Ventilator care/checklist

1. HOB >30 degrees
2. Temperature
3. DVT prophylaxis
4. Ulcer prophylaxis
5. WBC count
6. Maximum FiO2
7. Minimum FiO2
8. Maximum Peep
9. Minimum Peep

- Types
  - ✪ Volume (low pressure) Alarms
    - ★ Indicates low exhaled volume d/t disconnection, cuff leak, and/or tube displacement
    - ★ **Pressure (high pressure) Alarms**
      - Indicate excess secretions d/t client biting the tubing, kinks, coughing, **pulmonary edema**, **bronchospasm**, or **pneumothorax**
    - ★ Apnea Alarms
      - Indicates the ventilator does not detect spontaneous respirations in a preset time period
- RN
  - ★ Document tube placement in cm at the lips or teeth
  - ★ 2 staff members for repositioning
  - ★ Have resuscitation bag with face mask available at the bedside at all times
  - ★ Assess respiratory status every 1-2 hr
  - ★ Monitor and document vent settings q 1 hour
  - ★ Assess cuff pressure q 8 hr
  - ★ Assess for air leak around the cuff
    - Client speaking, air hissing, decreasing SaO2
  - ✪ Positive pressure mechanical ventilation
    - ★ Maintain patent airway
    - ★ Use 2 staff members to reposition and re-secure tube
    - ★ Have resuscitation bag w/ face mask at bedside
    - ★ Assess RR q 1-2 hrs
    - ★ Reposition ETT Q 24 hr

Pneumothorax

- Manifestations
  - **DIMINISHED LUNG SOUNDS ON AFFECTED SIDE**
  - **INCREASED RESPIRATORY RATE (EARLIEST SIGN***)**
  - Anxiety
  - Pleuritic pain

- Signs of respiratory distress
  - Tachypnea
  - Tachycardia
  - Hypoxia
  - Cyanosis
  - Dyspnea
  - Use of accessory muscles
- Hyperresonance on percussion due to trapped air
- Asymmetrical chest wall movement

Endotracheal Tube care

1. Check symmetry of chest expansion
2. Auscultate breath sounds of anterior and lateral chest bilaterally
3. Obtain capnography or end-tidal CO2 as indicated
4. Ensure chest x-ray obtained to verify proper tube placement
5. Check cuff pressure every 6-8 hours
6. Monitor for signs and symptoms of aspiration
7. Ensure high humidity; a visible mist should appear in the T-piece or ventilator tubing
8. Administer oxygen concentration as prescribed by the primary provider
9. Secure the tube to the patient's face with tape, and mark the proximal end for position maintenance
   a. Cut proximal end of tube if it is longer than 7.5 cm (3 in) to prevent kinking
   b. Insert an oral airway or mouth device if orally intubated to prevent the patient from biting and obstructing the tube
10. Use sterile suction technique and airway care to prevent iatrogenic contamination and infection
11. Continue to reposition patient every 2 hours and as needed to prevent atelectasis and to optimize lung expansion
12. Provide oral hygiene and suction the oropharynx whenever necessary

- **Nursing interventions**
  - **Generally, not left in place longer than 14 days d/t risk of infection and airway injury**
  - **Hyper oxygenate before suctioning and assess the patient, before, during and after the procedure**

- **Hyper oxygenate for 30 seconds and then suction for no more than 10 seconds (you can only hyper oxygenate for TWO MINUTES)**
- **Insert catheter without applying suction, apply suction while using a rotation motions to remove it**
- **Closed suction requires clean gloves**
- **Only perform 2 or 3 suction passes**

- **Possible complications**
  - **Airway injury**
  - **Hypoxia (IF SUCTIONING LASTS TOO LONG)**
  - **Nosocomial infections**
  - **Dysrhythmias**

Incorrect position of ET tube

- **A tube is inserted through the client's nose or mouth for emergency airway management, any other orifice is incorrect**
- **Mouth intubation is the easiest and quickest form of intubation and is often performed in the emergency department**
- **Nasal intubation is performed when the client has facial or oral trauma.This route is not used if the client has a clotting problem**
- **The tip of the ETT should project in the trachea, approximately 3-5 cm from the carina, and a chest x-ray will verify placement**

Chest tubes (expected findings in the chambers)

- 2 chambers: water seal- contains 2cm of water
- Normal fluctuation of water within the water-seal chamber is called tidaling (Investigate any cessation of tidaling, this may mean the tube is occluded)
- Constant bubbling in the suction chamber
  - **1st chamber drainage collection**
- Receives fluid from the pleural or mediastinal space
  - **2nd chamber water seal**
- Contains 2 cm of water acts as a 1-way valve
- Incoming air enters the collection chamber & bubbles up through the water
- Water prevents backflow of air into the client
- Brisk bubbling often occurs when a pneumothorax is initially evacuated
- Intermittent bubbling during exhalation, coughing, or sneezing may be observed as long as there is air in the pleural space
- When air leak resolves and lung become more fully expanded bubbling ceases

- Normal fluctuation of water w/in the **water-seal chamber** is called **tidaling**; this up and down movement in concert w/ respiration reflects intrapleural pressure changes during inspiration and expiration
- Investigate any cessation of tidaling, since this may signify an occluded chest tube
  - **3rd chamber - suction control (can be wet or dry)**
- Here we expect to see **constant**, slow & steady bubbling which indicates the suction is functioning properly
- **UNEXPECTED FINDING: CONSTANT BUBBLING IN THE WATER SEAL CHAMBER**

Blood Administration (important VS)

- **↑Temperature / BP / SpO2**
- **Stay with the client and monitor – Especially during the first 15 mins**

Blood Administration (Hgb <10 g/dL)

- **Nursing interventions**
  - **Pre-transfusion**
    - **Check VS before administration**
      - **↑Temperature / BP / SpO2**
    - **Type & Cross**
      - **Blood band bracelet**
    - **Large bore IVs**
      - **18 G or 20 G – so blood cells don't lyse**
      - **Prime tubing with 0.9% NaCl ONLY**
    - **Assess pt for previous reaction to blood products**
    - **2 RN verification for correct pt and product**
      - **Double check correct product and compare to ID band**
  - **Intra-transfusion**
    - **Check / Monitor VS**
      - **↑Temperature / BP / SpO2**
      - **Stay with pt and monitor – Especially during the first 15 mins**
    - **Monitor rate of infusion**
    - **Monitor for infusion reaction**
    - **Give within 4 hr packed RBC**
  - **Post-transfusion**
    - **Check VS**
      - **↑Temperature / BP / SpO2**
- **Identifying s/sx of transfusion reactions**
  - **Dyspnea (SOB)**
    - **High Fowler's position is first action**
  - **Redness at site of infusion and systemically**
  - **Flank pain**
  - **HTN**
  - **Fever**
  - **Tachycardia**

Acute respiratory failure manifestations

- **Manifestations – Prone Positioning!**
  - Dyspnea, Orthopnea
  - Cyanosis, Pallor
  - Hypoxemia, Tachycardia
  - Confusion, Irritability, Agitation
  - Restlessness, Hypercarbia
  - Accessory muscle use

Priority care for complications (ABCs)

- **A: airway**
  - **Inhalation injury (e.g. fire victim)**
  - **Obstruction (partial or complete) from foreign bodies, debris (vomitus), or tongue**
  - **Penetrating wounds and/or blunt trauma to upper airway**
- **B: breathing**
  - **Anaphylaxis**
  - **Flail chest w/pulmonary contusion**
  - **Hemothorax**
  - **Pneumothorax (e.g. open, tension)**
- **C: circulation**
  - **Direct cardiac injury (e.g. MI, trauma)**
  - **Pericardial tamponade**
  - **Shock (e.g. massive burns, hypovolemia)**
  - **Uncontrolled external hemorrhage**
  - **Hypothermia**

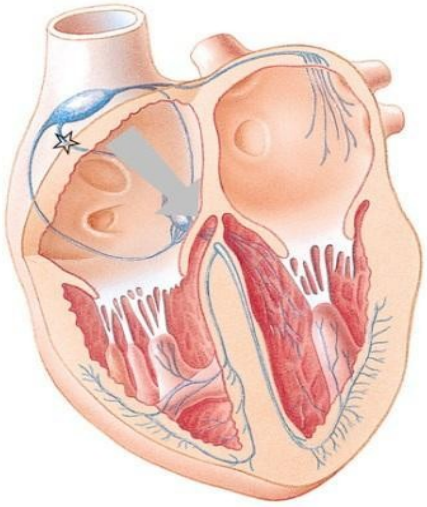
Identify dysrhythmias

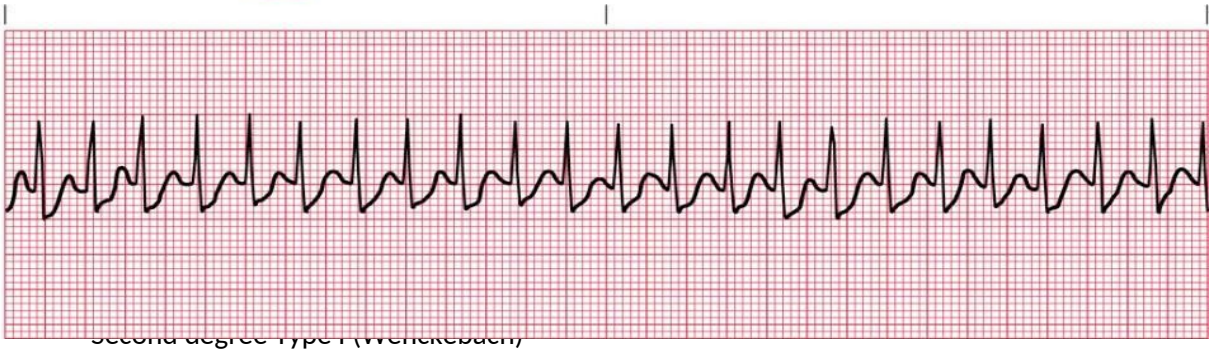
- Normal sinus rhythm
  - Regularity: The R-R intervals are constant, the rhythm is regular
  - Rate: The atrial and ventricular rates are equal; heart rate is between 60-100 bpm
  - P-wave: The P-waves are uniform. There is one P-wave in front of every QRS complex
  - PRI: The PR interval measures between 0.12 and 0.20 seconds, the PRI measurement is constant across the strip
  - The QRS complex measures less than 0.12 second
- Sinus Bradycardia
  - Regularity: The R-R intervals are constant, the rhythm is regular
  - Rate: The atrial and ventricular rates are equal; heart rate is less than 60 bpm
  - P-wave: The P-waves are uniform. There is one P-wave in front of every QRS complex
  - PRI: The PR interval measures between 0.12 and 0.20 seconds, the PRI measurement is constant across the strip
  - The QRS complex measures less than 0.12 second

- Sinus Tachycardia
    - Regularity: The R-R intervals are constant, the rhythm is regular
    - Rate: The atrial and ventricular rates are equal; heart rate is greater than 100 bpm (usually between 100-160 bpm)
    - P-wave: The P-waves are uniform. There is one P-wave in front of every QRS complex
    - PRI: The PR interval measures between 0.12 and 0.20 seconds, the PRI measurement is constant across the strip
    - The QRS complex measures less than 0.12 second
- Sinus Arrhythmia
    - Regularity: The R-R intervals vary, the rate changes with the patient's respirations
    - Rate: The atrial and ventricular rates are equal; heart rate is usually in a normal range (60-100 bpm) but can be slower
    - P-wave: The P-waves are uniform. There is one P-wave in front of every QRS complex
    - PRI: The PR interval measures between 0.12 and 0.20 seconds, the PRI measurement is constant across the strip
    - The QRS complex measures less than 0.12 second
- Premature Atrial Contraction (PAC's)
    - Regularity: Since this is a single premature ectopic beat, it will interrupt the regularity of the underlying rhythm
    - Rate: The overall rate will depend on the rate of the underlying rhythm
    - P-wave: The P-wave of the premature beat will have a different morphology than the P-waves of the rest of the strip. The ectopic beat will have a P-wave, but it can be flattened, notched, or otherwise unusual. It may be hidden within the T-wave of the preceding complex
    - PRI: The PR interval measures between 0.12 and 0.20 seconds, but can be prolonged; the PRI of the ectopic will probably be different from the PRI measurements of the other complexes
    - The QRS complex measures less than 0.12 second
- Atrial Tachycardia
    - Regularity: The R-R intervals are constant, the rhythm is regular
    - Rate: The atrial and ventricular rates are equal; the heart rate is usually between 150-250 bpm
    - P-wave: There is one P-wave in front of every QRS complex. The configuration of the P-wave will be different from that of sinus P-waves; they may be flattened or notched because of the rapid rate, the P-waves can be hidden in the T-waves of the preceding beats
    - PRI: The PR interval measures between 0.12 and 0.20 second and constant across the strip. The PRI may be difficult to measure if the P-waves is obscured by the T-waves
    - The QRS complex measures less than 0.12 second
- Atrial Flutter
    - Regularity: the atrial rhythm is regular. The ventricular rhythm will be regular if the AV node conducts impulses through a consistent pattern. If the pattern varies, the ventricular rate will be irregular
    - Rate: Atrial rate is between 250-350 bpm. Ventricular rate will depend on the ratio of impulses conducted through to the ventricles
    - P-wave: When the atria flutter, they produce a series of well-defined P-waves. When seen together, these "Flutter" waves have a saw-tooth appearance

- PRI: Because of the unusual configuration of the P-wave (Flutter wave) and the proximity of the wave to the QRS complex. It is often impossible to determine a PRI in the arrhythmia. Therefore, the PRI is not measured in Atrial Flutter
- QRS: The QRS complex measures less than 0.12 second; measurement can be difficult if one or more Flutter waves is concealed within the QRS complex

- **Atrial Fibrillation**
  - Catotid and radial pulses won't match, apical and radial pulses won't match
  - Regularity: The atrial rhythm is unmeasurable; all atrial activity is chaotic. The ventricular rhythm is grossly irregular, having no patter to its irregularity
  - Rate: The atrial rate cannot be measured because it is so chaotic; research indicates that it exceeds 350 bpm. The ventricular rate is significantly slower because the AV node blocks most of the impulses. If the ventricular rate is 100 bpm or less, the rhythm is said to be "controlled." If it is over 100 bpm, it is considered to have a "rapid ventricular response" and is called "uncontrolled."
  - PRI: Since there are no P-waves, the PRI cannot be measured
  - QRS: The QRS complex measurement should be less than 0.12 second
- Supraventricular Tachycardia (SVT)
  -



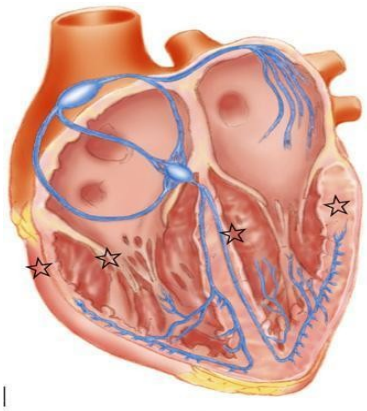


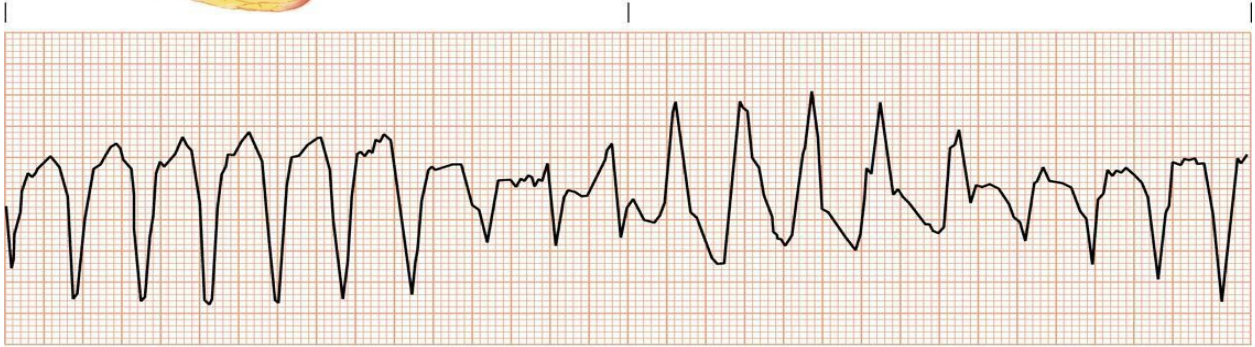
Second degree Type I (Wenckebach)

  - Regularity: The R-R interval is irregular in a pattern of grouped beating
  - Rate: Since some beats are not conducted, the ventricular rate is usually slightly slower than normal (<100 bpm). The atrial rate is normal (60-100 bpm)
  - P-Waves: The P-waves are upright and uniform. Some P-waves are not followed by QRS complexes

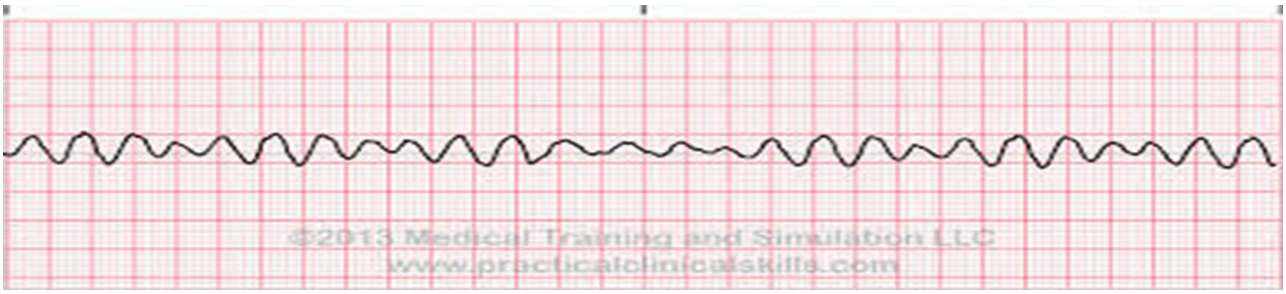
  - PRI: The PR intervals get progressively longer, until one P-wave is not followed by a QRS complex. After the blocked beat, the cycle starts again
  - QRS: The QRS complex measurement will be less than 0.12 second
- Second Degree Heart Block Type II
  - One or more P-waves not getting through, the atrial rate is 2-4x faster, the ventricular rate is slow to normal
- Third Degree Heart Block (Complete Heart Block)
  - Regularity: Both the atrial and the ventricular foci are firing regularly; this the P-P intervals and the R-R intervals are regular
  - Rate: The atrial rate will usually be in a normal range. The ventricular rate will be slower. If a junctional focus is controlling the ventricles, the rate will be 40-60 bpm
  - P-Waves: The P-waves are upright and uniform. There are more P-waves than QRS complexes
  - PRI: Since the block at the AV node is complete, none of the atrial impulses is conducted through to the ventricles. There is no PRI. The P-waves have no relationship to the QRS complexes. You may occasionally see a P-wave superimposed on the QRS complex
  - QRS: If the ventricles are being controlled by a junctional focus, the QRS complex will measure less than 0.12 second. If the focus is ventricular, the QRS will measure 0.12 second or greater
- Ventricular Tachycardia (V-tach/VT)
  - In VT you will see a succession of PVCs across the strip at a rate of about 150-250 bpm
  - Regularity: This rhythm is usually regular, although it can be slightly irregular
  - Rate: Atrial rate cannot be determined. The ventricular rate range is 150-250 bpm. If the rate is below 150 bpm, it is considered a slow VT. If the rate exceeds 250 bpm, it is called Ventricular Flutter
  - P-waves: None of the QRS complexes will be preceded by P-waves. You may see dissociated P-waves intermittently across the strip
  - PRI: Since the rhythm originates in the ventricles, there will be no PRI
  - QRS: The QRS complexes will be wide and bizarre, measuring at least 0.12 second. It is often difficult to differentiate between the QRS and the T-waves

- Torsades de pointes

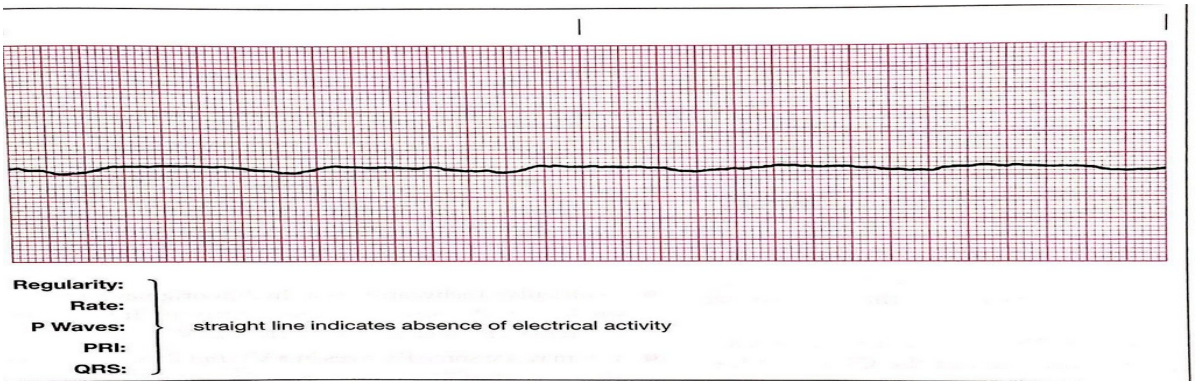




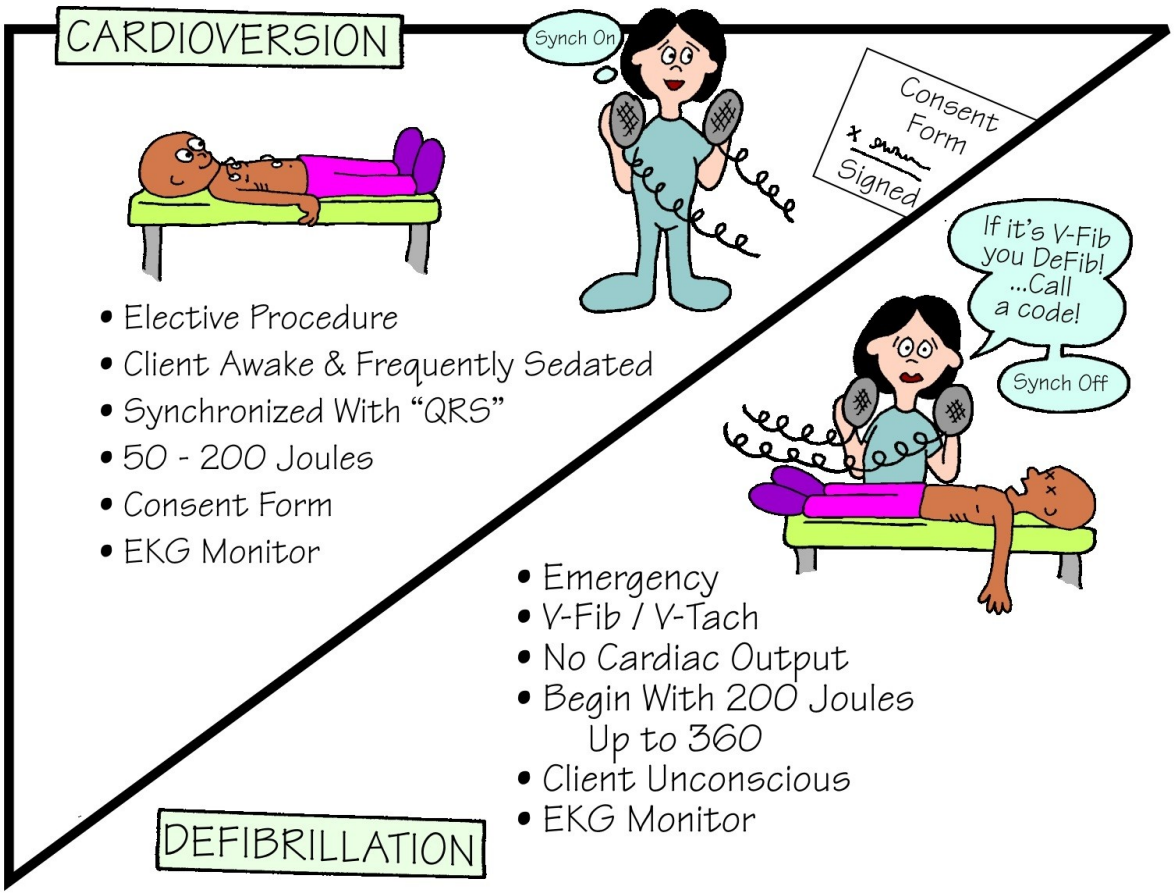
- Ventricular Fibrillation



- Asystole



Defibrillation & Cardioversion



- Defibrillation
  - Used in emergency situations as treatment of choice for
    - Ventricular fibrillation
    - Ventricular tachycardia without a pulse
  - Sooner a defibrillator is utilized in VF or pulseless VT, the better the survival rate
  - Delivery of the current is immediate and unsynchronized

- Electrical Cardioversion
  - Involves the delivery of a "timed" electrical current, synchronized with the ECG on a cardiac monitor

        - Atrial dysrhythmias
        - Supraventricular Tachycardia (SVT)
        - Ventricular tachycardia with a pulse
    - Pre-procedure
        - Explain the procedure to the client, and obtain consent
        - Administer oxygen
        - Document pre-procedure rhythm
        - Have emergency equipment available
        - Digoxin is held for 48 hr prior to elective cardioversion
    - Intra-procedure
        - Administer sedation as prescribed
        - Ensure proper placement of leads and machine settings (synchronized), including joules to be delivered
        - Monitor client in a lead that provides an upright QRS complex
        - All staff must stand clear of the client, equipment connected to the client, and the bed when a shock is delivered
        - Perform CPR/defibrillate/give anti-dysrhythmics if necessary
    - Post-procedure
        - Monitor VS, assess airway patency, and obtain an ECG
        - Provide client/family with reassurance and emotional support
        - Document the following
            - Pre-procedure rhythm
            - Number of defibrillation or cardioversion attempts, energy settings, time, and response
            - Client's condition and state of consciousness following procedure
            - Skin condition under the electrodes
    - Complications
        - Embolism
            - Can dislodge blood clots causing a PE, CVA, or MI
        - Decreased cardiac output and heart failure
            - Can damage heart tissue and impair heart function

Reducing CAD

- **Modifiable risk factors can be changed to benefit the pt's health (e.g. tobacco cessation, increase physical activity, increase healthy diet)**
- Risk factors
    - **Non-modifiable risk factors**
        - Increasing age
        - Gender (**MEN OLDER THAN 45**, more common in men than in women until 75)
        - Ethnicity (more common in **AA** than white males)
        - **Genetic predisposition and family history of heart disease**
    - **Modifiable risk factors**
        - Serum lipids- total cholesterol >200, triglycerides >150, LDL >160, HDL <40 in men and <50 in women

- Elevated CRP
- BP >140/90
- Diabetes
- Tobacco use
- Physical inactivity
- Obesity: waist circumference >102 cm in men and >88 cm in women
- Fasting glucose >100
- Psychosocial risk factors (depression, hostility, anger, stress)

Atelectasis manifestations

- Increasing dyspnea s
- Diminished breath sounds in lower lobes
- Cough and sputum production
- If large amount of lung tissue → marked respiratory distress may be observed
- Tachycardia
- Tachypnea
- Pleural pain
- Central cyanosis (late sign of hypoxemia)

Alteplase nursing tasks

- Medication should be given in the first 30 minutes of pts arrival
- Loading dose is given for a rapid therapeutic effect. Medication is in powder form and needs to be reconstituted with sterile water
- Minimize the number of times the patient's skin is punctured and avoid intramuscular injections.
- Draw blood for laboratory tests when starting the IV line.
- Start IV lines before thrombolytic therapy; designate one line to use for blood draws.
- Avoid continual use of noninvasive blood pressure cuff.
- Monitor for acute dysrhythmias and hypotension.
- Monitor for reperfusion: resolution of angina or acute ST-segment changes.
- Check for signs and symptoms of bleeding: decrease in hematocrit and hemoglobin values, decrease in blood pressure, increase in heart rate, oozing or bulging at invasive procedure sites, back pain, muscle weakness, changes in level of consciousness, complaints of headache.
- Treat major bleeding by discontinuing thrombolytic therapy and any anticoagulants; apply direct pressure and notify the physician immediately.
- Treat minor bleeding by applying direct pressure if accessible and appropriate; continue to monitor.

Pulmonary embolism nursing care and medications

- Manifestations: anxiety, feelings of impending doom, **SUDDEN ONSET OF chest PAIN**, pain upon inspiration and chest wall tenderness, dyspnea and air hunger, cough, hemoptysis
- Nursing Interventions: **administer oxygen therapy** to relieve hypoxemia and dyspnea, position the patient in high fowlers, initiate and maintain IV access, administer meds as prescribed,

assess respiratory status every 30 minutes, assess cardiac status, provide emotional support and comfort to control anxiety, and monitor changes in LOC and mental status

- Pharmacologic treatment: anticoagulants, direct factor Xa inhibitor, and thrombolytic therapy – **HEPARIN**
- Labs: Chest Xray, labs (ddimer), CT

Fat emboli S/S

- Manifestations
  - Dyspnea/resp distress/ Tachypnea (increased RR)/ Decreased O2 sat/ Chest pain
  - Tachycardia (increased HR)
  - Confusion (d/t hypoxia)

DIC Patho

- In DIC, normal hemostatic mechanisms are altered.
- The inflammatory response generated by the underlying disease initiates the process of inflammation and coagulation within the vasculature
- The natural anticoagulant pathways within the body are simultaneously impaired, and the fibrinolytic system is suppressed so that a massive amount of tiny clots forms in the microcirculation
- Initially, the coagulation time is normal. However, as the platelets and clotting factors form microthrombi, coagulation fails
  - Thus, the paradoxical result includes excessive clotting and bleeding
- The clinical manifestations of DIC are primarily reflected in compromised organ function or failure
- Decline in organ function is usually a result of excessive clot formation (with resultant ischemia to all or part of the organ) or, less often, of bleeding
- The excessive clotting triggers the fibrinolytic system to release fibrin degradation products, which are potent anticoagulants, furthering the bleeding
- The bleeding is characterized by low platelet and fibrinogen levels; prolonged PT, aPTT, and thrombin time; and elevated fibrin degradation products and D-dimers
- Mortality rate: 80%

DIC S/S

- Integumentary (skin)
  - ↓Temperature, sensation; ↑pain; cyanosis in extremities, nose, earlobes; focal ischemia, superficial gangrene
  - Petechiae, including periorbital and oral mucosa; bleeding: gums, oozing from wounds, previous injection sites, around catheters (IVs, tracheostomies); epistaxis; diffuse ecchymoses; subcutaneous hemorrhage; joint pain
- Circulatory/Respiratory
  - ↓Pulses: capillary refill >3 seconds; hypoxia (secondary to clot in lung); dyspnea; chest pain with deep inspiration; ↓breath sounds over areas of large embolism

    - Tachycardia; high-pitched bronchial breath sounds; tachypnea; ↑consolidation; s/s of acute respiratory distress syndrome
- Gastrointestinal
    - Gastric pain; "heartburn"
    - Hematemesis; melena; retroperitoneal bleeding (abdomen firm and tender to palpation; distended; ↑abdominal girth)
- Renal/Neurologic
    - ↓Urine output; ↑creatinine, ↑blood urea nitrogen; ↓alertness and orientation; ↓pupillary reaction; ↓response to commands; ↓strength and movement
    - Hematuria
    - Anxiety; restlessness; ↓mentation, altered LOC; headache; visual disturbances; conjunctival hemorrhage

DIC labs

- Decreased platelet count
- Increased PT time
- Increased aPTT time
- Increased Thrombin time
- Decreased fibrinogen
- Increased D-dimer level
- Increased Fibrin degradation products (FDPs)
- Thromboelastography, can be performed at the bedside and can better assess platelet function as well as fibrinolytic activity
- International Society on Thrombosis and Hemostasis has developed a highly sensitive and specific scoring system (See next slide)

Blood products/fluids in hypovolemic shock

- Resuscitation fluid options (During Hypovolemic Shock → **Replacing FLUIDS is #1 priority!!**)
    - Packed RBC's ** Most common given (hemorrhaging)
    - FFP
    - Platelets
    - 0.9% Nacl (crystalloid)
    - Lactated Ringers (LR) → best option when pt. is in metabolic acidosis
    - Albumin (colloids 5, 25%) → best option for burn patients

S/S of Hypovolemic Shock: Decreased intravascular volume d/t fluid loss

- Weak and thready pulse
- Dehydration
- Thirst
- ↓urine output
- Dizziness
- ↓central venous pressure

Fluid overload s/sx r/t dialysis

- Dependent and generalized edema
- Dysrhythmias (hyperkalemia)
- Crackles
- SOB
- JVD

Types of fluids

- Crystalloids
  - Contain the same concentration of electrolytes as the extracellular fluid
    - Does not alter the concentrations of electrolytes in the plasma
  - Fluids utilized in Shock
    - **0.9% NS**
    - **LR**
  - Disadvantage: some of the volume administered is lost to the interstitial compartment and some remains in the intravascular compartment; this occurs as consequence of cellular permeability that occurs during shock
  - Avoid both underresuscitating and overresuscitating the patient in shock
- Colloids
  - Similar to plasma proteins, contain molecules that are too large to pass through capillary membrane
  - Expand intravascular volume by exerting oncotic pressure, thereby pulling fluid into the intravascular space
  - In addition, colloids have a longer duration of action than crystalloids, because the molecules remain within the intravascular compartment longer
  - Typically, **albumin** is the agent used
  - Disadvantage of albumin is its high cost compared to crystalloid solutions.
- Blood components (PRBC's, FFP, & platelets)
  - Packed RBC's ** Most common given (hemorrhaging)
  - FFP
  - Platelets
  - 0.9% Nacl (crystalloid)
  - Lactated Ringers (LR) → best option when pt. is in metabolic acidosis
  - Albumin (colloids 5, 25%) → best option for burn patients

Pulse pressure and what it indicates

- Pulse pressure correlates well with stroke volume
  - Pulse pressure is calculated by subtracting diastolic measurement from systolic measurement; the difference is the pulse pressure: Normal 30-40 mmHg
  - Narrowing or decreased pulse pressure is an earlier indicator of shock than a drop in systolic BP
  - Elevation of diastolic BP w/release of catecholamines & attempts to increase venous return through vasoconstriction is an early compensatory mechanism in response to decreased stroke volume, BP, and overall cardiac output
  - **Note**: By the time BP drops, damage has already been occurring at the cellular and tissue levels!

Anaphylactic shock medication

- **Epinephrine IV/Pen (#1 first!!)**
  - Rapid acting medication that promotes effective oxygenation and used to treat anaphylactic shock (addresses ABC's)
- Diphenhydramine
  - Used to treat itching, rash, pruritis
- Albuterol (nebulized)
- Prednisone

Hypervolemia S/S

- ↑Tachycardia, ↑**HTN**
- **Dyspnea**
- **Weakness**
- **Edema**
- Bounding pulse
- ↑ RR
- SOB
- Acute weight gain
- Acites
- Distended jugular veins
- Cough
- Crackles
- ↑urine output

Stages of shock and S/S: Earlier interventions = an increased chance of survival. Initial aggressive therapy w/in 3 hrs of identifying shock for best outcomes.

- Initial
  - No visible changes in client parameters, only changes on cellular level
- Compensatory (non-progressive): Normal BP; HR >100 bpm; RR >20 breaths/min ($PaCO_2$ <32 mmHg); Skin is cold & clammy; Decreased urinary output; Confusion & agitation; Respiratory alkalosis
  - Measures to increase CO to restore tissue perfusion and oxygenation
  - SNS causes vasoconstriction, increased HR, increased heart contractility
    - This 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
    - Resulting in cool, clammy skin, hypoactive bowel sounds, decreased urine output
  - Perfusion of tissues is inadequate
  - Acidosis occurs from anaerobic metabolism

  - Respiratory rate increases due to acidosis, may cause compensatory respiratory alkalosis
  - Confusion may occur
- Progressive: Systolic <90 mmHg; MAP <65 mmHg & requires fluids resuscitation to support BP; HR >150 bpm; RR rapid, shallow breaths & crackles; PaO2 <80 mmHg; PaCO2 >45 mmHg; Skin is mottled & petechiae; Urinary output <0.5 mL/kg/hr; Lethargy; Metabolic acidosis
  - Compensatory mechanisms begin to fail
- Refractory
  - Irreversible shock and total body failure

Types of distributive shock

- Anaphylactic shock
- Neurogenic shock
- Septic shock

Cast care

- Keep clean & dry
- Frequent neuro assessments
- Educate pt no objects inside cast
- RICE
- Alleviate itching w/cool hair dryer
- Carry cast with palms of hands, not fingertips

Amputation care

Nursing interventions

- Prevent hypovolemia, pain, infection
- Assess surgical site for bleeding
- **Monitor tissue perfusion on stump (residual limb)**
- Monitor for signs of infection and non-healing incisions; infection can lead to osteomyelitis
- Perform ROM exercises
- Place pt in prone positioning for 20 – 30 min several times a day to help prevent hip flexion contractures ***(opens up hips)
- Elevate extremity for 24 - 48 hrs --- > NOT after 72 hrs

Preparing for prosthesis

Nursing interventions

Residual limb must be shaped and shrunk prior to prosthesis

Shrinkage interventions:

- Wrap stump using ACE bandage (figure-8 wrap) to prevent blood flow restriction and decrease edema
- Use stump shrinking sock (easier for pt to apply)
- Use air splint: inflated to protect and shape residual limb and for easy access to inspect the wound

Osteomyelitis nursing interventions - Chronic inflammation r/t infectious penetration d/t trauma or surgical repair

S/S:

- Bone pain that is constant, pulsating, localized, and worse with movement
- Fever (older adults might not have a fever)
- Leukocytosis and elevated ESR
- Untreated = **SEPSIS**

**** Monitor for signs of infection and non-healing incisions; infection can lead to osteomyelitis ****

Osteomyelitis treatments

Treatment:

- Antibiotics needed for **3** months
  - High risk for contracting **C. Diff**

Increased intracranial pressure (ICP) s/s

Manifestations

ICP: Early (LOC, HA, eye, wX)

- Change in LOC

- Change in condition (restless, confused, increased drowsiness, increased resp effort, purposeless mvmnt)

- Pupillary changes (PPP or dilation) / impaired ocular mvmnt

- Weakness in one extremity/one side/hemiplegia

- HA: constant, increasing in intensity, or aggravated by movement or straining

ICP: Late (RR/ VS (CUSHING'S TRIAD), emesis, LOC – coma/ stupor)

  - Resp and vasomotor changes

- VS:

- increase in SBP + temp
- decrease/ irregular HR
- widening pulse pressure
- slowing of HR -- >

- pulse may fluctuate rapidly from tachycardia to bradycardia, temp increase
  - **Cushing's triad: HTN, bradycardia, bradypnea (opposite of shock sx)**
- Projectile vomiting
- Deterioration of LOC; stupor to coma
- Hemiplegia, decortication, decerebration, flaccidity
- Resp pattern alterations: Cheyne-Stroke and arrest
- Loss of brainstem reflexes; pupil, gag, corneal, and swallowing

Increased ICP nursing care/actions

- Nursing interventions
  - Elevate HOB **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
- *Must know normal ICP*
  - 10 -15 mmHG

Meningitis s/s

Viral Meningitis s/s:

- Headache and fever are early manifestations
- Nuchal rigidity is a tell-tale sign of meningitis
- Positive Kernig sign
- Positive Brudzinski sign
- Client may complain of photophobia
- Petechial rash or purpuric lesions
- Seizures (late sign) r/t increased ICP

Bacterial Meningitis s/s:

- Nuchal rigidity

- Altered mental status/Fever/Chills
- Tachycardia
- Photophobia/Seizures
- Nausea/Vomiting
- Severe headache
- Positive Kernig/Brudzinski sign
- Restlessness/Irritability
- Red macular rash

Nursing interventions:

- Isolate the client as soon as meningitis is suspected/ Maintain isolation precautions per hospital policy.
  - The nurse should initiate droplet precautions, which require a private room. Continue droplet precautions until antibiotics have been administered for 24 hr and oral and nasal secretions are no longer infectious. Clients who have bacterial meningitis might need to remain on droplet precautions continuously.
  - Standard precautions are implemented for all clients who have meningitis.
- Implement fever-reduction measures, such as a cooling blanket, if necessary.
- Report meningococcal infections to the public health department.
- Decrease environmental stimuli/ Provide a quiet environment
- Minimize exposure to bright light (natural and electric)
- Maintain bed rest with the head of the bed elevated to 30°
- Monitor for increased IC
  - Tell the client to avoid coughing and sneezing, which increase ICP
- Maintain client safety, such as seizure precautions
  - Replace fluid and electrolytes as indicated by laboratory values
- Older adult clients are at an increased risk for secondary complications, such as pneumonia
  -

Pharmacologic treatment options:

- **Rifampin******
- Ceftriaxone or cefotaxime in combination with vancomycin: Antibiotics given until culture and sensitivity results are available. Effective for bacterial infections
- Phenytoin: Anticonvulsants given if ICP increases or client experiences a seizure.
- Analgesics for headache and/or fever.
  - *******Nonopioid to avoid masking changes in the level of consciousness**

Prophylactic treatment if exposed:

- Ceftriaxone or cefotaxime in combination with vancomycin: Antibiotics given until culture and sensitivity results are available. Effective for bacterial infections

Ways to diagnose and test for meningitis

- CT scan
  - Fluid shift and/or meningeal inflammation
- MRI
- Lumbar puncture
  - CSF cultures
  - Gram staining
  - Cloudy w/halo ring
  - Decreased Glucose
  - **o** Elevated WBC/Protein/CSF pressure

Types of strokes and their s/s

- **Hemorrhagic (manifestations, signs/symptoms)**
  - Increased ICP
  - Vomiting
  - HA
  - **Nuchal rigidity**
  - Sluggish pupil reaction
  - Speech difficulty
  - Visual disturbances – blown pupil
  - **Facial drooping**
  - **Severe HA**
  - **Rapid decline in LOC**
  - **Worsening neuro function and herniation**
  - **Changes in ICP**

- **Ischemic (manifestations, signs/symptoms)**
  - Sudden, severe headache
  - Confusion or change in mental status
  - Numbness or weakness of the face, arm, or leg
  - Difficulty in walking
  - Dizziness
  - Loss of balance or coordination
  - Visual disturbances
  - Trouble speaking or understanding speech

Glasgow coma scale

- Best possible score is 15
- Score </= 8 associated w/ severe head injury and coma
- Score 9-12 indicates moderate head injury
- Score >13 associated with minor head trauma

Traumatic amputation care

Nursing interventions

- Stop bleeding and apply direct pressure w/gauze or clean cloth
- Place severed extremity in plastic bag and ice
- Prevent hypovolemia, pain, infection
- Assess surgical site for bleeding
- **Monitor tissue perfusion on stump (residual limb)**
- Monitor for signs of infection and non-healing incisions; infection can lead to osteomyelitis
- Perform ROM exercises
- Place pt in prone positioning for 20 – 30 min several times a day to help prevent hip flexion contractures ***(opens up hips)
- Elevate extremity for 24 - 48 hrs --- > NOT after 72 hrs

Disaster triage: Overall goal is to do the greatest good for the highest number of people.

- Assign tag color
  - What are the colors in the tagging triage system and their terms? Briefly describe each one.
    - Green Tag(**Non-urgent** or class III): Minor injuries that do not require immediate treatment
      - Ex: Fractures, sprains, strains, abrasions, and contusions
    - Yellow Tag(**Urgent** or class II): Major injuries that require treatment, patients who can wait a short time for care
      - Ex: Open fractures w/ distal pulse, large wounds that need tx w/in 30 min to 2 hrs
    - Red Tag(**Emergent** or class I): Immediate threat to life Ex: Airway obstruction or shock
    - Black Tag (**Expectant** or class IV): Expected and allowed to die, patients who are expected to die or are dead
      - Ex: Massive head trauma, extensive full-thickness body burns, & high cervical SCI requiring mechanical ventilation
      - The black tag indicates injuries are extensive, and chances of survival are unlikely even with definitive care.
      - Persons in this group should be separated from other casualties, but not abandoned. Comfort measures should be provided when possible.
        - An example of a client that would be black tagged would be an unresponsive client that has a penetrating head wound.
        - Black tag category name: **EXPECTANT**
        - Would receive care last
- PPE – always wear the highest level of protection

- Emergency preparedness kit:
  - Items to include
    - What supplies would a nurse recommend community members include in a disaster preparedness kit?
      - A backpack with personal ID
      - Clean clothing, sturdy footwear, toiletries
      - Pocket-knife, first aid kit, matches in waterproof container
      - 3-day supply of water (1 gallon/day) / 3-day supply of non-perishable food
      - Blankets/sleeping bag/pillow
      - Adequate supply of prescription medications
      - Battery operated radio, flashlight and batteries
      - Credit card/cash/traveler's checks
    - Extra set of keys and full tank of gas in the car, cell phone

- Assess and prioritize acuity level
  - Prioritize patients based on chief complaint and presentation
  - What is the priority for any trauma situation, but particularly facial or neck trauma (including burns).
    - Airway
  - The nurse is caring for an elderly client that was found on the ground during a snowstorm. He is intoxicated, malnourished, frostbite to toes bilaterally, has a superficial non bleeding laceration to the right side of forehead, head lice and a core temp of 91.8 degrees. What condition does the nurse prioritize first?
    - Hypothermia (elevate core temp)

- Nursing roles during a disaster
  - May be asked to perform duties outside usual scope of practice
    - Teach them how to do it once and then they perform this task
      - Suturing
      - Put in chest tube
    - RN may act as triage officer; delegate to others too
      - Disaster = New settings and atypical roles for nurses arise during a disaster
        - Perform outside scope of practice
  - A nurse may serve as a triage officer during times of disaster
    - Delegate to others

Burns:

- Escharotomy
  - Patient education
    - Partial-thickness wounds form eschar; once eschar is removed, re-epithelialization begins at wound margins & appears as red or pink scar tissue
- Wound care

- Nursing interventions
  - Done during the acute phase
    - Considered a "major therapeutic intervention" of the acute phase
    - Flush chemical from wound & surrounding area w/copious amounts of saline solution or water
    - Cleansing and gentle debridement (using scissors & forceps) during a regular shower or w/patient in bed
    - Once daily shower & dressing change w/an evening dressing change in the patient's room are often routine in burn centers
    - Extensive, surgical debridement done in OR
    - Patients find 1st wound care to be both physically & mentally demanding; provide emotional support & begin to build trust during this activity
    - INFECTION can cause further tissue injury & possible sepsis
    - Source of infection is likely the patient's own normal flora, mostly from skin, respiratory, and GI system
    - Always wear PPE and use sterile gloves when applying ointments & sterile dressings
    - Permanent skin coverage is the primary goal; autograft (patient's own skin) or allograft (cadaver skin) is generally used; newer biosynthetic options are now available
    - Increase caloric intake
    - Vitamins ACE, multivitamins, zinc, ferrous sulphate
    - Partial-thickness wounds form eschar; once eschar is removed, re-epithelialization begins at wound margins & appears as red or pink scar tissue

- Emergent phase – burn – 72 hrs: The primary goal is to maintain a patent airway, administer IV fluids to prevent hypovolemic shock, and preserve vital organ functioning
  - Emergent (resuscitative) phase is time required to resolve the immediate, life-threatening problems resulting from burn injury
  - Primary concerns – onset of hypovolemic shock & edema formation
  - Nursing interventions
    - Begins at time of injury
    - Ends w/restoration of normal capillary permeability
    - Duration usually 48-72 hr
    - Includes prehospital care & emergency care
    - Assess bowels – may have paralytic ileus d/t shunted blood to vital organs
    - Protect from infection – where sterile gloves during ointment application and dressing changes
    - Hydration
    - Monitor for hypovolemic shock and AW edema
  - Monitor labs
  - Hyperkalemia – immediately after burn d/t massive cell destruction (decreased BP, muscle twitching/cramps, paresthesia)
    - Hypokalemia – later w/fluid shifts (shallow resp, confusion, weak/thready pulse, n/v)

- Hyponatremia – during burn shock d/t plasma loss/3rd spacing as well as during 1st week of acute phase (lethargic, HA, confusion, seizures, coma)
- Elevated Hgb, Hct, BUN, glucose (d/t stress)/dehydration
- Carboxyhemoglobin: more than 10% - IDs smoke inhalation

- Rules of Nines
  - Calculate TBSA affected
    - Head in whole = 9%
    - Anterior midline = 18%
    - Posterior midline = 18%
      - Trunk = 36% total
    - Each arm in full capacity = 9%
    - Each leg in full capacity = 18%
    - Perineal area in whole = 1%
- Prioritize care based on TBSA
  - Remove pt from source of burn and stop burning process
  - Circulation = #1 for unconscious pt – Compressions-Airway-Breathing (CAB)
    - Unconscious call CAB!
  - Burn pt may have other injuries that are priority over the burn
    - Internal bleeding/C-spine fracture/Pneumothorax]
- Fluid resuscitation
  - Fluids used, over what timeframes
    - LR
      - ½ over first 8 hrs
      - Next ½ over last 16 hrs
    - 4 mL per kg x % burned
    - Calculate using Parkland Baxter formula:
      - 4mL LR/kg x %TBSA burn
    - Signs of adequate replacement
      - Improvements in vitals/cap refill/LOC/UO

- ABC assessment prioritization
  - **Primary Survey**
    - Components
      - The ABCDE principle for a primary survey includes:
        - A: Airway and c spine (Inhalation injury, obstruction, penetrating wounds)
        - B: Breathing (Anaphylaxis, flail chest, hemothorax, pneumothorax)
        - C: Circulation (Cardiac injury, pericardial tamponade, shock, uncontrolled hemorrhage, hypothermia)
        - D: Disability (Head injury, stroke) -- use GCS
        - E: Exposure

DKA Treatment

- Rehydration = #1
  - Initial fluid of choice is 0.9% NS →rate of infusion dependent on clinical state of patient
  - If pt is hypernatremic → 0.45% saline in order to provide electrolyte free water
  - When BG reaches 200-300 or less →change to D5W to prevent decline in blood glucose level and so that insulin can be continued to achieve ketone clearance
- Restore electrolytes
  - Major electrolyte of concern is **POTASSIUM**
  - Initial plasma concentration may be low, normal, or high, but more often than not tends to be high (hyperkalemia)
  - Rehydration leads to:
    - Increased plasma volume and subsequent decreases in serum potassium
    - Increased urinary excretion of potassium
- Reverse acidosis
- Reversed with the use of insulin
- Insulin is usually infused IV at a slow, continuous rate (e.g., 5 units/hr)
- Hourly blood glucose values must be measured
- Regular insulin (only IV insulin) may be added to IV solutions

Insulin Administration

  - IV insulin @ rate of 5 units/ hr
  - Only "regular" insulin may be administered IV

HHS Treatment

- Rehydration
- Insulin administration
- Monitor fluid volume and electrolyte status
- Monitor for hypervolemia d/t massive rehydration

Compartment Syndrome S/S

  - Risk factors
    - Cast – newly applied or applied too early
  - Manifestations
    - ***Pain – unrelieved by meds; intense when passively moved***
    - **Paralysis** (late) – motor weakness, inability to move IDs major nerve damage **LATE** manifestations
    - **Paresthesia** (early) – numb, burning, and tingling = **EARLY** manifestations
    - Pallor – tissue is pale and nail beds are cyanotic
    - **Pulselessness – LATE** manifestation
    - Edematous/ hard muscles d/t swelling
  - Treatment:

- **Fasciotomy** or fasciectomy is a surgical procedure where the fascia is cut to relieve tension or pressure commonly to treat the resulting loss of circulation to an area of tissue or muscle. **Fasciotomy** is a limb-saving procedure when used to treat acute compartment syndrome.

Biological Weapons of Mass Destruction

Types of **biological weapons** include bacterial, like the plague, anthrax or Q fever (*Coxiella burnetii*). Viruses, including small pox, hepatitis, the avian influenza, and toxins, such as botchalism, ricin and staff.

Disaster preparedness kit

- Flashlight w/batteries
- Battery-powered radio
- Nonperishable food w/nonelectric can opener
- One gallon of water per person
- Basic first-aid supplies
- Matches in a waterproof container
- Emergency blanket and/or sleeping bag and pillow
- Rain gear
- Clothing and sturdy footwear
- Prescription and OTC medications
- Toiletries
- Important documents and money

PPE – Always wear the highest level if unknown

- Gown
- Mask
- Goggles
- Gloves

Pre-planning for a disaster

- Role of nurses
  - In the health care facility
    - The Joint Commission mandates specific standards for hospital preparedness, including an Emergency Operation Plan (EOP).
    - An EOP includes training for personnel, criteria for activation, and specific actions for various emergency/disaster scenarios.
    - Disaster drills should be conducted at least twice annually; one involving communitywide resources and actual or simulated clients.
  - In the community
    - Education provided to families about disaster planning

- What to do in a an evacuation
- Plans for family pets
- Where to meet in case of an emergency

- RN
  - Assess community for risks

Fire Emergency (RACE)

- Rescue
- Alarm
- Confine
- Extinguish

Carbon monoxide poisoning

- Manifestations
  - The nurse is caring for a patient in the emergency department who complains of a headache and shortness of breath. The patient mentions that everyone in the house has had a **headache** for the last 3 days and they are all feeling "off" What type of exposure would the nurse consider?
    - Carbon Monoxide exposure
      - HA / Confusion / Dizziness/ Vomiting
    - Carbon monoxide does not have an odor.
    - Mild Poisoning S/S: HA, flushing, decreased visual acuity, decreased cerebral functioning, slight breathlessness
    - Moderate Poisoning S/S: HA, N/V, drowsiness, tinnitus and vertigo, confusion and stupor, pale to reddish-purple skin, decreased BP, increased and irregular heartbeat, decreased ST segment
    - Severe Poisoning S/S: Coma, Seizures, Cardiopulmonary instability
    - Fatal Poisoning S/S: Death
    - Tx with 100% humidified O2 & hyper bariatric oxygenation

Heat Stroke

- Manifestations

Heat Stroke * more severe than heat exhaustion ****

- **Core temperature is > 105.3**
- **Altered mental status**
- Absence of perspiration
- Circulatory collapse
- Neurological symptoms
  - **Hallucinations**
  - **Loss of muscle coordination**

- Combativeness
  - *This is due to the brain's sensitivity to thermal injuries

SIADH = Excessive ADH (posterior pit) - Low **SERUM** Na / HIGH **URINE** Na, OsmoL, Specific Gravity

- **Manifestations** (won't be distinguished by early / late manifestations on exam)
  - EARLY
    - **HA / Weakness**
    - Anorexia / **Muscle cramps**
    - **Weight gain w/o edema*** → d/t retention of water instead of sodium
      - 1 kg = 1 L of fluid retention
  - LATE (as serum Na+ decreases)
    - **Personality changes** / Hostility
    - Sluggish DTRs
    - N / V / D
    - **Oliguria w/ dark yellow CONCENTRATED urine****
  - Dilutional HYPOnatremia***
  - Decreased serum osmolality (less than 270 mEq/L)
  - Concentrated urine = increased specific gravity
- **Interventions**
  - Restrict oral fluids - **no more than 1,000 mL / day!!!*****
  - Flush all enteral and gastric tubes with **0.9% NaCL**
  - mX I&O / Daily weights / VS for: increased BP / Tachycardia / HYPOthermia
  - Auscultate lung sounds to mX for pulmonary edema - **crackles will be present**
  - **Report altered mental status** (HA / Confusion / Lethargy / Seizure / Coma)
  - Reduce environmental stimuli = maintain seizure precautions
  - mX urine and blood chemistry
    - Pharm tX:
      - Tetracycline derivative / Vasopressin (ADH) *antagonist*
      - Loop diuretic / Hypertonic NaCL IV fluid

Diabetes insipidus = Lack of ADH (post. pit) = **DILUTE urine** w/ CONCENTRATED serum Na + K

- **Lab findings**
  - **Urine** (DILUTE) d/t POLYuria (excessive urine) = abrupt onset of 4-30 L/day
    - Decreased
      - **Specific Gravity <1.005****
      - Osmolality (<200)
      - pH / sodium / potassium
      - " AS URINE VOLUME INCREASES, URINE OSMOL. decreases "
        - Polyuria >30 mL/hr **(4-30 L/day)**
        - Tented skin
        - Tachycardia / HYPOtension
  - **Serum** (CONCENTRATED)
    - Increased

- Osmolality (>300)
- **Sodium / Potassium**
- " As serum volume decreases, serum osmol. INCREASES "

- **Pharmacologic treatment and expected findings**
  - **DESMOPRESSIN**
    - d/t DI pt. Not secreting VASOPRESSIN (needs adh replacement agent)
    - Causes increased H2O reabsorption by renals = decreases urine formation
    - mX efficacy by assessing UO / H2O deprivation test / Vasopressin test
    - Decrease oral fluids when starting meds
      - mX for vasoconstriction
      - mX for HA / Confusion / Other indications of H2O intoxication
      - S/S
        - Polyuria / Polydipsia
        - Nocturia** / Fatigue / Dehydration

Hypoglycemia = < 70 mg/dL (severe = < 40 mg/dL) d/t too much insulin, exercise, or not enough food intake

- **Manifestations*****
  - MILD =
    - Hunger / Nervousness / **Sweating**
    - Palpitations / **Tachycardia** / Tremors
  - MODERATE =
    - Confusion / **double vision** / drowsiness / emotional changes / HA
    - Imaired coordination / inability to concentrate / irrational or combative behavior
    - Lightheadedness / numbness of the lips and tongues / slurred speech
  - SEVERE= Difficulty arousing / disoriented behavior / loss of consciousness / seizures

- **Interventions**
  - Check BG levels
  - < 70 = take **15-20g**** of readily absorbable carbs*** (NOT for SEVERE DM!!!)
    - **4-6 oz (½ cup) of fruit juice or REGULAR soft drink**
    - **8 oz (1 cup) low fat milk**
    - **Glucose tabs or glucose gel**
    - **6-10 hard candies**
    - **1 tbsp of honey or syrup**
    - **4 tsp sugar / 4 sugar cubes**
    - **6 saltine crackers / 3 graham crackers**
      - **THEN recheck BG in 15 min**** cycle if still under 70
  - WNL = eat 15-20 g snack w/ **carbs AND protein** if next meal is more than (1) hour away

- BG increases approx. 40 mg/dL over 30 min following ingestion of 10g carbs

- Unconscious or unable to swallow = Admin **GLUCAGON via SQ or IM** route q 10 min until conscious -- notify PCP -- place in lateral position
  - **DO NOT GIVE UNCONSCIOUS PT ANYTHING BY MOUTH!!!!*****
- Acute care = Admin 25-50mL of 50% dextrose IV (D50) via IV if available
  - Until conscious (20 min) then have pt. ingest carbs orally

Myxedema Coma (untreated HYPOthyroidism = persistently LOW thyroid production (LOW T4,T3))

- **Manifestations** (everything SLOWWWS down)
  - Respiratory failure / Coma
  - **HYPOtension / HYPOthermia / HYPOventilation ******
  - HYPOnatremia / HYPOglycemia
  - Bradycardia / Dysrhythmia
- **Nursing interventions**
  - **Patent AW*****
  - Initiate aspiration precautions d/t AMS
  - Admin IV fluids as prescribed
    - Observe cardiac monitor for dysrhythmias (flat, inverted T waves)
    - Observe for evidence of UTI
    - Initiate IV fluids using 0.9% NaCL (d/t hyponatremia)
    - Admin Levothyroxine IV bolus (to correct hypothyroidism)

Addison's (need to ADD cortisol / ACTH)

- **Causes**
  - Damage or dysfunction of the adrenal cortex (located on top of kidneys)
  - **HYPOfunctioning adrenal cortex + lack of adequate amounts of serum cortisol**
    - Surgical removal of adrenal glands
    - TB / Histoplasmosis infection *** most common infxn's
    - Therapeutic use of corticosteroids* most common cause of Addis. crisis
- **Manifestations**
  - **Weight loss*** / Salt cravings
  - **Weakness*** / Fatigue
  - N / V / Dizziness w orthostatic **hypotension**** (dehydration)
  - Abdominal pain / Constipation or Diarrhea
  - HYPOnatremia / HYPOglycemia
  - **HYPERkalemia**** / HYPERcalcemia
  - **HYPERpigmentation*****
  - **Addisonian Crisis***** aka "ACUTE ADRENAL INSUFFICIENCY" (occurs as disease progresses)
    - **HYPOtension / HYPERkalemia*****
    - Cyanosis
    - Fever / N / V
    - Shock s/s
      - + Pallor, HA, Abd. pain, Diarrhea, confusion, restlessness
- Tx

- mX + tX **Hyperkalemia**
  - Admin calcium to counteract the effects of hyperkalemia and protect cardiac
  - **Sodium polystyrene sulfonate*** ** (kayexalate)
  - **Hydrocortisone sodium succinate*****
  - **Resin** to absorb potassium
  - Loop / thiazide diuretic **(furosemide)*****
  - Rapid infusion of 0.9% naCL
  - H2 agonists - Ranitidine to prevent ulcers
  - Sodium bicarb
- mX + tX Hypoglycemia
  - Admin **insulin** & dextrose to move potassium into cell
- Maintain safe environment

Cushing's (too much cortisol / ACTH production)

- **Manifestations (SATA)**
  - Weakness / Fatigue
  - Sleep disturbance / Back & Joint pain
  - Altered emotional state = irritability / depression
  - Decreased libido
    - **Central-type obesity w/ fatty "buffalo hump" in neck*****
    - Heavy trunk w/ thin extremities
    - **Moonface**
    - Bruising / petechiae / **purple striae**
    - **Tachycardia / HTN**
    - Weight gain / Increased appetite / dependent EDEMA
    - **Gastric ulcers** d/t oversecretion of hcl acid
    - **Thin, fragile skin**
    - Evidence of decreased immune function + inflammatory response
- **Interventions**
  - mX I&O / **Daily weights** / gastric bleeding
  - Assess for indications of HYPERvolemia
  - Maintain safe environment to minimize risk of pathologic fracture and skin trauma
  - Prevent infxn by performing frequent hand hygiene
  - Encourage physical activity w/in pt. Limitations
  - Provide meticulous skin care
  - Change pt. Position q 2 hr
  - mX for and protect against skin breakdown and infxn
  - Use **surgical asepsis** when performing dressing changes and invasive procedures
  - mX WBC w/ differential daily
  - Nutrition
    - Eat foods HIGH in Calcium & Vitamin D & Potassium
    - No alcohol or caffeine
    - **Sodium**** / Fluid RESTRICTION** (d/t H2O retention)

Dialysis types

- 1) Hemodialysis
  - Circulates pt's blood through an artificial kidney (dialyzer) to remove waste products & excess fluids
- 2) Peritoneal
  - Uses pt's peritoneal membrane as the semipermeable membrane to exchange fluid & solutes
- 3) CRRTs (Continuous Renal Replacement Therapies)
  - Circulating pt's blood through a hemofilter to replace normal kidney fxn

Complications of peritoneal dialysis and the associated s/sx of those complications?

- Can allow microorganisms into the peritoneum
  - Monitor for s/sx of infection (peritonitis) → can lead to **sepsis**
    - Abd pain or tenderness
    - Fever
    - N/V/D
    - Anorexia
    - Low urine output
    - Thirst
  - Protein loss
  - Hyperglycemia and hyperlipidemia
  - Poor dialysate inflow or outflow

Complications of hemodialysis and the associated w/sx of those complications

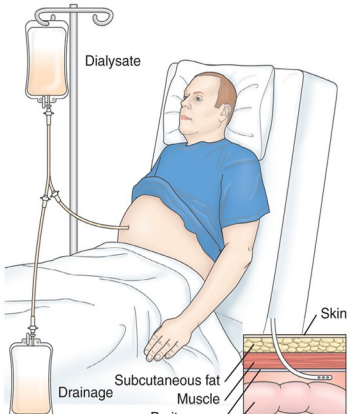
- Clotting/infection of the access site
- Immunosuppressive disorders increase the risk of infection
- Advanced age is at risk for induced hypotension due to chronic illness
- Disequilibrium syndrome
- Anemia

Labs that can be affected by dialysis

- BUN
- Hgb
- K+
- Albumin

Peritoneal dialysis education

- Uses pt's peritoneal membrane as the semipermeable membrane to exchange fluid & solutes --- Helps sustain life for pt. who have acute or chronic kidney disease requiring dialysis
  - Rids the body of excess fluid and electrolytes



- Achieves acid/base balance
- Eliminates waste products
- Restores internal homeostasis by
  - Osmosis / Diffusion / Ultrafiltration
- Involves instillation of HYPERtonic **dialysate** solution into the peritoneal cavity and subsequent dwell times
- Drain the dialysate solution that contains the waste productions
- **Peritoneum** serves as the filtration membrane

End stage kidney disease education/precautions

- GFR <15
- End-stage kidney disease exists **when 90% of the functioning nephrons are destroyed** and are no longer able to maintain fluid, electrolyte, and acid-base homeostasis
- Dialysis or kidney transplantation can maintain life, but neither is a cure for CKD
  - **Preventative measures through health promotion**
    - **Drink at least 2L water daily**
    - **Test for albumin in urine annually**
    - **Limit OTC NSAIDS**

Foods (examples) to avoid with kidney disease

- Foods containing high sodium (salt)
- Processed meats (ham, bacon, lunch meats, sausage)
- Canned soups
- Frozen dinners
- Pickled foods (pickles, olives)
- Condiments (soy sauce, ketchup, BBQ sauce)

Nursing education about nutrients for pts with kidney disease

- Restrict dietary Na+, K+, Ph-, and Mg+
- Provide a diet that is high in carbohydrates and moderate in fat
- Restrict intake of fluids (based on urinary output)
- Limit OTC NSAIDs, salt, alcohol, smoking

AKI labs

- Serum creatinine gradually increases 1-2 mg/dL every 24-48 hr, or 1-6 mg/dL in 1 week or less
- BUN can increase 80 to 100mg/dL within 1 week
- Urine specific gravity varies in postrenal type
- Can be elevated up to 1.030 in prerenal type
- Diluted as low as 1.000 in intrarenal type
- Serum electrolytes:

  - sodium can be decreased (prerenal azotemia) or increased (intrarenal azotemia)
  - hyperkalemia, hyperphosphatemia, hypocalcemia
- Hct: decreased
- UA: presence of sediment (RBS, casts)
- ABG: metabolic acidosis

CKD Lab finding

- UA: hematuria, proteinuria, and decrease in specific gravity
- Serum creatinine: gradual increase over months to years
- BUN: gradual increase with elevated serum Cr over months to years
- Serum electrolytes:
- Decreased Na+ (dilutional) and calcium
- increased K+, Ph-, Mg+
  - CBC: decreased Hgb and Hct from anemia secondary to loss of erythropoietin in CKD

Acute pancreatitis S/Sx and labs

- Severe, constant, knife-like pain (LUQ, mid-epigastric, and/or radiating to back)
- Sudden onset of severe, boring pain (goes through the body)
- Epigastric, radiating to back, left flank, or left shoulder
- Worse when lying down
- Pain relieved somewhat by fetal position or sitting upright, bending forward
- N/V/ Weight loss
- Seepage of blood-stained exudates into tissue as a result of pancreatic enzymes actions
- Ecchymosis on the flanks - Turner's sign
- Bluish-gray periumbilical discoloration - Cullen's sign
- Generalized jaundice
- Absent or decreased bowel sounds
- Warm, moist skin; fruity breath (hyperglycemia)
- Ascites

Labs

- Serum lipase - increases slowly but remains elevated for up to 2 weeks
- WBC count - increased d/t infection/inflammation
- Serum liver enzymes and bilirubin - increased with associated biliary dysfunction

DM labs w/patient education and reducing risk of complications

- 1/3 undiagnosed → 1 out of 3 Americans will have DM by 2050
- Diagnostic criteria for diabetes include **2 findings** (on separate days) of at least 1 of the following:
- **S/Sx diabetes** +PLUS+ **casual blood glucose concentration of greater than > 200** mg/dL (w/o regard to last meal)
  - Classic s/sx diabetes = polyuria + polydipsia + unexplained weight loss
- **Fasting blood glucose over > 126** mg/dL

  - fasting = no caloric intake x 8 hrs
  - Postpone admin of antidiabetic med until AFTER level is drawn
  - Instruct pt. To fast 8 hr prior = NPO except H20 is OK
- **2-hour** postload glucose **> 200 mg/dL** DURING **oral glucose tolerance test** (mostly with gestational diabetics)
  - OGTT = 75 g anhydrous glucose dissolved in water
  - BG levels checked q 30 mins within 2 hr period
- **A1C over > 6.5%** (exception to 2-findings rule d/t 3 mo time span)
  - Confirm by repeat testing on a different day
  - **Best indicator over 90-120 days timespan**
  - **Non-diabetic reference range = 4-6%**
  - **W/diabetes = 6.5 - 8% with a TARGET total of < 7%**
    - No fasting needed
    - Quarterly or twice yearly
    - 4x / year for diabetics

Myocardial infarction labs

- **Diagnostic testing**
  - **12-lead ECG changes**
    - **PCP needs to read within 10 mins**
    - **NSTEMI = no ST elevation**
    - **STEMI = ST elevation facing the area of infarction w/T-wave hyperactivity**
  - **Laboratory blood specimens**
    - **Cardiac enzymes**
      - **Troponin I / Troponin T**
      - **Myoglobin**
      - **CKMB**
  - **Cardiac Stress Testing**
  - **Echocardiography**

Myocardial infarction manifestations

- **MONA**
  - **Morphine**
  - **Oxygen**
  - **Nitroglycerin**
  - **Aspirin 162-325 mg**
- Supplemental oxygen
- Beta-blocker
- Angiotensin-converting enzyme inhibitor within 24 hours
- Anticoagulation with heparin and platelet inhibitors
- Evaluate for indications for reperfusion therapy:
  - Percutaneous coronary intervention
  - Thrombolytic (fibrinolytic) therapy
- Continue therapy as indicated:

- IV heparin, low-molecular-weight heparin, bivalirudin, or fondaparinux •
- Clopidogrel (Plavix)
- Glycoprotein IIb/IIIa inhibitor
- Bed rest for a minimum of 12–24 hours

Chest tube indications

- **Unexpected finding**
  - **Constant bubbling in the water seal chamber**
- **Air leaks result if a connection is not taped securely**
  - **Monitor the water seal chamber for continuous bubbling (air leak finding). If observed, locate the source of the air leak, and intervene accordingly (tighten the connection, or replace drainage system)**
  - **Check all connections**
- **Accidental disconnection, system breakage, or removal can occur at any time**
  - **If the tubing separates, instruct the client to exhale as much as possible and to cough to remove as much air as possible from the pleural space**
  - **If the chest tube drainage system is compromised, immerse the end of the chest tube in sterile water to restore the water seal**
  - **If the chest tube is accidentally removed, dress the area with dry, sterile gauze**
- **Tension Pneumothorax**
  - **Sucking chest wounds, prolonged clamping of the tubing, kinks, or obstruction in the tubing, or mechanical ventilation with high levels of PEEP can cause a tension pneumothorax**
  - **Assessment findings include**
    - **Tracheal deviation**
    - **Absent breath sounds on one side**
    - **Distend neck veins**
    - **Respiratory distress**
    - **Asymmetry of the chest**
    - **Cyanosis**

Fluid volume overload (Hypervolemia) – Think SPEEDS up b/c needs to work harder

Manifestations

- ↑**Tachy**cardia, **↑HTN**
- Bounding pulse
- ↑Increased **RR**
- SOB
- **Dyspnea**
- **Weakness**
- Acute weight gain
- **Edema**
- Ascites

- Distended jugular veins
- Cough
- Crackles
- Increased urine output

Nursing interventions

- Monitoring respiratory status for S/S of pulmonary complications
- BP, HR, Rhythm
- I & O, Urine Volume, Color
- Skin Assessment for edema and turgor
- I & O's / Daily Weights (1kg = 1L fluids)
- Assess breath sounds
- Monitor degree of edema (feet, ankles, & sacral region)
- Restrict sodium intake / Fluid restrictions
- Promote rest

Complications

- Pulmonary edema
  - **S/S:** anxiety, tachycardia, dyspnea, restlessness, lethargy, crackles, productive cough with FROTHY PINK-TINGED SPUTUM***
  - **RN:** High Fowlers, O2 therapy/PAP/Vent, Morphine, Nitrates, Diuretics

Pericarditis

Diagnosis:

- **Chest X-ray to see the size of your heart and any fluid in your lungs.**
- **Electrocardiogram (ECG or EKG) to look for changes in your heart rhythm. In about half of all patients with pericarditis, the heart rhythm goes through a sequence of four distinct patterns. Some patients do not have any changes, and if they do, they may be temporary.**
- **Echocardiogram (echo) to see how well your heart is working and check for fluid or pericardial effusion around the heart. An echo will show the classic signs of constrictive pericarditis, including a stiff or thick pericardium that constricts the heart's normal movement.**
- **Cardiac MRI to check for extra fluid in the pericardium, pericardial inflammation or thickening, or compression of the heart. A contrast agent called gadolinium is used during this highly specialized test.**
- **CT scan to look for calcium in the pericardium, fluid, inflammation, tumors and disease of the areas around the heart. Iodine dye is used during the test to get more information about the inflammation. This is an important test for patients who may need surgery for constrictive pericarditis.**
- **Cardiac catheterization to get information about the filling pressures in the heart. This is used to confirm a diagnosis of constrictive pericarditis.**

- **Blood tests can be used to make sure you are not having a heart attack, to see how well your heart is working, test the fluid in the pericardium and help find the cause of pericarditis. If you have pericarditis, it is common for your sedimentation rate (ESR)and ultra sensitive C reactive protein levels (markers of inflammation) to be higher than normal. You may need other tests to check for autoimmune diseases like lupus and rheumatoid arthritis.**

Treatment:

- Medical Management – NOT Indomethacin b/c it decreases coronary blood flow!
  - NSAIDs
    - Prescribed for pain relief during acute phase
    - Helps reabsorb fluid in patients w/rheumatic pericarditis
  - Colchicine
    - Severe pericarditis and does not respond w/NSAIDs
    - Can also be utilized in the acute stage in place of NSAIDs
  - Corticosteroids
    - Severe Pericarditis or if not responding to NSAIDs
    - If contraindication to NSAIDs or for specific diseases (e.g. pregnancy)

AAA manifestations

- Constant gnawing feeling in abdomen
- Flank or back pain – pressure on the nerves cause this pain
- Pulsating abdominal mass (do NOT palpate, can cause rupture)
- Bruit over the area of the aneurysm
- Elevated blood pressure (unless in cardiac tamponade or rupture of aneurysm)
- Indications of a rupturing abdominal aortic aneurysm include constant, intense back pain; falling blood pressure; and decreasing hematocrit

Treatment:

- Endovascular surgery – the graft is inserted into a blood vessel in the groin and then carefully passed up into the aorta.
- Open surgery – the graft is placed in the aorta through a cut in the stomach.

ABGs Electrolyte imbalances S/S

- **↓Hyponatremia**
  - **Seizures,** HYPOtension
  - Decreased skin turgor
  - Dry mucosa
  - HA, Confusion, **Lethargy**
  - Tachycardia
  - Nausea, Fatigue
  - Neuro changes, L. Headed
  - **Increased ICP**
  - Abdominal cramping
  - Anorexia

- Muscle twitching
- Hyperactive bowel sounds

- **Hypernatremia**
  - Thirst
  - Elevated temperature
  - Dry, swollen tongue
  - Sticky mucosa
  - Restlessness
  - Weakness, Anorexia
  - Neuro symptoms – Cerebral Edema
  - Muscle Twitching
  - Coma, Decreased DTRs
  - Lethargy
  - Decreased Urine output

- **↓Hypokalemia**
  - Fatigue
  - Anorexia
  - N/V
  - Dysrhythmias
  - Muscle weakness and cramps
  - Paresthesias
  - Glucose intolerance
  - Decreased muscle strength
  - Decreased DTRs
  - HYPOtension
  - Thready, weak pulse

- **Hyperkalemia**
  - Cardiac changes and dysrhythmias
  - Muscle weakness with potential respiratory impairment
  - Parashesia/Paralysis
  - Anxiety
  - Diarrhea/Nausea

Electrolyte imbalances causes

- **Normal Electrolyte Ranges:**
  - **(Na+) 135 – 145**
  - **(K+) 3.5 – 5**
  - **(Ca+) 9.0 – 10**
  - **(Mg) 1.3 – 2.1**
  - **(Phos) 3 – 4.5**
  - **(Cl-) 98 – 106**
- **↓Hyponatremia (Neuro): Respiratory arrest; Seizures; Coma**

- Diuretics
- NG tube suction
- Hyperglycemia
- Kidney disease
- SIADH

- **Hypernatremia (Neuro):Convulsions; Death; Seizures**
  - Diabetes Insipidus
  - Kidney failure
  - Cushing's syndrome
  - Aldosteronism
  - Glucocorticosteroids

- **↓Hypokalemia (Cardiac): Respiratory failure; Cardiac arrest**
  - Vomiting/Diarrhea
  - NG suctioning
  - Excessive use of laxatives
  - Tap water enemas
  - Kidney disease
  - Diuretics
  - Corticosteroids

- **Hyperkalemia (Cardiac): Cardiac arrest**
  - Chronically ill patients
  - Decrease in renin & aldosterone
  - Increased use of salt substitutes
  - ACE inhibitors
  - K+ sparing diuretics
  - DKA
  - Sepsis, trauma, surgery, fever, MI

MODS – Multiple Organ Dysfunction Syndrome

a. Failure of 2 or more organ systems in an acutely ill patient such that homeostasis cannot be maintained w/o intervention
b. May be a complication of any form of shock
c. Precise mechanism remains unknown → frequently occurs toward the end of the continuum of septic shock when tissue perfusion cannot be effectively restored
d. It is not possible to predict which patients who experience shock will develop MODS, partly b/c much of the organ damage occurs at the cellular level and therefore cannot be directly observed or measured
e. Organ failure usually begins in the lungs, and cardiovascular instability as well as failure of the hepatic, GI, renal, immunologic, and CNS follow

- Clinical assessment tools attempt to predicts pts at risk
  - APACHE (Acute Physiology and Chronic Health Evaluation)
  - SAPS (Simplified Organ Failure Assessment)

- PIRO (Predisposing factors, the Infection, the host Response, and Organ dysfunction)

- Manifestations of MODS:
  - Respiratory
    - Severe dyspnea, tachypnea
    - PaO2/FiO2 ration <200
    - Bilateral fluffy infiltrates on CXR
    - V/Q mismatch
    - Refractory hypoxemia
  - Cardiovascular
    - Myocardial depression
    - Massive vasodilation
    - Decrease SVR, BP, MAP
    - Increase HR
    - Biventricular failure
  - Central Nervous System
    - Acute change in neurologic status → confusion, disorientation, delirium
    - Fever
    - Seizures
    - Failure to wean, prolonged rehabilitation
  - Endocrine System
    - Hyperglycemia
  - Renal System
    - Pre-renal
      - BUN/Creatinine rate >20:1
    - Intrarenal
      - BUN/Creatinine rate <10:1
  - Gastrointestinal System
    - Hypoperfusion → decrease peristalsis, paralytic ileus
    - GI bleeding
  - Hepatic System
    - Bilirubin >2, increased LFTs
    - Hepatic encephalopathy
  - Hematologic System
    - Coagulopathy (increased PT & PTT, decreased platelet count)
    - Increased D-dimer
- Clinical Manifestations
  - Typically lungs are first (progressive dyspnea & respiratory failure
  - Usually hemodynamically stable but may require increasing amounts of IV fluids and vasoactive agents to support BP and cardiac output
  - Signs of a hypermetabolic state, hyperlactic academia, and increased BUN are present
  - Metabolic rate may be 1.5-2x the BMR resulting in loss of skeletal muscle mass (autocatabolism)
  - 7-10 days later, hepatic and renal dysfunction occur
    - Increased Bilirubin and LFTs
    - Increased Creatinine and Anuria

- As lack of tissue perfusion continues, the hematologic system becomes dysfunctional
  - Worsening immunocompromised
  - Increasing the risk of bleeding
- CV system becomes unstable and unresponsive to vasoactive agents, and the patient's neurologic response progresses to a state of unresponsiveness or coma
- The goal of all shock states is to reverse the tissue hypoperfusion and hypoxia
- If effective tissue perfusion is restored before organs become dysfunctional, the patient's condition stabilizes
- Along the septic shock continuum, the onset of organ dysfunction is a warning prognostic sign
  - The more organs that fail, the worse the outcome

- Medical Management
  - Prevention remains the top priority!
  - Early detection & documentation of initial signs of infection are essential
  - Subtle changes in mentation and a gradual rise in temperature are early warning signs
  - If preventative measures fail, treatment measures to reverse MODS are aimed at
    - Controlling the initiating event
    - Promoting adequate organ perfusion
    - Providing nutritional support
    - Maximizing patient comfort
- Nursing Management
  - General plan of nursing care for patients with MODS is the same as that for patients with septic shock
  - Primary nursing interventions are aimed at supporting the patient and monitoring organ perfusion until primary organ insults are halted
  - Providing information and support to family members is a critical role of the nurse → health care team must address end-of-life decisions to ensure that supportive therapies are congruent with the patient's wishes
  - Patients who survive MODS must be informed about the goals of rehabilitation and expectations for progress toward these goals, b/c massive loss of skeletal muscle mass makes rehabilitation a long, slow process

Cushing's Triad

- Hypertension
- Bradycardia
- Bradypnea (abnormally slow breathing rate)

Airway obstruction

- Manifestations
  - What are the clinical manifestations of a complete airway obstruction? Think about a person who is choking in a restaurant. What would you see (or hear) to indicate this person is obstructed?

- Stridor
- Cannot cough, speak, or breathe
- May clutch the neck between the thumb and fingers
- Choking
- Apprehensive appearance
- Refusing to lie flat
- Labored breathing
- Use of accessory muscles
- Flaring nostrils
- Increasing anxiety, restlessness, and confusion
  - Cyanosis, loss of consciousness, and hypoxia are LATE manifestations

- Incomplete obstruction occurs when there is partial upper airway obstruction and ability to breath is maintained. Inspiratory stridor and increased work of breathing are the hallmarks.

CPP (Central Perfusion Pressure)

- What is it, what is a normal value?
  - MAP s/b **70 – 100**
    - Less than 50 indicates permanent neuro damage ***