

SECTION: PC-2

PROTOCOL TITLE: PED Symptomatic Bradycardia

REVISED: April 29, 2011

General Comments: Symptomatic bradycardia is defined in pediatrics as hypotension or other S/S of poor perfusion, with a (relative to age) bradycardia. Most bradycardia is hypoxia related, and will usually respond to oxygenation.

BLS SPECIFIC CARE: See General Pediatric Care Protocol PC-1

Stable/asymptomatic/adequate perfusion

- Ensure adequate oxygenation, ventilation, and perfusion
- Resolve any causes of hypoxia
- Monitor closely

Unstable/symptomatic/poor perfusion

- Resolve any causes of hypoxia
- Aggressive oxygenation and ventilations
- Consider chest compressions with frequent (30 sec-1 min) re-evaluation for situations refractory to oxygenation
- Determine patient's color category on length based resuscitation tape (Broselow Tape)

ILS SPECIFIC CARE: See General Pediatric Care Protocol PC-1

ALS SPECIFIC CARE: See General Pediatric Care Protocol PC-1

- Consider underlying causes of cardiac arrest and treat as well.
- Epinephrine:
 - IV/IO: 0.01 mg/kg (0.1 ml/kg) 1:10,000 with 5-10 ml NS flush.
 - Repeat every 3-5 minutes as needed
 - ETT: 0.1 mg/kg (0.1 ml/kg) 1:1,000 diluted to 5 ml in NS.
 - Repeat every 3-5 minutes as needed
- Atropine:
 - If increased vagal tone is suspected or primary AV block is present.
 - IV/IO: 0.02 mg/kg
 - Minimum dose: 0.1 mg
 - Maximum child dose: 0.5 mg
 - Maximum total child dose: 1 mg
 - Maximum adolescent dose: 1 mg
 - Maximum total adolescent dose: 2 mg
 - Repeat every 3-5 minutes as needed
 - ETT: 0.03 mg/kg
 - Repeat every 3-5 minutes as needed

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Transcutaneous Pacing:

For bradycardia unresponsive to pharmacologic therapy:

- Consider initial rate at 80-100, initial MA at 60-80

Vasopressors:

Epinephrine is the preferred agent in this setting:

- Epinephrine infusion
 - 0.1-1 mcg/kg/min IV/IO
 - See, "Pediatric Epinephrine," preparation and infusion chart
 - Titrate to adequate heart rate/blood pressure response
- Dopamine infusion :
 - 2-20 mcg/kg/min IV/IO dopamine infusion
 - See, "Pediatric Dopamine," preparation and infusion chart
 - Titrate to adequate heart rate/blood pressure response

Additional considerations:

- IV/IO Sodium bicarbonate for known hyperkalemia, bicarb acidosis (DKA, TCA), or prolonged resuscitation after ROSC.
- IV/IO 1 mEq/kg
 - Repeat at 0.5 mEq/kg in 10 minutes.

PHYSICIAN PEARLS:

The following information is adapted from the Medtronic Physio-control website regarding pediatric pacing.

“Bradycardia is the most common dysrhythmia in children and is usually secondary to hypoxic events. Although noninvasive pacing may be attempted, typically bradycardias of hypoxic etiology do not respond. First line therapy is prompt airway support, ventilation and oxygenation.

Although less frequent in occurrence, children and infants do experience heart blocks and bradycardias where treatment with noninvasive pacing is indicated and could be lifesaving. Indications for pediatric noninvasive pacing are:

- Bradycardia refractory to oxygenation, and drug therapy
- Bradycardias from surgically acquired AV blocks
- Congenital AV block
- Viral myocarditis
- Newborn complete heart block due to maternal lupus
- Heart block secondary to toxin or drug overdose
- Permanent pacemaker generator failure or lead wire fracture
- And epicardial pacing wire failure (post cardiac surgery)

The landmarks for pacing electrode placement are the same for adults and children; however placement on a child is more challenging due to the limited size of the torso. Anterior/posterior is the most common pacing electrode placement. Anterior-lateral placement is also acceptable but will take up more space on an already crowded chest. In order to obtain a clear tracing on the monitor, ECG electrodes should be placed well away from the pacing electrodes. Pediatric pacing electrodes should be used on children who weigh less than 33 pounds (15 Kg). The larger "adult" size pacing electrodes should be used as soon as they fit on a child's chest without overlap of the sternum, spine and diaphragm.

Capture thresholds in children are similar to those in adults. This may seem odd, given the much smaller size of children. Studies indicate no relationship between body surface area, weight, and capture thresholds and although many children will achieve capture between 50-100 ma, higher current requirements are possible. The pacing rate must be set high enough to perfuse the patient.”

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