# Cardiac Arrest

**Note:**

- These guidelines are based on (or adapted from) the current *American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care*
- Remember these "keys to success". They apply to anytime throughout this protocol that CPR is called for.
    - High quality chest compressions:
        - Compress at a rate between 100 - 120/minute
        - Compress to a depth of at least 2 inches
        - Allow the chest to completely recoil
        - Minimize the frequency and duration (10 seconds at the most) of interruptions in chest compressions
        - Switch rescuers doing compressions at least every 2 minutes, preferably every minute if you have 3 or more rescuers
        - Do not over-ventilate! Follow the AHA Guidelines for ventilations carefully. Give just enough volume to make the chest rise slightly. Excessive rate and volume of ventilation are detrimental to resuscitation. Do not interrupt compressions to insert an advanced airway
        - Audible and visual CPR feedback options/ advisories on the monitor must be turned on and followed
        - Do not move a patient that needs compressions unless required to for access to the patient or an unsafe scene.
    - Approach the resuscitation as a team with defined roles that include assigning a team leader
    - Minimize interruptions for defibrillation:
        - When using a manual defibrillator, pre-charge the defibrillator before stopping CPR to check rhythm or resume CPR after rhythm check while defibrillator charges
        - After defibrillation, immediately resume compressions – do not wait for pulse checks or rhythm analysis on the monitor
- Unlike adult cardiac arrest, which is usually due to a primary cardiac abnormality, pediatric cardiac arrest most often occurs as a result of respiratory failure. The most common reasons for this include progressive respiratory failure and shock.
- The AHA recommends applying Pediatric guidelines to any child that has not yet reached puberty. Puberty is defined as breast development in females and the presence of axillary hair in males.
    - Use a pediatric reference guide (i.e. Broselow tape) for all pediatric medication doses.

| ***Priorities*** | ***Assessment Findings*** |
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| Chief Complaint | Collapsed, unresponsive, no pulse, not breathing normally |
| OPQRST | Witnessed? Estimated down time. Circumstances/trauma. Location of patient. Antecedent symptoms/signs (chest pain, difficulty breathing). Environmental factors, medication-related problems or overdose. Arrest due to hypoxia. |
| Associated Symptoms/ Pertinent Negatives | Bystander-initiated CPR. Pre-arrival CPR instructions from dispatch? Public access AED use? Drowning? |
| SAMPLE | Does the patient have any allergies to medications? History of heart disease? Current cardiac medications? |
| Initial Exam | Establish unresponsiveness. Look for absence of normal breathing. |

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| Detailed Focused Exam | **General:** Identify unresponsiveness. Look for rigor mortis, dependent lividity, or non-survivable trauma. Look for a valid Wisconsin Do-Not-Resuscitate bracelet or a POLST form.<br>**Skin:** Warm/cold, dependent lividity, signs of trauma?<br>**HEENT:** Airway patent, foreign bodies (e.g. dentures), neck swelling or trauma, trachea in midline?<br>**Chest:** Spontaneous respirations, subcutaneous air or crepitation, or deformity?<br>**Lungs:** Equal breath sounds, difficulty bagging or ventilation?<br>**Cardiovascular:** Absence of heart sounds, carotid or femoral pulses?<br>**Abdomen:** Distended?<br>**Extremities:** Rigor mortis, edema, deformity?<br>**Neurological:** Unresponsive to verbal and painful stimulation? GCS? |
| Goals of Therapy | Return of spontaneous circulation (ROSC), intact neurologic function. |
| Monitoring | BP, HR, RR, cardiac monitoring, $SpO_2$, $ETCO_2$ |

## PUBLIC SAFETY DISPATCHER

- Provide CPR & AED instructions per agency's emergency medical dispatch protocols

## LAW ENFORCEMENT OFFICER FIRST ON SCENE

- Assess need for CPR/AED
  - Patient is unconscious or appears lifeless and
  - Patient is not breathing normally (i.e. gasping is not normal)
- Apply AED and turn unit ON
- Follow AED prompts
- Begin Hands-Only™ CPR

## EMERGENCY MEDICAL RESPONDER (EMR)/ EMERGENCY MEDICAL TECHNICIAN (EMT)

- Check for DNR bracelet or indications to withhold CPR. See *Determination of Death/ Termination of Resuscitation Guideline*.
- Establish that the patient is unresponsive and not breathing or not breathing normally.
- If the patient appears lifeless, begin chest compressions. If you are unsure about lifelessness, check for a pulse for no longer than 10 seconds. Initiate resuscitation if pulse is absent or undetermined.
  - Agonal breathing is not a sign of life. Begin compressions.

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| **Adult** | • Initiate resuscitation<br>  o If you witnessed the arrest, proceed immediately to defibrillation. Turn on AED and follow prompts.<br>  o If you did not witness the arrest or the AED is not immediately available, begin high quality continuous chest compressions (CCC)<br>  o Insert oral airway, ensure patent airway, and apply O2 per NRB mask at 15L while compressions are in progress.<br>  o If adequate bystander CPR or CCC has been performed for at least two minutes prior to your arrival, prepare for immediate defibrillation by attaching AED pads. Then turn on the unit and follow prompts. Restart compressions immediately after shock is delivered.<br>• If arrest is likely due to a primary cardiac event, do not place non-visualized airway until 600 compressions have been given.<br>  o If inadequate or no bystander CPR was given or no shock was indicated in the above analysis, immediately administer 200 continuous chest compressions<br>  o Analyze rhythm after each set of 200 compressions have been given (about 2 minutes)<br>  o Follow prompts to deliver a shock if indicated then immediately administer another 200 CCC.<br>  o After 600 CCC have been completed, place an advanced airway without stopping compressions. Begin asynchronous ventilations at 8 – 10 breaths/minute.<br>  o Continue the cycle of "200 compression – Analysis – Shock if indicated – Resume compressions" until patient shows signs of life or you are relieved by ALS. |

- For ADULT cases where the cardiac arrest was likely due to hypoxia, and not from a primary cardiac event and <u>all</u> PEDS, begin compressions and facemask or bag-valve-mask (BVM) ventilations at a ratio of 30:2 (standard CPR). After three 2-minute rounds of compressions and shocks (analyses), consider placement of a non-visualized airway (NVA). May consider NVA earlier if BVM ventilations are ineffective with an oral airway. Once the NVA is in place, begin asynchronous ventilations at 8 – 10 breaths/minute.
  - Choking, drowning, poisoning or trauma are common conditions that cause hypoxia
- Consider use of a mechanical compression device

## ADVANCED EMT (AEMT)

- Follow high quality chest compressions and AED use as outlined above.
  - Place Q-CPR puck and enable advisories.
- Never interrupt or compromise high quality compressions to obtain venous access (IO/IV)
- Initiate IO after 600 CCC (or 6 minutes of standard CPR), or sooner if possible and run wide open.
  - An IV is an acceptable alternative but an IO is preferred.

- *Contact Medical Control for additional orders.*

## INTERMEDIATE/ PARAMEDIC

- Direct BLS providers to continue CPR. Assure that they are providing high quality compressions.
- If 600 CCC have been performed, place an advanced airway without interrupting compressions.
    - Place $ETCO_2$ device to monitor for ROSC
- Initiate cardiac rhythm monitoring and analysis.
- Initiate IV if not able to initiate IO
    - Medication administration routes in order of preference: IO – IV – ET
- **VF/Pulseless VT**
    - Defibrillate 200 J biphasic (360 J monophasic), (PEDS 2 J/kg)
    - Resume CPR immediately for 2 minutes, do not check for pulse
    - Defibrillate at 200 J biphasic (360 J monophasic), (PEDS 4 J/kg)
    - Resume CPR immediately for 2 minutes
    - **Epinephrine** 1 mg (10 cc of 1:10,000), (PEDS 0.01 mg/kg, 0.1 mL/kg of 1:10,000) IO/IV every 3 – 5 minutes
    - If VT/VF persists, defibrillate at 200 J biphasic (360 J monophasic), (4 J/kg) every 2 minutes with continuous CPR between defibrillations
    - Anti-arrhythmics
        - **Amiodarone** 300 mg (PEDS 5 mg/kg) IO/IV bolus[1]; may repeat 150 mg IO/IV once in 3 – 5 minutes (PEDS 5 mg/kg every 3 – 5 minutes up to two times)
        - Paramedic: **Magnesium sulfate** 2 g (PEDS 25 – 50 mg/kg, max 2 g) IO/IV bolus for Torsades de Pointes
        - If chronic dialysis patient and suspected hyperkalemia
            - Paramedic: **Calcium chloride** 500 mg (5 mL of a 10% solution), (PEDS 20 mg/kg (0.2 mL/kg of a 10% solution), may repeat x1
            - Paramedic: **Sodium bicarbonate** 1 mEq/kg IO/IV
        - If there is suspicion of an overdose of a calcium channel blocking agent such as verapamil, nifedipine, or diltiazem (Cardizem).
            - Paramedic: **Calcium chloride** 4 mg/kg (0.04 mL/kg of a 10% solution), (PEDS 20 mg/kg (0.2 mL/kg of a 10% solution), may repeat x1
            - Paramedic: consider **glucagon** 1 mg IO/IV

- **Asystole/PEA**
    - If asystole appears on the monitor, confirm true asystole
        - Check on/off switches
        - Check leads
        - Check gain and sensitivity settings
        - Confirm asystole in 2 or 3 leads
    - Identify and correct reversible causes: The Five H's and T's
        - The Five Hs
            - Hypovolemia
                - Infuse normal saline wide open
            - Hypoxia
                - Administer high-flow oxygen and perform ventilation: do not hyperventilate

- Hydrogen ion, i.e. acidosis
  - Perform ventilation
  - Paramedic: Consider **sodium bicarbonate** 1mEq/kg IO/IV
- Hyper-/Hypokalemia
  - Hyperkalemia
    - Paramedic: Consider **calcium chloride** 4 mg/kg (0.04 mL/kg of a 10% solution), (PEDS 20 mg/kg (0.2 mL/kg of a 10% solution) May repeat x 1
    - Paramedic: Consider **sodium bicarbonate** 1mEq/kg IO/IV
    - Intermediate/Paramedic: Consider continuous nebulized **albuterol,** starting with 5 – 10 mg
  - Hypokalemia
    - No other specific field treatment.
- Hypothermia
  - See *Hypothermia & Frostbite Guidelines*

▪ The Five Ts
- Toxins
  - See *Toxic Exposure & Overdose Guidelines*
- Tamponade
  - IV fluids wide-open
  - Rapid transport to the hospital
- Tension pneumothorax
  - Perform needle decompression
- Thrombosis, cardiac i.e. myocardial infarction
  - No other specific field treatment.
- Thrombosis, pulmonary i.e. pulmonary embolism
  - No other specific field treatment.

- **Epinephrine** 1 mg (10 cc of 1:10,000), (PEDS 0.01 mg/kg, 0.1 mL/kg of 1:10,000) IO/IV every 3 – 5 minutes

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| **Adult** | ○ Consider **atropine** only if there is evidence of a vaso-vagal reaction preceding death (e.g. during or immediately after a bowel movement, fainting in church): 1 mg IO/IV. Repeat every 3-5 minutes to a maximum of 0.04 mg/kg (3 – 4 mg). Atropine should not be given routinely. |

- See *Return of Spontaneous Circulation Guidelines* for supportive care after ROSC
- Consider termination of resuscitation (*Determination of Death/ Termination of Resuscitation Guidelines*)

*Contact Medical Control for the following:*
- To discuss termination of resuscitation for situations not covered by *Determination of Death/ Termination of Resuscitation Guidelines*
- Additional medication orders

FOOTNOTES

[1] Lidocaine may be substituted for amiodarone during a medication shortage. Lidocaine 1-1.5 mg/kg IO/IV repeat in 5 – 10 mins up to 3 mg/kg.

[2] Calcium gluconate may be substituted for calcium chloride during a medication shortage. Calcium gluconate 500 mg (15 mL of 10% solution), (PEDS 60 – 100 mg/kg (0.6 – 1 mL/kg of a 10% solution) IO/IV.

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