Exam 2 Concept Review:

1. S/S of Hypovolemic Shock
    - Decreased intravascular (blood) volume
    - Decreased venous return
    - Decreased stroke volume
    - Decreased cardiac output
    - Decreased tissue perfusion
    - Tachycardia
    - Hypotension
    - Hyperthermia
    - Tachypnea
    - Hypoxia
    - Thready pulse
    - Confusion
2. 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
    - Anticoagulant pathways within the body are impaired and the fibrinolytic system is suppressed so a massive amount of tiny clots form in the microcirculation
    - Results in excessive clotting and bleeding
    - Characterized by low platelet and fibrinogen levels, prolonged PT, PTT and thrombin time, and elevated fibrin degradation products and D-dimers
3. DIC S/S
    - Bleeding from the mucous membranes, venipuncture sites, and GI and urinary tracts
    - Bleeding can range from minimal internal bleeding to profuse hemorrhage from all orifices
    - Petechiae, bleeding, ecchymosis, joint pain, tachycardia, tachypnea, hematuria, anxiety, restlessness, altered LOC
4. DIC labs
    - Decreased platelet count <100,000 or <50,000
    - Increased PT time >3 seconds
    - Increased PTT time
    - Increased thrombin time
    - Decreased fibrinogen <100
    - Increased D-dimer level
    - Increased fibrin degrading products
5. ABGs Electrolyte imbalances S/S
    - Metabolic acidosis S/S:
        - Low pH <7.35
        - PaCO2 35-45
        - Bicarbonate <22
        - **Headache, confusion, drowsiness, tachypnea, hypotension, decreased cardiac output, dysrhythmia, shock**

- Metabolic alkalosis:
    - High pH >7.45
    - PaCO2 35-45
    - High bicarbonate >26
    - **Respiratory depression, tachycardia, symptoms of decreased calcium, symptoms of hypokalemia**
- Respiratory acidosis:
    - Low pH <7.35
    - PaCO2 >45
    - HCO3 22-26
    - Tachycardia, tachypnea, hypertension, mental changes, feeling of fullness in head
- Respiratory alkalosis:
    - High pH >7.45
    - PaCO2 <35
    - HCO3 22-26
    - **Lightheadedness, inability to concentrate, numbness and tingling, loss of consciousness**

6. Electrolyte imbalances causes
    - Imbalance of output and intake
7. S/S of Hypovolemia
    - Tachycardia
    - Hypotension
    - Hyperthermia
    - Tachypnea
    - Hypoxia
    - Thready pulse
    - Confusion
8. Blood products/fluids in hypovolemic shock
    - 2 large gauge IV lines are inserted
    - IO catheter can be inserted for quick access in the sternum, legs, or arms
    - Administer fluids that will remain in the intravascular compartment to avoid fluid shifts from the intravascular compartment to the intracellular compartment
    - Crystalloid solutions are usually given
        - Lactated ringers
        - Normal saline
    - Colloid solutions may also be used
        - Albumin
        - Blood
9. Types of fluids
    - Isotonic crystalloid solutions:
        - Contain the same concentration of electrolytes as the extracellular fluid
        - Does not alter the concentrations of electrolytes in the plasma

        - **0.9% normal saline**
        - **lactated ringers**
    - IV colloidal solutions
        - Similar to plasma proteins, contain molecules that are too large to pass through the capillary membrane
        - Expand intravascular volume by exerting oncotic pressure, thereby pulling fluid into the intravascular space
        - Have a longer duration of action than crystalloids, molecules remain within the intravascular compartment longer
        - **Albumin is typically used (more expensive**)
        - Blood
10. **Complications of fluid replacement:**
    - Cardiovascular overload
    - Pulmonary edema
    - Acute coronary syndrome
11. Pulse pressure and what it indicates
    - MAP= cardiac output x peripheral resistance
    - MAP should be >65
    - MAP indicates tissue and organ perfusion
12. Anaphylactic shock medications
    - Fluid management
    - Intramuscular epinephrine is given for vasoconstriction action
    - Diphenhydramine (Benadryl) is given IV for reverse the effects of histamine
    - Nebulized bronchodilators (albuterol)
    - Ranitidine (Zantac)
13. Hypervolemia S/S
    - Tachycardia
    - Bounding pulse
    - Hypertension
    - Tachypnea
    - Increased central venous pressure
    - Headache
    - Altered LOC
    - Ascites
    - Crackles
    - Edema
14. Stages of shock and S/S
    - Initial
        - No visible changes in client, only on a cellular level
    - Compensatory stage
        - Blood pressure: normal
        - HR: tachycardia >100
        - RR: tachypnea >20, $PaCO_2$ <32
        - Skin: cold, clammy

        - Urinary output: decreased
        - Mentation: confused or agitated
        - Acid-base imbalance: Respiratory alkalosis
    - Progressive stage
        - BP: hypotension systolic <90, MAP <65, requires fluids
        - HR: tachycardia >150
        - RR: rapid, shallow respirations, crackles, PaO_2 <80, $PaCO_2$ >45
        - Skin: mottled, petechiae
        - Urinary output: <0.5 ml/kg/hr
        - Mentation: lethargy (falling asleep)
        - Acid-base balance: metabolic acidosis
    - Irreversible stage
        - BP: requires mechanical or pharmacological support
        - HR: erratic
        - RR: requires intubation and mechanical ventilation and oxygenation
        - Skin: jaundice
        - Urinary output: anuric, requires dialysis
        - Mentation: unconscious
        - Acid-base balance: profound acidosis
15. Types of distributive shock
    - Septic shock
    - Anaphylactic shock
    - Neurogenic shock
16. DIC Treatment
    - Treat underlying condition
    - Correct secondary tissue ischemia
        - Oxygen
        - Fluid replacement
        - Correct electrolyte imbalances
        - Administer vasopressors
    - If serious hemorrhage occurs:
        - Cryoprecipitate: replace fibrinogen and factors V and VII
        - Platelets
        - Use caution with FFP (replaces coagulation factors but can cause capillary leak and further compromise pulmonary function)
    - Controversial: heparin infusion
17. MODS Nursing Management
    - Primary nursing interventions are aimed at supporting the patient and monitoring organ perfusion until primary organ insults are halted
    - Providing information and support to the family
    - Patients who survive must be informed about rehabilitation goals (long, slow process)
    - Prevention remains top priority
    - Provide nutritional support

- Patient comfort

18. Cardiogenic Shock Nursing interventions
    - **Prevention**
    - **Treat underlying cause**
    - Monitor hemodynamic status
    - Administer medications
        - IV fluids
        - Oxygen
        - Pain control
        - Arterial line
        - Labs: BNP, cardiac profile
        - Dobutamine
        - Nitroglycerin
        - Dopamine
        - Vasoactive medications
        - Antiarrythmic medications
    - Monitor and maintain IADP
    - Ensure safety and comfort
19. Neurogenic S/S and causes
    - Causes:
        - Spinal cord injury
        - Spinal aesthesia
        - Depressant action of medications
        - Lack of glucose
    - S/S:
        - **Hypotension**
        - **Bradycardia**
        - Dry, warm skin
20. Medications: Norepinephrine, Epinephrine, Nitroglycerin, Dopamine, Vasopressin
    - Norepinephrine (levophed)
        - Used for septic shock
        - IV vasopressor
        - Increases heart rate, cardiac output and blood pressure
        - Helps break down fat and increase blood sugar levels
    - Epinephrine:
        - Used in anaphylaxis shock
        - Causes peripheral vasoconstriction and bronchodilation and opposes the effects of histamines
    - Nitroglycerin:
        - Used in cardiogenic shock
        - Given IV at low doses
        - Acts as a venous vasodilator and therefor reduces preload

    - Given at higher doses it causes arterial vasodilation and reduces afterload as well
    - Increase cardiac output while minimizing cardiac workload.
    - Vasodilation enhances blood flow to the myocardium, improving oxygen delivery
- Dopamine:
    - Used in cardiogenic shock
    - Sympathomimetic agent
    - Improves tissue perfusion
    - Slightly increases the heart rate and cardiac output
- Vasopressin (potressin):
    - Increase blood pressure by vasoconstriction
    - Used to maintain MAP in patients, can be titrated by the nurse
    - Used in neurogenic shock, septic shock, and cardiogenic shock

21. Cardiogenic Shock Causes
    - Coronary causes:
        - Acute MI
    - Non-coronary causes:
        - Severe hypoxemia
        - Tension pneumothorax
        - Cardiomyopathy
        - Valvular stenosis
        - Cardiac temponade
        - Dysrhythmias
        - Blunt cardiac injury

Types and Causes	Examples
Systolic dysfunction • Inability of the heart to pump blood forward	Myocardial infarction, cardiomyopathy, blunt cardiac injury, severe systemic or pulmonary hypertension, myocardial depression from metabolic problems
Diastolic dysfunction • Inability of the heart to fill	Cardiac tamponade, ventricular hypertrophy, cardiomyopathy
Dysrhythmias	Bradydysrhythmias, tachydysrhythmias
Structural factors	Valvular stenosis or regurgitation, ventricular septal rupture, tension pneumothorax

22. What is MODS
    - Failure of 2 or more organ systems in an acutely ill patient such that homeostasis cannot be maintained without intervention

- A complication from any form of shock
- Organ failure usually begins in the lungs
- Clinical manifestations:
    - **Lungs are first (dyspnea, respiratory failure)**
    - Hyperglycemia, increased BUN
    - Hepatic and renal dysfunction occurs
    - Hematologic system becomes dysfunctional
    - CV system becomes unstable

23. Expected reference ranges for electrolytes:
    - Sodium: 135-145
    - Calcium: 9-10.5
    - Potassium: 3.5-5
    - Magnesium: 1.3-2.1
    - Chloride: 98-106
    - Phosphorus: 3-4.5
24. **Third spacing:**
    - **Loss of ECF into a space that does not contribute to equilibrium between the ICF and the ECF is referred to as third spacing**
    - **Early evidence is decreased urine output**
25. Hyponatremia (low sodium)
    - Net gain of water or loss of sodium
    - Water moves from the ECF to the ICF causing cells to swell
    - Causes:
        - Excessive sweating
        - Diuretics
        - NG suctioning
        - Kidney disease
        - Inadequate sodium intake
        - Hyperglycemia
        - Cerebral salt wasting syndrome
    - Manifestations:
        - Poor skin turgor
        - Dry mucosa
        - Headache
        - Decreased salvation
        - Hypotension
        - Nausea
        - Abdominal cramping
        - Neurological changes
        - seizures
        - CONFUSION
    - Medical management:
        - Water restriction

        - Sodium replacement
        - Intake and output

26. Hypernatremia (high sodium)
    - Causes dehydrated cells
    - Causes:
        - Water deprivation
        - Diabetes insipidus
        - Heatstroke
        - Hyperventilation
        - Watery stools
        - Burns
        - Excessive intake of sodium
    - Manifestations:
        - Thirst
        - Elevated temperature
        - Dry swollen tongue
        - Sticky mucosa
        - Restlessness
        - Weakness
        - Irritability
        - Muscle twitching
    - Nursing care:
        - Monitor level of consciousness
        - Monitor vital signs and heart
        - Auscultate lung sounds
        - Monitor intake and output
27. Hypokalemia (low potassium)
    - **Causes:**
        - GI losses
        - Medications
        - alterations of acid-base imbalances
        - hyperaldosterism
        - poor dietary intake
    - **Manifestations:**
        - Fatigue
        - Anorexia
        - Nausea
        - Vomiting
        - Dysrhythmias
        - Muscle weakness and cramps
        - Paresthesias
        - Glucose intolerance
        - Decreased muscle strength and DTR’s

    - Prominent U wave, ST depression, shallow T wave
- **Medical and nursing management:**
    - Increase potassium
    - Assessment
    - Monitor ECG and ABGs
    - Monitor potassium

28. Hyperkalemia (excess potassium)
    - **Causes:**
        - Impaired renal function
        - Hypoaldosteronism
        - Tissue trauma
        - Acidosis
    - **Manifestations:**
        - Cardiac changes and dysrhythmias
        - Muscle weakness
        - Respiratory impairment
        - Paresthesias
        - Anxiety
        - GI manifestation
    - **Medical/nursing management:**
        - Monitor ECG
        - Limit dietary potassium
        - IV sodium bicarbonate
        - IV calcium gluconate
        - Dialysis
        - Assessment of potassium levels
        - Mix IVs containing potassium well
        - Dietary teaching
        - Wide flat P wave, prolonged PR interval, widened QRS. Peaked T wave
29. Hypocalcemia (low calcium)
    - **Causes:**
        - Hypoparathyroidism
        - Malabsorption
        - Pancreatitis
        - Alkalosis
        - Massive transfusion of blood
        - Renal failure
        - Medications
    - **Manifestations:**
        - Tetany
        - Circumoral numbness
        - Paresthesias
        - Hyperactive DTR’s

        - Positive Trousseaus sign and Chovstek sign
        - Seizures
        - Dyspnea
        - Abnormal clotting
        - Anxiety
    - **Medical/nursing management:**
        - IV calcium gluconate, calcium and vitamin D supplements
        - Weight bearing exercises
        - Patient teaching of diet
30. Hypercalcemia (high calcium)
    - Causes:
        - Bone loss
        - Malignancy
    - Manifestations:
        - Muscle weakness
        - Incoordination
        - Anorexia
        - Constipation
        - Nausea and vomiting
        - Abdominal and bone pain
        - Polyuria
        - Thirst
        - ECG changes
        - Dysrhythmias
    - Medical/ nursing management:
        - Treat underlying cause
        - Fluids
        - Furosemide
        - Encourage ambulation
        - Fiber
        - Safety
31. Hypomagnesemia (low magnesium)
    - Causes:
        - Alcoholism
        - GI losses
        - Enteral feeding
        - Medications
        - Diabetic ketoacidosis
        - Sepsis
        - Burns
        - Hypothermia
    - Manifestations:
        - Neuromuscular irritability

        - Muscle weakness
        - Tremors
        - ECG changes and dysrhythmias
        - Alterations in mood and LOC
    - Medical management/nursing:
        - Diet
        - Oral magnesium
        - Magnesium sulfate IV
        - Safety
        - Patient teaching related to diet
        - Medications
        - Alcohol use
32. Hypermagnesemia (high magnesium)
    - Causes:
        - Renal failure
        - Diabetic ketoacidosis
        - Excessive administration of magnesium
    - Manifestations:
        - Flushing
        - Hypotension
        - Nausea
        - Vomiting
        - Hypoactive reflexes
        - Drowsiness
        - Muscle weakness
        - Depressed respirations
        - ECG changes
        - Dysrhtyhmias
    - Medical management/nursing:
        - IV calcium
        - Loop diuretics
        - IV NS
        - Do not administer medications containing magnesium
33. Hypophosphatemia:
    - **Causes:**
        - Alcoholism
        - Refeeding after starvation
        - Pain
        - Heat stroke
        - Resp alkalosis
        - Hyperventilation
        - Diabetic ketoacidosis
        - Hepatic encephalopathy

        - Major burns
        - Low magnesium
        - Low potassium
        - Diarrhea
        - Vitamin D deficiency
        - Use of diuretics
    - **Manifestations:**
        - Neurological symptoms
        - Confusion
        - Muscle weakness
        - Tissue hypoxia
        - Muscle and bone pain
        - Increased susceptibility to infection
    - **Medical/nursing management:**
        - Oral or IV phosphorus replacement
        - Encourage foods high in phosphorus
        - Gradually introduce calories
34. Hyperphosphatemia
    - **Causes**:
        - Renal failure
        - Excess phosphorus
        - Excess vitamin D
        - Acidosis
        - Chemotherapy
    - **Manifestations**
        - Soft tissue calcifications
    - **Medical management:**
        - Treat underlying disorder
        - Vitamin D
        - Antacids
        - Loop diuretics
        - NS IV
        - Dialysis
35. Hypochloremia:
    - **Causes:**
        - Addisons disease
        - Reduced chloride intake
        - GI loss
        - Diabetic ketoacidosis
        - Diaphoresis
        - Fever
        - Burns
        - Medications

    - Metabolic alkalosis
- **Manifestations**
    - Agitation
    - Irritability
    - Weakness
    - Hyperexcitability of muscles
    - Dysrhythmias
    - Siezures
    - Coma
- **Medical management:**
    - Replace chloride IV NS
    - Avoid free water
    - Encourage high chloride foods

36. Hyperchloremia
    - **Causes:**
        - Excess sodium chloride infusions with water loss
        - Head injury
        - Hypernatremia
        - Dehydration
        - Severe diarrhea
        - Resp alkalosis
        - Metabolic acidosis
        - Medications
    - **Manifestations:**
        - Tachypnea
        - Lethargy
        - Weakness
        - Tachypnea
        - Hypertension
        - Cognitive changes
    - **Nursing management**
        - Restore electrolyte and fluid balance
        - Lactated ringers
        - Sodium bicarbonate
        - Diuretics
        - Patient teaching related to diet and hydration
37. ABG normal values
    - PH: 7.35-7.45
    - PcCO2: 35-45
    - HCO3: 22-26

Please note there are several ABGs and electrolyte abnormality questions on this exam!