

CARDIAC ARREST: PEDIATRIC (ALS AND BLS)

SIGNS & SYMPTOMS:

1. Absent pulse (brachial in infant)
2. Absent or agonal breathing
3. Pupils: dilated, sluggish or unreactive
4. Skin: pale, cool, cyanotic, mottled
5. Neuro: unconscious, seizure activity (initially)
6. J (Osborn) ECG wave in hypothermia

OBTAIN HISTORY OF:

1. PMH/Meds/Allergies
2. Witnessed or unwitnessed collapse
3. DNR status
4. Bystander CPR
5. Down time
6. Potential causes: accident, abuse, drowning, electrocution, FBAO, respiratory distress

CONTRAINDICATIONS:

1. The automatic transport ventilator (Autovent 2000) is contraindicated in patients < 90 pounds.
2. Combitubes are contraindicated in patients < 5 feet.
3. Demand valve resuscitators are contraindicated in patients < 12 years.
4. AEDs should use specific AED pediatric patches in patients < 12 years or < 90 pounds. If ALS is delayed and an adult AED is available, the adult AED may be used on a child over 1 year of age (place adult patches anterior/posterior if needed).

PRECAUTIONS:

1. Pulse oximetry and end-tidal CO₂ monitoring in low perfusion states may be unreliable.
2. Any medication given on standing order is at the dose recommended by a weight based resuscitation tape
3. Remember that most arrests in children are respiratory related and adequate ventilation is the key for successful resuscitation and correction of acidosis.
4. Placement of an OG tube in intubated pediatric arrest is important to counter the effects of gastric distention.
5. Because the head of a child is proportionally larger, padding under the shoulders or torso will assist in airway management and may be required to keep the head in neutral alignment.

NONTRAUMATIC BLS CARDIAC ARREST CARE:

1. Ventilate:
 - A. Initially, high flow 100% O₂ using an oral airway, bag-valve system, and proper size mask.
 - B. Ventilate the patient with two ventilations for each 30 compressions for single person CPR in the infant and child.
 - C. Ventilate the patient with two ventilations for each 15 compressions for two-person CPR in the infant and child.
 - D. Ventilate the patient with one ventilation every 3-5 seconds once an advanced airway is established.
2. Perform CPR (compression rates 100/minute)
 - A. In children <8 years old, if a pulse is not palpable or heart rate is < 60/min and signs of poor systemic perfusion are present;
 - B. Until adequate perfusion is restored;
 - C. If instructed by a physician.
3. Position on short or longboard and prepare for immediate transport.
4. Consider ALS response.
5. Transport to closest appropriate medical facility.

NONTRAUMATIC ALS CARDIAC ARREST CARE: In addition to above and as appropriate:

1. Apply monitoring electrodes and/or pediatric defibrillation patches or paddles.
2. Identify rhythm; treat as follows:
 - A. Ventricular fibrillation or pulseless ventricular tachycardia:**
 1. Defibrillate @ 1 J/lb (2 J/kg).
 2. Resume CPR; reassess adequacy of ventilation, oxygenation and compressions.
 3. May establish more definitive airway with ET; continue to ventilate with 100% O₂
 4. Insert orogastric tube if evidence of gastric distention.
 5. Establish vascular access with NS; intraosseous (IO) is preferred in children < 8 years.
 6. Administer initial dose of epinephrine 1:10,000 IO or IV per weight based resuscitation tape; circulate with cardiac compressions.
 7. Defibrillate @ 2 J/lb (4 J/kg).
 8. Administer initial dose of Amiodarone IO/IV (5mg/kg); circulate with cardiac compressions.
 9. Defibrillate @ 2 J/lb (4 J/kg).
 10. Contact monitoring physician for further orders.

B. Asystole or PEA:

1. Continue CPR.
 2. Establish more definitive airway with ET; continue to ventilate with 100% O₂.
 3. Insert orogastric tube if evidence of gastric distention.
 4. Consider and treat underlying causes, e.g. hypoxia, tension pneumothorax, etc.
 5. Establish vascular access with NS; intraosseous (IO) is preferred in children < 8 years.
 6. Administer initial dose of epinephrine 1:10,000 IO or IV; circulate with cardiac compressions.
 7. Contact monitoring physician for further orders.
3. Position on board. Immobilize head if patient is intubated.
 4. If intubated, recheck and document ET tube checks with every move and before entering the emergency department.

TRAUMATIC BASIC LIFE SUPPORT CARDIAC ARREST CARE: Care for traumatic cardiac arrest differs in the following ways:

1. While manually stabilizing the neck, open the airway using the modified jaw thrust or chin lift technique. Provide manual stabilization during all airway procedures until the patient is secured on a board with C-collar.
2. Control major external bleeding.
3. Assess chest for life-threatening injuries, e.g. sucking chest wound, flail chest and treat as appropriate.
4. Expose as indicated and perform PCT survey if patient appropriate for pediatric PCT.
5. Prepare for immediate transport. Attempt to keep scene times to five minutes.
6. Apply C-collar while logrolling onto backboard. Check back for injuries. Have PCT in place on board and secure around patient. Orders for pediatric PCT inflation must come from monitoring physician.
7. May apply AED/monitor to monitor heart rate. Do not delay transportation.
8. Begin transport to Level I Trauma Center.
9. EMT with IV training- establish large bore IV(s) enroute.

ADVANCED LIFE SUPPORT: In addition to above and as appropriate:

1. Attach ECG monitor enroute.
2. Establish IV(s) and/or IO(s) enroute; consider fluid boluses of 20 cc/kg, reassessing patient after each bolus.
3. If V-fib or V-tach, follow algorithm above.
4. If asystole or PEA, follow algorithm above. Do not delay scene times to administer medications.
5. Perform needle jet insufflation (<8 y/o) ASAP if unable to ventilate due to traumatic airway obstruction.
6. Perform pericardiocentesis ASAP if cardiac tamponade is suspected.
7. Perform needle chest decompression ASAP if tension pneumothorax is suspected.
8. ALS: Attempt pericardiocentesis and bilateral needle chest decompression prior to considering discontinuation of resuscitation efforts in traumatic arrest.

HYPOTHERMIC CARDIAC ARREST CARE: Hypothermic cardiac arrest differs in the following ways:

1. Take 30 - 45 seconds to confirm pulselessness or profound bradycardia. Perform CPR if no pulse is felt after 30 - 45 seconds.
2. Perform all treatments and transportation as gently as possible to avoid precipitating V-fib.
3. Remove wet garments and protect against further heat loss and wind chill through the use of blankets and heated patient compartment.
4. Maintain horizontal position, avoiding rough and excessive movement.
5. Severe hypothermia is frequently preceded by other disorders (e.g. drowning, overdose or trauma). Assess for and treat these underlying conditions while simultaneously managing the hypothermia.
6. Transport to a Level I Trauma Center if profound hypothermia is suspected.
7. ALS: Administered medications can accumulate to toxic levels if used repeatedly in the severely hypothermic patient. If the patient fails to respond after one shock or initial drug therapy, subsequent defibrillations or additional medication should be avoided

SPECIAL NOTES:**BASIC LIFE SUPPORT:**

1. Following the run, send the following documentation to the Regions Hospital EMS office: copy of the run report, Cardiac Arrest/Advanced Procedures Data Collection Form. Any patient who is transported to a medical facility with a Combitube (ALS or ET) in place must also have the last section of the form signed by the receiving physician or anesthetist. Obtain three copies of the code summary. One should be left with the patient at the hospital, one should remain with the run report in the service files, and one should be forwarded to the Regions Hospital EMS office.

2. Children who are pronounced dead secondary to SIDS or suspicious circumstances should be left at the scene whenever possible. This avoids the disturbance of a possible crime scene. Observe and note: location, position, ambient temperature, objects around child including mattress and bedding, behavior of all people present, explanations provided and presence of vomitus in the mouth or foreign body.
3. ECG monitoring is an important diagnostic tool in sick and injured children.
4. Consider contacting department Chaplain or other support person.

ADVANCED LIFE SUPPORT: In addition to the above and as appropriate:

1. An initial dose of atropine, Amiodarone, or epinephrine only may be given on standing order, prior to physician contact if a pediatric reference guide is used.
3. The dose for epinephrine 1:10,000 is 0.01 mg/kg (0.1 ml of 1:10,000 solution) IV or IO push.
4. The dose for atropine is 0.02 mg/kg IV or IO (minimum dose of 0.1 mg and a maximum single dose of 0.5 mg for a child and 1.0 mg for an adolescent).
5. The dose for Amiodarone is 5.0 mg/kg IV or IO.
6. When venous or intraosseous routes are not available, the endotracheal route can be used to deliver epinephrine, atropine and naloxone. The current recommended IV dose should be considered the *minimum* dose for endotracheal administration; doses higher than those administered IV are often required.
7. Pediatric paddles or defibrillation electrodes should be used for patients weighing < 22 lb. (10 kg) or for patients whose chest size cannot accommodate adult manual paddles/electrodes.
8. The On Call Coordinator should be contacted on all pediatric arrests. Additionally, the OCC should be contacted on all pediatric IO attempts (successful or unsuccessful).