



**MICHIGAN
State Protocols**

Protocol Number

**Protocol Name
Pediatric Cardiac
Table of Contents**


6.1	General Pediatric Cardiac Arrest
6.2	Bradycardia
6.3	Tachycardia

Pediatric Cardiac Arrest – General


This protocol should be followed for all pediatric cardiac arrests.

- If an arrest is of a known traumatic origin refer to the **Traumatic Arrest Protocol**.
- If it is unknown whether the arrest is traumatic or medical, continue with this protocol.
- Once arrest is confirmed, emphasis should be on avoiding interruptions in CPR.
- CPR should be done in accordance with current guidelines established by the American Heart Association.

Note: Primary cardiac arrest in the pediatric patient is rare. Most arrests are secondary to respiratory failure. Consider maintaining basic airway management techniques if effective. Advanced airway insertion attempts should be performed in such a manner as to keep CPR interruptions to a minimum. Medications given during cardiac arrest are given IV or IO.

1. Confirm Arrest
 - a. Assess for signs of normal breathing.
 - b. Check a carotid or brachial pulse as age appropriate for not more than 10 seconds.
2. Initiate CPR or continue CPR if already in progress and apply and use AED per **Electrical Therapy Procedure** as soon as possible.
3. Ensure CPR quality
 - a. Compressions at least 1.5” in depth for infants, 2” in depth for children.
 - b. Compression rate at least 100-120 per minute (An FDA approved mechanical CPR device operating at the manufacturers pre-set rate meets this requirement).
 - c. Avoid excessive ventilation (volume and rate).
4. Continue CPR with minimal interruptions, changing the rescuer doing compressions every 2 minutes, when possible.
5. Initiate ALS response if available.
6. Establish a patent airway, maintaining C-Spine precautions if indicated, using appropriate airway adjuncts and high flow oxygen. Ventilations with BVM may be as effective as endotracheal intubation in children. Any patient 8 years and under shall be ventilated via BVM or other basic maneuver.
-  7. If Return of Spontaneous Circulation (ROSC) has **not** been achieved after three, two minute cycles of CPR and ALS is not available or delayed, contact medical control, initiate transport.
8. If unable to ventilate or unable to maintain a patent airway, establish an airway with a supraglottic airway when indicated per **Emergency Airway Procedure**.
 - a. Minimize interruptions in compressions during airway placement to less than 10 seconds.
 - b. After insertion provide continuous CPR, without pauses for ventilation. Ventilations delivered at 10 breaths per minute or 1 breath every 6 seconds. See **Emergency Airway Procedure**.

- c. All airway adjuncts should be utilized with high flow oxygen.
 - d. Utilize waveform capnography (if available).
9. Verify CPR quality frequently and anytime rescuer providing compressions or ventilations change.

 10. Start an IV/IO NS KVO. IO may be the first choice. See **Vascular Access & IV Fluid Therapy Procedure**.

 11. Check rhythm, shock if indicated (**2 J/kg**) and continue CPR.

12. Administer Epinephrine

- a. 1 mg/10 ml, 0.01 mg/kg (0.1 ml/kg)
- b. Max dose 1mg (10 ml)
- c. Repeat every 3-5 minutes

13. If airway has not been established, **and** unable to ventilate, establish airway per **Emergency Airway Procedure**.

- a. Minimize interruptions in compressions during airway placement to less than 10 seconds.
- b. Supraglottic airways are an acceptable alternative for endotracheal intubation.
- c. After interventional airway is established, ventilation rate is 10 breaths per minute

14. Utilize waveform capnography; if PETCO₂ is < 10 mm Hg attempt to improve CPR quality.

15. Recheck rhythm every 2 minutes

16. If shockable rhythm persists

- a. Shock at **4 J/kg** every 2 minutes with immediate resumption of compressions. Subsequent shocks must be at least 4 J/kg, but may escalate to 10J/kg or adult dosage.
- b. Administer Amiodarone
 - i. 5 mg/kg
 - ii. Max dose 300 mg
 - iii. May be repeated if continuous shockable rhythm up to 2 more times (maximum total dose 15 mg/kg or 450 mg)

17. Consider causes of arrest (non-shockable)

- a. Hypovolemia – Administer 20 ml/kg NS IV/IO bolus
- b. Tension pneumothorax – see **Pleural Decompression Procedure**
- c. Hypothermia – see **Hypothermia Cardiac Arrest Protocol**, consider rapid transport



d. Hyperkalemia (renal failure) – Contact Medical Control

- i. Administer Calcium Chloride (10%), 20 mg/kg (0.2 ml/kg), max dose 1 gm
- ii. Administer Sodium Bicarbonate 1 mEq/kg IV/IO with 20 ml NS flush between medications



18. Additional basic and/or advanced life support care as appropriate.





19. Consider termination of resuscitation per **Termination of Resuscitation Protocol**.

Pediatric Bradycardia

Aliases: Slow heart rate, heart block

Bradycardia should be considered to be due to hypoxia until proven otherwise. This protocol applies to pediatric patients with bradycardia, a pulse, and poor perfusion (cardiopulmonary compromise).

1. If heart rate is < 60 despite adequate oxygenation and ventilation, perform CPR.
-  2. Establish vascular access
-  3. Apply cardiac monitor to identify rhythm
4. If HR continues to be less than 60, despite oxygenation & ventilation
 - A. Administer Epinephrine 1mg/ 10mL,
 - i. 0.01 mg/kg (0.1 ml/kg) IV/IO up to 1 mg (10 ml),
 - ii. Repeat every 3-5 minutes.
 - B. If HR is unresponsive to epinephrine:
 - i. Administer Atropine 0.02 mg/kg IV/IO (minimum dose 0.1 mg, maximum single dose 0.5 mg)
 - ii. May repeat once in 5 minutes, if effective.
 - C. If HR is unresponsive to Epinephrine and Atropine:
 - i. Consider transcutaneous pacing at rate up to 100 bpm per **Electrical Therapy Procedure**.
 - ii. Sedation may be used to facilitate transcutaneous pacing per MCA selection. Refer to **Patient Sedation Procedure**.

Notes:

1. Signs of cardiopulmonary compromise include:
 - a. Hypotension is SBP less than $70 + (\text{age} \times 2)$.
 - b. Acutely altered mental status.
 - c. Signs of shock - indicated by absent or weak peripheral pulses, increased capillary refill time, skin cool/mottled.
 - d. Respiratory difficulty indicated by increased work of breathing (retractions, nasal flaring, grunting), cyanosis, altered level of consciousness (unusual irritability, lethargy, failure to respond to parents), stridor, wheezing.
2. When CPR is required, a precise diagnosis of the specific bradyarrhythmia is not important.
3. If severe hypothermia follow **Hypothermia Cardiac Arrest Protocol**

Pediatric Tachycardia

Aliases: Supraventricular tachycardia (SVT), atrial fibrillation (a-fib), atrial flutter, ventricular tachycardia (V-tach)



This protocol is for paramedic use only.

This protocol is intended for symptomatic pediatric patients with elevated heart rate, relative for their age. Refer to MI-MEDIC for appropriate vital signs and medication doses.

- I. General Treatment
 - A. Manage airway as necessary
 - B. Provide supplemental O₂ as needed to maintain O₂ saturation > 94%
 - C. Initiate monitoring and perform 12-lead EKG
 - D. Establish vascular access
 - E. Identify and treat underlying causes of tachycardia such as dehydration, fever, vomiting, sepsis and pain.
 - F. Administer fluid bolus 20cc/kg for patients with likely fluid depletion
 - G. Consider the following additional therapies if specific dysrhythmias are recognized:



- II. Specific Dysrhythmia Treatment
 - A. **Regular Narrow Complex Tachycardia – Stable (SVT)**
 - i. Perform vagal maneuvers
 - ii. Administer Adenosine
 1. 0.1 mg/kg (max of 6 mg)
 2. May repeat with 0.2 mg/kg (max of 12 mg)
 - B. **Regular Narrow Complex Tachycardia – Unstable**
 - i. Deliver a synchronized shock; 0.5-1 J/kg for the first dose
 - ii. Repeat doses should be 2 J/kg
 - C. **Regular, Wide Complex Tachycardia – Stable**
 - i. Consider Adenosine 0.1 mg/kg (max of 6 mg) for SVT with aberrancy
 - ii. If ventricular in origin, give Lidocaine 1 mg/kg IV (max of 100 mg)
 - D. **Regular, Wide Complex Tachycardia – Unstable**
 - i. Synchronized cardioversion 0.5-1.0 J/kg
 - E. **Unstable, Irregular, Wide Complex Tachycardia –**
 - i. Defibrillate according to **Electrical Therapy Procedure**
 - ii. Refer to **Pediatric General Cardiac Arrest Protocol**