Infectious Emergencies

1. Sepsis & Septic Shock

**Background:**
- Incidence of pediatric sepsis: 0.6 cases per 1000 population.
- Respiratory infections and primary bacteremia are the cause in approximately 2/3 of severe sepsis.
- Risk factors for septic shock include age less than one month, serious injury, chronic pulmonary disease, congenital heart disease, immunosuppression, urinary tract abnormalities, in-dwelling vascular catheters.
- Up to 75% of children with sepsis have no infectious etiology identified (“culture-negative sepsis”).
- Infection: Suspected or proven infection caused by a pathogen.
- Systemic inflammatory response syndrome (SIRS): defined by 2 or more of the following (one of which must include abnormal temperature or leukocyte count):
  - Core temperature >38.5°C or <36°C.
  - Tachycardia (>2 standard deviations above normal for age).
  - OR in children less than 1 year of age, bradycardia (<10th percentile for age).
  - Tachypnea (respiratory rate >2 standard deviations above normal for age) OR mechanical ventilation.
  - Leukocyte count elevated or depressed for age, or >10% immature neutrophils.
- Sepsis- SIRS plus suspected or proven infection.
- Severe sepsis: Sepsis associated with cardiovascular (CV) dysfunction, acute respiratory distress syndrome (ARDS), or dysfunction in 2 or more other organ systems.
- Septic Shock: Sepsis with CV dysfunction refractory to ≥40 mL/kg of isotonic fluids within one hour.
- Fluid Refractory Septic Shock: CV dysfunction persists despite ≥60 mL/kg of isotonic fluids.
- Catecholamine Resistant Shock: CV dysfunction persists despite vasoactive medication infusion.
- Shock: An acute state of circulatory dysfunction that results in failure to deliver sufficient amounts of oxygen and other nutrients to meet the tissue metabolic demands.
  - Compensated: Neurohormonal mechanisms maintain blood pressure and tissue perfusion.
  - Uncompensated: Neurohormonal mechanisms unable to maintain blood pressure and tissue perfusion, but is reversible with intervention.
  - Irreversible: Cell death and irreversible end-organ damage.

**Signs and Symptoms:**
- Fever, hypothermia, lethargy, tachypnea, decreased urine output, altered mental status.

**Evaluation:**
- Physical exam: General appearance, vital signs, cardiovascular status (tachycardia, hypotension, delayed capillary refill (cold shock) or flash capillary refill (warm shock)), respiratory status (tachypnea, increased work of breathing), neurologic status (altered mental status).
- Rapid recognition and treatment of sepsis and septic shock are critical to ensure positive outcomes.
- Labs: CBC with differential, CRP, blood & urine culture, urinalysis, basic metabolic panel, blood gas and lactate.
- CXR if focal lung findings identified.
- Consider head CT and lumbar puncture if suspected CNS infection.

**Management:**
- Consult Pediatric Critical Care.
HDVCH has developed these stabilization and transport guidelines as a general reference tool to assist referring physicians. Pediatric medical needs are complex and these guidelines may not apply in every case. HDVCH relies on its referring providers to exercise their own professional judgment with regard to the appropriate treatment and management of their patients. Referring providers are solely responsible for confirming the accuracy, timeliness, completeness, appropriateness and helpfulness of this material and making all medical, diagnostic or prescription decisions.

- Intravenous antimicrobial therapy should be initiated immediately after obtaining appropriate cultures with the goal of infusion completion within one hour of presentation.
- Do NOT delay administration of antimicrobial therapy in order to perform a lumbar puncture.
- For children younger than 28 days: See Neonatal Septic Shock Guidelines.
- For children older than 28 days with Septic Shock:

<table>
<thead>
<tr>
<th>AGE:</th>
<th>ANTIMICROBIALS:</th>
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<tbody>
<tr>
<td>For children &gt; 28 days &amp; immunocompetent</td>
<td>Ceftriaxone (100 mg/kg/dose; max 2 gm) <strong>AND</strong> Vancomycin (15 mg/kg/dose; max 1 gm)</td>
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<tr>
<td>For children &gt; 28 days &amp; immunocompromised</td>
<td>Cefepime (50 mg/kg/dose; max 2 gm) <strong>AND</strong> Vancomycin (15 mg/kg/dose; max 1 gm)</td>
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<tr>
<td>For children &gt; 28 days &amp; suspected intra-abdominal infection</td>
<td>Piperacillin/Tazobactam (100 mg piperacillin/kg/dose; max 3.375 gm) <strong>AND</strong> Vancomycin (15 mg/kg/dose; max 1 gm)</td>
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