Pediatric Hypotension/ Shock

History
- Blood loss
- Fluid loss
- Vomiting
- Diarrhea
- Fever
- Infection

Signs and Symptoms
- Restlessness, confusion, weakness
- Dizziness
- Tachycardia
- Hypotension (Late sign)
- Pale, cool, clammy skin
- Delayed capillary refill
- Dark-tarry stools

Differential
- Shock
  - Hypovolemic
  - Cardiogenic
  - Septic
  - Neurogenic
  - Anaphylactic
- Trauma
- Infection
- Dehydration
- Congenital heart disease
- Medication or Toxin

Blood Glucose Analysis Procedure

IV or IO Access Protocol UP 6

P Cardiac Monitor

Pediatric Airway Protocol(s) ***if indicated***

Diabetic Protocol PM 2 ***if indicated***

Age Specific Blood Pressure indicating possible shock

Age 0 – 28 days: SBP < 60
Ages ≥ 1 month: SBP < 70
Age 1 – 9: SBP < 70 + (2*x* Age)

Ages 10 – 64: SBP < 90
Ages ≥ 65: SBP < 110

All ages Shock Index: HR > SBP

History and Exam Suggest Type of Shock

Cardiogenic

Chest Pain: Cardiac and STEMI Protocol AC 4
Appropriate Pediatric Arrhythmia Protocol(s) ***if indicated***

A **Normal Saline Bolus**
5 – 10 mL / kg IV / IO
Titrate to age appropriate
SBP ≥ 70 + (2 x Age)
Maximum 10 mL / kg

Hypovolemic / **Distributive**

Pediatric Allergy Protocol PM 1 ***if indicated***

Suspected Sepsis Protocol UP 15 ***if indicated***

Multiple Trauma Protocol TB 6 ***if indicated***

A **Normal Saline Bolus**
20 mL / kg IV / IO
Titrate to age appropriate
SBP ≥ 70 + (2 x Age)
Maximum 60 mL / kg

Obstructive

P Chest Decompression-Needle Procedure ***if indicated***

P **Push Dose Epi: 1 mcg/mL 2 – 3 mcg IV / IO**
Repeat every 2 – 3 minutes as needed

Epinephrine 0.5 mcg/kg/min IV / IO
Or
Norepinephrine 0.5 mcg/kg/min IV / IO
Titrate to age appropriate
SBP ≥ 70 + 2 x Age
See page 2

Notify Destination or Contact Medical Control

Pediatric Medical Protocol Section

Hypotension/ Shock

Shock:
Shock is inadequate tissue delivery of oxygen and nutrients to meet tissue demand. Shock is often characterized by inadequate peripheral and organ perfusion. Being in a shock state is not dependent on Blood Pressure. In fact, shock often exists when Blood Pressure is normal and even elevated. Early recognition and initiation of treatment of shock is key to improving outcomes.

Compensated Shock:
Pediatric patients can often compensate for for a prolonged period by increasing heart rate, increasing systemic vascular resistance, increasing cardiac contractility, and increasing in venous smooth muscle tone. Early recognition and early treatment is directed at preventing compensated shock from progressing to hypotensive shock and then cardiac arrest as compensatory mechanisms fail.

Fluid Resuscitation:
IV / IO NS or LR 20 mL/kg Bolus
Give rapid boluses and repeat every 5 minutes as needed
After 60 mL/kg of IV / IO fluids then start vasopressors
Pediatric patients are typically very responsive to fluid resuscitation

Types of Shock:
Pediatric dosing DO NOT exceed adult dosing.
Warm shock: Warm extremities, slightly delayed to normal capillary refill:
Give **Norepinephrine 0.5 mcg/kg/min IV / IO** and titrate to effect SBP > 70 + 2(Age).
Maximum starting dose 5 mcg/min

Cold shock: Cool to cold extremities with delayed capillary refill.
Give **Epinephrine 0.5 mcg/kg/min IV / IO** and titrate to effect SBP > 70 + 2(Age).
Maximum starting dose 5 mcg/min

Push-Dose Epinephrine:
1 mg of Epinephrine 1:1000 mixed in 1 Liter of NR = 1 mcg/mL
If patient requires ≥ 2 push dose vasopressors start infusion or if suspected sepsis, start Levophed infusion.

Epinephrine or Norepinephrine DRIP

Patient weight *x* 0.6 = mg amount to add to 100 mL of NS or LR in the Buritrol

mL / hr	Dose
1 mL/hr	0.1 mcg/kg/min
2 mL/hr	0.2 mcg/kg/min
3 mL/hr	0.3 mcg/kg/min
4 mL/hr	0.4 mcg/kg/min
5 mL/hr	0.5 mcg/kg/min
6 mL/hr	0.6 mcg/kg/min
7 mL/hr	0.7 mcg/kg/min
8 mL/hr	0.8 mcg/kg/min
9 mL/hr	0;9 mcg/kg/min
10 mL/hr	1 mcg/kg/min

Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Consider all possible causes of shock and treat per appropriate protocol. Majority of decompensation in pediatrics is airway or respiratory related.**
- **Decreasing heart rate and hypotension occur late in children and are signs of impending cardiac arrest.**
- **Shock may be present with a normal blood pressure initially or even elevated.**
- **Shock often is present with normal vital signs and may develop insidiously. Tachycardia may be the first and only sign.**
- **Consider all possible causes of shock and treat per appropriate protocol.**
- **Hypovolemic Shock:**
  Hemorrhage, trauma, GI bleeding, or pregnancy-related bleeding.
  Tranexamic Acid (TXA):
  Agencies utilizing TXA must submit letters from the their receiving trauma centers for approval by the OEMS Medical Director.
  Receiving trauma centers must agree to continue TXA therapy with repeat dosing.
  TXA is NOT indicated and should NOT be administered where trauma occurred > 3 hours prior to EMS arrival.
- **Cardiogenic Shock:**
  Heart failure: MI, Cardiomyopathy, Myocardial contusion, Ruptured ventricle/ septum/ valve/ toxins.
- **Distributive Shock:**
  Septic/ Anaphylactic/ Neurogenic/ Toxic
  Hallmark is warm, dry, pink skin with normal capillary refill time and typically alert.
- **Obstructive Shock:**
  Pericardial tamponade. Pulmonary embolus. Tension pneumothorax.
  Signs may include hypotension with distended neck veins, tachycardia, unilateral decreased breath sounds or muffled heart sounds.
- **Acute Adrenal Insufficiency or Congenital Adrenal Hyperplasia:**
  Body cannot produce enough steroids (glucocorticoids/ mineralocorticoids.)
  May have primary or secondary adrenal disease, congenital adrenal hyperplasia, or more commonly have stopped a steroid like prednisone. Injury or illness may precipitate.
  Usually hypotensive with nausea, vomiting, dehydration and/ or abdominal pain.
  If suspected, Paramedic should give Methylprednisolone 125 mg IM / IV / IO or Dexamethasone 10 mg IM / IV / IO.
  Use steroid agent specific to your drug list.
  May administer prescribed steroid carried by patient IM / IV / IO. Patient may have Hydrocortisone (Cortef or Solu-Cortef). Dose: < 1y.o. give 25 mg, 1-12 y.o. give 50 mg, and > 12 y.o. give 100 mg or dose specified by patient's physician.