N441 Concepts for Exam 2

1. Blood Gases
    - Components: pH, PaO2, PaCO2, HCO3-
    - normal values, determining acidosis alkalosis and if the cause is respiratory or metabolic)
        - pH: 7.35 - 7.45
        - PaCO2: 35 - 45
        - HCO3-: 22 - 26

2. Resp acidosis (EKG changes)
    - Dysrhythmias: ventricular fibrillation can be the first indication in a client receiving anesthesia
    - Associated with hyperkalemia?: peaked T waves, widened QRS

3. Electrolyte Imbalances (what conditions cause electrolyte imbalances)
    - Diarrhea
    - Kidney disease or failure

4. Hyperkalemia
    - EKG changes
        - Premature ventricular contractions (PVCs)
        - Ventricular fibrillation
        - Peaked T waves
        - Widened QRS
    - Nursing interventions
        - Priority nursing care is to prevent falls, assessing for cardiac complications, and health teaching
        - Avoid administering “aged” blood in clients with imparied kidney function because the deterioration of RBCs releases K+ into the stored blood
        - Mx I&O
        - Assess for muscle weakness
        - Observe for GI manifestations, such as nausea and intestinal colic
        - Report abnormal findings; BUN, creatinine, glucose, ABGs
        - Clients with impaired kidney function and taking potassium-sparing diuretics should not receive potassium replacement or salt substitutes
        - If potassium level is elevated, report and stop IV infusion of K+, maintain IV access, stop all K+ supplements, and promote K+restricted diet
        - The client may receive furosemide to promote potassium excretion
        - A combination of glucose and insulin admin may be prescribed to promote reduction of potassium level
        - Kayexalate (oral or rectal) may be prescribed to promote intestinal potassium excretion

        - Promote movement of potassium from ECF to ICF
            - Admin IV fluids with dextrose and regular insulin
            - Admin sodium bicarbonate to reverse acidosis
        - Mx cardiac rhythm, and intervene promptly as needed
    - Diet adjustments
        - Avoid foods high in potassium
            - Citrus fruits, legumes, whole-grain foods, lean meat, milk, eggs, coffee, tea, cocoa, and some cola beverage high in K+
        - Read food labels for potassium content
        - Foods with less potassium include
            - Butter, margarine, cranberry juice, ginger ale, hard candy, root beer, sugar, and honey
    - Intervention medication generic and name brand
        - Loop diuretics - furosemide (Lasix)
        - Cation exchange resins - sodium polystyrene sulfonate (Kayexalate)

5. Hypokalemia
    - Medications that cause
        - Diuretics (thiazides, loop diuretics)
        - Corticosteroids
        - Digitalis
        - Laxatives/tap water enema
    - Dietary changes
        - Encourage foods high in potassium
            - Avocado, broccoli, dairy products, dried fruit, cantaloupe, melons, bananas, juices, lean meats, milk, whole grains, and citrus fruits
        - Oral potassium supplements
    - Symptoms esp at night with furosemide
        - Nocturia???
        - Leg cramps

6. Hyponatremia (common symptoms)
    - VS (can vary based on state of ECF vol)
        - d/t hypovolemia:
            - Hypothermia
            - Tachycardia
            - Rapid thready pulse
            - Hypotension/orthostatic hypotension
            - Diminished peripheral pulses
        - d/t hypervolemia
            - Bounding pulse
            - Normal to high BP
    - Neuromusculoskeletal:

        - Headache
        - Confusion
        - Lightheadedness, dizziness
        - Lethargy, fatigue
        - Muscle weakness to the point of possible respiratory compromise
        - Decreased DTRs
        - Seizures
    - GI
        - Increased motility
        - Hyperactive bowel sounds
        - Abdominal cramping
        - Nausea

7. Hypocalcemia (common symptoms)
    - Tetany: the most common
    - Paresthesia of the fingers and lips (early Sx)
    - Muscle twitches as hypocalcemia progresses
    - Seizure d/t irritability of the CNS
    - Frequent, painful muscle spasms at rest in the foot or calf (Charley horses)
    - Hyperactive DTRs
    - Positive Chvostek's sign (tapping on the facial nerve triggering facial twitching)
    - Positive Trousseau's sign (hand/finger spasms with sustained BP cuff inflation)
    - Hx of thyroid surgery or irradiation of the upper chest or neck, which places a client at risk for developing hypocalcemia
    - Cardiovascular
        - Prolonged QT intervals as a result of a prolonged ST segment
        - Risk of torsades de pointes
        - Decreased myocardial contractility
            - Decreased HR and hypotension when hypocalcemia is severe
    - GI
        - Hyperactive bowel sounds
        - Diarrhea
        - Abdominal cramps

8. Hypovolemia
    - Compensatory mechanisms
        - Tachycardia - in an attempt to maintain a normal BP
        - Tachypnea - to compensate for lack of fluid vol within the body
    - Symptoms
        - VS: hyperthermia, tachycardia, thready pulse, hypotension, ortho hypotension, decreased central venous pressure, tachypnea, hypoxia
        - NM: dizziness, syncope, confusion, weakness, fatigue
        - GI: thirst, dry furrowed tongue, N/V, anorexia, acute wt loss

        - GU: oliguria (decreased production and concentration of urine)
        - Other: diminished cap refill, cool clammy skin, diaphoresis, sunken eyeballs, flattened neck veins, poor skin turgor and tenting, wt loss
    - Monitoring during volume replacement
        - Mx I&O
        - Mx VS; ortho hypotension - risk for falls
        - Mx for changes in mentation and confusion
        - Mx weight Q8h

9. Normal Values for electrolytes
    - Sodium: 135 - 145 mEq/L
    - Calcium: 9 - 10.5 mEq/L
    - Potassium: 3.5 - 5 mEq/L
    - Magnesium: 1.3 - 2.1 mEq/L
    - Chloride: 98 - 106 mEq/L
    - Phosphorus: 3 - 4.5 mg/dL

10. Hypervolemia
    - Treatment: management of FVE is directed at the causes
        - Diuretics
            - Thiazide (HCT) - mild to moderate hypervolemia
            - Loop diuretics - severe hypervolemia
        - Dialysis
        - Nutrition therapy
    - Diet adjustments
        - Low in sodium
            - From mild restriction to as little as 250 mg/day
            - Seasoning substitutes: lemon juice, onions, garlic
            - Salt substitutes; use cautiously if taking potassium-sparing diuretics (i.e., spironolactone)
        - Restrict fluid intake
    - Lab expectations
        - Decreased H&H
        - Decreased serum and urine osmolarity
        - Decreased urine sodium and specific gravity
        - Decreased BUN d/t plasma dilution
    - Signs
        - VS: tachycardia, bounding pulse, HTN, tachypnea, increased CVP
        - NM: weakness d/t excess fluid retained, which depletes energy and increases the workload for the body, HA, altered LOC
        - GI: ascites
        - Resp: crackles, cough, increased RR, dyspnea

- Other: peripheral edema, wt gain, distended neck veins, increased urine output

11. Prevention is key for shock and MODS.

12. Shock
    - Identification
        - Hypoperfusion of tissues
        - Hypermetabolism
        - Activation of the inflammatory response
    - Stages and signs
        - Initial: no visible changes in client parameters, only changes on cellular level
        - Compensatory (non-progressive): measure to increase CO to restore tissue perfusion and oxygenation
            - Inadequate perfusion, tachycardia, changes in affect, anxious, confusion, normal BP, skin is cold and clammy, decreased urine output, resp.alkalosis
        - Progressive: compensatory mechanisms begin to fail
            - All organs suffering from the hypoperfusion, decreased mental status, hypoxia, dysrhythmias, ischemia, MAP <65, SBP <90, rapid shallow resp w/ crackles, skin is mottled/petechiae, lethargic, met.acidosis
        - Refractory: irreversible shock and total body failure
            - Organ damage is extremely severe, no response to Tx
    - Nursing interventions for irreversible shock, signs, how to prevent
        - Nursing interventions
            - Nurse focused on prescribed treatments, Mx the pt, preventing complications, protecting the pt from injury, and providing comfort
            - Offering brief explanations to pt about what is happening is essential even if there is no certainty that the pt hears or understands what is being said
            - SImple comfort measures, including reassuring touches, should continue to be provided despite the pt's non-responsiveness to verbal stimuli
            - As it becomes obvious that pt is unlikely to survive, family must be informed about the prognosis and likely outcome
            - Opportunities should be provided - throughout the patient's care - for family to see, touch, and talk to pt
            - Close family friends or spiritual advisors may be of comfort to the family members in dealing with the inevitable death of their loved one
        - Signs

        - At this point, organ damages so severe that patient does not respond to treatment and cannot survive
        - BP remains low
        - Renal, liver function fail
        - Anaerobic metabolism worsens acidosis
        - Multiple organ dysfunction progresses to complete organ failure
        - Judgment that shock is irreversible only made in retrospect
    - Early interventions are essential to survival
        - Know who's at risk: chronic illness, malnutrition, immunosuppression, surgical or traumatic wounds
        - Report subtle changes in assessment
        - Hemodynamic monitoring, ECG monitoring, ABGs, serum electrolyte levels, physical & mental status changes

13. Septic Shock
    - Prevention: strict infection control practices, beginning with thorough hand hygiene techniques
        - Implementing programs to prevent central line infection
        - Ensuring early removal of invasive devices (indwelling urinary catheter)
        - Implementing prevention programs to prevent VAP
        - Early debriding of wounds to remove necrotic tissue
        - Carrying out standard precautions
    - Pulse: bounding pulse
    - Expected lab work: increased WBC, CRP, and procalcitonin
    - Fever: > 38.3 C (> 101 F)

14. Cardiogenic
    - Activity restriction: low activity/rest/save energy to lower oxygen demand
    - Primary cause
        - Coronary: acute MI resulting in damage to a significant portion of LV myocardium
        - Non-coronary: conditions that stress the myocardium
            - Severe hypoxemia
            - Tension pneumothorax
            - Cardiomyopathies
            - Valvular stenosis or regurgitation
            - Cardiac tamponade
            - Dysrhythmias
            - Blunt cardiac injury
    - Treatment as it relates to afterload (heart muscle has to eject blood)
    - Therapeutic hypothermia temp 32-36 C
        - Pain control: IV morphine (by decreasing preload)
        - Dobutamine

    - Nitroglycerin
    - Dopamine
    - Antiarrhythmic meds

15. Neurogenic Shock
    - Cause: loss of sympathetic tone causing massive vasodilation, depressant action of medication or lack of glucose (insulin reaction)
    - Infuse fluids cautiously as the cause of hypotension is NOT related to fluid loss
        - Head trauma, spinal cord injury, and epidural anesthesia
        - Corticosteroids not found to be effective against this type of shock
    - Expected vital signs: Bradycardia and hypotension

16. Anaphylactic Shock
    - Initial treatment: IM epinephrine (peripheral vasoconstriction and bronchodilation)
    - Causes: hypersensitivity (allergic) reaction to a sensitizing substance (e.g., drug, chemical, vaccine, food, insect venom)
        - The reaction causes massive vasodilation, release of vasoactive medications, and an increase in capillary permeability
    - Symptoms, signs aka stridor and wheezing, rash, itching
        - Hypotension
        - Neurologic compromise
        - Respiratory distress
        - Cardiac arrest
        - Laryngeal edema, severe bronchospasm
        - Reduced blood pressure
        - GI distress
        - Skin or mucosal tissue irritation=== at least 2 of these symptoms should be present within 2- 30 minutes of exposure

17. Hypovolemic Shock
    - What blood products are appropriate: PRBC, FFP & Platelets are administered to replenish the patient's oxygen-carrying capacity in conjunction with other fluids
    - Expected vital signs
        - increased HR, RR
        - Decreased BP

18. MODS
    - Definition: failure of 2 or more organ systems in an accurately ill patient such that homeostasis cannot be maintained without intervention
    - What to assess: assess for organ failure beginning in the lungs, and cardiovascular instability as well as failure if hepatic, GI, renal, immunologic and CNS follow. Assessment tools for MODS: APACHE (Acute Physiology and Chronic Health Evaluation), SAPS (Simplified Acute Physiology Score), PIRO

(Predisposing factors, the infection, the host response, and organ dysfunction), SOFA (Sequential Organ Failure Assessment)
- First failure organ: Lungs
- Prognosis: as it becomes obvious that the patient is unlikely to survive, the family must be informed about the prognosis and likely outcome

19. ABG's that indicate hyperventilation and appropriate interventions
    - (Compensatory)Respiratory alkalosis: can be a result of the compensatory stage of shock, caused by metabolic acidosis
    - Nursing interventions
        - Oxygen therapy
        - Anxiety reduction intervention
        - Rebreathing techniques