N441 Exam 3 Concept Review

Week 7:

1. Neurovascular assessment (what to assess and priority)

- Neurovascular Assessment
    - Essential throughout immobilization
    - Assessments are performed every 1 hr for the 1st 24 hrs and every 1-4 hrs thereafter
    - Includes:
        - **Pain** assess pain level, location, and frequency; assess pain using 0 to 10 pain scale, and have the client describe the pain; immobilization, ice, and elevation of the extremity with the use of analgesics should relieve most of the pain
        - **Sensation** assess for numbness or tingling of the extremities; loss of sensation can indicate nerve damage
        - **Skin temperature** – check the temperature of the affected extremity; extremity should be warm, not cool, to touch; cool skin can indicate decreased arterial perfusion
        - **Capillary refill** – press nail beds of affected extremity until blanching occurs; blood return should be within 3 seconds; prolonged refill indicates decreased arterial perfusion; nail beds that are cyanotic can indicate venous congestion
        - **Pulses** should be palpable and strong; pulses should be equal to the unaffected extremity; edema can make it difficult to palpate pulses, so Doppler ultrasonography might be required
        - **Movement** client should be able to move affected extremity in active motion

2. Embolism (patho, who is at risk, S/S and nursing intervention priority)

- Adults older than age 70 are at a high risk of developing a fat embolism; **hip and pelvis fractures are common causes**
- Can occur after the injury, usually within 12-48 hr following long bone fractures or with total joint arthroplasty
- Fat globules from the bone marrow are released into the vasculature and travel to the small blood vessels, including those in the lungs, resulting in acute respiratory insufficiency and impaired organ perfusion; careful diagnosis should differentiate between fat embolism and pulmonary embolism
- **Manifestations:**
    - Early manifestations:
        - Dyspnea, increased RR, decreased O2sat
        - HA

        - Decreased mental acuity r/t low arterial O2 level
        - Respiratory distress
        - Tachycardia
        - Confusion
        - Chest pain
    - Late manifestations:
        - **Cutaneous petechiae** (pinpoint-size subdermal hemorrhages that occur on neck, chest, upper arms, and abdomen from blockage of capillaries by fat globules)
        - This is discriminating finding from pulmonary embolism

- **Nursing Actions:**
    - Maintain the client on bed rest
    - Prevention includes **immobilization** of fractures of the long bones and minimal manipulation during turning if immobilization procedure has not yet been performed
    - Treatment includes **oxygen** for respiratory compromise, corticosteroids for cerebral edema, vasopressors, and fluid replacement for shock, as well as pain and anti-anxiety medications as needed

3. Traction types (skeletal and skin, primary purpose of each, nursing assessment of patient and weights)

- Traction uses a pulling force to promote and maintain alignment of the injured area
- Traction prescriptions should include:
    - type of traction
        - Skin (Buck's)-used preoperatively for hip fractures
            - Primary purpose is to decrease muscle spasms and immobilize the extremity prior to surgery. The pulling force is applied by weights that are attached by rope to the client's skin with tape, straps, boots, or cuffs
                - » Bryant traction used for congenital hip dislocation in children
        - Skeletal (Halo)
            - Screws are inserted into the bone. Can use heavier weights (15 to 30 pounds) and longer traction time to realign the pone. Provide frequent pin site care to prevent infection
    - amount of weight
    - whether traction can be removed for nursing care
- **Goals of Traction**:
    - Prevent soft tissue injury

- Realign of bone fragments
- Decrease muscle spasms and pain
- Correct or prevent further deformities

- **Nursing Actions**:
    - **Assess neurovascular status of the affected body part every 1hr** for 24 hrs and every 4 hr after that
    - Maintain body alignment and realign if the client seems uncomfortable or reports pain
    - Avoid lifting or removing weights
    - Ensure that weights hang freely and are not resting on the floor
    - If the weights are accidentally displaced, replace the weights; if the problem is not corrected, notify the provider
    - Ensure that pulley ropes are free of knots, fraying, loosening, and improper positioning at least every 8 to 12 hrs
    - Notify the provider if the client experiences severe pain from muscle spasms unrelieved with medications or repositioning; move the client in halo traction as a unit without applying pressure to the rods; this will prevent loosening of pins and pain
    - Routinely monitor skin integrity and document
    - Use **heat/massage as prescribed to treat muscle spasms**
    - Use therapeutic touch and relaxation techniques
- **Pin Site Care**
    - Pin care is done frequently throughout immobilization (skeletal traction and external fixation methods) to prevent and to monitor for manifestations of infection
        - Drainage and redness (color, amount, odor)
        - Loosening of pins
        - Tenting of skin at pin site (skin rising up pin)
    - Pin care protocols (**chlorhexidine**) are based on provider preference and facility policy; a primary concept of pin care is that one cotton swab is designated for each pin to avoid cross-contamination
    - Pin care is provided usually once a shift, 1 to 2 times a day, or per facility protocol
- Registered Nurse (RN)
    - Perform neurovascular assessment on the affected extremity
    - Assess for manifestations of compartment syndrome
    - Monitor cast during drying for denting or flattening
    - Teach patient and caregiver about cast care and complications of casting
    - Determine correct body alignment to enhance traction

- Instruct patient and caregiver about traction and correct body positioning
- Teaching patient and caregiver ROM exercises
- Assess for complications associated with immobility or fracture
- Develop plan to minimize complications associated with immobility or fracture

- Licensed Practical/Vocational Nurse (LPN/LVN)
  - Check color, temperature, capillary refill, and pulses distal to the cast
  - Mark circumference of any drainage on the cast
  - Monitor skin integrity around cast and at traction pin sites
  - Pad cast edges and traction connections to prevent skin irritation
  - Monitor pain intensity and administer prescribed analgesics
  - Notify RN of changes in pain or if pain persists after prescribed analgesics are administered
- Unlicensed Assistive Personnel (UAP)
  - Position casted extremity above heart level as directed by RN
  - Apply ice to cast as directed by RN
  - Maintain body position and integrity of traction (after being trained and evaluated in this procedure)
  - Assist patient with passive and active ROM exercises
  - Notify RN about patient complaints of pain, tingling, or decreased sensation in the affected extremity

4. Pressure point prevention (for pts in traction)

- Maintain body alignment and realign if the client seems uncomfortable or reports pain
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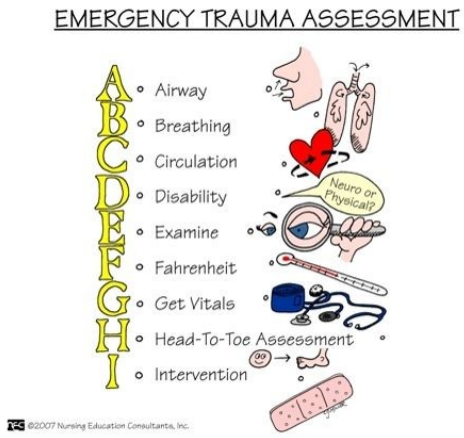
5. Promoting functional healing

- HEALTH PROMOTION AND DISEASE PREVENTION
  - Wear helmets when skateboarding, riding a bike or motorcycle, skiing, and playing football or any other sport that could cause a head injury
  - Wear seat belts when driving or riding in a care
  - Avoid dangerous activities (speeding, driving under the influence of alcohol or drugs)
  - Avoid riding in the back of a pick-up truck
  - Promote programs directed at older adults to prevent falls, which are a major cause of neurologic injury in adults ages 65-75

6. Prioritization



7. Amputations (Prep for prosthesis, contractures and interventions)

- Prevent post-complications (hypovolemia, pain, infection)
- Assess surgical site for bleeding
- Monitor tissue perfusion of end of residual limb
- Monitor for manifestations of infection and non-healing of incision; infection can lead to osteomyelitis
- Incisional pain
  - Treat w/ analgesics
- Phantom limb pain
  - Sensation of pain in the location of the extremity following the amputation
  - Related to severed nerve pathways
  - Can be experienced immediately after surgery, up to several weeks, or indefinitely

        - Treat by administering calcitonin, beta-blockers, antiepileptics (gabapentin), antispasmodics (baclofen)
        - Teach client how to push the residual limb down toward the bed while supported on a soft pillow; this helps reduce phantom limb pain and prepare the limb for a prosthesis
- Residual limb must be shaped and shrunk in preparation for prosthetic training
- Shrinkage interventions:
        - Wrap the stump, using elastic bandages **(figure-8 wrap)** to prevent restriction of blood flow and decrease edema
        - Use a stump shrinker sock (easier for the client to apply)
        - Use an air splint (plastic inflatable device) inflated to protect and shape the residual limb and for easy access to inspect the wound
- Post-op complications
    - Cardiopulmonary complications r/t co-morbid conditions
    - DVT
    - Stump hematoma
    - Infection
    - Need for re-amputation (revision)
    - Phantom limb pain
    - Flexion contracture
        - More likely w/ hip or knee joint following amputation d/t improper positioning
        - Nursing Actions:
            - ROM exercises and proper positioning immediately after surgery
            - To prevent knee or hip flexion contractures may elevate extremity for 24-48hrs to reduce swelling/discomfort, then no more elevation
            - **Have client lay prone 20-30 min several times a day to help prevent hip flexion contractures**
- Good functional outcomes is largely dependent on preop functional status
- Successful ambulation with a prosthetic is less likely in patients who have undergone major amputation for PAD
        - Only approx 25% will ambulate outside the home
- Preop risk factors that increase risk for not being able to use a prosthetic include the following:

- Non-ambulatory before amputation, above-knee amputation, age >70, homebound but ambulatory status, dementia, end-stage renal disease, CAD

- Energy required for ambulation w/ AKA is approx 50% higher than after BKA

8. Compartment Syndrome (S/S)

- Usually affects extremities and occurs when pressure within 1 or more of the muscle compartments (an area covered with an elastic tissue called fascia) of the extremity compromises circulation, resulting in an ischemia-edema cycle
- Capillaries dilate in an attempt to pull oxygen into the tissue; increased capillary permeability from the release of histamine leads to edema from plasma proteins leaking into the interstitial fluid space
- Increased edema causes pressure on the nerve endings, resulting in pain; blood flow is further reduced and ischemia persists, resulting in compromised neurovascular status
- **Pressure can result from external sources, such as a tight cast or a constrictive bulky dressing**
- Internal sources, such as an accumulation of blood or fluid within the muscle compartment, can cause pressure as well
- **Manifestations**:
    - Assessed by using the five P's:
    - (1) pain
    - (2) paralysis
    - (3) paresthesia
    - (4) pallor
    - (5) pulselessness
        - Increased **pain** unrelieved with elevation or by pain medication; intense pain when passively moved
        - **Paresthesia** or numbness, burning, and tingling are early manifestations
        - **Paralysis**, motor weakness, or inability to move the extremity indicate major nerve damage and are late manifestations
        - Color of tissue is pale (**pallor**), and nail beds are cyanotic
        - **Pulselessness** is a late manifestation of compartment syndrome

Week 8:

1. Hemorrhagic Stroke (S/S, how it differs from Embolic Stroke)

- Occur secondary to a ruptured artery or aneurysm

- Prognosis is poor d/t amount of ischemia and **increased ICP caused by the expanding collection of blood**
- If caught early and evacuation of clot can be done with cessation of the active bleed, the prognosis of a hemorrhagic stroke improves significantly
- Acute hemorrhagic stroke
    - Severe elevations may worsen bleeding however an increased MAP may be necessary to maintain cerebral perfusion in some patients
    - If SBP >200 or MAP >150 then aggressive BP reduction w/ IV gtt
    - SBP >180 or MAP >130 then BP reduction w/ intermittent IV meds
- PHYSICAL ASSESSMENT FINDINGS:
    - **Left cerebral hemisphere** responsible for language mathematics, and analytic thinking
        - Expressive and receptive aphasia, agnosia, alexia, agraphia, right extremity hemiplegia or hemiparesis, slow cautious behavior, depression, anger, visual changes such as hemianopia
    - **Right cerebral hemisphere** responsible for visual and spatial awareness and proprioception
        - Altered perception of deficits, unilateral neglect, loss of depth perception, poor impulse control, visual changes
- **tPA is contraindicated in patients with hemorrhagic stroke**

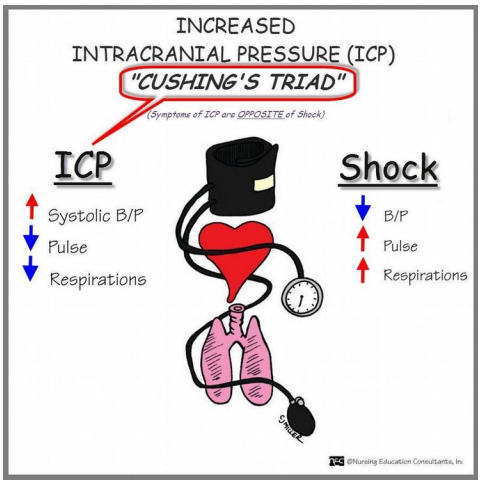
2. Increased ICP (normal values, S/S early vs late, earliest sign)

- Normal values:
    - CPP (cerebral perfusion pressure) is closely linked to ICP
    - CPP = MAP (mean arterial pressure) – ICP
    - **Normal CPP is 70 to 100**
    - A CPP of ***less than 50*** results in **permanent neurologic damage**
- Signs and symptoms: **EARLY**
    - Changes in LOC
    - Any change in condition
        - Restlessness, confusion, increasing drowsiness, increased respiratory effort, purposeless movements
    - Pupillary changes and impaired ocular movements
    - Weakness in one extremity or one side
    - Headache: constant, increasing in intensity, or aggravated by movement or straining
- Signs and symptoms: **LATE**
    - Respiratory and vasomotor changes

- VS: Increase in systolic blood pressure, widening of pulse pressure, and slowing of the heart rate; pulse may fluctuate rapidly from tachycardia to bradycardia; temperature increase
  - Cushing's triad: bradycardia, hypertension, bradypnea
- Projectile vomiting
- Further deterioration of LOC; stupor to coma
- Hemiplegia, decortication, decerebration, or flaccidity
- Respiratory pattern alterations including Cheyne-Stokes breathing and arrest
- Loss of brainstem reflexes: pupil, gag, corneal, and swallowing

3. ICP Maintenance (nursing interventions to keep ICP normal, medications)

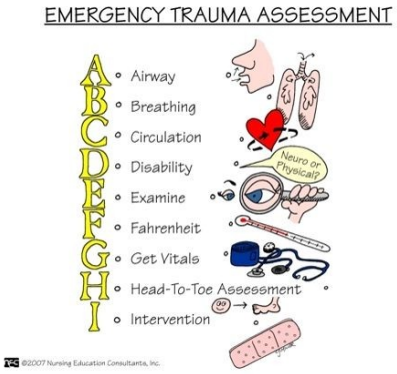
- If increased ICP:
  - Elevate HOB to at least 30 degrees (promote venous drainage)
  - Avoid extreme flexion, extension, or rotation of head, maintain the body in a midline neutral position
  - Maintain patent airway
  - Administer O2 to keep PaO2 >60
  - Consider hyperventilation to decrease ICP
  - Maintain c-spine stabilization
  - Maintain safety and seizure precautions
- Medications
  - Mannitol
    - Osmotic diuretic to treat cerebral edema; drives fluid from brain into blood
    - Administer IV
    - Insert foley
    - Monitor serum electrolytes and osmolality closely
  - Barbiturates
    - Pentobarbital and thiopental
    - Induced coma to decrease cellular demand until ICP can be decreased
  - Phenytoin
    - Used prophylactically to prevent or treat seizures
    - Dosing based on therapeutic blood levels
  - Morphine
    - Analgesic to control pain and restlessness



4. Central Perfusion Pressure

- CPP (cerebral perfusion pressure) is closely linked to ICP
- CPP = MAP (mean arterial pressure) – ICP
- **Normal CPP is 70 to 100**
- A CPP of less than 50 results in permanent neurologic damage

5. Prioritization (ABC)



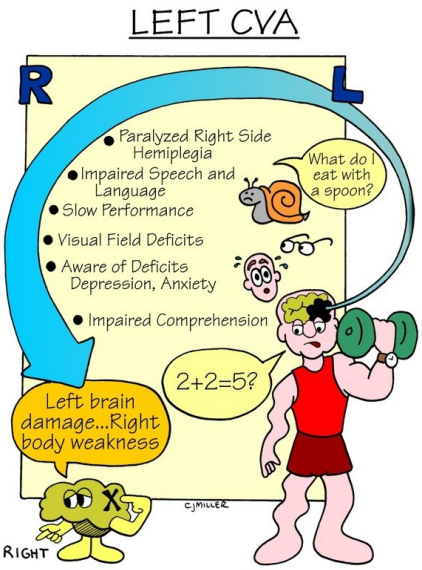
6. Glascow Coma Scale (when it's used, what values mean, value changes that are concerning)

- Concentrates on neurologic function and is useful to determine the LOC and monitor responses to treatment
- Reported as a number that allows providers to immediately determine if neurologic changes have occurred
  - Considerations:
    - **Eye opening (E): best eye response**
      - 4= eye opening occurs spontaneously
      - 3= eye opening occurs to sound

        - 2= eye opening occurs secondary to pain
        - 1= eye opening does not occur
    - **Verbal (V): best verbal response**
        - 5= conversation is coherent and oriented
        - 4= conversation is incoherent and oriented
        - 3= words are spoken but inappropriately
        - 2= Sounds are made, but no words
        - 1= vocalization does not occur
    - **Motor (M): best motor response**
        - 6= commands are followed
        - 5= local reaction to pain occurs
        - 4= general withdrawal to pain
        - 3= decorticate posture (adduction of arms, flexion of elbows & wrists)
        - 2= decerebrate posture (abduction of arms, extension of elbows & wrist)
        - 1= motor response does not occur
- Intubation limits ability to use GCS summed scores
    - If intubation is present, GCS may be reported as 2 scores, with modification noted
    - Generally reported as “GCS 5t” t represents intubation tube
- Interpretation of Findings:
    - Best possible score 15
    - Score <8 associated w/ severe head injury and coma
    - Score 9-12 indicates moderate head injury
    - Score >13 associated with minor head trauma

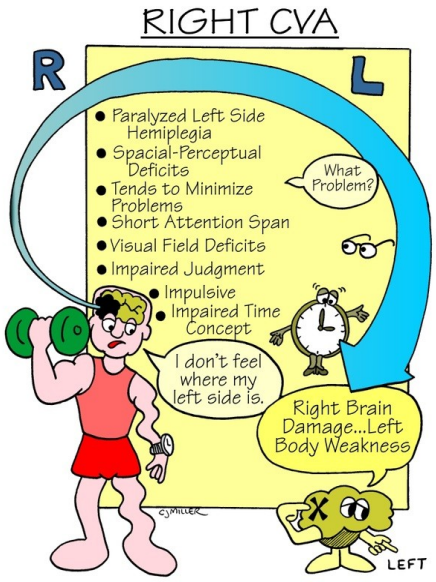
7. Manifestations of left hemispheric stroke (personality and MSK)

- **Left cerebral hemisphere** responsible for language mathematics, and analytic thinking
    - Expressive and receptive aphasia, agnosia, alexia, agraphia, right extremity hemiplegia or hemiparesis, slow cautious behavior, depression, anger, visual changes such as hemianopia



8. Manifestations of right hemispheric stroke (personality and MSK)

- **Right cerebral hemisphere** responsible for visual and spatial awareness and proprioception
    - Altered perception of deficits, unilateral neglect, loss of depth perception, poor impulse control, visual changes



9. Aphasia (communication techniques)

- Assess the ability to understand speech by asking the client to follow simple commands

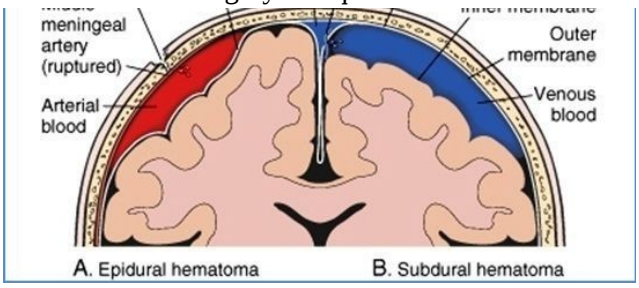
- Observe for consistently affirmative answers when the client actually does not comprehend what is being said
- Assess accuracy of yes/no responses in relation to closed-ended questions
- Supply the client with a picture board of commonly requested items/needs
- For expressive and receptive aphasia speak slowly and clearly, use one-step commands

10. Basal skull fracture (Differentiate between CSF and nasal secretions)

- EXPECTED FINDINGS:
  - Presence of alcohol or illicit drugs at time of injury, amnesia, **CSF leakage from nose and ears can indicate basilar skull fracture ("halo" sign: yellow stain surrounded by blood on a paper towel; fluid tests positive for glucose)**

11. Epidural hematoma (S/S, transient)

- Blood collection in the space between the skull and the dura.
- Patient may have a brief loss of consciousness with return of lucid state; then as hematoma expands, increased ICP will often suddenly reduce LOC
- An emergency situation!
- Treatment includes measures to reduce ICP, remove the clot, and stop bleeding (burr holes or craniotomy)
- Patient will need monitoring and support of vital body functions; respiratory support
  - Monitor for severe headache, rapid decline in LOC, worsening neurological function and herniation, and changes in ICP
  - Surgery is required to remove subdural and epidural hematoma



12. Traumatic brain injury

- TYPES OF BRAIN INJURY
  - **<u>Concussion or mild traumatic brain injury</u>**
    - Occurs after head trauma that result in a change in client's neurological function but no identified brain damage and usually resolves within 72 hr
    - Post concussion syndrome includes persistence of cognitive and physical

manifestations for an unknown period of time

- **Contusion**
  - Occurs when the brain is bruised and the client has a period of unconsciousness associated with stupor and/or confusion
- **Diffuse axonal injury**
  - Widespread injury to the brain that results in coma and is seen in severe head trauma
- **Intracranial hemorrhage**
  - Can occur in epidural, subdural, or intracerebral space
  - Collection of blood following head trauma

- Open-head injuries pose a high risk for infection; scalp injuries often result in profuse bleeding d/t poor vasoconstriction of the blood vessels of the scalp
- Skull fractures can occur following forceful head injury; brain might be damaged as a result; nurse should be alert for drainage from the ears or eyes (CSF)
- A cervical spine injury should always be suspected when a head injury occurs; a cervical spine injury must be ruled out prior to removing any devices used to stabilize the cervical spine

13. Lumbar puncture

- Procedure during which a small amount of CSF is withdrawn from the spinal canal and then analyzed to determine its constituents
- Indications:
  - Detect presence of some diseases (multiple sclerosis, syphilis, meningitis), infection, and malignancies
  - May be used to reduce CSF pressure, instill a contrast medium or air for diagnostic tests, or administer medications or chemotherapy directly to spinal fluid
- Pre-procedure:
  - Can be associated w/ rare but serious complications, such as brain herniation, especially when performed in the presence of increased ICP
  - LP for clients who have bleeding disorders or who are taking anticoagulants can result in bleeding that compresses the spinal cord
- Post-procedure:
  - Monitor the puncture site client should remain lying for several hours to ensure that site clots and to decrease the risk of post-lumbar puncture HA, caused by CSF leakage

14. Thrombolytics (contraindications)

- Inclusion criteria
  - Clinical diagnosis of ischemic stroke causing measurable neurologic deficits
  - Onset of symptoms <4.5 hrs before beginning treatment; if exact time not known it

is defined as the last time the client was known to be normal

- Age >18

- **Exclusion criteria**
  - **Stroke or head trauma in the previous 3 months**
  - **Previous intracranial hemorrhage**
  - **Intracranial neoplasm, AV malformation, or aneurysm**
  - **Recent intracranial or intraspinal surgery**
  - **Arterial puncture at a non-compressible site in the previous 7 days**
  - **Symptoms suggestive of subarachnoid hemorrhage**
  - **Persistent BP elevation (SBP >185 or DBP >110)**
  - **Active internal bleeding**
  - **Age >80**
  - **Oral anticoagulant use regardless of INR**
  - **Severe stroke (NIHSS score >25)**

15. Autonomic Dysreflexia (Patho, Nursing interventions for BP)

- Occurs secondary to SNS stimulation and inadequate compensatory response by the PNS
- Clients who have lesions below T6 do not experience dysreflexia
- Stimulation of SNS causes extreme HTN, sudden severe HA, pallor below the level of the spinal cord's lesion dermatome, blurred vision, diaphoresis, restlessness, nausea, and piloerection
- Stimulation of PNS bradycardia, flushing above the corresponding dermatome, and nasal stuffiness
  - **Nursing intervention: place patient in a sitting position**