PEDIATRIC CARDIAC ARREST

Effective: January 1, 2025
Replaces: January 1, 2024

1. Patient Care Goals

1.1. Return of spontaneous circulation (ROSC)
1.2. Preservation of neurologic function
1.3. High-quality chest compressions/CPR with minimal interruption from recognition of cardiac arrest until confirmation of ROSC or field termination of resuscitative efforts
1.4. Recognition and treatment of reversible causes of cardiac arrest
1.5. For medical (non-traumatic) causes of cardiac arrest without obvious signs of death, 20 minutes of resuscitation efforts on-scene prior to making transport decision
1.6. Treatment consistent with patient's wishes as documented in Advanced Health Care Directives, POLST or DNR orders

2. BLS Treatment

2.1. If patient shows signs of obvious death **(Policy 600)**, do not resuscitate
2.2. Confirm status of DNR / POLST / End of Life Option Act, if possible
2.2.1. Do not delay care and/or CPR while confirmation is being made (**Policy 604**)
2.3. Address any areas of significant blood loss with hemorrhage control measures, regardless of any active bleeding or hemorrhage **(700-M17)**
2.3.1. Apply tourniquet(s) proximal to any large wound, laceration, or amputation of the extremities, regardless of any active bleeding or hemorrhage
2.4. Apply **Spinal Motion Restriction (SMR)** if indicated **(700-M11)**
2.5. If traumatic cardiac arrest is suspected **initiate transport to appropriate receiving trauma center**, all remaining care to be completed en route to trauma center **(Policy 602)**.
2.6. High quality uninterrupted CPR **(700-S01)**
2.7. Routine Medical Care – Pediatric **(700-S05)**
2.8. **Oropharyngeal airway (OPA)**
2.9. **BVM –** Ventilate once every three seconds (1:3), with supplemental oxygen
2.10. **Apply AED** and follow device instructions

3. ALS Treatment

3.1. Place patient on cardiac monitor and treat accordingly
3.1.1. If the traumatic arrest patient is asystolic on initial contact, do not resuscitate
3.2. If traumatic cardiac arrest is suspected **initiate transport to appropriate receiving trauma center**, all remaining care to be completed en route to pediatric trauma center
3.3. **Supraglottic airway device** (LMA Supreme)
3.3.1. If Supraglottic airway attempt fails:
3.3.1.1. **Oropharyngeal airway (OPA)**
3.4. **EtCO2** continuous numeric and waveform monitoring on every airway adjunct
3.5. **Vascular Access (IV) or Vascular Access (IO)**, per procedure **(700-M13)**

4. Ventricular Fibrillation and Pulseless Ventricular Tachycardia

4.1. **Defibrillation: 2 joules/kg, 4 joules/kg, 4 joules/kg**

4.1.1. Starting with lowest energy setting (2 joules/kg)
4.1.2. Each subsequent shock at 4 joules/kg
4.2. **Epinephrine (1:10,000) 0.01 mg/kg IV / IO**, repeat every 3-5 minutes for the duration of the arrest (Epinephrine is not indicated in traumatic cardiac arrest with hypovolemia from exsanguinating hemorrhage)
4.3. **Amiodarone 5mg/kg IV / IO,** single dose only
4.4. BASE CONTACT: Consult for further instruction on Amiodarone dosages, if there is a successful conversion to a sustained pulsatile rhythm or (ROSC)

5. Asystole (Non-Traumatic)

5.1. **Epinephrine (1:10,000) 0.01 mg/kg IV / IO**, repeat every 3-5 minutes for the duration of the arrest
5.2. Provider may consider termination of resuscitative efforts after a total of at least twenty (20) minutes of EMS provider resuscitation if:
5.2.1. Arrest was not witnessed by the EMS provider
5.2.2. No return of spontaneous circulation (ROSC) prior to transport

6. Pulseless Electrical Activity (PEA)

6.1. Identify and treat any reversible causes:
6.1.1. **Hypovolemia:** Reassess any hemorrhage control interventions to ensure they are adequately addressing blood loss and reapply if necessary **(700-M17).** Consider a **20 ml/kg Fluid bolus**, repeat once if needed **(700-P10)**
6.1.2. **Hypoxia:** Ensure that the patient is adequately ventilated, utilizing an airway adjunct and bag valve mask with a supplemental oxygen supply
6.1.2.1. Ensure proper chest rise and fall
6.1.2.2. Reassess any sucking chest wounds or flail segment interventions
6.1.3. **Hyperkalemia:** Peaked T-waves, with possible widening of the QRS complex
6.1.3.1. Consider **Calcium Chloride 10mg/kg IV / IO**, max dose 1gm
6.1.3.2. Flush the IV tubing well between injections
6.1.3.3. Consider **Sodium Bicarbonate 1mEq/kg IV/ IO**, max dose 50mEq
6.1.4. **Tension Pneumothorax:** If tension pneumothorax is suspected or the patient has a traumatic injury to the chest, perform bilateral pleural decompression if not already completed. **(700-M02)**
6.2. **Epinephrine (1:10,000) 0.01 mg/kg IV / IO**, may repeat every 3-5 minutes for the duration of the arrest (Epinephrine is not indicated in traumatic cardiac arrest with hypovolemia from exsanguinating hemorrhage)
6.3. Treat any rhythm changes according to correct treatment protocol.
6.3.1. If the PEA changes to asystole, the provider may follow the criteria in section 4.2.

7. Hypothermic Cardiac Arrest

7.1. Assess pulse for 45 seconds
7.2. If no pulse is present, **Start CPR**
7.3. If defibrillation is indicated, limit to one (1) shock until patient is warm
7.4. If patient presents with dysrhythmias, treat as appropriate but withhold IV medications until temperature rises above 86°F
7.5. Consider rewarming measures **(700-P09)**

7.5.1. Patients that are hypothermic can be unresponsive to pharmaceutical therapy and electrical therapy and should be transported with CPR and warming measures

8. Ventricular Assist Device (VAD) Cardiac Arrest

8.1. High quality uninterrupted CPR **(700-S01)** may be provided if:

8.1.1. Patient is unresponsive, apneic and there is a device failure alarm with no rotor hum upon auscultation

8.1.2. **Mechanical CPR devices are contraindicated**

8.2. If there is presence of rotor hum with no failure alarm, continue with airway management, do not perform chest compressions **(700-M01)**

8.3. Defibrillation(s) by manual defibrillator or AED may only be delivered if the patient is unresponsive

8.4. Any pediatric VAD patient in cardiac arrest, that does not meet obvious death criteria (**Policy 600**) shall be transported to:

8.4.1. Stanford Hospital

8.5. Treat the cardiac arrest VAD patient with the guidelines found in the Ventricular Assist Device protocol **(700-S11)**

8.6. If further guidance is required during patient care, make BASE CONTACT

9. Pregnant Cardiac Arrest

9.1. Any pregnant patient beyond 20 weeks gestation (uterine fundus palpated at or above the umbilicus) in cardiac arrest, that does not meet obvious death criteria (**Policy 600**) shall be transported to:

9.1.1. Either Stanford Hospital or Santa Clara Valley Medical Center (for potential resuscitative hysterotomy)

10. Drowning or Mechanical Asphyxiation

10.1. Any drowning or mechanical asphyxiation patient, in cardiac arrest, with suspected head or spinal injury shall be transported to a Pediatric Trauma Center (**Policy 602**)

10.2. If head or spinal injury is not suspected, transport to a Pediatric Receiving Center (**Policy 602**)

11. Traumatic Cardiac Arrest

11.1. **Initiate Immediate Transport to appropriate receiving Trauma Center**, all care to be completed en route to pediatric trauma center **(Policy 602)**.

11.2. Epinephrine is not indicated in traumatic cardiac arrest with hypovolemia from exsanguination; otherwise epinephrine can be used in traumatic cardiac arrest

12. Return of Spontaneous Circulation (ROSC)

12.1. If any Return of Spontaneous Circulation (ROSC) occurs,

12.1.1. If systolic blood pressure is less than ninety (90) mmHg (age 10 and older), or less than 70 mmHg + 2x age years (age 0-9)

12.1.1.1. **20 ml/kg Fluid bolus**

12.1.1.2. **Dopamine 5 – 10 mcg/kg/min IV,** titrate to SBP greater than 90 mmHg (age 10 and older), or greater than 70 mmHg + 2x age years (age 0-9)

12.1.2. Continue ventilations at a rate and volume to keep ETCO2 between 30-40 mmHg

12.1.3. If wide complex tachycardia, perform **synchronized cardioversion** (**700-P14**)

12.1.4. **Blood Glucose Level,** readings of less than 60mg/dl require interventions

12.1.5. Transport to closest Advanced Pediatric Receiving Center, unless a traumatic cardiac arrest

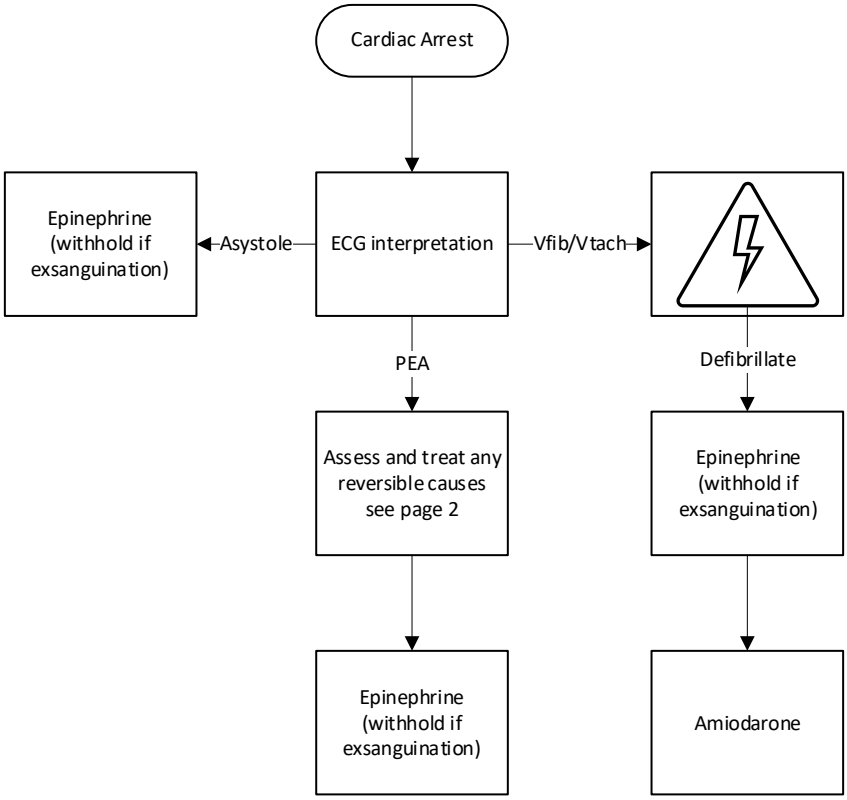
13. Pertinent Assessment Findings

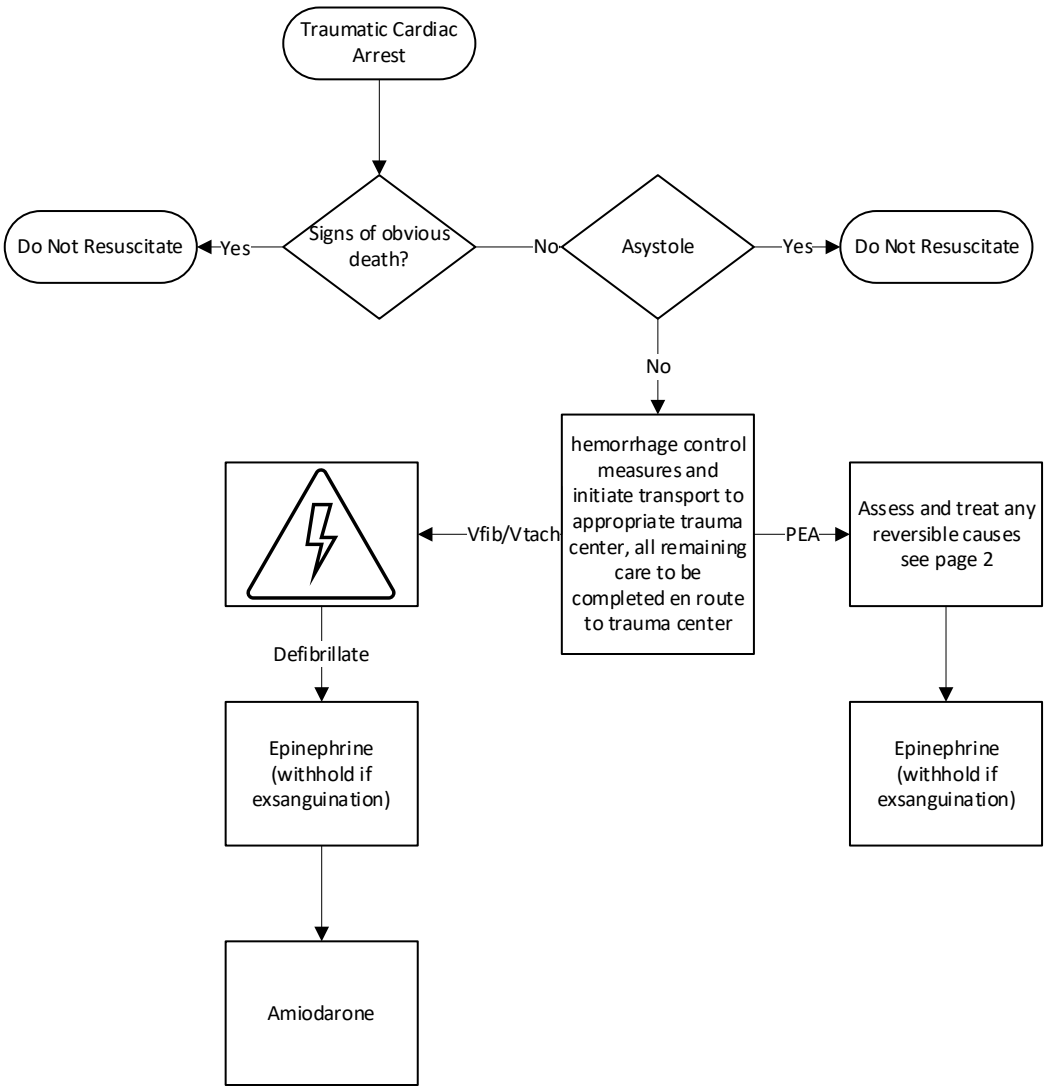
13.1. Obvious signs of death **(Policy 600)**
13.2. Evidence of STEMI after ROSC
13.3. Reversible causes of cardiac arrest
13.3.1. Hypoxia
13.3.2. Hypovolemia
13.3.3. Hypothermia
13.3.4. Hypo-/hyperkalemia
13.3.5. Tension Pneumothorax
13.3.6. Toxins (e.g. tricyclic antidepressants, beta blockers, opioids)
13.4. ETCO2 lower than 10mmHg despite high quality CPR

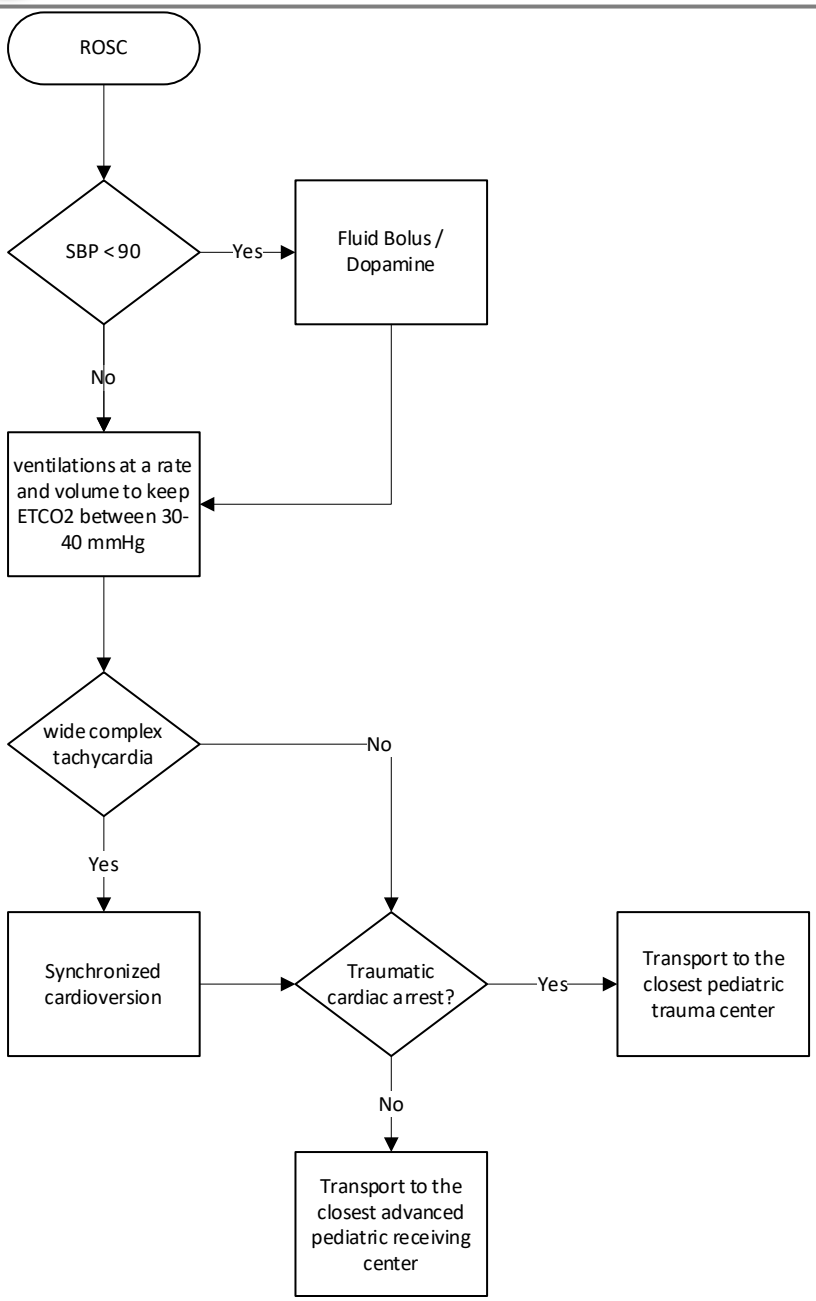
14. Key Documentation Elements

14.1. Resuscitation attempted and all interventions performed
14.2. Arrest witnessed
14.3. Location of arrest
14.4. First monitored ECG rhythm
14.5. CPR prior to EMS arrival
14.6. Outcome upon arrival at hospital
14.7. Any ROSC
14.8. Presumed cardiac arrest etiology

15. Treatment Flow Charts




Traumatic Cardiac Arrest
Signs of obvious death?
Yes
Do Not Resuscitate
No
Asystole
Yes
Do Not Resuscitate
No
hemorrhage control measures and initiate transport to appropriate trauma center, all remaining care to be completed en route to trauma center
Vfib/Vtach
PEA
Assess and treat any reversible causes see page 2
Defibrillate
Epinephrine (withhold if exsanguination)
Epinephrine (withhold if exsanguination)
Amiodarone


ROSC
SBP < 90
Yes
Fluid Bolus / Dopamine
No
ventilations at a rate and volume to keep ETCO2 between 30-40 mmHg
wide complex tachycardia
No
Yes
Synchronized cardioversion
Traumatic cardiac arrest?
Yes
Transport to the closest pediatric trauma center
No
Transport to the closest advanced pediatric receiving center