

# HYPOTENSION OR SHOCK

**INCLUSION Criteria:** Patients with a MAP < 65 mmHg (adult) or age-appropriate MAP (pediatric) **WITH** clinical signs of poor perfusion (altered mental status, syncope, weakness, lightheadedness, fatigue, chest pain, difficulty breathing, hypoxia, pallor, diaphoresis); **Pediatric:** capillary refill time > 2 seconds with other signs and symptoms of poor perfusion

**EXCLUSION Criteria:** None

**OTHER GUIDELINES TO CONSIDER:** [Abdominal Pain](#), [Airway Management](#), [Allergic Reaction/Anaphylaxis](#), [Bradycardia – Adult \(8 Years & Older\)](#), [Chest Pain/Acute Coronary Syndrome \(ACS\)](#), [Fever or Suspected Sepsis](#), [Hemorrhage Control](#), [Hypoglycemia or Hyperglycemia](#), [Nausea or Vomiting](#), [Tachycardia](#), [Traumatic Injuries](#)

<b>EMR</b>	<ul style="list-style-type: none"> <li>• <a href="#">Universal Care</a></li> <li>• Evaluate for external bleeding and control hemorrhage</li> <li>• Place patient in supine position with legs elevated, unless contraindicated</li> <li>• Prevent hypothermia, keep patient warm</li> <li>• If evidence of traumatic etiology or concern for multisystem trauma, consider:             <ul style="list-style-type: none"> <li>○ <a href="#">Hemorrhage Control</a></li> <li>○ <a href="#">Pelvic Binder</a></li> </ul> </li> <li>• Initiate <a href="#">Pulse Oximetry</a> <ul style="list-style-type: none"> <li>○ If pulse oximetry is less than 93%, titrate <a href="#">Oxygen</a> to lowest level to maintain pulse oximetry at 93% or greater</li> <li>○ Do not withhold oxygen if patient is having difficulty breathing or if unable to assess an oxygen saturation</li> </ul> </li> <li>• Obtain <a href="#">Blood Glucose</a>, if &lt; 60 mg/dl, see <a href="#">Hypoglycemia or Hyperglycemia</a> guideline</li> </ul>
<b>EMT</b>	<ul style="list-style-type: none"> <li>• Initiate <a href="#">Cardiac Monitoring</a></li> <li>• <b>IF AUTHORIZED:</b> acquire <a href="#">12 Lead ECG</a> within 5 minutes of patient contact</li> <li>• Transmit ECG to hospital</li> </ul>
<b>AEMT</b>	<ul style="list-style-type: none"> <li>• Initiate <a href="#">IV/IO Access</a> <ul style="list-style-type: none"> <li>○ Consider second IV access site</li> <li>○ Consider early IO access in critically ill patients</li> <li>○ Do not delay transport to obtain vascular access</li> </ul> </li> <li>• Administer <a href="#">Fluid Bolus – IV/IO</a> <ul style="list-style-type: none"> <li>○ <b>Adult:</b> <ul style="list-style-type: none"> <li>▪ 500 mL bolus; may repeat up to 2000 mL</li> </ul> </li> <li>○ <b>Pediatric:</b> <ul style="list-style-type: none"> <li>▪ 20 mL/kg; may repeat up to 60 mL/kg</li> </ul> </li> <li>○ Monitor patient for signs of developing pulmonary edema (respiratory exam, respiratory effort, SpO2)</li> </ul> </li> <li>• <b>Sepsis:</b> If patient presents with 2 or more systemic illness markers AND history/physical exam suggest infection:             <ul style="list-style-type: none"> <li>○ Administer <a href="#">Fluid Bolus – IV/IO</a> <ul style="list-style-type: none"> <li>▪ <b>Adult:</b> <ul style="list-style-type: none"> <li>• 30 mL/kg maximum initial bolus 3000 mL; may bolus with additional 500 mL as needed to maintain or increase MAP &gt; 65 mmHg</li> </ul> </li> <li>▪ <b>Pediatric:</b> <ul style="list-style-type: none"> <li>• 20 mL/kg; may repeat up to 60 mL/kg</li> </ul> </li> </ul> </li> <li>○ Stop fluid bolus if any signs of pulmonary edema develop</li> </ul> </li> </ul>
<b>INT</b>	<ul style="list-style-type: none"> <li>• <b>Tension pneumothorax</b> <ul style="list-style-type: none"> <li>○ Perform <a href="#">Needle Decompression</a> on affected side if chest trauma present and tension pneumothorax suspected</li> </ul> </li> <li>• <b>Persistent hypotension or signs of shock not responding to initial fluid bolus, consider:</b> <ul style="list-style-type: none"> <li>○ <a href="#">Epinephrine Push Dose (1:10,000)</a> <ul style="list-style-type: none"> <li>▪ <b>Adult:</b> <ul style="list-style-type: none"> <li>• 0.05 mg IV/IO every 2-5 minutes as needed; may double subsequent boluses to 0.1 mg</li> </ul> </li> <li>▪ <b>Pediatric:</b> <ul style="list-style-type: none"> <li>• 0.001 mg/kg every 2-5 minutes as needed (max initial dose 0.05 mg); may double subsequent doses to 0.002 mg/kg (max dose 0.1 mg)</li> </ul> </li> </ul> </li> </ul> </li> </ul>

- **Traumatic hemorrhage** – in patients > 18 years old with significant hemorrhage, consider, if available:
  - **Tranexamic Acid (TXA)**
    - **Adult:** > 18 years old with major trauma and clinical evidence of marked blood loss, internal or external AND injury occurred < 3 hours prior AND HR > 110 mmHg or SBP < 90 mmHg:
      - **IV/IO:** 20 mg/kg mixed in 100 cc NS/LR/D5W and infused **slowly** over 10 minutes; maximum initial dose 1 gram. **NEVER administer as an IV bolus**
- **Persistent hypotension or signs of shock not responding to initial fluid bolus or epinephrine push dose, consider, if available:**
  - **Norepinephrine - Preferred for septic shock and vasodilatory (distributive) shock**
    - **Adult (> 12 years old):**
      - **IV/IO Infusion ONLY:**
        - Mix 4 mg in 250 mL NS = 16 mcg/mL OR
        - Mix 4 mg in 500 mL NS = 8 mcg/mL
          - **Infusion:** 4-12 mcg/min; titrate to keep MAP > 65 mmHg
    - **Pediatric (< 12 years old):**
      - **IV/IO Infusion ONLY:**
        - Mix 4 mg in 500 mL NS = 8 mcg/mL
          - **Infusion:** 0.1 mcg/kg/min; titrate to maintain age appropriate minimum SBP; Maximum dose 2 mcg/kg/min
  - **Epinephrine**
    - **Adult:**
      - **IV Infusion:** 2-20 mcg/minute
      - **May also be initiated as a second line vasopressor if patient fails to respond to norepinephrine**
  - **Phenylephrine -**
    - **All ages >10 kg:**
      - **IV/IO Push Dose ONLY: Mix 10 mg phenylephrine in 100 mL normal saline = 100 mcg/mL**
        - Withdraw 10 mL of diluted solution into 10 mL syringe and apply label
          - Starting dose: 50 mcg = 0.5 mL every 2-5 minutes as needed to achieve age-appropriate MAP
          - If MAP not significantly improved, increase each subsequent dose by 50 mcg
            - 2<sup>nd</sup> dose = 100 mcg (1 mL)
            - 3<sup>rd</sup> dose = 150 mcg (1.5 mL)
            - Maximum dose 400 mcg (4 mL) or 5 mcg/kg
- **Adrenal Insufficiency or Addison's Disease** - If patient is at risk for adrenal insufficiency or Addisonian Crisis (identified by medic alert bracelet, family, or history of chronic steroid use), consider assisting patient with prescribed rescue steroid or consider **one** of the following, if available:
  - **Dexamethasone**
    - **Adult:**
      - **PO/IM/IV/IO:** 10 mg
    - **Pediatric:**
      - **PO/IM/IV/IO:** 0.3 mg/kg (maximum dose 10 mg)
  - **Methylprednisolone**
    - **Adult:**
      - **PO/IM/IV/IO:** 125 mg
    - **Pediatric:**
      - **PO/IM/IV/IO:** 2 mg/kg maximum single dose 125 mg
- If vasoactive medications have reached maximum dosages and the patient fails to improve, **CONTACT ONLINE MEDICAL CONTROL**

NOTES

- Consider causes and treat underlying etiology whenever possible
  - Hypovolemic:** Insufficient circulating volume
    - Most common
    - Causes: Diarrhea/vomiting, sepsis, burns, hemorrhage, spinal cord injury, dehydration, heat emergencies, drugs/toxins, anaphylaxis
  - Cardiogenic:** Failure of the heart to pump effectively causing pulmonary edema
    - Causes: Cardiac dysrhythmias, cardiomyopathy, myocarditis, congestive heart failure, cardiac valve problems
  - Obstructive:** Blockage or obstruction to blood flow in the circulatory system that impairs the heart's ability to pump blood effectively
    - Causes: Tension pneumothorax, cardiac tamponade, pulmonary embolism
  - Distributive:** Widespread dilation of blood vessels, resulting in inadequate blood flow to tissues and organs resulting in impaired utilization of [Oxygen](#)
    - Septic shock:** overwhelming systemic infection resulting in vasodilation leading to hypotension
    - Anaphylactic shock:** Widespread vasodilation caused by histamine release leading to increased capillary permeability and hypotension
    - Neurogenic shock:** High spinal injuries resulting in loss of sympathetic tone and widespread vasodilation; skin is pink and warm due to lack of vasoconstriction
- [Norepinephrine](#) is the recommended first line vasopressor for patients suffering from septic and vasodilatory (distributive) shock
- Epinephrine push dose is the preferred vasopressor for **pediatrics**
- Hemorrhagic shock
  - Every effort should be made to control blood loss. Blood products are the optimal resuscitation fluid. Since blood products are not available prehospital, the goal is to maintain adequate perfusion with IV fluids and vasopressors and provide rapid transport.

Norepinephrine Drip					
Mix: 4 mg in 250 mL = 16 mcg/mL					
Mix: 4 mg om 500 mL = 8 mcg/mL					
Shock - All Types Dose 4 - 12 mcg/min	4 mcg/min	6 mcg/min	8 mcg/min	10 mcg/min	12 mcg/min
Ages > 12 years	gtts/min (60 gtt tubing)	gtts/min (60 gtt tubing)	gtts/min (60 gtt tubing)	gtts/min (60 gtt tubing)	gtts/min (60 gtt tubing)
250 mL (16 mcg/mL)	15	22.5	30	37.5	45
500 mL (8 mcg/mL)	30	45	60	75	90

Norepinephrine Drip								
Mix: 4 mg in 500 mL = 8 mcg/mL								
Shock - All Types Starting dose 0.1 mcg/kg/min Maximum dose 2 mcg/kg/min				0.1 mcg/kg/min	0.2 mcg/kg/min	0.3 mcg/kg/min	0.4 mcg/kg/min	0.5 mcg/kg/min
Age	Broselow	Kilos	Pounds	gtts/min (60 gtt tubing)	gtts/min (60 gtt tubing)	gtts/min (60 gtt tubing)	gtts/min (60 gtt tubing)	gtts/min (60 gtt tubing)
Newborn	3-5 kg	3-5 kg	6 - 11 lbs	4	7	11	15	18
6 mo	PINK	6-7 kg	13 - 15 lbs	5	10	15	21	26
9 mo	RED	8-9 kg	16 - 20 lbs	6	12	20	27	33
1 yr	PURPLE	10-11 kg	21 - 24 lbs	8	16	24	33	41
2 yrs	YELLOW	12-14 kg	25 - 31 lbs	10	20	31	42	52
4 yrs	WHITE	15-18 kg	32 - 40 lbs	13	26	40	54	67
6 yrs	BLUE	19-23 kg	41 - 48 lbs	17	34	51	69	86
8 yrs	ORANGE	24-29 kg	49 - 66 lbs	21	42	65	87	108
10 yrs	GREEN	30-36 kg	67 - 80 lbs	27	52	81	108	135
11-12 years		40 kg	88 lbs	30	60	90	120	150

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