with artificial airway
  - Oropharyngeal: suction in mouth with yankeur – patient can cough but not clear secretions
  - Nasopharyngeal: suction with measured tube – patient can cough but not clear secretions
  - Orotracheal/Nasotracheal: unable to manage secretions
  - Endotracheal and tracheal: used with artificial airway
    - Open: sterile
    - Closed: pre-oxygenate, introduce suctioner, suction, may repeat
- Documentation:
  - Suctioning:
    - Amount
    - Color
    - Consistency
    - Source

        - Tolerance of procedure
    - Artificial airways:
        - Time
        - Meds used?
        - Patient condition
        - Size and tube placed
        - Placement of tube
        - Cuff inflation

Nursing Process:

September 19

- Assessment: gather info about the condition
- Diagnosis: identify patient problems
- Plan: set goals of care and desired outcomes
- Implement: perform actions identified in planning
- Evaluate: determine if goals and outcomes are achieved
- Concept mapping: a visual representation that illustrated the connections between health problems → holistic perspective
- Data collection:
    - Primary: patient
    - Secondary: family, health care team, medical records, etc.
- Subjective vs Objective data
- Open ended questions vs closed ended questions
- Verbal vs nonverbal communication/observation
- Assessment moves from general → specific
- Cultural considerations → if you don’ t know, ask!

Nursing Diagnosis:

September 21

- Medical diagnosis: identifying a disease based on specific evaluation of signs and symptoms
- Nursing diagnosis: an actual or potential complication that nurses monitor to detect change in status
    - Examples: ineffective airway clearance, anxiety, deficient knowledge, spiritual distress

Documentation:

September 26

- Systematic, continuous, EVERYTHING DOCUMENTED OR IT WASN'T DONE
- Must be factual, complete, accurate, current, organized
- Start discharge planning upon admission
- Consultant: professional caregiver providing formal advice to another
- Referrals: arrangement for services by another care provider
- SOAP:
  - Subjective
  - Objective
  - Assessment
  - Plan
- SOAPIER
  - Subjective
  - Objective
  - Assessment
  - Plan
  - Intervention
  - Evaluation
  - Revision

Patient Education:

September 28

- Teach information needed to promote, restore, and maintain optimal health
- Education includes: promotion, maintenance, prevention, restoration, and coping
- Teach information that the patient and family need to make decisions about care
- Health literacy: social skills that determine the ability to use info in ways to promote health
- Self-efficacy: ones perceived ability to complete a task
- Domains of learning:
  - COGNATIVE: discussion, acquiring knowledge, lecture, question and answer session

    - AFFECTIVE: role play, acceptance of feelings
    - PSYCHOMOTOR: demonstration and return demonstration

Urinary Elimination:

October 3

- Organs in the urinary system:
    - Kidneys: maintaining fluid and electrolyte balance by filtering wastes
    - Ureters: transport urine from kidneys to bladder
    - Bladder: place where urine sits until urge to urinate
    - Urethra: urine travels from bladder and exits through urethral meatus
- Use skin and mucosal membranes to assess hydration
- Distended bladder rises above the symphysis pubis
- Oliguria: small amounts of urine
- Urine:
    - Pale-straw (normal) to amber color (irregular)
    - Transparent
    - Ammonia odor is normal
- Urinary diversions: taking urine out a different way than body is used to
- Pyelonephritis: kidney infection
- Factors affecting urination:
    - Pre-renal, renal, post-renal
    - Anxiety, emotional stress, privacy issues
    - Coffee, tea, cocoa, cola INCREASE urine formation
    - Alcohol DECREASE urine formation – increase water loss
    - Fever causes highly concentrated urine but DECREASES urine volume
- Catheters:
    - Intermittent urethral catheter: used to drain bladder for short periods (5-10 minutes)
    - Indwelling urethral catheter: used to remain in place for continuous drainage

Bowel Elimination:

October 5

- Begins in mouth, ends in anus
- Small intestine:
  - Duodenum, jejunum, ileum
- Large intestine:
  - Ascending colon, transverse colon, descending colon, sigmoid colon, rectum, and anus
- Large intestine does not absorb nutrients
- Enemas: relieves constipation, cleans bowels before procedure
- Peristalsis: contractions that make you poop
- Black, tarry stool = blood
- Factors that affect → age, diet, fluids, physical activity, pregnancy, medications, etc.
- Bowel diversions:
  - Stoma: temporary or permanent artificial opening in abdominal wall (standard)
    - MALODORUS FLATUS IS NORMAL GAS IN A STOMA
  - Ileostomy or colonoscopy: surgical opening in the ileum or colon

Sexuality:

October 17

- Bacterial STIs: syphilis, gonorrhea, chlamydia
- Viral SRIs: HPV (genital warts), HSV (genital herpes) **most common, HIV/AIDS
- Contraception
- Abortion
- Infertility = inability to conceive after 1 year of unprotected intercourse
- “I feel happier but my sex drive is gone” → sexual dysfunction

Skin Integrity and Wound Care:

October 19

- Epidermis → dermis → subcutaneous tissue
- Risk for pressure ulcers:
  - Older adults, those who have experienced trauma

    - Those with spinal cord injuries
    - Those who have fractured hip
    - Long-term homes, community care, acutely ill, in critical care settings
    - Individuals with diabetes***
- Pressure intensity – tissue ischemia occurs when the pressure applied over a capillary exceeds the normal capillary pressure and the vessel is occluded for periods of time
- Hyperemia: redness – vasodilation (blood vessel expansion) → is this blanchable/nonblanchable
- Early signs of skin damage include induration (stiffness) and increased warmth at the injury site
- Pressure duration – low pressure over a long period / high pressure over a short period → extended pressure contributes to cell death
- Tissue tolerance – shear, friction, and moisture affect ability to tolerate pressure → poor nutrition, increased aging, hydration status, low blood pressure
- RISKS FOR DEVELOPMENT: impaired sensory perception, impaired mobility, altered level of consciousness, shear, friction, moisture
- Pressure Ulcer Classifications:
    - Stage 1: non-blanchable redness, skin intact, warmth, edema, hardness
    - Stage 2: partial-thickness, shallow, open ulcer with red-pink wound bed without slough, serum filled/serosanguinous filled blister
    - Stage 3: full-thickness SKIN loss, subcutaneous tissue may be present but NO tendon, bone, etc., slough, eschar, tunneling, undermining
    - Stage 4: full-thickness TISSUE loss, exposed bone, tendon, muscle, slough, eschar, tunneling, undermining
    - Unstageable: actual depth of ulcer is completely obscured, wound bed is unstageable, debridement of wound bed may expose III or IV

    - Deep-Tissue Injury: purple or maroon intact skin or blood-filled blister caused by damage of underlying soft tissue
- ACUTE: heals through orderly and timely manner
    - Causes: trauma, surgical incision
    - Implications of healing: clean and intact wound edges
- CHRONIC: fails to heal through orderly and timely manner
    - Causes: vascular compromise, chronic inflammation, insults to tissue
    - Implications of healing: continued exposure to insult impedes wound healing
- PRIMARY INTENTION: wound that is closed
    - Causes: surgical incision, sutured or stapled wound
    - Implications of healing: epithelialization, minimal scar formation
- SECONDARY INTENTION: wound edges are not approximated
    - Causes: pressure ulcers, surgical wounds that have tissue loss or contamination
    - Implications of healing: granulation, wound contraction, epithelialization
- TERTIARY INTENTION: wound is left open for several days, then wound edges are approximated
    - Causes: contaminated wounds and require observation for signs of inflammation
    - Implications of healing: closure of wound is delayed until risk of infection is resolved
- Higher the “intention” (primary → secondary → tertiary) the higher the risk for infection, higher degree of tissue loss, higher risk for the loss of tissue function
- Partial-Thickness Wound Repair:
    - Inflammatory response
    - Epithelial proliferation (REPRODUCTION) and migration
    - Reestablishment of epidermal layers
- Full-Thickness Wound Repair:

    - Hemostasis: series to control blood loss, bacterial control, seal the defect → blood vessels constrict and platelets gather to stop bleeding
    - Inflammatory: secrete histamine to allow for white blood cells to get into damaged tissues →localized redness, edema, warmth, and throbbing
    - Proliferation: 3-24 days; filling the wound with granulation tissue, wound contraction, and wound resurfacing (EPITHELIALIZATION),
    - Maturation: sometimes 1 year +; collagen scar continues to reorganize and gain strength, remodel, etc.
- COMPLICATIONS
    - Hemorrhage: bleeding from the wound site after hemostasis is bad – indicates a dislodged blood clot, infection, slipped suture, etc., hematoma → localized collection of blood
    - Infection: wound drainage, warmth, pain, smell, edema
    - Dehiscence: when layers of skin and tissue separate → separation of wound layers (indicated by an increase in serosanguinous drainage)
    - Evisceration: protrusion of visceral organs through a wound opening
- Types of wound drainage:
    - Serous: clear, watery plasma
    - Purulent: thick, yellow, green, tan, or brown
    - Serosanguinous: pale, pink, watery, mixture of clear and red fluid
    - Sanguineous: bright red; indicates active bleeding
- Nutrition: make sure adequate calories, protein, vitamin C, A, zinc and fluid!!!
- Drains:
    - Penrose drain: lies under a dressing, a pin is dropped in place to prevent it from slipping farther into a wound

- Debridement: removal of nonviable, necrotic tissue to rid the wound of infection, enable visualization, and provide a clean base necessary for healing
- Clean ulcers only with noncytotxic wound cleaners such as NORMAL SALINE OR COMMERCIAL WOUND CLEANERS → they do not damage or kill fibroblasts and healing tissue
- Dressings: protects wound, aids in hemostasis, absorbs drainage and debriding a wound, supports a wound site, promotes thermal insulation, moist environment
    - Gauze: absorbent, useful in wounds to wick away exudate, pack,
    - Transparent film: ideal for small superficial wounds (stage I ulcers, partial thickness wound)
    - Hydrogel: hydrates and absorbs small amounts of exudate, partial thickness wounds, deep wounds with some exudate, necrotic wounds, burns, and radiation damaged skin
    - HYDROGEL ADVANTAGES: soothing and can reduce pain, provides moist environment, debrides necrotic tissue, does not adhere to wound base and is easy to remove
    - Hydrocolloid: shallow to moderately deep dermal ulcers, DO NOT absorb from heavily draining wounds, leave a residue in the wound bed that is easily confused with purulent drainage → A DRESSING THAT FORMS A GEL THAT INTERACTS WITH WOUND SURFACE
    - VAC: negative pressure to draw edges of the wound together

Fluid Balance:

October 24

- Fluid: water that contains dissolved substances (glucose, mineral salts, proteins, etc.)
- Fluid amount: volume
- Fluid concentration: osmolality
- Degree of acidity: pH
- Body water → intracellular (2/3) + extracellular (1/3)→interstitial (25%)+plasma (8%)
- Ions = cations: + … anions –
- Solutions
    - Isotonic: no change → same concentration of nonpermeant particles as normal blood
    - Hypotonic: cell swells (more water enters cell) **WATER EXCESS** → more dilute than blood
    - Hypertonic: cell shrinks (more water leaves cell) **WATER DEFICIT** → more concentrated than blood
- Osmosis: particles pulling water to create balance → “water follows salt”
- Fluid volume deficit – **hypovolemia**
- Fluid volume excess – **hypervolemia** → occurs when too much isotonic fluid in extracellular compartment
- Movement:
    - Active transport: against osmotic pressure to an area of higher pressure; ENERGY
    - Diffusion: passive movement down the concentration gradient → H to L
    - Osmosis: movement of water from lesser to greater concentration (water may be off balance but concentration of solute is equal on both sides)
    - Filtration: movement under pressure from H to L
- ANTIDIURETIC HORMONE: REABSORB WATER. tells kidneys how much water to conserve → WATER RETURNED TO BLOOD
- ALDOSTERONE: tells body to conserve salt (similar to ADH because water follows salt → ADH follows aldosterone) → NA+, CL-, WATER RETURNED TO BLOOD … K+, H+ EXCRETED IN URINE
- RENIN-ANGIOTESIN-ALDOSTERONE MECHANISM: regulates blood pressure and fluid balance → NA+, CL-, WATER EXCRETED IN URINE

- ATRIAL NATRIUETRIC PEPTIDES: reduces an expanded extracellular fluid volume by increasing renal sodium excretion
- **Increased plasma osmolality triggers thirst** because when the blood has high osmolality it secretes antidiuretics to conserve and reabsorb water = concentrated urine, thirst, etc.
- Risk factors:
    - Age, environment, gastrointestinal output, chronic diseases, trauma, therapies
- Fluid Volume Deficit CAUSES:
    - Vomiting
    - Diarrhea
    - Abnormal losses through the skin
    - Fever
    - Increased urination (excess diuretics, diabetes insipidus)
    - Bleeding
    - Decreased intake of fluids (anorexia, impaired swallowing, confusion, inability to access fluids)
    - Nasogastric suctioning
    - Third-spacing (fluid increase in transcellular spaces and not available as ECF)
- Fluid Volume Deficit SIGNS AND SYMPTOMS:
    - Intake less than output … decreased urine volume
    - Weight loss, poor skin turgor
    - Dry mucous membranes, cracked lips, tongue is furrowed/shrunken
    - Concentrated urine (increased specific gravity)
    - DECREASED blood pressure; PULSE WEAK, RAPID, THREADY
    - Orthostatic hypotension (DECREASE IN SYSTOLIC BP)
    - Increased hematocrit (increase in red blood cell count)
    - Increased blood urea nitrogen (BUN)
- Fluid Volume Excess CAUSES:
    - Excessive sodium chloride intake
    - Rapid administration of sodium-containing IV
    - Impaired liver, heart, kidney, or adrenal function

    - Very young and older adults at higher risk for fluid imbalances
    - Poor alcoholic intake history
- Fluid Volume Excess SIGNS AND SYMPTOMS:
    - Edema, moist mucous membranes
    - Pale dilute urine
    - INCREASED blood pressure; tachycardia and bounding pulse
    - Intake greater than output
    - Mental confusion
    - CRACKLES IN LUNGS
    - Anxiety, weight gain
- Fluid Volume Excess TREATMENT:
    - Assess lung sounds and vital signs, diuretics as ordered
    - Remove water pitcher, offer ice chips (COUNT AS HALF VOLUME), no gum or hard candy (restrict sodium if ordered)
    - Put patient in fowlers position
    - If fluids are restricted, 50% OF TOTAL SHOULD BE ON DAYLIGHT SHIFT
- Acid base balance: acid production, acid buffering, acid excretion
    - Normal blood pH: 7.35 to 7.45
- ACIDOSIS: increase in H+ concentration or decrease in bicarbonate (base) → LOWER PH
- ALKALOSIS: decrease in H+ concentration or increase in bicarbonate (base) → HIGHER PH
- ACID BASE MNEMONIC: ROME
    - R - RESPIRATORY
    - O – OPPOSITE
        - Respiratory acidosis: DECREASE PH, INCREASE CO2
        - Respiratory alkalosis: INCREASE PH, DECREASE CO2
    - M – METABOLIC
    - E – EQUAL
        - Metabolic acidosis: DECREASE PH, DECREASE BICARBONATE (HCO3)

        - Metabolic alkalosis: INCREASE PH, INCREASE BICARBONATE (HCO3)
- Renal failure → metabolic acidosis
- Renal organs/system → responsible for respiratory acidosis compensation

Electrolytes:

October 26

- Normal electrolyte values:
    - **Potassium: 3.5-5.0** mEq/L
    - **Magnesium: 1.5-2.5** mEq/L
    - **Sodium: 135-145** mEq/L
    - **Calcium: 8.5-10.5** mg/dl
- Sodium
    - Imbalances associated with changes in osmolality
    - Major role in ECF volume and concentration, nerve impulses, acid base balance
- Hypernatremia: serum sodium > 145
    - Occurring with water loss or sodium gain
    - Causes hyperosmolatlity leading to cellular dehydration
    - RELEASE OF ADH TO CONSERVE WATER
    - Thirst, lethargy, agitation, seizures, coma, decreased urine output, impaired LOC
        - Management: IV solution of 5% dextrose in water or hypotonic saline, diuretics
        - Must be reduced gradually to avoid cerebral edema!!!!!
- Hyponatremia: serum sodium < 135
    - Occurring with increase in water, decrease in sodium from water excess vomiting, diuretics, suctioning, diarrhea, inadequate intake of salt, etc.
    - Anorexia, nausea, vomiting, abdominal cramping, weakness, fatigue, neurological changes, confusion, orthostatic hypotension
        - Management: fluid restriction, hypertonic saline solution 3% NaCl given
- Potassium

    - Major role in ICF cation
    - Critical to action membrane potential
    - Transmission and conduction of nerve impulses, normal cardiac rhythms, muscle contraction, acid base balance
    - POTASSIUM BALANCE IS NECESSARY FOR CARDIAC FUNCTION
    - DIURETICS CAN CAUSE EXCRETION OF POTASSIUM!!!!!!!!!!
- Hyperkalemia: serum K > 5.0 mEq/L
    - Occurring with increased retention, increased intake, mobilization from ICF
    - EKG CHAGES, HEART PROBLEMS, DYSRTHYMIAS
    - Cardiac conduction may be impaired, ventricular fibrillation, irritability, anxiety, abdominal cramping, diarrhea, weakness of lower extremities, paresthesia, irregular pulse
        - Management: eliminate intake, increase elimination, force K from ECF to ICF, administer IV calcium gluconate
- Hypokalemia: serum K <3.5 mEq/L
    - Potentially lethal ventricular arrhythmias, impaired repolarization, increased toxicity, muscle weakness, paralysis, decreased GI motility, altered airway responsiveness, hyperglycemia
    - Diminished deep tendon reflexes, respiratory muscle weakness, faint pulse, EKG changes, increased sensitivity to digoxin, cardiac arrhythmias, decreased GI motility
        - Management: never push IV (painful), never give with anuric renal failure, cardiac monitor is needed, assess IV site (burning?), central line is preferred
- <u>Calcium</u>
    - Obtained in ingested foods
    - Bones readily store
    - Controlled by parathyroid hormone, calcitonin, vitamin D
- Hypercalcemia: > 10.5 mg/dl

    - Hyperparathyroidism and bone metastasis with reabsorption
    - Sometimes caused by hyperthyroidism, fatigue, weakness, lethargy, anorexia, constipation, kidney stones, bradycardia, heart block
        - Management: loop diuretic, hydration with isotonic saline infusion, synthetic calcitonin, mobilization
- Hypocalcemia: < 8.5 mg/dl
    - Trousseau's sign → when patient's thumb and index finger draws together when blood pressure cuff is inflated above systolic pressure
    - Chvostek's sign → chronic alcohol abuse
    - Convulsions, arrhythmias, tetany, spasms, stridor, Chvostek's sign
        - Management: check IV site because calcium is very hard on the veins, intake of calcium and vitamin D, watch for signs of tetany
- <u>Magnesium</u>
    -
- Hypermagnesemia: > 2.5 mEq/L
    - Excessive use of Mg+2 containing laxatives and antacids
    - Lethargy, hypoactive deep tendon reflexes, bradycardia, hypotension, flushing, sensation of warmth, flaccid muscle paralysis, decreased rate and depth of respirations, cardiac dysthymias, cardiac arrest
- Hypomagnesemia: < 1.5 mEq/L
    - Decreased Mg+2 intake and absorption
    - Malnutrition, chronic alcoholism, chronic diarrhea, laxative misuse
    - **lots of the same signs as hypocalcemia

- EXTRAS:
    - 1 KG = 1 L … OR 2.2 LBS = 1 L
    - 0.9% sodium chloride is an isotonic solution → best for dehydrated patient
    - 60 gtt = 1 ml

    - patient with nasogastric suctioning are at risk for potassium deficit
    - blood should be allowed at room temp for a max of 4 hours
    - Diabetes insipidus (does not require insulin) places at risk for DEHYDRATION
- Questions:
    - Most at risk for fluid imbalance: AN INFANT WITH DIARRHEA
    - Principal ions found in extracellular fluids: SODIUM AND CHLORIDE
    - Fluids in the interstitial spaces are called: EXTRACELLULAR FLUIDS
    - Movement of particles from H → L is: DIFFUSION
    - Stimulates the thirst center in hypothalamus: DECREASED BLOOD VOLUME
    - Healthy state, fluid output should be: APPROX. THE SAME AS FLUID INTAKE
    - Experiencing intracellular fluid deficit, intervention would be: OBSERVE FOR INCREASE IN TEMPERATURE ?????

IV Therapy:

October 31

- **ISOTONIC → to INCREASE extracellular fluid that was lost by dehydration, blood loss, surgery, vomiting, diarrhea, etc.**
- **Does not alter the cell, just adds to the ECF**
    - 5% Dextrose in Water ***considered isotonic out of body, hypotonic inside body
        - does not contain sodium
        - should not be used in excess volume
        - DILUTES THE AMOUNT OF NA IN SERUM
        - CAUSES K TO SHIFT FROM EXTRACELLULAR FLUID TO INTRACELLULAR COMPARTMENT
        - NOT GIVEN TO DIABETES PATIENTS, RENAL DISEASE OR LIVER DISEASE

        - Insulin can be added with this to treat hyperkalemia!!!!
        - NOT for patients with increased INTRACRANIAL PRESSURE
    - 0.9% NaCl (normal saline)
        - expands vascular volume → extracellular compartment
        - used to treat diabetic ketoacidosis
        - USED TO HYDRATE
        - USED MOST OFTEN – USED WHEN LR OR D5W DO NOT WORK WITH THEM
        - LOTS OF SODIUM IN THIS SOLUTION
        - Slide:
        - CAUSE DANGEROUS HYPERNATREMIA AND HYPERCLOREMIA WHICH CAN LEAD TO ACIDOSIS
        - **UTILIZED WITH BLOOD ADMINISTRATION**
        - MUST BE ADMINISTERED WITH CAUTION WITH RENAL FAILURE BECAUSE I CAN CAUSE VOLUME OVERLOAD
    - Lactated Ringer's
        - Expands vascular volume
        - Contains electrolytes
        - Used to treat hypovolemia, burns, diarrhea, vomiting, dieresis, metabolic acidosis
        - Most like blood**
        - Assess patient for fluid OVERLOAD
        - Slide:
        - MOST LIKE BLOOD
        - INDICATED IN SEVERE VOMITING, DIARRHEA, DIURESIS
        - IMPORTANT TO OBSERVE PATIENT FOR CIRCULATORY OVERLOAD
        - DO NOT USE IN LIVER DISEASE PATIENTS
        - LESS NA AND MORE ELECTROLYTES THAN NS BUT STILL RELATIVELY HIGH NA
- **HYPOTONIC: needs water because cell is shrunk → after solution, cell swells**
- **DO NOT GIVE HYPOTONIC SOLUTIONS TO ANY CRANIAL PRESSURE RISK PATIENT**

    - 0.33% NaCl (1/3 normal saline)
        - provides Na, Cl, and free water
        - allows kidneys to select and retain needed amounts
    - 0.45% NaCl (1/2 normal saline)
        - treats HYPERNATREMIA as it contains a small amount of sodium
        - lead to cellular edema or water intoxication
        - may cause increased ICP, head trauma, third space fluid shift
        - slide:
        - AN INITIAL HYDRATING FLUID
        - UTILIZED TO TEST KIDNEY FUNCTION
        - USED CAUTIOUSLY WITH EDEMATOUR CLIENTS WITH CARDIAC, RENAL, OR HEPATIC DISEASE
        - LEAD TO CELLULAR EDEMA OR WATER INTOXICATION
        - MAY CAUSE INCREASED ICP IN CVA, HEAD TRAUMA, OR NEUROLOGICAL PATIENTS
- **HYPERTONIC: VERY HIGH % OF SODIUM IN SOLUTIONS TO MAKE CELL SHRINK BC TOO MUCH WATER**
- **USUALLY GIVEN THROUGH CENTRAL LINE BECAUSE SOLUTIONS ARE VERY HARD ON THE VEINS**
    - 5% Dextrose in 0.45% NaCl
        - treat HYPOVOLEMIA
        - maintains fluid intake
        - do not use for clients with kidney or heart disease!!!!
        - Monitor for hypervolemia!!!
    - 10% Dextrose in Water
        - supplies 340 cal/L
        - used for PPN
    - 5% Dextrose in 0.9% NaCl
        - replaces nutrients and electrolytes
        - draws fluid out of intracellular and interstitial spaces into the vascular space → expanding vascular volume
        - administer carefully and slowly to prevent pulmonary edema

        - 3% or 5% Normal Saline
            - draws water from cells into ECF by osmosis
- selecting a site: inner arm, dorsal surface of hand, dorsal surface of foot (children)
- USE MOST DISTAL SITES FIRST
- Avoid: areas with infection, infiltration, thrombosis, fistulas, same side as mastectomy
- Tube should be changed every 72 hours
- Line should flush easily → NO SWELLING, COOLNESS TO TOUCH, OR TENDERNESS
- COMPLICATIONS:
    - Infiltration: fluid enters subcutaneous tissue
        - Treatment: discontinue IV
    - Phlebitis: inflammation of the vein
        - Treatment: discontinue IV
    - Fluid Volume Excess
        - Treatment: slow the IV rate and notify healthcare provider
    - Bleeding
        - Treatment: apply pressure to IV site

Care of The Surgical Patient

November 14

Ethics

November 14

Grief, Dealth, and Dying

November 16