

Pediatric Septic Shock

Facts: Mortality of 97% in the 1960's now reduced to 9%
 Severe hypovolemia is the primary cause of shock due to sepsis and usually responds to aggressive fluid resuscitation.
 Hemodynamic patterns of individual pts can vary widely.
 Low CO, not low SVR, is the predominant cause of death.

Signs and Symptoms: Before hypotension occurs, look for triad of:

1. Hypothermia or hyperthermia
2. Altered mental status (inconsolable irritability, lack of interaction with parents, inability to be aroused)
3. Warm shock (peripheral vasodilation): flash cap refill, bounding pulses, warm extremities
- or** 3. Cold shock (peripheral vasoconstriction): cap refill > 2 sec, ↓ pulses, UO < 1 mL/kg/hr, mottled or cool extremities.

Fluid bolus: NS 20 mL/kg bolus over 5-10 min., repeat according to LOC, Heart rate, Urinary Output, Capillary refill, Cardiac output.
 Average fluid need is 40-60 mL/kg in the first hour.
 Monitor for rales, gallop rhythm, hepatomegaly, ↑ WOB
 Large volumes of fluid have not been shown to increase the incidence of ARDS or cerebral edema.
 Colloid may be more effective in those with narrow pulse pressure (narrow pulse pressure implies ↓CO and ↑SVR).

Correct BG: Hypoglycemia is neurologically devastating.

Correct Ca: Hypocalcemia contributes to myocardial dysfunction.

Inotrope: If shock is refractory to fluids, establish central line & arterial line
 Start Dopamine or Dobutamine. If still refractory:

If Normal BP and Cold shock (↓CO, ↑SVR): Dopamine	If ↓ BP and Cold shock (↓CO, ↑SVR): Epinephrine	If ↓ BP and Warm shock (↑CO, ↓SVR): Norepinephrine
--	--	---

Hydrocortisone: If at risk for adrenal insufficiency, do baseline cortisol level and give hydrocortisone 1-2 mg/kg for stress, 50 mg/kg for shock. Follow with same dose as 24 hr infusion.
 If not at risk for adrenal insufficiency, perform ACTH test, then consider hydrocortisone if ↑ in cortisol is ≤ 9 μg/dL.

Transfuse: To maintain Hgb ≥ 10 g/dL and thereby support DO₂.

ScvO₂: Target ScvO₂ (Central venous oxygen saturation). If ScvO₂ > 70% achieved within first 6 hours, mortality rate reduced by 50%):

If Normal BP and Cold shock and ScvO ₂ < 70%: Add Nitroprusside, or Nitroglycerine, or Milrinone, or Inamrinone	If ↓ BP and Cold shock and ScvO ₂ < 70%: Titrate fluids Titrate Epinephrine or try Dobutamine + Norepinephrine	If ↓ BP and Warm shock and ScvO ₂ ≥ 70%: Titrate fluids Titrate Norepinephrine Vasopressin?
--	---	---

Intubate if: Fluid requirement > 40 mL/kg
 Impaired mental status or moribund state
 Hypoventilation
 Increased WOB

Other causes: If hypotension is refractory to all treatment, look for other causes: pericardial effusion, pneumothorax, bleeding, acute abdomen.

Consider: ECMO (Extracorporeal membrane oxygenation).

Don't consider: Xigris (Activated Protein C). Safety and efficacy have not been established in pediatric patients.