



Shock

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Initial Disclaimer

- There is substantial variation in the acute management of shock due to differing emphasis on physiologic principles, institutional preferences, and personal experience.



Shock

- Definition – Inadequate tissue perfusion
 - Widespread oxygen, nutrients and cellular function inadequate
- Shock is life-threatening
- Progression of shock is neither linear nor predictable



Pathophysiology

- Vascular
- Baroreceptors
- Renal
- Adrenal gland
- Hepatic
- Pulmonary



Stages of Shock

- Initial
- Clinical findings
 - No visible changes only cellular changes
 - Production of pyruvic and lactic acid



Stages of Shock

- Compensatory stage
- Clinical findings
 - Blood pressure – drop in blood pressure
 - Heart rate – greater than 100 beats per minute
 - Respiratory status – greater than 20 breaths per minute
 - Skin – Pale and Cool moist
 - Urinary output – decreased
 - Mentation – Confusion
 - Acid-base balance – Respiratory alkalosis



Stages of Shock

- Progressive
- Clinical findings
 - Blood pressure – Systolic less than 80 – 90 mm Hg
 - Heart rate – greater than – 150 beats per minute
 - Respirations – Rapid, shallow, crackles
 - PaO₂ – less than 80 mm Hg, PaCO₂ greater than 45 mm Hg
 - Skin – Mottled, petechiae
 - Urinary output – Anuria
 - Mentation – Lethargy
 - Acid-base balance – Metabolic acidosis



Stages of Shock

- Refractory (Irreversible)
- Clinical Findings
 - Blood pressure – requires support
 - Heart rate – erratic or asystole
 - Respiratory status – requires support
 - Urinary output – Renal failure
 - Mentation – unconscious
 - Acid-base balance – profound acidosis



Challenges

- Monitoring tissue perfusion
- Reducing anxiety
- Promoting safety
- Preventing complications
- Promoting rest and comfort
- Supporting family members



Management Strategies in Shock

- Oxygen
- Fluid replacement
- Vasoactive medication therapy
- Nutritional support



Fluid Replacement

- Normal Saline – crystalloid (isotonic)
- Lactated Ringer's – crystalloid (slightly hypotonic)
- 5%Dextrose – crystalloid (hypotonic)
- Albumin – natural colloid
- Dextran – artificial colloid
- Hydroxyethyl starch – synthetic colloid



Pulse pressure

- Pulse Pressure =
- Systolic Blood Pressure – Diastolic Blood Pressure
- Pulse Pressure is an important indicator of the health and tone of the arterial walls.



Classification of Shock

- Hypovolemic shock
- Cardiogenic shock
- Distributive (Circulatory) shock
 - Neurogenic shock
 - Septic shock
 - Anaphylactic shock
- Obstructive shock



Hypovolemic Shock

- Fluid and Blood replacement
- Redistribution of fluid
- Pharmacologic therapy
- Administering blood and fluids safely
- Implementing other measures



Cardiogenic Shock

- First line treatment
 - Oxygenation
 - Pain control
 - Monitoring
 - Laboratory marker monitoring
 - Pharmacologic therapy
- Preventing cardiogenic shock
- Medications and intravenous fluids



Distributive (Circulatory) Shock

Anaphylactic Shock risk factors

- Penicillin sensitivity
- Transfusion reaction
- Bee sting allergy
- Latex sensitivity
- Severe allergy to some foods or medications

Neurogenic Shock risk factors

- Spinal cord injury
- Spinal anesthesia
- Depressant action of medications
- Glucose deficiency



Obstructive Shock

- Pulmonary embolism
- Pericardial tamponade
- Hemopneumothorax
- Tension pneumothorax



Resuscitation Endpoints

- Heart Rate
- Blood Pressure
- **Urine Output**
 - No longer utilized in isolation to determine tissue oxygenation
- Additional measurements



Intervention Goals

- Control of underlying cause
- Rapid correct of hypoperfusion
- Halt oxygen debt accumulation
- Repay oxygen debt
- Careful monitoring of resuscitation endpoints



Summary

Resuscitative efforts must focus on stopping development of cellular dysfunction resulting in the downward spiral to death.

