
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 $>38.5^{\circ}\text{C}$ or $<36^{\circ}\text{C}$.
 - Tachycardia (>2 standard deviations above normal for age).
 - OR in children less than 1 year of age, bradycardia ($<10^{\text{th}}$ 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:

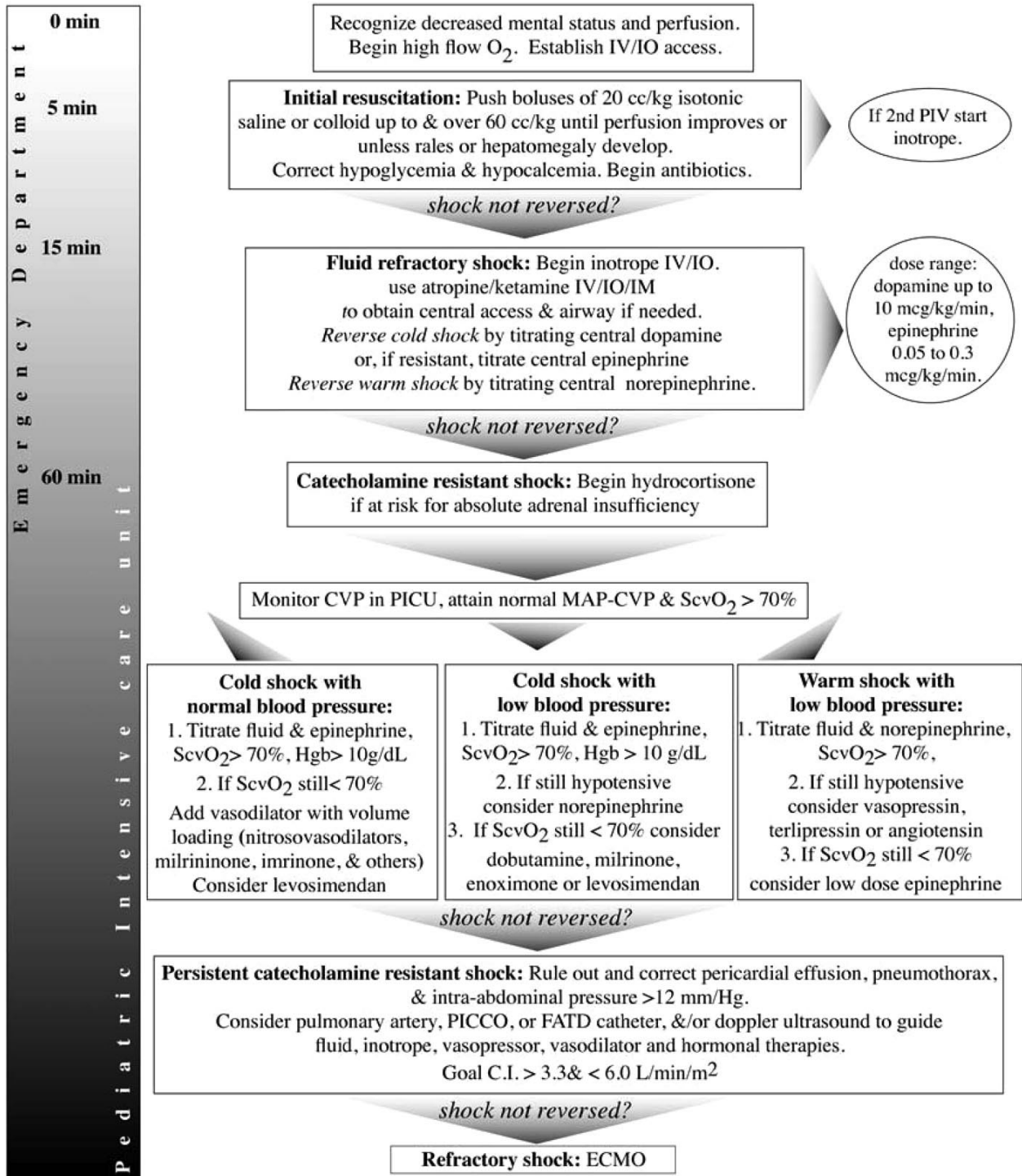
- Fever, hypothermia, lethargy, tachypnea, decreased urine output, altered mental status.

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.



- 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:

AGE:	ANTIMICROBIALS:
For children > 28 days & immunocompetent	Ceftriaxone (100 mg/kg/dose; max 2 gm) AND Vancomycin (15 mg/kg/dose; max 1 gm)
For children > 28 days & immunocompromised	Cefepime (50 mg/kg/dose; max 2 gm) AND Vancomycin (15 mg/kg/dose; max 1 gm)
For children > 28 days & suspected intra-abdominal infection	Piperacillin/Tazobactam (100 mg piperacillin/kg/dose; max 3.375 gm) AND Vancomycin (15 mg/kg/dose; max 1 gm)