



Pediatric Bradycardia With a Pulse

History

- Past medical history
- Foreign body exposure
- Respiratory distress or arrest
- Apnea
- Possible toxic or poison exposure
- Congenital disease
- Medication (maternal or infant)

Signs and Symptoms

- Decreased heart rate
- Delayed capillary refill or cyanosis
- Mottled, cool skin
- Hypotension or arrest
- Altered level of consciousness

Differential

- Respiratory failure, Foreign body, Secretions, Infection (croup, epiglottitis)
- Hypovolemia (dehydration)
- Congenital heart disease
- Trauma
- Tension pneumothorax
- Hypothermia
- Toxin or medication
- Hypoglycemia
- Acidosis

Bradycardia
Typically HR < 60/min
Hypotension / AMS / Poor Perfusion / Shock

	Pediatric Airway Protocol(s) AR 5, 6 as indicated
	Identify underlying cause Search for reversible causes
P	Cardiac Monitor
	IV or IO Protocol UP 6

Heart Rate < 60/min
Persists despite oxygenation and ventilation

Exit to
Pediatric Cardiac Arrest
Protocol(s) PC 1, 4, 7

NO

	Identify underlying cause Search for reversible causes
	Blood Glucose Analysis Procedure
	IV or IO Protocol UP 6
A	Normal Saline Bolus 20 ml / kg IV / IO Repeat as needed x 3 Maximum 60 mL / kg
P	Epinephrine 1:10,000 0.01 mg/kg IV / IO Maximum Single Dose 1mg Or Epinephrine 1:1000 0.1 mg / kg ETT Maximum 2.5 mg Repeat every 5 minutes
P	Atropine 0.02 mg / kg IV / IO May repeat x 1 Minimum single dose 0.1 mg Maximum single dose 0.5 mg
P	If no improvement Consider Transcutaneous Pacing Procedure

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia
Hypoglycemia

Tension pneumothorax
Tamponade; cardiac
Toxins
Thrombosis; pulmonary (PE)
Thrombosis; coronary (MI)

Suspected Beta-Blocker or Calcium Channel Blocker

Follow Pediatric Toxicology Protocol

Notify Destination or Contact Medical Control



Pediatric Bradycardia With Poor Perfusion

Pearls

- **Recommended Exam:** Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro
- Bradycardia is often associated with hypoxia so insure patent airway, breathing, and circulation as needed.
- Begin CPR immediately with persistent bradycardia and poor perfusion despite adequate oxygenation and ventilation.
- Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.
- Rhythm should be interpreted in the context of symptoms and pharmacological treatment given only when symptomatic, otherwise monitor and reassess.
- Consider hyperkalemia with wide complex, bizarre appearance of QRS complex, and bradycardia.
- **12-Lead ECG:**
 - 12 Lead ECG not necessary to diagnose and treat
 - Obtain when patient is stable and/or following rhythm conversion.
- **Unstable condition**
 - Condition which acutely impairs vital organ function and cardiac arrest may be imminent.
 - If at any point patient becomes unstable move to unstable arm in algorithm
- Epinephrine is first drug choice for persistent, symptomatic bradycardia.
- **Atropine:**
 - Second choice, unless there is evidence of increased vagal tone or a primary AV conduction block, then give atropine first.
 - Ineffective and potentially harmful in cardiac transplantation. May cause paradoxical bradycardia.
- **Symptomatic bradycardia causing shock or peri-arrest condition:**
 - If no IV or IO access immediately available, start Transcutaneous Pacing, establish IV / IO access, and then administer epinephrine.
 - Epinephrine should be administered followed Atropine if no response.
- **Symptomatic condition**
 - Arrhythmia is causing symptoms such as palpitations, lightheadedness, or dyspnea, but cardiac arrest is not imminent.
 - Symptomatic bradycardia usually occurs at rates < 50 beats per minute.
 - Search for underlying causes such as hypoxia or impending respiratory failure.
- **Serious Signs / Symptoms:**
 - Hypotension. Acutely altered mental status. Signs of shock / poor perfusion. Chest pain with evidence of ischemia (STEMI, T wave inversions or depressions.) Acute CHF.
- **Transcutaneous Pacing Procedure (TCP)**
 - Indicated with unstable bradycardia unresponsive to medical therapy.
 - If time allows transport to specialty center because transcutaneous pacing is a temporizing measure.
 - Transvenous / permanent pacemaker will probably be needed.
 - Immediate TCP with high-degree AV block (2d or 3d degree) with no IV / IO access.
- Most maternal medications pass through breast milk to the infant so maintain high-index of suspicion for OD-toxins.
- Hypoglycemia, severe dehydration and narcotic effects may produce bradycardia. Many other agents a child ingests can cause bradycardia, often is a single dose.