Shock chapter

**Shock**
- Condition in which tissue perfusion is inadequate to deliver oxygen, nutrients to support vital organs, cellular function
- Affects all body systems
- Classic signs of early shock: Tachycardia, tachypnea, restlessness, anxiety, cool, clammy skin with pallor
- Complications from shock
  - ARDS, DIC, MODS

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**Classifications of Shock**

- **Hypovolemic**: shock state resulting from decreased intravascular volume due to fluid loss
- **Cardiogenic**: shock state resulting from impairment or failure of myocardium
- **Septic**: circulatory shock state resulting from overwhelming infection causing relative hypovolemia
- **Neurogenic**: shock state resulting from loss of sympathetic tone causing relative hypovolemia
- **Anaphylactic**: circulatory shock state resulting from severe allergic reaction producing overwhelming systemic vasodilation, relative hypovolemia
Stages of shock

Compensatory Stage of Shock
- SNS causes vasoconstriction, increased HR, increased heart contractility
  - This maintains BP, CO
- Body shunts blood from skin, kidneys, GI tract, 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 Stage of Shock
- Mechanisms that regulate BP can no longer compensate, BP and MAP decrease
- All organs suffer from hypoperfusion
- Vasoconstriction continues further compromising cellular perfusion
- Mental status further deteriorates from decreased cerebral perfusion, hypoxia
- Lungs begin to fail, decreased pulmonary blood flow causes further hypoxemia, carbon dioxide levels increase, alveoli collapse, pulmonary edema occurs
- Inadequate perfusion of heart leads to dysrhythmias, ischemia
- As MAP falls below 65, GFR cannot be maintained
  - Acute renal failure may occur
- Liver function, GI function, hematological function all affected
- Disseminated intravascular coagulation (DIC) may occur as cause or complication of shock

Irreversible Stage of Shock
- At this point, organ damage so severe that patient does not respond to treatment and cannot survive
- BP remains low
- Renal, liver function fail
- Anaerobic metabolism worsens acidosis
- Multiple organ dysfunction progresses to complete organ failure
- Judgment that shock is irreversible only made in retrospect
General Management Strategies in Shock

- Fluid replacement to restore intravascular volume
  - Crystalloid, colloid solutions
  - 3:1 rule 300cc of crystalloid to compensate for 100cc of blood loss
  - Complications of fluid administration
  - Vasoactive medications to restore vasomotor tone, improve cardiac function
  - Nutritional support to address metabolic requirements

Fluid replacement
- Crystalloids: 0.9% normal saline, lactated Ringer’s solution, hypertonic solutions (3% hypertonic saline)
- Colloids: albumin, dextran (dextran may interfere with platelet aggregation)
- Blood components for hypovolemic shock
- Complications of fluid replacement include fluid overload, pulmonary edema

Pharmacological treatment
- Used when fluid therapy alone does not maintain MAP
- Support hemodynamic status; stimulate SNS
- Check vital signs frequently; continuous monitoring of vital signs every 15 minutes or more often
- Give through central line if possible
- Extravasation may cause extensive tissue damage
- Dosages usually titrated to patient response
Hypovolemic Shock

• Manifestations: Restlessness; pale, cool, clammy skin, tachycardia, tachypnea, flat, non-distended peripheral veins, decreased jugular vein circumference, decreased urinary output, altered mental status
• Medical management
  – Treatment of underlying cause
  – Fluid, blood replacement
  – Redistribution of fluid
  – Pharmacologic therapy
• Nursing management
  – Administering blood, fluids safely
  – Implementing other measures (Oxygen)

Trendelenburg is used to relieve symptoms of hypovolemic shock
Cardiogenic Shock

**cardiogenic shock:** shock state resulting from impairment or failure of the myocardium

- Manifestations: Similar to hypovolemic shock except distended jugular and peripheral veins, symptoms of heart failure (pulmonary edema) crackles
- Medical management
  - Correction of underlying causes
  - Initiation of first-line treatment
- Oxygenation
- Pain control
- Hemodynamic monitoring
- Laboratory marker monitoring
- Fluid therapy
- Mechanical assistive devices

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**Cardiogenic Shock: Pharmacologic Therapy**

- Dobutamine
- Nitroglycerin
- Dopamine
- Other vasoactive medications
- Antiarrhythmic medications

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**Cardiogenic Shock: Nursing Management**

- Preventing cardiogenic shock
- Monitoring hemodynamic status
- Administering medications, IV fluids
- Maintaining intra-aortic balloon counter pulsation
- Ensuring safety, comfort
**Circulatory Shock**

*Circulatory shock: shock state resulting from displacement of intravascular volume creating a relative hypovolemia and inadequate delivery of oxygen to the cells; also called distributive shock*

**Septic Shock**
- Immunosuppression
- Extremes of age (<1 y and >65 y)
- Malnourishment
- Chronic illness
- Invasive procedures
- Emergent and/or multiple surgeries

**Anaphylactic Shock**
- History of medication sensitivity
- Transfusion reaction
- History of reaction to insect bites/stings
- Food allergies
- Latex sensitivity

**Neurogenic Shock**
- Spinal cord injury
- Spinal anesthesia
- Depressant action of medications

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**Physiology**

- Precipitating event
- Vasodilation
- Activation of inflammatory response
- Maldistribution of blood volume
- Decreased venous return
- Decreased cardiac output
- Decreased tissue perfusion

**Pathophysiology**
Septic shock: circulatory shock state resulting from overwhelming infection causing relative hypovolemia

Causes:
Pneumonia
Kidney infection
Abdominal infection
Blood infection (bacteremia)

Neurogenic shock: shock state resulting from loss of sympathetic tone causing relative hypovolemia

Causes:
- spinal cord injury is the primary cause
- trauma to spinal cord
- improperly administered anesthesia
- drugs and meds that affect the autonomic nervous system

S/sx: the clinical characteristics of neurogenic shock are signs of parasympathetic stimulation. It is characterized by dry, warm skin rather than the cool, moist skin seen in hypovolemic shock. Another characteristic is hypotension with bradycardia, rather than the tachycardia that characterizes other forms of shock.
Anaphylactic
circulatory shock state resulting from a severe allergic reaction producing an overwhelming systemic vasodilation and relative hypovolemia

Causes:
- medications such as penicillin
- insect stings
- food allergies
- agents in immunotherapy
- latex
- in rare cases, exercise and aerobic activity

Anaphylaxis has three defining characteristics:
• Acute onset of symptoms
• Presence of two or more symptoms that include respiratory compromise, reduced BP, GI distress, and skin or mucosal tissue irritation
• Cardiovascular compromise from minutes to hours after exposure to the antigen

**Nutritional Therapy**
• Nutritional support needed to meet increased metabolic, energy requirements prevent further catabolism, due to depletion of glycogen
• Support with parenteral or enteral nutrition
• GI system should be used to support its integrity
• Administration of glutamine
• Administration of H2 blockers or proton-pump inhibitors

**Some Assessment Thoughts**
• Assess breathing for rate, depth, symmetry of chest movement
• Observe for use of accessory muscles
• Auscultate lung sounds
• Assess circulation with B/P
• Assess pulse pressure
• Assess peripheral pulses
• Skin and mucous membranes