

## Resuscitation: Cardiac Arrest

**Goals:** Return of Spontaneous Circulation (ROSC) with preserved neurologic function

**Inclusion Criteria:** Patients in cardiac arrest

**Exclusion Criteria:** Valid out-of-hospital DNR order; conditions incompatible with life for which resuscitation need not be attempted (refer to [Determination of Death Policy](#)); neonates (refer to [Neonatal CPG](#))

**Refer to:** [Asystole/PEA](#), [VFib/pulselessVTach](#) and [Post-Cardiac Arrest CPGs](#); [Determination of Death Policy](#)

- **NOTE:** On-scene CPR and ALS resuscitation for **at least 10 minutes** is preferable to immediate transport (as long as the scene is safe) and is associated with higher survival rates with good neurological function

### Basic Level

1. Assess and support ABCs according to [UNIVERSAL CARE – ADULT](#) or [UNIVERSAL CARE – PEDIATRIC](#), as clinically indicated, using the modified “CAB” sequence for cardiac arrest:
  - a. **C (Circulation):** Immediately begin high-quality, minimally-interrupted CPR, starting with chest compressions:
    - i. Place the patient supine on a firm surface with adequate space to perform team-based CPR
    - ii. Power on AED/defibrillator and apply hands-free defibrillation pads to patient’s bare chest
    - iii. A metronome shall be used for all CPR incidents (**chest compression rate: 100-120/minute**)
    - iv. If possible, do not pause chest compressions for more than 10 seconds for any reason
  - b. **A (Airway):** Ensure airway patency, using OPA and/or NPA adjunct and suctioning
    - i. Jaw thrust is preferred if trauma is suspected; refer to [Spinal Motion Restriction Policy](#)
  - c. **B (Breathing):** Assist ventilations with 100% FiO<sub>2</sub> and 8-10 gentle, one-handed BVM breaths per minute over 1-1.5 seconds each, just enough to cause chest rise (avoid over-ventilation)

<u>Age</u>	<u>Compression Depth</u>	<u>CPR Ratio</u>	<u>Ventilations</u>
Infant (Less than 1 yr)	Approx. 1.5 inches	15:2	Pause compressions to give breaths
Child (1 to 8 yr)	Approx. 2 inches		
Adolescent and Adult (At least 8 yr)	2-2.5 inches	Continuous Chest Compressions (CCC)	8 to 10 per minute, without pausing compressions

2. For cardiac arrest in cases of suspected trauma, BLS units should begin transport if transfer to the closest appropriate Trauma Center is faster than waiting for an ALS unit:
  - a. Minimize scene time and continue treatment en route
  - b. Contact BioTel as soon as possible, in order to expedite Trauma Center notification and preparation
3. As soon as an AED or defibrillator arrives, POWER ON the device first, and then apply hands-free pads
  - a. Minimize chest compressions interruptions during pad placement

c. Infants less than 1 year of age:

i. AED: May be used (front/back pad placement, if needed), but should not delay high-quality CPR

ii. Manual defibrillator: Use pediatric pads when available

d. Children 1 to 8 years of age:

i. AED: Use pediatric AED pads or other device-specific pediatric modification when available

ii. Manual defibrillator: Use pediatric pads when available

4. AED general guidelines:
  - a. Follow ALL visual and voice prompts and leave AED applied until advanced level providers arrive
5. After each 2-minute CPR cycle, briefly (less than 5 seconds) pause chest compressions to check rhythm:
  - a. If the rhythm is organized, check for palpable pulse:
    - i. If palpable pulse consistent with ROSC, refer to the [Post-Cardiac Arrest Care CPG](#)
    - ii. If no palpable pulse, resume CPR refer to the [Asystole/PEA CPG](#)
  - b. If patient remains in a shockable rhythm (VFib or pulseless VTach), resume CPR and refer to the [VFib/pulseless VTach CPG](#)

6. For all defibrillation attempts:
  - a. Consider pre-charging manual defibrillator to the next energy level during CPR, before the next shock
  - b. Perform chest compressions (without ventilations) while the AED/defibrillator charges
  - c. Immediately after rhythm check/shock, resume high-quality CPR for 2 full minutes
  - d. Do not administer “stacked” shocks
  - e. Do not interrupt chest compressions for more than 5 seconds before or after a shock
7. If time permits, perform and a POC Glucose analysis and treat according to the [Diabetic Emergencies CPG](#)
  - a. Do not administer glucose unless there is documented hypoglycemia
8. Perform a focused Secondary Survey and SAMPLE history, as conditions permit
  - a. Look for signs of traumatic injury, drug overdose and other special conditions

### Advanced Level

1. Assess and support vital functions, focusing on immediate, high-quality, minimally-interrupted CPR:
  - a. Initiate PetCO<sub>2</sub> monitoring as soon as possible:
    - i. Low PetCO<sub>2</sub> value may indicate overly aggressive ventilation or inadequate chest compressions
    - ii. Normal or high PetCO<sub>2</sub> value may indicate ROSC, even before a pulse is palpable
  - b. Ensure that manual monitor/defibrillator is in MANUAL mode and in PADDLES lead:
    - i. Exception: some agencies may use a manual device in “AED mode” for ADULTS only, depending on AED mode configuration, agency MOP/SOP, and specific Medical Direction authorization
2. Do not attempt advanced airway placement for at least 6 minutes (three, 2-minute cycles of CPR), unless necessary because of regurgitation:
  - a. Minimize interruption to chest compressions during advanced airway insertion
  - b. After securing the advanced airway, deliver ventilations without interrupting chest compressions
    - i. Medical etiology: 10 ventilations per minute (once every 6 seconds)
    - ii. **Trauma etiology: 6 ventilations per minute (once every 10 seconds)**
    - iii. Do NOT over-ventilate
3. Establish IV/IO access as soon as possible, but NOT before CPR or AED/defibrillator application
  - i. Medical etiology: TKO unless hypovolemia suspected
  - ii. Trauma etiology: Wide open until ROSC is achieved, then decreased to TKO
4. Special circumstances:
  - a. **Tension pneumothorax (known or suspected):** Perform needle thoracostomy on affected side and contact BioTel as soon as possible (Refer to [Needle Thoracostomy Procedure](#))
  - b. **Cardiac tamponade (suspected, based on history/mechanism):** Infuse 20 mL/kg (up to 1000 mL maximum per bolus) Normal Saline IV/IO
  - c. **Pregnancy:**
    - i. Request additional EMS resources AND notify BioTel as soon as possible
    - ii. If definite pulse, but no breathing or abnormal breathing: Provide 1 ventilation every 5-6 seconds
    - iii. If no pulse: Begin CPR immediately with same hand placement as non-pregnant patient
    - iv. If uterus is palpable at or above umbilicus, perform continuous aortocaval decompression:
      1. If rescuer is available: One- or two-handed (preferred), manual left uterine displacement



(Adapted from American Heart Association)

2. If rescuer is unavailable: Left lateral tilt on long spine board is a less effective alternative



(Adapted from American Heart Association)

5. Identify presenting dysrhythmia and treat according to the specific CPG ([Asystole/PEA](#) or [VFib/pulseless VT](#))
6. In the event of Return of Spontaneous Circulation (ROSC), refer to the [Post-Cardiac Arrest CPG](#)
7. If there is no response to therapy and patient meets criteria, consider terminating resuscitation efforts in the field: Refer to Termination of Resuscitation Efforts section of the [Determination of Death Policy](#)
8. For additional patient care considerations not covered under standing orders, consult BioTel
9. **Refer to the age-based Summary Cardiac Arrest Resuscitation on the next page (Table 1)**

Therapy	Adolescent and Adult (8 <sup>th</sup> Birthday and older)	Child (1 to 7 years)	Infant* (Less than 1 year)
CPR	Continuous Chest Compressions (CCC) (no pause for ventilations)	15 compressions to 2 ventilations (pause for ventilations)	
Compression to Ventilation Ratio, <i>without advanced airway</i>	8 to 10 ventilations per minute (do NOT pause compressions)	15 compressions to 2 ventilations (pause for ventilations)	
Ventilation Volume	Gentle, one-handed BVM squeeze over 1 to 1.5 seconds each, Sufficient to cause visible chest rise		
Compression Rate	100-120 per minute Use metronome!		
Hand Placement	2 hands on lower ½ of sternum	1 or 2 hands on lower ½ of sternum	"2 thumbs-encircling hands" in center of chest, just below nipple line
Chest Compression Depth	2 to 2.5 inches (~5 to 6.4 cm)	At least ⅓ chest depth (Approx. 2 inches (5 cm))	At least ⅓ chest depth (Approx. 1.5 inches (4 cm))
Chest Recoil	Allow full chest recoil after every compression; Do not lean on the chest after compression		
Defibrillation	Adult AED/defibrillator pads	<b>1<sup>st</sup> choice:</b> Manual defibrillator with pediatric pads Dose: 2 J/kg, 4 J/kg, 4-10 J/kg <b>2<sup>nd</sup> choice:</b> AED with device-specific pediatric AED pads or pediatric setting <b>3<sup>rd</sup> choice:</b> AED with adult pads (place front and back on left chest, if necessary)	
Compression to Ventilation Ratio, <i>with advanced airway</i>	Continuous compressions:100-120/minute Medical: one ventilation every 6 seconds (10 per minute) <b>Trauma: one ventilation every 10 seconds (6 per minute)</b>	Continuous compressions:100-120/minute Provide one ventilation every 6 seconds (10 per minute)	

\*Refer to [Neonatal Care CPG](#) for resuscitation guidelines for newly-born infants