- **Ventilator Care**
  - Maintain a patent airway and assess the position and placement of the tube, document size of ET tube and tube placement centimeters at the clients teeth or lips, reposition Q2H and PRN, suction oral and tracheal secretions to maintain tube patency, have a resuscitation bag with a face mask available
  - Assess respiratory status every 1-2 hr, breath sounds equal bilaterally, presence of reduced or absent breath sounds, respiratory effort, or spontaneous breaths
  - Monitor VS, ABG's, CXR's LOC
  - Monitor and document ventilator settings hourly
  - Rate, FiO2 and tidal volume, mode of ventilation, use of adjuncts (PEEP, CPAP), plateau or peak inspiratory pressure (PIP), and alarm settings
  - Assess cuff pressure at least every 8 hours and maintain pressure below 20mmHg to reduce vocal cord necrosis

- **Pneumothorax:**
  - causes:
    - presence of air or gas in the pleural space that causes lung collapse
  - findings:
    - anxiety
    - pleuritic pain
    - respiratory distress
    - tracheal deviation
    - absent breath sounds on the affected side
    - asymmetrical chest wall movement
    - subcutaneous emphysema

- **ET tube placement**
  - Common misplacement is often in the right main bronchus, pull back ET tube and reassess
  - Common signs you are in the right main bronchus and not above the carina
  - Right-sided breath sounds heard but left-sided breath sounds are absent, left-sided chest wall expansion is absent, possible low SpO2
- **Chest tube:**
  - normal findings:
    - water seal chamber contains 2 cm of water
    - the normal fluctuation of water within the water seal chamber is called tidaling
      - monitor for the stoppage of bubbling
  - abnormal findings
    - water seal chamber:
      - add fluid as needed
      - absence of tidaling indicated lung re-expansion or obstruction
      - continuous bubbling indicates an air leak
    - replace collection chamber when full
    - suction control chamber: no bubbling indicates suction is not working
- **Blood transfusion:**
  - times:
    - Stay with patient for the first 15 minutes and monitor closely
    - After 15 minutes recheck vital signs
    - 1-2ml/minute (60-120ml/hr) and can increase if the patient tolerates it

        - 30 minutes to initiate transfusion once blood has been received
        - 4 hours to completely administer
    - nursing responsibilities:
        - Ensure type and crossmatch is ordered and drawn
        - Verify order (what product, how many units, medications to administer)
        - Ensure informed consent
        - Patient education
        - 18 or 20 gauge IV
        - Baseline vitals
        - Confirm name, DOB, MRN, and blood bank ID with blood bank
        - Two RN at bedside

- **Pulmonary embolism S/S & treatment**
    - S/S:
        - anxiety
        - sudden onset of chest pressure
        - pain upon inspiration
        - chest wall tenderness
        - dyspnea/tachypnea
        - cough/hemoptysis
        - pleurisy
        - tachycardia and hypotension
        - diaphoresis
        - low grade fever
        - petechiae over chest
        - distended neck veins
        - syncope

- Treatment:
  - O2 therapy to relieve hypoxemia and dyspnea, high fowler's position, initiate IV access, assess respiratory status at least every 30 minutes (Auscultate lung sounds, Measure rate, rhythm, and ease of respirations, Inspect skin color and capillary refill, Examine for position of trachea)
  - Anticoagulants to prevent clots from getting larger or additional clot from forming
  - Direct factor Xa inhibitor (Rivaroxaban ((Xarelto)) binds directly with the active center of factor Xa, which inhibits the production of thrombin
  - Thrombolytic therapy (Alteplase, reteplase, tenecteplase) used to dissolve blood clots and restore pulmonary blood flow

- **fat embolism S/S & treatment**
  - S/S:
    - Known as a fat globule from bone marrow that is released into the vasculature and travels through blood vessels and potentially into the lungs
    - Results in acute respiratory insufficiency and impaired organ perfusion
      - Most common in hip/pelvis fixation
      - Can also be seen in long bone fractures
  - Treatment:
    - oxygen administration
    - bed rest
    - corticosteroids for cerebral edema
    - vasopressors
    - fluid replacement

        - analgesics
        - anti anxiety medications

- **Acute respiratory failure manifestations**
    - Respiratory failure is a sudden and life-threatening deterioration of the gas exchange function of the lung
    - PaO2 less than 60 mm Hg (Hypoxemia) and PaCO2 >50 mm Hg (hypercapnia) with an arterial pH <7.35
- **Defibrillation/Cardioversion**
    - Defibrillation: Ventricular fibrillation, ventricular tachycardia without a pulse
        - Used in emergency situations as a treatment of choice for ventricular fibrillation and pulseless VT (Not used in conscious people or who have a pulse)
        - The sooner its used, the better the survival rate
        - Delivery of the current is immediate and unsynchronized
    - Electrical Cardioversion: Atrial dysrhythmias, supraventricular tachycardia, ventricular tachycardia with a pulse
    - Involves the delivery of times electrical current to terminate a tachydysrhythmia
    - synchronized with the ECG on a cardiac monitor
- **Coronary artery disease risk factors**
    - Modafiable
        - Serum lipids (TC >200, Triglycerides >150, LDL >160, HDL <40 in men and <50 in women
        - BP >140/90, Diabetes, tobacco use, physical inactivity, obesity

- Nonmodifiable
- Increasing age, gender (more common in men than women until 75), ethnicity (more common in white men), genetic predisposition and family history of heart disease

- **Atelectasis**
  - Increasing dyspnea
  - diminished breath sounds in lower lobes
  - cough and sputum production
  - respiratory distress
  - tachycardia
  - tachypnea
  - pleural pain, central cyanosis
  - Patients usually have difficulty breathing in the supine position and are anxious

- **Pulmonary edema**
  - S/S:
    - frothy sputum
    - dyspnea
    - crackles
    - tachycardia

- **DIC**
  - S/S:
    - Bleeding from mucous membranes, venipuncture sites, and GI and urinary tracts
    - Decreased temperature, increased pain, decreased pulses, hypoxia, decreased urine output, increased creatinine, and increased BUN, decreased alertness and orientation
    - Bleeding can range from minimal occult internal bleeding to profuse hemorrhage from all orifices
    - Typically develop MODS
    - Initial phase: only manifestation may be decrease in platelet count

        - The patient experiences S/S of thrombosis in the organs involved
        - As clotting factors and platelets are consumed to form thrombi, bleeding occurs
        - initially subtle but can develop into frank hemorrhage
    - Labs:
        - Decreased platelet count
        - increased PT time
        - Increased aPTT time
        - Increased Thrombin time
        - Decreased fibrinogen
        - Increased D-dimer level
        - Increased Fibrin degradation products
    - Treatment:
        - Treat underlying condition
        - Correct secondary effects of tissue ischemia
            - Improve oxygenation
            - Replace fluids
            - Correct electrolyte imbalances
            - Administer vasopressor medications
        - If serious hemorrhage occurs
            - Cryoprecipitate: replace fibrinogen and factors V and VII
            - Platelets: correct severely low platelet levels and can control bleeding
                - Replaces coagulation factors but can exacerbate capillary leak, further compromising pulmonary function
        - Controversial treatment!!: interrupt the thrombosis process through the use of a heparin infusion
            - Heparin may inhibit the formation of the microthrombi and thus permit perfusion of the organs to resume
- **Acid-base imbalances- how to calculate and causes of abnormal**
    - Reference ranges:
        - pH 7.35—7.45

        - PaCO2 35—45 mm Hg
        - HCO3- 22—26 mEq/L
        - PaO2 80–100 mm Hg
    - Causes of abnormal ABG's:
        - respiratory acidosis:
            - problem with inadequate excretion of CO2
        - respiratory alkalosis:
            - hyperventilation due to fear, anxiety, intracerebral trauma, salicylate toxicity, excessive mechanical ventilation
            - metabolic acidosis:
                - diarrhea, starvation, DKA, kidney failure, pancreatitis
            - metabolic alkalosis:
                - vomiting
                - blood transfusions
                - TPN
                - cushing's syndrome
                - hyperaldosteronism
- **Hypovolemic Shock causes and S/S***************
    - S/S:
        - tachycardia
        - hypoxia
        - pallor
        - hypotension
        - decreased cardiac output
        - decreased CVP
    - Causes:
        - decrease in intravascular volume of at least 15-30
        - excessive fluid loss from diuresis, vomiting, or diarrhea
        - blood loss secondary to surgery, trauma, burns, DKA
- **Fluid overload S/S:**
    - S/S:
        - Acute weight gain
        - peripheral edema

        - ascites
        - distended jugular veins
        - crackles
        - elevated CVP
        - shortness of breath
        - increased BP
        - bounding pulse and cough
        - increased respiratory rate
        - increased urine output
- **Cardiogenic shock treatment**
    - Preventing cardiogenic shock
    - Monitoring hemodynamic status
    - Administering medications, IV fluids
    - Maintain/Monitor IABP
    - Ensure safety and comfort
- **Septic shock treatment**
    - vasopressors to maintain map above 65
    - Lactate greater than or equal to 2
- **Anaphylactic shock treatment**
    - Norepinephrine- causes peripheral vasoconstriction and bronchodilation and opposes the effect of histamine
    - Diphenhydramine and ranitidine are given as adjunctive therapies to block the ongoing release of histamine from allergic reactions
    - Nebulized bronchodilators
    - Fluid resuscitation
- **Cast care/assessment**
    - Care:
        - Frequent neuro assessments
        - Keep it dry
        - Don't stick anything into the cast
        - Keep it above the level of the heart for the first 48 hours and ice therapy first 24 hours
        - Ensure not too tight
        - A hairdryer on cool setting for itching

        - Regularly move joints above and below the cast
- **Prevent amputation complications**
    - Prevent post-op complications such as hypovolemia, pain, infection
    - Assess surgical sites for bleeding
    - monitor tissue perfusion at the end of the residual limb
    - monitor for manifestations of infection and non healing incision that can lead to osteomyelitis
    - Manage phantom pain with medications and mirror therapy
    - The residual limb is prepped with a figure 8 wrap and shrinking procedures

- **Osteomyelitis**
    - S/S:
        - Bone pain that is constant, pulsating, localized, and worse w movement
        - Erythema and edema at the site of infection
        - fever
        - leukocytosis and increased ESR
    - Treatment:
        - Long-lasting antibiotics
        - surgical debridement and possible bone graft
        - hyperbaric O2 treatments
        - surgically implanted antibiotic bead in bone cement
- **Increase Intracranial pressure and normal value**
- **below 15**
    - Treatment:
        - Mannitol
        - head of the bed at 30 degrees
    - Nursing actions:
        - Low lit room
        - HOB at 30-35 degrees

        - Keep neck straight
        - Avoid coughing or sneezing
        - limit visitors
        - neuro assessment
        - administer Mannitol
        - Continuous monitoring ICP
    - S/S:
        - Headache
        - Decreased LOC
        - fever
        - Altered respirations
        - pupil changes
        - restlessness
        - irritability
        - sensitivity to light
        - KNOW VS!!
            - increased BP, bradycardia, and bradypnea: Cushing's triad
- **Meningitis**
    - S/S
        - Fever
        - chills
        - nausea
        - lethargic
        - headache
        - neck pain (Nuchal rigidity)
        - altered LOC
        - Positive brudzinski and kernig's sign
            - Brudzinski: flexion of the knees and hips while flexing the neck
            - Kernig: resistance and pain with the extension of the clients leg

- **Ischemic stroke S/S and treatment**
  - Sudden severe headache
  - Confusion or change in mental status
  - numbness or weakness of the face, arm, or leg
  - difficulty walking
  - dizziness
  - loss of balance
  - visual disturbances
  - trouble speaking or understanding speech
- **Hemorrhagic stroke S/S and treatment**
  - severe “exploding” headache
  - early and sudden changes in LOC
  - nausea/vomiting
  - possible seizure activity
- **Glasgow coma scale**
  - 8= intubate
  - 3= coma
  - 15 is best possible score
  - Based on eyes, verbal and motor skills
- **Traumatic amputation**
  - Care:
    - Stop the site of bleeding and apply direct pressure
    - elevate the extremity
    - wrap in dry gauze
    - place severed extremity in a bag and submerge in ice bath, ensure extremity doesn't come in contact with water
- **Triage- ED, and disaster**
  - ED:
    - Level 1- immediate resuscitation
      - Cardiac arrest, intubation, overdose
    - Level 2- emergent: seen within 10 minutes

        - Chest pain
    - Level 3- urgent: seen within 1 hour
        - Abdominal pain, gynecological disorders, hip fractures in the elderly
    - Level 4- less urgent: seen within 2 hours
        - Laceration, closed extremity trauma, cystitis
    - Level 5- nonurgent: seen within 2 hours
        - Simple rash, cold symptoms, minor burns
- Disaster:
    - RED- immediate
        - Chest wound, airway obstruction, shock, hemothorax, amputations, open fractures, 2-3rd degree burns
    - YELLOW- delayed
        - Stable wounds, soft tissue injury, gi disruption, fractures, eyes and CNS injuries
    - GREEN- minimal
        - Injuries are minor and treatment can be delayed hours to days; minor burns, sprains, lacerations, PTSD
    - BLACK- expectant//dead probs

- **Triage officer**
    - RN, EMT, paramedics
- **Partial-thickness burns S/S**
    - Damage to the entire epidermis and parts of the dermis; flash flames, scalds, brief contact w hot object
    - Pink to red
    - Blisters
    - Mild to moderate edema
    - No eschar
    - Painful
    - Heals between 2-3 weeks
    - No scarring but minor pigment changes

- **Full-thickness burn s/s**
  - S/S:
    - damage to the entire epidermis and dermis
    - nerve damage
    - may appear red, black, brown, yellow, or white
    - no blisters
    - severe edema
    - eschar is hard
    - sensation minimal or absent
    - heals within weeks to months
    - scarring
    - grafting
- **Burns and electrolytes**
  - Hyperkalemia
  - Hyponatremia
- **Primary vs. Secondary assessment**
  - Primary- rapid assessment of life-threatening conditions
    - Completed systematically
    - Standard precautions
    - ABCDE
      - A-airway & cervical spine
      - B-breathing
      - C-Circulation
      - D-disability
      - E- exposure
  - A secondary- detailed assessment
    - History and physical examination, assessment
- **Fluids specific for:**
  - blood transfusion
  - burns:
    - Lactated ringers
  - DKA/HHS:
    - Hypotonic fluid

        - Administer regular insulin (IV) ((Only insulin that can be delivered through IV))
        - Assess potassium levels
- **Rule of Nines**
    - Torso: 18
    - Back: 18
    - Front legs: 9
    - Back legs: 9
    - Perineum: 1
    - Front arms: 4.5
    - Back of arms: 4.5
- **Escharotomy**
    - Incision through the eschar to relieve pressure and improve circulation
- **Fasciotomy**
    - Incision through the eschar and fascia used when escharotomy does not improve the condition
- **Biological weapons of mass destruction**
    - Smallpox
    - Anthrax
    - Plagues
    - Botulism
    - Ebola
    - Tularemia
- **Disaster preparedness kit**
    - Identification cards & insurance cards & money
    - Light source
    - First aid kit
    - Nonperishable food and can opener
    - Tools
    - Radio

- Pet supplies
- Warm and clean clothing
- Medications
- Cleaning products
- Writing utensils
- Whistle

- **PPE**
  - A- highest level of respiratory, skin, eyes, and mucous membranes protection
    - Vapor tight
  - B- the highest level of respiratory protection but lower precautions for eyes and skin
  - C- air purifier respirator
  - D- typical work precautions and uniform
- **Pre-planning for a disaster**
  - Take a look at what resources are needed, how many people could be affected, and work with the government on plans and procedures for the future
- **Fire emergency steps**
  - RACE
  - Rescue, alarm, contain, extinguish
- **Carbon monoxide**
  - S/S:
    - house fires, cars in closed garages
    - Above 10% carbon monoxide in the blood indicates poisoning
    - Headache
    - Flushing
    - Decreased visual acuity
    - Decreased cerebral functioning
    - Dyspnea
    - N/V

        - Tinnitus
        - Vertigo
        - Irregular heart rate
        - Hypotension
        - Coma
        - Seizures
        - Death
    - Treatment:
        - oxygen therapy
        - airway patency

- **Heatstroke**
    - S/S:
        - Fever (104 and up)
        - Lack of perspiration
        - Hypotension
        - Tachycardia
        - Altered LOC
        - Abnormal potassium and sodium levels
    - Treatment:
        - administer oxygen as needed
        - initiate large bore IV access for rapid fluid resuscitation
        - insert catheter
        - apply ice packs and cooling blankets
- **Insulin- treatment of DKA/HHS**
    - Administer regular insulin (IV)
- **Diabetes insipidus S/S & Treatment**
    - S/S
        - Polyuria
        - Polydipsia
        - Nocturia
        - Fatigue

        - Dehydration
        - Tachycardia
        - Hypotension
        - Dry mucous membranes
        - Weak peripheral pulses
        - Neuro changes
    - Treatment:
        - Vasopressors
        - Diet modifications
        - Monitor daily weight
- **SIADH S/S and treatment**
    - S/S:
        - headache
        - weakness
        - anorexia
        - muscle cramps
        - weight gain
        - personality changes
        - sluggish DTR
        - N/V/D
        - oliguria
    - Treatment:
        - Loop diuretics
        - Vasopressin
        - Tetracycline derivatives
        - Monitor intake and output
        - Vitals
        - NPO for fluids
        - Daily weights and compare
        - Seizure precautions
- **Hypoglycemia S/S & treatment**
    - S/S:

        - Tachycardia
        - Sweating
        - Shakiness
        - Headache
        - Tremors
    - Treatment
        - 15 g of fast-acting carbohydrates to immediately increase insulin levels
        - Want to consume foods high in protein
            - Glucose tablets
            - 6-10 lifesavers
            - 4 tsp sugar
            - 4 sugar cubes
            - 1 tbsp honey
            - ½ cup of orange juice or other fruit juices
            - 8 oz low-fat milk
            - 6 saltine crackers
            - 3 graham crackers
- **Myxedema coma nursing actions**
    - ABC's
    - Monitor intake and output
    - Assess arterial blood gases
    - Take and compare daily weights
    - Treat the symptoms

- **Addison's S/S**
- Damage of the adrenal cortex resulting in aldosterone and cortisol
    - hyperpigmentation
    - hyperkalemia
    - weight loss
    - craving salt
    - weakness and fatigue

- N/V/Anorexia
- constipation/diarrhea
- dizziness
- hyponatremia
- hypoglycemia

- **Cushing's disease S/S**
  - over secretion of hormones from the adrenal cortex
  - Moon face
  - Fatigue
  - Joint pain
  - Depression
  - Decreased libido
  - Increased body hair
  - Buffalo hump
  - Stretch marks
  - Hyperglycemia
- **Hemodialysis:**
  - Complications:
    - Clotting
    - Infection
    - The decrease in circulating fluid volume
  - Labs:
    - Serum glucose
    - Coagulation labs
    - CBC
- **Patient education for dialysis and diet**
  - Peritoneal:
    - The client will feel a sensation of fullness intraprocedural
    - Ensure the patient understands the procedure
    - Have the patient perform a return demonstration
  - Hemodialysis:

- **Acute kidney and chronic kidney disease labs**
  - ABG's:
    - Decreased pH
    - Decreased HCO3
  - Labs:
    - Increased creatinine
    - Increased BUN
    - Urine specific gravity:
      - Elevated in prerenal
      - Diluted in intrarenal
    - Sodium:
      - Decreased in prerenal
      - Increased in intrarenal
    - Increased potassium
    - Increased phosphate
    - Decreased calcium
    - Decreased hematocrit
    - Decreased GFR as the disease progresses
- **Pancreatitis:**
  - Labs:
    - Increased serum lipase
    - Increased serum amylase
    - Increased WBC count
    - Increased serum liver enzymes
    - Increased bilirubin
  - S/S:
    - Nausea
    - Vomiting
    - Severe weight loss
    - Epigastric pain that is worsened when
    - laying down
- **Patient education- reducing the risk of DM**

- meal planning
- insulin administration
- blood glucose monitoring
- inspect feer daily
- when to contact PCP
- proper syringe disposal
- sick day rule
- shoes
- hydrated
- monitoring urine ketones
- oral medication regime
- carb sources with BG is low
- avoid excessive exercise

- **DM labs**
  - blood glucose
  - A1C%- 7 or below
  - fasting glucose above 150 indicated diabetes
- **MI**
  - S/S:
    - Chest pain
    - SOB
    - nausea
    - anxiety
    - cool pale skin
    - increased HR and RR
  - labs:
    - Troponin
    - Increase of troponin in the serum can be detected within a few hours during an acute MI
    - Can be elevated with sepsis, heart failure, and respiratory failure
    - Creatine kinase

        - CK-MB increases when there is damage to cardiac cells
        - Myoglobin
        - Increases 1-3 hours and peaks within 12 hours after onset of symptoms

- **Chest tube indications**
    - Pneumothorax
    - pleural collection
    - pleurodesis
    - thoracotomy
    - post op
- **Transfusion-associated circulatory overload**
    - cough
    - dyspnea
    - DJV
    - pulmonary congestion
    - hypertension
    - tachycardia
    - bounding pulse
    - restlessness
- **Pericarditis DX & TX**
    - Diagnosis:
        - elevated cardiac enzymes
        - myoglobin
        - CBC
        - BNP
        - NO elevated troponins
    - Treatment:
        - NSAIDS for pain relief during the acute phase
        - Colchicine for severe pericarditis and does not respond with NSAIDS

        - Corticosteroids for severe pericarditis or if not responding to NSAIDS
        - NOT indomethacin because it decreases coronary blood flow

- **Abdominal aortic aneurysm**
    - S/S:
        - Constant gnawing feeling in abdomen
        - Flank or back pain
        - Pulsating abdominal mass
        - Bruit over area
        - Elevated blood pressure
    - treatment:
        - elective resection to manage aneurysm 5.5 cm or greater
        - emergency resection if ruptured
        - percutaneous aneurysm repair to insert endothelial stent graft

- **Stages of shock**
    - S/S
        - Shock progresses along a continuum and can be identified as early or late, depending on the S/S
        - Earlier interventions equals higher rate of survival, initiate aggressive therapy within 3 HOURS of identifying shock for best outcomes
        - Stage 1: Initial- no visible changes in client parameters, only changes on cellular level
        - Stage 2: Compensatory (Non- progressive)- measures to increase CO to restore tissue perfusion and oxygenation
            - Causes vasoconstriction, increased HR, increased heart contractility
                - Maintains BP and cardiac output

        - Body shunts blood from skin, kidneys, GI tract to the heart, lungs, and brain to maintain blood supply of these vital organs
            - Results in cool, clammy skin, hypoactive bowel sounds, decreased urine output
        - Inadequate perfusion of tissues, acidosis occurs, respiratory rate increases due to acidosis, confusion may occur
- Stage 3: Progressive- Compensatory mechanisms begin to fail
    - Mechanisms that regulate BP can no longer compensate so BP drops
        - All organs suffer from hypoperfusion, vasoconstriction continues further compromising cell perfusion
        - Mental status further deteriorates from decreased perfusion and hypoxia
    - Lungs begin to fail, rapid shallow respirations, hypoxemia, increased CO2, alveoli collapse, and pulmonary edema occurs
        - Inadequate perfusion of the heart leads to dysrhythmias and ischemia
        - When MAP falls below 70, GFR can't be maintained
    - Liver function, GI function, and hematological function all affected
- Stage 4: Refractory- Irreversible shock and total body failure
    - Severe organ damage and PT cannot survive
    - Erratic heart rate, intubation, jaundice, anuric, unconscious
        - BP remains low
        - Renal and liver function fail
        - Anaerobic metabolism worsens acidosis
        - Complete organ failure

- **Distributive shock**
  - neurogenic, septic, and anaphylactic
- **Abnormal electrolyte S/S**
  - Hyponatremia: poor skin turgor, dry mucosa, headache, decreased salivation, decreased blood pressure, nausea, abdominal cramping, neurologic changes and CONFUSION
  - Hypernatremia: Thirst, elevated temperature, dry, swollen tongue, sticky mucosa, neurologic symptoms, restlessness, weakness
  - Hypokalemia: Fatigue, anorexia, nausea, vomiting, dysrhythmias, muscle weakness and cramps, paresthesias, glucose intolerance, decreased muscle strength and DTR’s
  - Hyperkalemia: cardiac changes and dysrhythmias, muscle weakness with potential respiratory impairment, paresthesias, anxiety, GI manifestations
  - Hypocalcemia: Tetany, circumoral numbness, paresthesias, hyperactive DTR, Trousseau's sign, chvostek sign, seizures, respiratory symptoms of dyspnea and laryngospasm, abnormal clotting anxiety
  - Hypercalcemia: muscle weakness, incoordination, anorexia constipation, nausea and vomiting, abdominal and bone pain, polyuria, thirst, ECG changes, dysrhythmias
  - Hypomagnesemia: neuromuscular irritability, muscle weakness, tremors, athetoid movements, ECG changes, alterations in mood and LOC
  - Hypermagnesemia: Flushing, lowered BP, nausea, vomiting, hypoactive reflexes, drowsiness, muscle weakness, depressed respirations, ECG changes, dysrhythmias
  - Hypophosphatemia: neurologic symptoms, confusion, muscle weakness, tissue hypoxia, muscle and bone pain, increased susceptibility to infection
  - Hyperphosphatemia: few symptoms, soft tissue calcifications, symptoms occur due to associated hypocalcemia
  - Hypochloremia: agitation, irritability, weakness, hyperexcitability of muscles, dysrhythmias, seizures, coma

- Hyperchloremia: tachypnea, lethargy, weakness, rapid deep respirations, hypertension, cognitive changes

- **Multiple organ dysfunction syndromes**
  - S/S:
    - Multiple organ dysfunction syndromes- failure of 2 or more organ systems in an acutely ill patient such that homeostasis cannot be maintained without intervention
      - a complication of any form of shot
      - frequently occurs toward the end of the continuum of septic shock when tissue perfusion cannot be effectively restored
      - organ failure usually begins in the lungs
  - Management:
    - The general plan is the same as patients with septic shock
    - Primary interventions are aimed at supporting the patient and monitoring organ perfusion until primary organ insults are halted
    - providing information and support to the family is a critical role of the nurse
      - Must address end of life decisions to ensure supportive therapies are the patient's wishes
    - Patients who survive must know about rehab and the expectations for progress as the skeletal muscle mass makes rehab a long slow process
- **Compartment syndrome:**
  - Elevated pressure within an anatomic compartment that is above normal perfusion pressure
  - If untreated, neuromuscular damage can occur within 4-6 hr
  - Caused by an increase in compartment volume and decrease in compartment size (edema or bleeding or restrictive cast or maybe even both)
  - Ischemia-edema cycle
  - Manifests with the 5 P’s:
    - pain: increased/unrelieved pain

        - Paresthesia: numbness, burning, tingling (early signs)
        - Paralysis: motor weakness or inability to move extremity (late sign)
        - pallor: pale tissue and cyanotic nail beds
        - pulselessness: late manifestation
    - Other manifestations: muscles are hard and swollen if untreated can lead to tissue necrosis
- **Cushing's triad:**
    - hypertension
    - bradycardia
    - Cheyne-stokes respirations
- **Complete and incomplete airway obstruction**
    - Complete:
        - Clutching neck
        - decreasing O2 saturation
        - Unable to speak
        - Cyanosis
        - Unable to breathe
        - Unable to cough
        - absence of breath sounds
        - can lead to unconsciousness/death
    - Incomplete:
        - Stridor/wheezing
        - Spontaneous coughing
        - Verbalizing they feel like they cannot breathe
        - allows passage of O2 still
        - gagging
        - throat clearing
- **Cerebral perfusion pressure**
    - 70-100
    - MAP minus ICP