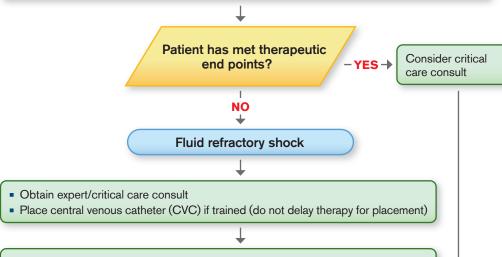
Identify Septic Shock

- Use a screening tool, such as the Phoenix Sepsis Score
- Follow facility protocols and facility trigger tools
- Ensure adequate airway, oxygenation and ventilation; ensure vascular access (IV/IO) if not already obtained; if advanced airway is needed, do not use etomidate for induction
- Rapidly administer 10-20 mL/kg crystalloid fluid bolus; balanced/buffered crystalloids are preferred over 0.9% NS; repeat bolus as needed to max of 60mL/kg; reassess after each bolus
 - In the absence of intensive care availability, consider a decreased fluid bolus of up to 40 mL/kg (in 10 to 20 mL/kg aliquots) over the first hour
- Administer broad-spectrum antibiotics as soon as possible (do not delay fluid therapy or antibiotic administration)
- Obtain blood for cultures (do not delay antibiotics to obtain cultures) and laboratory studies (e.g., glucose, calcium, lactate)
- Implement measures to control the source of infection as needed
- Identify and treat hypoglycemia and hypocalcemia
- Evaluate for untreated/unrecognized morbidities as resources allow



- Initiate epinephrine or norepinephrine infusion
 - Titrate as needed to manage perfusion
 - May alternatively initiate dopamine infusion as initial catecholamine if epinephrine/norepinephrine are not available
 - Preferable to administer through CVC, but do not delay initiation for CVC placement



- Continue monitoring and supporting hemodynamic status
- Titrate medications and continue interventions as appropriate
- Consider hydrocortisone if at risk for absolute adrenal insufficiency and not responsive to adequate fluid therapy and vasopressor administration
- Ensure continued adequate airway, oxygenation and ventilation
- Place CVC and invasive blood pressure monitoring if not already done
- Continue assessment for etiology of septic shock and direct therapy accordingly
- Obtain further diagnostic laboratory studies

Within First Hour

- IV/IO within 5 min
- Appropriate fluid resuscitation within 15 to 30 min
- Antibiotics within 60 min; vasopressors within 60 min if needed

Goals of First Hour

- Maintain or restore airway, oxygenation and ventilation
- Maintain or restore circulation, defined as normal perfusion for age, normal blood pressure for age, normal HR for age, capillary refill ≤ 2 sec and normal mental status. Additional parameters can include normal urine output for age, normal lactate levels and normal invasive pressures

Medications

Epinephrine

 0.1 to 1 mcg/kg/min IV/IO infusion, titrated to clinical effect

Norepinephrine

 0.05 to 2 mcg/kg/min IV/IO infusion, titrated to clinical effect

Care Notes

- Do not use colloids in the initial resuscitation of children and infants with septic shock or another sepsisassociated organ dysfunction.
- Consider smaller (5 to 10 mL/kg) fluid bolus volumes in children with cardiac dysfunction/heart failure.
- Consider a trial of noninvasive mechanical ventilation (over invasive mechanical ventilation) in children and infants with sepsis induced pediatric acute respiratory distress syndrome (PARDS) without a clear indication for intubation and who are responding to initial resuscitation; consider a trial of prone positioning in children with sepsis and severe PARDS.



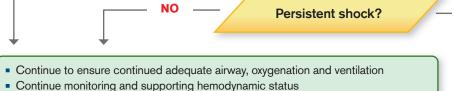
Catecholamine Resistant Shock

Further care should be guided by pediatric critical care/emergency specialist

- Place CVC and invasive blood pressure monitoring if not already done
- Continue vasopressors already initiated and titrate to optimize perfusion
- Ensure adequate intravascular volume
- Goals of management are appropriate perfusion and blood pressure for age, normalized HR for age, adequate cardiac output, normalized end-organ perfusion, normalized lactic acid and ScvO₂ ≥ 70%
- Consider hydrocortisone if at risk for absolute adrenal insufficiency and not responsive to adequate fluid therapy and vasopressor administration, if not already given
- Evaluate for untreated/ unrecognized morbidities
- Obtain laboratory and diagnostic imaging studies



- Consider adding vasopressin
- Consider adding an milrinone for persistent poor perfusion and cardiac dysfunction despite other vasoactive agents
- Consider PRBC transfusion as clinically indicated



- Evaluate for untreated/ unrecognized morbidities
- Consider ECLS for continued refractory shock

- Place CVC and invasive blood pressure monitoring (as indicated) if not already done
- Titrate medications and continue interventions as appropriate
- Continue assessment for etiology of septic shock and direct therapy accordingly
- Continue to assess for morbidities and complications
- Repeat appropriate laboratory and diagnostic imaging studies

Untreated/Unrecognized Morbidities

- Unrecognized/uncontrolled source infection
- Pericardial effusion
- Pneumothorax

YES -

- Adrenal insufficiency
- Hypothyroid
- Hemorrhage or ongoing blood loss
- Increased intra-abdominal pressure
- Excessive immunosuppression and/or immunocompromise

Therapeutic End Points in Shock

- Normal peripheral pulses and capillary refill (< 2 sec)
- Normal HR for age
- Normal blood pressure for age
- Normal urine output
 - Infants and young children: 1.5 to 2 mL/kg/hr
 - Adolescents: 1 mL/kg/hr
- Normal mental status
- Correction of acidosis
- Normal lactate levels
- Normal perfusion pressure (MAP CVP) for age, $ScvO_2 \ge 70\%$ (except congenital heart patients with mixing lesions), and cardiac index > 3.5 < 5.5 L/min/m² in PICU

Medications	Dosage
Epinephrine	0.1 to 1 mcg/kg/min IV/IO infusion, titrated to desired clinical effect
Dopamine	2 to 20 mcg/kg/min IV/IO infusion, titrated to desired clinical effect
Hydrocortisone	2 mg/kg IV/IO, max, 100 mg
Milrinone	 Loading dose: 50 mcg/kg IV/IO over 10 to 60 min (may choose not to administer bolus in setting of hypotension) Infusion: 0.25 to 0.75 mcg/kg/min
Norepinephrine	0.05 to 2 mcg/kg/min IV/IO infusion, titrated to desired clinical effect
Vasopressin	0.0002 to 0.002 units/kg/min (0.2 to 2 milliunits/kg/min) IV/IO infusion, titrated to desired clinical effect

Care Notes

- Children with purpura fulminans, recent or chronic steroid use, or pituitary or adrenal abnormalities are at risk for absolute adrenal insufficiency.
- Consider a trial of noninvasive mechanical ventilation (over invasive mechanical ventilation) in children and infants with sepsis induced pediatric acute respiratory distress syndrome (PARDS) without a clear indication for intubation and who are responding to initial resuscitation; consider a trial of prone positioning in children with sepsis and severe PARDS.