<table>
<thead>
<tr>
<th>TYPES OF SHOCK</th>
<th>Hypovolemic</th>
<th>Cardiogenic</th>
<th>Distributive</th>
<th>Obstructive</th>
<th>Neurogenic or Spinal</th>
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<tr>
<td><strong>Assessment findings</strong></td>
<td>- Trauma: MOI → internal / external loss of blood (hemorrhage) - Medical: - Hx of fluid loss, i.e. vomiting, diarrhea, dehydration... - Bleeding from mouth or rectum - bright or dark red - coffee-ground emesis (vomiting) - melena (black tarry stools)</td>
<td>Caused by inadequate function of the heart or pump failure. The backup of blood into the lungs (pulmonary edema) is a major effect leading to impaired ventilation. - Chief complain of: - chest discomfort - dyspnea - syncope/near syncope associated w/altered HR. - Abnormal hearth rhythms/rate: - bradycardia - excessive Tachycardia - dysrhythmias - Signs of acute CHF: - pulmonary edema - jugular venous distention - orthopnea</td>
<td>Occurs with any medication suggesting vasodilation &amp; “leaky” vessels. Examples: - Anaphylaxis - Septic or infection - Certain drug overdose s/s: - signs of a sympathetic nervous system response: - ↑ HR - ↑ RR - clammy or diaphoretic skin - warm, flushed skin, specially in dependent areas - systemic swelling &amp; brochoconstriction - hives</td>
<td>Physical obstruction of blood flow or ventilation. Insufficient O₂ in the blood will produce shock. Examples: - Significant chest wall trauma: - Rib or sternal fractures - Tension pneumothorax - Pericardial tamponade - Medical cause: - Pulmonary embolus s/s: - mechanism of injury - signs of poor perfusion/shock - sympathetic nervous system response (↑ HR + ↑ RR) - dyspnea (SOB) and/or chest discomfort</td>
<td>- Associated specifically with spinal trauma, vessels below the spinal injury dilate. - Rare occurrence - MOI - Falls: landing feet-first or head-first - Penetrating trauma to the back with neurological deficits. s/s: Loss of function below the site of spinal cord injury: - flaccid paralysis distal to injury site - loss of sympathetic NS function: - relative bradycardia - hypotension - vasodilation: warm, pink, dry skin - loss of bladder control - priapism (persistent, and often painful, penile erection)</td>
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<td><strong>Dysfunctions in perfusion</strong></td>
<td>- Loss of plasma/fluid - Loss of red blood cells (=&gt; inability to deliver enough O₂ to the cells)</td>
<td>- Altered HR - Reduced preload in tachycardia - Reduction in timely cardiac output - Myocardial trauma - Damage to contractile &amp; electrical cells - Inefffective pumping - CHF or severe AMI - Damage to contractile cells - Fluid &amp; pressure backs up into the lungs (=&gt; SOB)</td>
<td>Slow movement of red blood cells to the tissues: - dilated vessels are unable to move fluid as effectively to the cells - “leaky” vessels encourage fluid to move out of the vascular system (=&gt; pulmonary edema, pedal edema)</td>
<td>- Chest wall trauma - Inability to ventilate adequately - Tension pneumothorax - Compression of lung tissue &amp; kinking of vena cava - Cardiac tamponade - Pressure against ventricles that ↓ cardiac output. - Pulmonary embolus - Obstruction of the pulmonary artery - Inefficient loading of red blood cells at the lungs</td>
<td>- Similar to distribute shock - Loss of sympathetic tone - ↓ HR - ↓ cardiac output - ↓ peripheral vascular resistance. Parasympathetic nervous system kicks in.</td>
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<td><strong>Treatment</strong></td>
<td>- High flow O₂ - Secure &amp; maintain an airway &amp; provide respiratory support as needed. - Minimize the loss of red blood cells in uncontrolled bleeding - Increase the amount of circulating fluid. - Splint any bone &amp; joint injuries - If no fracture extremities, raise legs 6” to 12”. - Conserve body heat w/blankets - Rapid Transport</td>
<td>Base treatment on the particular dysfunction: - Symptomatic Bradycardia: Atropine - Tachycardia: - vagal maneuver - O₂ - fluid bolus if no signs of pulmonary edema (keep in mind that by given fluids you will increase the workload of a sick heart) - Myocardial trauma: - High flow O₂ - fluid bolus is no signs of pulmonary edema - MI/CHF: - O₂ - other drugs if BP allows for their admin. - Rapid Transport</td>
<td>- High flow O₂ - Secure &amp; maintain an airway &amp; provide respiratory support as needed. - Fluid boluses – septic shock - Specific treatments for: - anaphylaxis: - Epi 1:1,000 - 0.1-0.5mg - Benadryl - 10-50mg - overdose: - Narcan 0.4-2mg - Conserve body heat w/blankets - PASG</td>
<td>- Early recognition and transport to a trauma or critical care hospital. - Recognition is often difficult - Use of MOI or patient history may assist in recognition - Aggressive ventilation w/high flow O₂ - Fluid boluses - Rapid Transport</td>
<td>- High flow O₂ - Secure &amp; maintain an airway &amp; provide respiratory support as needed. - Large-bore IV with fluid boluses - Atropine with slow rates - PASG - Rapid Transport</td>
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## STAGES OF SHOCK

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<thead>
<tr>
<th>Assessment findings</th>
<th>Compensated</th>
<th>Decompensated</th>
<th>Irreversible</th>
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<tr>
<td>- 15-25% of fluid loss from the vessels</td>
<td>- 25-35% of fluid loss from the vessels</td>
<td>- &gt; 35% fluid loss from the vessels</td>
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<td>- Signs are subtle</td>
<td>- The body cells are profoundly hypoxic</td>
<td>- Low blood volume ↓ cardiac preload:</td>
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<td>- Compensation by the sympathetic NS</td>
<td>- The sympathetic NS can NOT maintain perfusion</td>
<td>- ↓ cardiac output</td>
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<td>- Patient may show signs of an adrenaline rush: ↑ HR + ↑ RR (bcos the sympathetic nervous system kicks in)</td>
<td>- Classic signs of shock</td>
<td>- loss of peripheral pulses</td>
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<td>- Body cells begin to starve for O₂ , resulting in:</td>
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<td>- very ↓ BP</td>
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<tr>
<td>- Anxiousness</td>
<td>- Pale skin</td>
<td>- Body cells die</td>
<td></td>
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<tr>
<td>- Complain of thirst</td>
<td>- Complain of weakness</td>
<td>- All vital signs bottom out</td>
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### HR
- ↑ HR (tachycardia), i.e. 120-ish
- ↑↑ HR (marked tachycardia), i.e. 140-ish
- Slow

### RR
- Normal or ↑ RR (little change)
- ↑↑ RR: marked tachypnea
- Slow / Agonal (shallow, slow (3-4 per minute), irregular inspirations followed by irregular pauses)

### LOC
- Anxiousness, restless
- Confused, obvious alteration in mental status
- Unconsciousness/Coma

### SKIN
- Pale
- Cool
- Clammy
- Peripheral sweating
- Very pale
- Cold
- Sweating (diaphoretic)

### BP
- Very little change (normal or high)
- ↓ BP
- None or very ↓ BP

## Pathophysiology

### Cellular Ischemic Phase
- ↓ O₂ delivery cause the cells transition from aerobic to anaerobic metabolism in the periphery:
  - cells begins to build lactic acid
  - cellular activity begins to slow
- Elevated levels of acid stimulate chemoreceptor
  - stimulation of the medulla
  - ↑ HR
- Closure of the pre-capillary sphincter causes stagnation of blood
  - Blood begins to coagulate behind the closed pre-capillary sphincter
  - Post-capillary sphincter closes

### Capillary Stagnation Phase
- Loss of fluid and O₂ delivery begin to impact more of the body. Organs and cells in the core begin to transition to anaerobic metabolism.
- Lactic acid build in the cells, and leak into the capillaries:
  - stimulates opening of the pre-capillary sphincter
  - stagnated and clotted blood moves into the capillaries
- Cell function drops dramatically
- Continued closure of post-capillary sphincters:
  - pressure changes cause fluid shifts into the capillaries
  - drop in circulating blood volume =>reduce preload:
    - Cardiac output drops
    - Blood pressure begins to fall

### Celluar Activities in Shock

### Capillary Washout Phase
- Cell functions cease and cells die from lack of O₂
- Large accumulations of acid force the opening of the capillary sphincters, ⇒ sludge, clots and acid circulates throughout the entire body
- Organ function fails from profound acidosis and hypoxia.
  - ↓ HR
  - ↓ RR
  - Loss in vascular constriction