Pulseless Unresponsive Child - BLS Provider with AED

**BLS**

1. Initial Assessment/Care Protocol 1P
2. Initiate CPR according to American Heart Association Standards.
3. If AED is available, place device on patient using pediatric appropriate attachments. If no pediatric attachments are available, use adult size pads.
4. Follow AED procedures.
5. Airway Management Protocol 7P

Note: The priority in cardiac arrest is circulation with minimal interruptions to CPR. “Push hard, push fast” with compressions at a rate of 100-120/minute. Continuous uninterrupted compressions are the utmost importance for patient survival.

**ALS**

6. Initiate appropriate advanced airway procedures.
7. Establish IV/IO access Procedure 13 or Procedure 14
8. Follow the appropriate protocol (Sections A-I below).
9. Refer to Handtevy System as a guide for proper dosage volume and sizing of equipment.
Pulseless Unresponsive Child – BLS Provider with AED

**Initial Assessment**
- Unresponsive?
- Not breathing or only gasping?
- Call for resources, get AED/defibrillator

**Check pulse:**
- DEFINITE pulse
- Within 10 seconds?
  - Give 1 breath every 3 seconds
  - Add compressions if pulse remains <60/min with poor perfusion despite adequate oxygenation and ventilation
  - Recheck pulse every 2 minutes

**One rescuer:** Begin cycles of 30 COMPRESSIONS and 2 BREATHS
**Two Rescuers:** Begin cycles of 15 COMPRESSIONS and 2 BREATHS

**After 2 minutes of CPR, get AED / Defibrillator (if not already done)**
- Attach and use AED / Defibrillator

**Check Rhythm**
- Shockable rhythm?
  - Give 1 shock
  - Resume CPR Immediately
    - For 2 minutes
  - Resume CPR Immediately
    - For 2 minutes
  - Check rhythm every 2 minutes; continue until ALS providers take over or until victim starts to move

**High Quality CPR**
- Rate at least 100-120/min
- Compression depth at least 1/3 anterior-posterior diameter of the chest, about 1½ inches (4cm) in infants and 2 inches (5cm) in children.
- Allow complete chest recoil after each compression
- Minimize interruptions in chest compressions
- Avoid excessive ventilation

---
### A. Ventricular Fibrillation/Pulseless Ventricular Tachycardia

**ALS**

1. For a patient with an unwitnessed onset of V-Fib or Pulseless V-Tach (pVT), initiate CPR for 2 minutes

2. **Defibrillate at 2 joules/kg** and subsequent defibrillations should escalate beginning at 4j/kg up to **MAX dose** of 10j/kg (or adult dose) every 2 minutes, **continue CPR** for a minimum of two minutes. Then re-assess ECG Rhythm. If still VF:
   3. **Defibrillate at 4 joules/kg.** Resume CPR

4. Administer **Epinephrine (1:10,000), 0.01mg/kg**, (0.1mL/kg) IV/IO push, circulate with 2 minutes of CPR.

5. **Defibrillate at 6 joules/kg.** Resume CPR

6. Administer **Amiodarone, 5mg/kg**, IV/IO push, circulate with 2 minutes of CPR

7. **Defibrillate at 8 joules/kg.** Resume CPR

8. Administer **Epinephrine (1:10,000), 0.01mg/kg**, (0.1mL/kg) IV/IO push, circulate with 2 minutes of CPR.

9. **Defibrillate at 10 joules/kg.** Resume CPR

10. Administer **Amiodarone, 5mg/kg**, IV/IO push, circulate with 2 minutes of CPR

11. **Defibrillate at 10 joules/kg.** Resume CPR

12. Administer **Epinephrine (1:10,000), 0.01mg/kg**, (0.1mL/kg) IV/IO push, circulate with 2 minutes of CPR.

13. **Defibrillate at 10 joules/kg.** Resume CPR

14. Administer **Amiodarone, 5mg/kg**, IV/IO push, circulate with 2 minutes of CPR

15. **Defibrillate at 10 joules/kg.** Resume CPR

16. Administer **Epinephrine (1:10,000), 0.01mg/kg**, (0.1mL/kg) IV/IO push, circulate with 2 minutes of CPR.

17. **Defibrillate at 10 joules/kg.** Resume CPR

18. Administer **Magnesium Sulfate 25-50mg/kg IV/IO (Max dose of 2G) over 2 min.,** if patient is in polymorphic ventricular tachycardia (Torsades de Pointes) or refractory V-Fib (can be done at any time after the first epinephrine)

19. Consider underlying causes and manage as soon as possible, indicated in **“Potentially Reversible Causes in Cardiac Arrest”** at the end of Section E., PEA.
Ventricular Fibrillation / Pulseless Ventricular Tachycardia

Initial Assessment
Protocol 1P

CPR (2 MINUTES)
Airway
IV / IO Access

Shockable Rhythm?
YES: Defib 2j/kg
Epinephrine every 3-5 min

NO

CPR 2 Minutes
CPR 2 Minutes
EPI every 3-5 min
EPI every 3-5 min

Shockable Rhythm?
YES: Defib 4j/kg
Amiodarone 5mg/kg
Repeat once

NO

Shockable Rhythm?
YES: Defib 6j – 10j/kg
Magnesium Sulfate 25-50mg/kg
(Torsades or refractory VF)

Continue CPR → medication → defibrillation at 4-10j/kg → continued CPR.

If pulses are restored (ROSC), refer to the Post Resuscitative Care Protocol (Section G)
B. Regular, Wide Complex Tachycardia with a Pulse

Infants: Rate ≥220/min./Children: Rate ≥180/min.

Wide Complex Tachycardia - Stable Patient

**BLS**

1. Initial Assessment/Care [Protocol 1P]

2. Provide oxygen.

**ALS**

3. Obtain EKG and determine *regularity of R-R waves*.

4. Consider *Adenosine 0.1mg/kg* rapid IVP (max dose 6mg) if rhythm is regular and QRS complexes are monomorphic as a diagnostic tool.

5. Administer *Amiodarone 5mg/kg IV over 20-60 minutes*.

6. If the patient's condition deteriorates at anytime, move immediately to "*unstable pediatric patient*" above, or to VF/Pulseless VT, Section A.

Wide Complex Tachycardia - Unstable Patient

Regular, Wide Complex (QRS > 0.09 sec) Tachycardia with a Pulse.

"Unstable" includes patients presenting with *any* of the following signs related to the wide complex tachycardia:

a. Chest pain/discomfort

b. Acutely altered mental status

c. Shortness of breath

d. Hypotension

2. Initial Assessment/Care [Protocol 1P]

3. Provide oxygen.

4. Obtain EKG and determine *regularity of R-R waves*.

5. If conscious, attempt to sedate by administering *Versed (midazolam), 0.1 mg slow IVP.* *DO NOT delay cardioversion to sedate patient and obtain a 12-lead EKG if they are unstable.*
6. Begin **synchronized cardioversion at 0.5 J/kg.** (If impossible to synchronize, defibrillate as in Section “A. Ventricular Fibrillation/Pulseless Ventricular Tachycardia” Pediatric section). If patient does not convert after initial cardioversion of 0.5 J/kg, increase doses:
   a. 1 J/kg Synchronized
   b. 2 J/kg Synchronized

7. Consider **Adenosine 0.1mg/kg rapid IVP** (Max dose of 6mg) as a diagnostic tool, if rhythm is regular and the QRS are monomorphic.

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**C. Sustained Narrow Complex Tachycardia**

**Sustained Sinus Tachycardia – Stable Patient**

Infants: Rate <220/min./Children: Rate <180/min.

Sinus tachycardia is usually greater than the normal rate, but the rate may vary. Upon acquiring history, it is compatible and consistent with known cause; P waves are present and normal, variable R-R with a constant PR interval.

**BLS**

1. Initial Assessment/Care Protocol 1P
2. Provide oxygen.

**ALS**

3. Obtain EKG and determine **regularity of R-R waves.**
4. Consider underlying causes of tachycardia, probable sinus tachycardia.
   a) Refer to Handtevy system as a guide for appropriate pediatric vital signs.
   b) Seek for and treat the underlying cause. (*Examples of causes:* hyperthermia, dehydration,...)
   c) Contact MCP for consultation.

**SVT - Stable Patient**

Regular, Narrow Complex (QRS ≤ 0.09 sec)

Infants: Rate ≥220/min./Children: Rate ≥180/min.

Pediatric patient with a history of abrupt rate change, P waves are absent and/or abnormal, HR is not variable with activity.
**BLS**

5. Initial Assessment/Care Protocol 1P

6. Provide oxygen.

**ALS**

7. Obtain EKG and determine *regularity of R-R waves*.

8. Consider underlying causes of tachycardia.
   
   a) Refer to *Handtevy system* as a guide for appropriate pediatric vital signs

9. Consider vagal maneuvers.

10. Administer **Adenosine, 0.1 mg/kg rapid IVP** (Max first dose of 6mg). This may be repeated in 1-2 minutes at 0.2 mg/kg rapid IVP (Max second dose of 12mg).
   
   a) Adenosine should be administered through a large-bore catheter preferably at the antecubital fossa and followed by a rapid flush of 5-10mL of IV solution.

11. If the QRS width is thought to be wide (> 0.09 sec) then follow section Protocol 9 B, “Regular, Wide Complex Tachycardia with a Pulse” pediatric section, 9.8).

12. If the patient's condition deteriorates at any time, move immediately to "unstable patient" below.

**SVT (Unstable Pediatric Patient)**

Regular, Narrow Complex (QRS ≤ 0.09 sec)

Infants: Rate ≥220/min.
Children: Rate ≥180/min.

Patient presents with vague/nonspecific history of abrupt rate changes, P waves absent and/or abnormal, HR is not variable with activity.

“Unstable” includes patients presenting with any of the following signs related to the wide complex tachycardia:

- a. Chest pain/discomfort
- b. Acutely altered mental status
- c. Shortness of breath
- d. Hypotension
**BLS**

1. Initial Assessment/Care [Protocol 1P](#)

2. Provide oxygen.

**ALS**

3. Obtain EKG and determine **regularity of R-R waves**.

4. If conscious, attempt to sedate by administering **Versed (midazolam), 0.1 mg/kg slow IVP/IO/IM** ([Procedure 15](#)).

5. Begin **synchronized cardioversion at 0.5 J/kg**. (If impossible to synchronize, defibrillate as in Section “A. Ventricular Fibrillation /Pulseless Ventricular Tachycardia” Pediatric section). If patient does not convert after initial cardioversion of 0.5 J/kg, increase doses:
   a) **1 J/kg Synchronized**
   b) **2 J/kg Synchronized**

6. Administer **Adenosine, 0.1 mg/kg rapid IVP** (Max dose of 6mg).

7. Administer a **fluid challenge of 20 mL/kg**.

8. If the patient’s rhythm fails to convert, consult MCP for further treatment instructions.
Pediatric Tachycardia

Initial Assessment
Identify and treat Underlying Cause
- Maintain patent airway; assist breathing as necessary
- Administer Oxygen
- Apply Cardiac Monitor to identify rhythm; monitor blood pressure and SAO₂
- IV/IO access
- Perform 12 lead ECG if available; but don’t delay therapy

Patient Stable?

Check Rhythm

STABLE

Wide
Probable ventricular tachycardia
Consider Adenosine 0.1mg/kg; if the QRS is regular and monomorphic
Amiodarone 5mg/kg over 20-60 minutes
Seek Expert consultation

Narrow
Probable supraventricular tachycardia
Vagal Maneuvers
Adenosine 0.1mg/kg
Seek Expert consultation

Probable sinus tachycardia
Search for cause
Adenosine 0.1mg/kg
Fluid Challenge 20mL/kg
Seek Expert consultation

Synchronized Cardioversion
Sedate with Versed if time allows
Adenosine 0.1mg/kg

UNSTABLE

Probable ventricular tachycardia
Probable supraventricular tachycardia
Probable sinus tachycardia
Search for cause
Treat signs and symptoms as indicated
Seek Expert consultation

WIDE

NARROW

STABLE

UNSTABLE
### D. Asystole, Agonal rhythm, Idioventricular with rate <20 bpm or Pulseless Bradycardias

If heart rate is <60/min. in an infant or child, along with poor systemic perfusion, begin chest compressions.

**ALS**

1. Initiate CPR according to AHA standards. Two minutes of CPR will be done prior to stopping and assessing the rhythm.

2. Airway Management [Protocol 7P](#)

3. IV/IO Access [Procedure 13](#) & [Procedure 14](#) will be done concurrently with CPR. Medication administration will begin as soon as an appropriate route becomes available.

4. Administer **Epinephrine 1:10,000, 0.01 mg/kg IVP/IO** (0.1 mL/kg), MAX DOSE of 1mg.
   a. Subsequent doses of **Epinephrine 1:10,000, 0.01 mg/kg IVP/IO** (0.1 mL/kg) should be administered every 3-5 minutes, MAX 1mg per dose.

5. Consider underlying causes and manage as soon as possible, indicated in “Potentially Reversible Causes in Cardiac Arrest” at end of Section E., PEA.

### E. Pulseless Electrical Activity (PEA)

**ALS**

1. Initiate CPR according to AHA standards. Two minutes of CPR will be done prior to stopping and assessing the rhythm.

2. Airway Management [Protocol 7P](#) and

3. IV/IO Access [Procedure 13](#) & [Procedure 14](#) will be done concurrently with CPR. Medication administration will begin as soon as an appropriate route becomes available.

4. Administer **Epinephrine 1:10,000, 0.01 mg/kg IVP/IO** (0.1 mL/kg) or IO, MAX DOSE 1mg.
   a. Subsequent doses of **Epinephrine 1:10,000, 0.01 mg/kg IVP/IO** (0.1 mL/kg) should be administered every 3-5 minutes.

5. Consider causes and manage as soon as possible, indicated in the following chart, “Potentially Reversible Causes in Cardiac Arrest.”
<table>
<thead>
<tr>
<th>Potentially Reversible Causes in Cardiac Arrest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypovolemia</strong></td>
</tr>
<tr>
<td>Fluid bolus of 20mL/kg; 10mL/kg for neonates (&lt;1 month), rapid transport</td>
</tr>
<tr>
<td><strong>Hypoxemia</strong></td>
</tr>
<tr>
<td>Confirm adequacy of oxygenation, airway management, consider establishing advanced airway.</td>
</tr>
<tr>
<td><strong>Hydrogen-ions (Acidosis)</strong></td>
</tr>
<tr>
<td>Give Sodium Bicarbonate, 1 mEq/kg IV/IO, airway management, consider advanced airway.</td>
</tr>
<tr>
<td><strong>Hypothermia</strong></td>
</tr>
<tr>
<td>Warming of patient</td>
</tr>
<tr>
<td><strong>Hypoglycemia</strong></td>
</tr>
<tr>
<td>Treat per Protocol 36P, Impaired Consciousness</td>
</tr>
<tr>
<td><strong>Hyperkalemia</strong></td>
</tr>
<tr>
<td>Calcium Chloride and/or Sodium Bicarbonate.</td>
</tr>
<tr>
<td><strong>Tension Pneumothorax</strong></td>
</tr>
<tr>
<td>Needle decompression per Procedure 5</td>
</tr>
<tr>
<td><strong>Cardiac Tamponade</strong></td>
</tr>
<tr>
<td><strong>(Toxin): Beta Blocker OD</strong></td>
</tr>
<tr>
<td>Poison Control: Glucagon IVP. Dosage per MCP.</td>
</tr>
<tr>
<td><strong>(Toxin): Calcium Channel Blocker OD</strong></td>
</tr>
<tr>
<td>Poison Control: Calcium Chloride and/or Glucagon IVP. Dosage per MCP.</td>
</tr>
<tr>
<td><strong>(Toxin): Suspected Narcotic OD</strong></td>
</tr>
<tr>
<td>Narcan, 0.4 mg IV/IO/IN per dose as needed.</td>
</tr>
<tr>
<td><strong>Thrombosis</strong></td>
</tr>
<tr>
<td>Coronary: Consider 12-Lead ECG; Pulmonary Embolism</td>
</tr>
<tr>
<td><strong>Trauma</strong></td>
</tr>
</tbody>
</table>


F. Symptomatic Bradycardia

Causes of bradycardia in the pediatric population may be caused by hypoxemia, heart block, heart defects, hypothermia, head injury, and/or toxin/drug induced.

Care must be taken to ensure the adequacy of oxygenation and airway patency. Hypoxemia is the leading cause of bradycardia in children. If heart rate is <60/min. in an infant or child, along with poor systemic perfusion, begin chest compressions.

ALS

1. Initial Assessment/Care Protocol 1P

2. Begin assisting ventilations and oxygenate patient via BVM if HR <100, reassess every 2 min.

3. Initiate CPR according to AHA standards if patient’s heart rate ≤60 or despite of assistance of ventilations & oxygenation.

Two minutes of CPR will be done prior to stopping and assessing the rhythm. Airway Management Protocol 7P and IV/IO Access Procedure 13 & Procedure 14 will be done concurrently with CPR. Medication administration will begin as soon as an appropriate route becomes available.

4. Administer Epinephrine (1:10,000), 0.01 mg/kg IVP/IO (0.1 mL/kg). For ET use 1:1,000, 0.1 mg/kg. May be repeated every 3-5 min. (No max dose)

5. Administer Atropine, 0.02 mg/kg IVP/IO. 0.1 mg is the minimum single dose (0.5 mg is maximum single dose), for increased vagal tone or primary AV block, may be repeated once in 3-5 min. (not to exceed a maximum dose of 0.04mg/kg)

6. Consider causes and manage as indicated in the following chart, “Potentially Reversible Causes in Cardiac Arrest.”

MCP

7. Epinephrine infusion.

8. Dopamine infusion.

9. External pacing (TCP), Procedure 23
Pediatric Bradycardia

**Initial Assessment**
*Identify and treat Underlying Cause*
- Maintain patent airway; assist breathing as necessary
- Administer Oxygen
- Apply Cardiac Monitor to identify rhythm; monitor blood pressure and SAO₂
- IV/IO access
- Perform 12 lead ECG if available; but don’t delay therapy

**Patient Stable?**
**YES**
- Search for cause
- Support ABC’s
- Give oxygen
- Treat signs and symptoms as indicated

**CPR IF HR<60/MIN** with poor perfusion despite oxygenation and ventilation
**YES**
- Bradycardia persists?
  **YES**
  - Epinephrine 1:10,000
    0.1mg/kg
  **NO**
  - Atropine
    0.2mg/kg
  - Consider Inotropes and Pacing

**NO**