

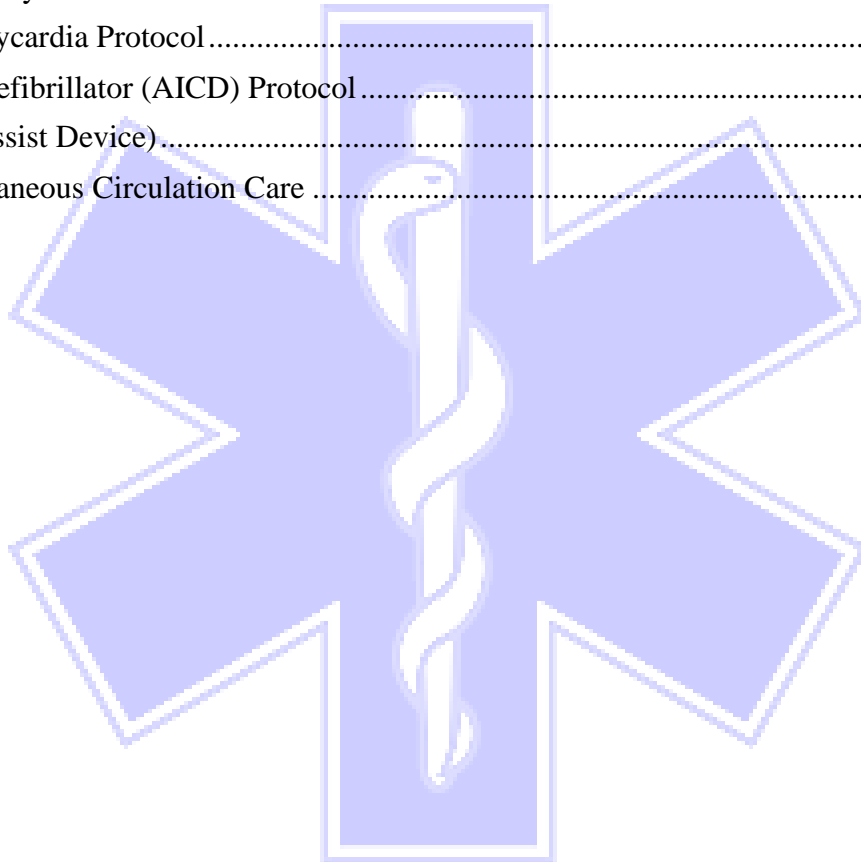
Memorial EMS  
Decatur Memorial EMS  
Springfield Memorial EMS

## **CARDIAC CARE**



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## Routine Cardiac Care Protocol

Patients experiencing chest pain with a suspected cardiac origin may present with signs and symptoms which include:

- Substernal chest pain / pressure
- Heaviness, tightness, or discomfort in the chest
- Radiation and/or pain/discomfort to the neck or jaw
- Pain/discomfort/weakness in the shoulders/arms
- Nausea/vomiting
- Diaphoresis
- Dyspnea

Priorities in the care of chest pain patients include:

- Assessing and securing ABCs.
- Determining the quality and severity of the patient's distress.
- Obtain 12 lead, activate STEMI ASAP if indicated.
- Obtaining a medical history (including medications & allergies).

Timely transportation to the emergency department and/or the Cardiac Cath Lab is a key factor in patient outcome.

### EMR Care

EMR Care should be focused on assessing the situation and initiating care to reassure the patient, reducing the patient's discomfort, and beginning treatment for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. **Oxygen:** If respiratory distress is noted, 15 LPM via NRM or if unable to tolerate the mask, 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress is noted, apply a pulse ox. If  $\geq 94\%$  and no signs/ symptoms of respiratory distress, no Oxygen is required. If  $\leq 94\%$  apply nasal cannula at 2-6 LPM or 15 LPM via NRM as needed to raise pulse ox to  $\geq 94\%$ .

### EMT Care

EMT Care should be directed at conducting a thorough patient assessment, providing care to reassure the patient, reducing the patient's discomfort, beginning treatment for shock, and preparing or providing patient transportation.

1. EMT Care includes all components of *EMR Care*.
2. **Aspirin (ASA):** 324mg PO (4 tablets of 81mg chewable aspirin by mouth).
  - Give all 4 --81mg ASA unless the patient can absolutely confirm taking ASA 325 mg within the last hour.
  - Ask the patient specifically about any history of hypersensitivity to ASA.
  - Do not give ASA to patients with active ulcer disease or known allergy to ASA.

## Routine Cardiac Care Protocol

### EMT Care {Continued}

3. **Nitroglycerin (NTG):** 0.4mg SL. May repeat every *3-5 minutes* to a total of 3 doses (if systolic BP remains > 110mmHg).
  - a. NTG (& ASA) may be administered without contacting Medical Control if the patient is age 30 or older, has chest pain consistent with ACS, and has a systolic BP > 110mmHg. *If the patient does not meet these criteria, consult Medical Control prior to administering NTG.*
4. Initiate ALS intercept as soon as possible.
5. Obtain **12-Lead EKG** (if equipped) **within 10 minutes of patient contact and transmit to the receiving hospital.**
6. At any time the caregiver feels patient meets STEMI declaration criteria, treat based on *12 Lead Identified STEMI Declaration Protocol.*
7. Transport as soon as possible (transport can be initiated at any time during this sequence).

### A-EMT/ EMT-I Care

A-EMT/ EMT-I Care should be directed at conducting a thorough patient assessment, providing care to reassure the patient, reducing the patient's discomfort, beginning treatment for shock and preparing or providing patient transportation.

1. Render initial care in accordance with the *EMT Care.*
2. Obtain **peripheral IV** access.
3. Manage pain, nausea and vomiting based on *Pain Control Protocol.* Note: *Fentanyl is preferred for Cardiac related chest pain which is not responsive to Nitro or when Nitro is contraindicated.*

### Paramedic Care

Paramedic Care should be directed at conducting a thorough patient assessment, providing care to reassure the patient, reducing the patient's discomfort, beginning treatment for shock, and preparing or providing patient transportation.

1. Paramedic Care includes all components of *A-EMT/ EMT-I Care.* If time permits, establish a 2<sup>nd</sup> line (preferably an 18g saline lock) en route.
2. **Contact receiving hospital** as soon as possible, especially if you have sent them a STEMI EKG.

## Routine Cardiac Care Protocol

### Critical Thinking Elements

- Consider the patient to be in cardiogenic shock if the patient has dyspnea, diaphoresis, a systolic BP < 100mmHg, with signs of congestive heart failure.
- EKG limb leads should be placed **on the patient's limbs.**
- Consider carrying gowns to place the patient in during 12-lead acquisition.
- A pulse oximeter is a tool to aid in determining the degree of patient distress and the effectiveness of EMS interventions.
- NTG that the patient self-administers prior to EMS arrival should be documented and reported to the receiving hospital. Subsequent doses should be provided by the EMS unit's stock.
- **Medications should not be administered IM to a suspected AMI patient.**
- Use nitro with caution if an Inferior M.I. is suspected as this may cause a severe drop in blood pressure. Aggressively treat with fluids if BP <100mmHg.
- Nitro is contraindicated if the patient has taken erectile dysfunction medications such as Sildenafil (Viagra), Tadalafil (Cialis), and Vardenafil (Levitra) in the last 48 hours.

### Pearls

- **Time is Muscle. Responders must understand the process from First Medical Contact to delivery at Percutaneous Coronary Intervention center. A change in the sequence of steps may be the most expeditious way to impact total time to intervention for the patient.**
- **Use of the auto-diagnose function on a 12-Lead EKG comes with its own risks/ benefits. Auto-diagnose is most accurate when it identifies a STEMI, but does not guarantee that the patient is suffering from STEMI. Lack of identification does NOT guarantee the patient is not suffering a STEMI.**

## 12 Lead Identified STEMI Declaration Protocol

Early identification of ST Elevation Myocardial Infarction (STEMI) is crucial. The benefits of thrombolytic therapy or Percutaneous Coronary Intervention (Cardiac Cath Lab) are time-dependent, and the 12-Lead EKG may provide early recognition of acute myocardial infarction (AMI). Remember *time is muscle!* A 12-Lead EKG is an assessment tool that can be completed by most EMS providers. Reading of the EKG is an advanced skill that will be verified by the Emergency Department physician.

Indications for a 12-Lead EKG include (but are not limited to):

- Chest pain / discomfort
- Epigastric pain/ nausea
- Shortness of breath of suspected cardiac etiology
- Blunt chest trauma
- Pulmonary edema / Cardiogenic shock
- Wide complex tachycardia
- Symptomatic bradycardia
- Vague “unwell” symptoms in diabetic and elderly patients
- Unstable patients with symptoms to suspected cardiac origin.

Upon determining that a patient has a complaint or symptoms that indicate performing a 12-Lead:

1. Initiate *Routine Cardiac Care Protocol* and **obtain 12-Lead EKG as soon as possible.**
2. Transmit the EKG and **contact the receiving hospital** as soon as possible (within 10 minutes of arriving at patient side).
  - a. If EKG findings are suspicious of STEMI, scene time should be limited, but more importantly a report to the receiving facility should be completed so that arrangements can be made to take patient directly to the Cardiac Cath Lab, if needed.
  - b. **Concurrent processes of activating the Cardiac Cath Lab (CCL) WHILE EMS care and transport occurs will facilitate faster delivery of needed interventions.** A report including what additional interventions EMS will complete that is made earlier can significantly increase the ability to go directly to CCL rather than EMS waiting until all treatment has been completed and then contacting Medical Control.
3. **Defib Fast Patches** must be applied (location per manufacturer recommendation) to any suspected STEMI patient, regardless of their perceived stability.
4. **Contact Medical Control** with patient report and verification of 12-Lead EKG findings.
  - a. EMS Report should follow format of an *EMS Alert Patient Report*.
    - i. EMS must know pre-hospital CCL activation process for all facilities they transport to as well as locations of each facility’s CCL.
5. CQI is completed on all STEMI diagnosis patients. EMS paperwork should include EKG and any monitor tracings.

## 12 Lead Identified STEMI Declaration Protocol

### EMS Alert Patient Report- STEMI

The following information and format necessitate expedited delivery of information for potential pre-hospital STEMI declaration.

1. Unit identification
2. ETA & Destination if other than Medical Control Center being contacted.
  - a. (Agencies should utilize their approved local Medical Control).
  - b. (Agencies whose normal Medical Control Center may not be the receiving destination of a STEMI patient must communicate early to determine destination. Report should include everything needed to activate CCL team.)
3. “Inbound EMS Alert Patient Report- Potential STEMI.”
  - a. The above statement should be made within the first 5 seconds of the communication.
4. History of present illness
  - a. Chief complaint
  - b. Onset
  - c. EKG finding
5. Patient Status
  - a. Level of consciousness
  - b. Vital Signs
  - c. Additional pertinent complaints
6. Acknowledge necessary treatment plan. (May not be complete at time of communication.)
7. Determine destination (facility and location).

### Transporting Units

1. Destination decisions must be informed decisions based on local and regional destination capabilities, time since onset and transportation distances.
  - a. See *EMS Triage Destination Plan*.
  - b. Include Medical Control with decision making.

## Cardiogenic Shock Protocol

Cardiogenic shock occurs when the heart loses its ability to effectively pump blood, resulting in hypoperfusion of organs. The signs and symptoms of cardiogenic shock include:

- Pain, heaviness, tightness, or discomfort in the chest with hypotension (systolic BP < 100mmHg)
- Rales or crackles (“wet” lung sounds indicating pulmonary edema)
- Pedal edema (while not an acute finding, may be a clue to underlying cardiomyopathy)
- Dyspnea
- Diaphoresis
- Nausea/vomiting

Patients with a history of coronary artery disease, MI or previous CHF have an increased risk. Priorities in the care of the cardiogenic shock patient include:

- Assessing and securing ABCs.
- Determining the quality and severity of the patient’s distress.
- Identifying contributing factors of the event.
- Obtaining a medical history (including medications and allergies).

Timely transportation to the emergency department is a key factor in patient outcomes.

### EMR Care

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. **Oxygen:** If respiratory distress is noted, 15 LPM via NRM or if unable to tolerate the mask, 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress is noted, apply a pulse ox. If  $\geq 94\%$  and no signs/ symptoms of respiratory distress, no Oxygen is required. If  $\leq 94\%$  apply nasal cannula at 2-6 LPM or 15 LPM via NRM as needed to raise pulse ox to  $\geq 94\%$ .

### EMT Care

1. EMT Care includes all components of *EMR Care*.
2. Initiate ALS intercept and transport as soon as possible.
3. Obtain **12-Lead EKG** and transmit to receiving hospital if capabilities exist.
4. Apply **Waveform Capnography** (if equipped)



## Cardiogenic Shock Protocol

### A-EMT/ EMT-I Care

1. A-EMT/ EMT-I Care includes all components of *EMT Care*.
2. Obtain **Peripheral IV** access.

### Paramedic Care

1. Paramedic Care includes all components of *A-EMT/ EMT-I Care*.
2. Consider multiple large bore IV's.
3. Ready IVF on a pressure bag and start **NS IV fluid bolus** if hypotensive with a goal systolic blood pressure > 90 mmHg. Caution in the setting of CHF (Rales in lungs)
4. Manage all dysrhythmias according to appropriate protocols.
5. **Norepinephrine**: MUST use 60 gtts/mL tubing.
  - Begin infusion at 4mcg/min (15 gtts/min) IO or large bore IV.
  - May increase by 4mcg/min (+15 gtts/min) every 5 min to maintain SBP>90mmHg or MAP>65mmHg.
  - Maximum rate 20mcg/min (75 gtts/min).
6. **Contact receiving hospital** as soon as possible.

### DOSING CHART BASED ON 60 GTTS/MIN TUBING

Desired Dose (mcg/min)	4 mcg/min	8 mcg/min	12 mcg/min	16 mcg/min	20 mcg/min
Drip rate (drops/min)	15 gtts/min	30 gtts/min	45 gtts/min	60 gtts/min	75 gtts/min

- Norepinephrine is 4mg in 250mL of D5W (typical) giving a concentration of 16mcg/mL.
- Norepinephrine and 60 gtt tubing must be stored together in drug bag.
- Monitor IV site for any signs of medication extravasation. If concerns for norepinephrine extravasation, discontinue use of involved IV site (for any use) and notify receiving hospital staff of extravasation at patient handoff. Leave the IV cannula in place.

## Cardiac Arrest Pit Crew CPR Protocol

The successful resuscitation of patients in cardiac arrest is dependent on a systematic approach of initiating high-quality CPR and early defibrillation and transferring care to advanced life support providers in a safe, timely, and effective manner. Most **adults who survive non-traumatic cardiac arrest are resuscitated from ventricular fibrillation with defibrillation but require high-quality CPR, specifically chest compressions, for neurologically intact survival.** The primary factor for successful defibrillation and resuscitation is decreasing the time interval from onset of cardiac arrest to effective CPR, defibrillation, and advanced life support. **Uninterrupted CPR without pauses is the goal of Pit Crew CPR.**

### EMR Care

EMR Care should be focused on confirming that the patient is in full arrest and in need of CPR. Resuscitative efforts should be initiated *immediately* by beginning chest compressions, opening the airway, and initiating ventilations while attaching a defibrillator.

1. Determine unresponsiveness. Confirm that a transporting unit (and/or Paramedic intercept) has been activated.
2. Immediately initiate CPR.
  - a) First rescuer at patient's right side.
    - i. Compressions at a **rate of 120/ minute**. Consider use of a portable metronome to keep high quality pace of compressions.
    - ii. Counting out every 30<sup>th</sup> compression.
    - iii. First and second rescuer change roles NOT locations every two minutes/ 240 compressions while rhythm/ pulse check occurs.
  - b) Second rescuer at patient's left side.
    - i. Place patient on AED or manual defibrillator.
    - ii. Defibrillating, if indicated, after every 2-minute cycle.
  - c) Third rescuer at patient's head.
    - i. Ensures seal of face mask of BVM with two hand seal.
    - ii. Provides the ventilations after every 30<sup>th</sup> compression. Ventilations should take **no longer than 2 seconds**.
    - iii. Once an advanced airway (iGel and ETT) is placed and confirmed, there is no compression pause needed for ventilations.
3. Continue based on Pit Crew CPR sequence and roles.

### EMT Care

EMT Care should focus on maintaining good CPR and defibrillation, if indicated. Transporting BLS units should initiate an ALS intercept as soon as possible. The decision to initiate transport should be made based on distance to ALS, number of providers currently available and potential for rendezvous locations.

1. EMT Care includes all the components of *EMR Care*.

## Cardiac Arrest Pit Crew CPR Protocol

### EMT Care (Cont.)

2. 2-minute cycles of CPR should be continued. Ventilation via BVM is an acceptable method while on scene so long as compliance is obtained.
  - a. Consider placement of OPA/NPA.
  - b. A Lucas II, rescue pump, or other system approved device can be implemented at any pulse check pause.
3. Place the system approved **Supraglottic Airway Device** (when possible) and continue ventilations (third or subsequent rescuer).
4. **Place Waveform Capnography** (if equipped) to monitor airway placement and identify ROSC.

### A-EMT/ EMT-I Care

A-EMT/ EMT-I Care should focus on maintaining the continuity of care by confirming that the patient is in cardiac arrest and maintaining quality resuscitation initiated by earlier providers.

1. A-EMT/ EMT-I Care includes all the components of EMT Care.
2. **Continue cycles of CPR.** Providers should be changed out at 2-minute intervals or when not performing chest compressions.
  - a. Initial three responder positions should continue to provide the basic Triangle of Care.
3. Transition from AED to EMT-I defibrillator.
4. Evaluate current resuscitation efforts and address any gaps.
5. Obtain **Vascular Access** via IO or IV.
6. Treat based on appropriate cardiac protocol.
7. Prior to patient movement for transport **Obtain Definitive Airway** based on *Supraglottic Airway Procedure* or *Advanced Airway Procedure* if not already done.
8. A system approved Impedance Threshold Device can be added after placement confirmation (for patients > 1 yr old).

### Paramedic Care

Paramedic Care should focus on maintaining the continuity of care by confirming that the patient is in cardiac arrest and continuing resuscitative efforts initiated by the First Responders.

1. Paramedic Care includes all the components of *A-EMT/ EMT-I Care*.
2. Determine appropriateness for transport.
3. Exercise caution so to not detract from high quality CPR and interventions to expedite transport. There is greater potential for successful resuscitation if attention to quality supersedes a perceived need to rush to the Emergency Department. **At least 6 rounds of high-quality CPR/ care should be the goal prior to considering moving the patient or transporting (unless prior ROSC is achieved and maintained).**
4. Place an **OG tube** if time permits to relieve gastric distention (if the patient is intubated or supraglottic airway is in place).
5. With the vast improvements in CPR quality and devices, patients may show signs of responsiveness and even CPR induced lucidity at times during the resuscitation. **Compassionate care** may be indicated in these situations. **Contact Medical Control** for possible orders of Versed, Ketamine, or Fentanyl administration.

## Cardiac Arrest Pit Crew CPR Protocol

### Pearls

- If EMS personnel witness the cardiac arrest, defibrillate as soon as possible.
- Do not touch, ventilate, or move the patient while the AED is analyzing.
- Patients with implanted pacemakers or implanted defibrillators (AICDs) are treated the same way as any other patient. Do not place the electrodes, Quick Combo pads or Fast Patches over the top of the pacemaker or AICD site.
- Treat the patient – not the monitor. A rhythm present on the monitor screen should NOT be used to determine pulse. If the monitor shows a rhythm and the patient has no pulse, begin CPR.
- Trauma patients in cardiac arrest should be evaluated for viability. If the patient is to be resuscitated, begin CPR and LOAD & GO.
- A medical cardiac arrest patient will benefit from a controlled resuscitation rather than hasty resuscitation that results from the urge to transport immediately.
- Resuscitation and treatment decisions are based on the duration of the arrest, physical exam and the patient's medical history. Consider cease-effort orders if indicated.
- Consider underlying etiologies and treat according to appropriate protocols. Until likely cause is identified, treatment on scene encompasses nearly everything the Emergency Department provides. Care on scene should focus on quality first before emergent transport.



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## Cardiac Arrest Pit Crew CPR Protocol

	Position 1-Right	Position 2-Left	Position 3-Head	Position 4	Position 5-Paramedic	Position 6- Code Commander
2-minute cycle (240 compressions)	<ul style="list-style-type: none"> <li>• Check LOC</li> <li>• Initiate Chest Compression (CC)</li> <li>• Rate of 120/min</li> <li>• Full Recoil</li> </ul>	<ul style="list-style-type: none"> <li>• Apply Defib</li> <li>• Situate defib at patient's L shoulder</li> <li>• Assist with Respirations every 30 CC</li> <li>• After clear-pushes Defib button until moved to manual defib</li> </ul>	<ul style="list-style-type: none"> <li>• Count- every 30<sup>th</sup> announced</li> <li>• 2 hand seal on BVM</li> <li>• Insert Oral Airway</li> <li>• Remind providers 1/2 to ventilate during upstroke of CC</li> </ul>	<ul style="list-style-type: none"> <li>• Assist where needed</li> </ul>	<ul style="list-style-type: none"> <li>• May be A-EMT until Paramedic arrival</li> </ul>	<ul style="list-style-type: none"> <li>• Can be same person as #5</li> </ul>
	Defib	If	Indicated	CC	During	Charge
2-minute cycle (240 compressions)	<ul style="list-style-type: none"> <li>• Situate airway bag at pt R shoulder</li> <li>• Hook up O2 to BVM</li> <li>• Assist with Respirations every 30th CC</li> <li>• Assemble supraglottic /ETT, Insert</li> </ul>	<ul style="list-style-type: none"> <li>• CC</li> <li>• After clear-pushes Defib button until moved to manual defib</li> </ul>	<ul style="list-style-type: none"> <li>• Count- every 30<sup>th</sup> announced</li> <li>• 2 hand seal on BVM</li> <li>• Remind providers 1/2 to ventilate during upstroke of CC</li> </ul>	<ul style="list-style-type: none"> <li>• Obtain history</li> <li>• Obtain patient info</li> </ul>		
	Defib	If	Indicated	CC	During	Charge
2-minute cycle (240 compressions)	<ul style="list-style-type: none"> <li>• CC</li> </ul>	<ul style="list-style-type: none"> <li>• Assist with Respirations</li> <li>• After clear-pushes Defib button until moved to manual defib</li> </ul>	<ul style="list-style-type: none"> <li>• Count- every 30<sup>th</sup> noted</li> <li>• 2 hand seal on BVM</li> <li>• Remind providers 1/2 to ventilate during upstroke of CC</li> </ul>		<ul style="list-style-type: none"> <li>• Situate ALS equipment at pt's feet.</li> <li>• Prep IO, fluids, and pressure bag</li> <li>• Insert IO</li> <li>• Admin first Epi</li> </ul>	<ul style="list-style-type: none"> <li>• Oversee status of code</li> <li>• Complete any interventions not already completed</li> </ul>

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## Cardiac Arrest Pit Crew CPR Protocol

	Defib	If	Indicated	CC	During	Charge
2-minute cycle (240 compressions)	<ul style="list-style-type: none"> <li>If not already completed, plan for advanced airway</li> <li>Assist with Respirations</li> </ul>	<ul style="list-style-type: none"> <li>CC</li> <li>After clear-pushes Defib button until moved to manual defib</li> </ul>	<ul style="list-style-type: none"> <li>Count- every 30<sup>th</sup> announced</li> <li>2 hand seal on BVM</li> <li>Remind providers 1/2 to ventilate during upstroke of CC</li> </ul>		<ul style="list-style-type: none"> <li>Transition to manual monitor/mode</li> <li>Transition to CC during charge AND THEN monitor check &amp; defib</li> </ul>	<ul style="list-style-type: none"> <li>Review Hs &amp; Ts</li> <li>Correct and issues found</li> </ul>
	Defib	If	Indicated	CC	During	Charge
2-minute cycle (240 compressions)	<ul style="list-style-type: none"> <li>CC</li> </ul>	<ul style="list-style-type: none"> <li>Assist with Respirations</li> <li>After clear-pushes Defib button until moved to manual defib</li> </ul>	<ul style="list-style-type: none"> <li>Count- every 30<sup>th</sup> announced</li> <li>2 hand seal on BVM</li> <li>Remind providers 1/2 to ventilate during upstroke of CC</li> </ul>		<ul style="list-style-type: none"> <li>Administer anti-arrhythmic</li> </ul>	
	Defib	If	Indicated	CC	During	Charge
2-minute cycle (240 compressions)	<ul style="list-style-type: none"> <li>Assist with Respirations</li> </ul>	<ul style="list-style-type: none"> <li>CC</li> <li>After clear-pushes Defib button until moved to manual defib</li> </ul>	<ul style="list-style-type: none"> <li>Count- every 30<sup>th</sup> counted</li> <li>2 hand seal on BVM</li> <li>Remind providers 1/2 to ventilate during upstroke of CC</li> </ul>	<ul style="list-style-type: none"> <li>Develop plan for patient move</li> </ul>	<ul style="list-style-type: none"> <li>Administer 2<sup>nd</sup> Epi</li> </ul>	<ul style="list-style-type: none"> <li>If ROSC, complete a 12 Lead ASAP and move to post-ROSC checklist</li> </ul>
Repeat	As	Needed	Repeat	As	Needed	Repeat

## Cardiac Arrest Pit Crew CPR Protocol

### Assumptions

- CPR is the priority. A-EMT/ EMT-I and Paramedic interventions begin when qualified personnel arrive and movement to these interventions will not detract from high-quality CPR.
- If no shock is indicated, providers may need to transition to different treatment guideline(s).
- Pulse check does not occur until monitor check at end of every 2-minute CPR cycle.
- For agencies that have identified difficulties in number of responders, modifications may be needed. Those should be identified and developed early and in cooperation with local Medical Control and additional responding agencies.
- CPR should not be interrupted to switch out providers for advanced procedures (an A-EMT or Paramedic Provider doing compressions should not stop compressions to move to another role) unless it is time for a pulse/rhythm check.
- If at any time the patient regains a pulse (ROSC), consistent attention must be given to ensure the pulse is not lost. Treat the patient based on appropriate protocols.

### EMS Alert Patient Report- Arrest/ Near Arrest

The following information and format necessitate expedited delivery of information for arrest and near arrest patients (cardiac and respiratory). Trauma should follow trauma format.

1. Unit identification
2. ETA & Destination if other than Medical Control Center is being contacted.
  - a. (Agencies should utilize their approved local Medical Control).
3. "Inbound EMS Alert Patient Report- Arrest."
  - a. The above statement should be made within the first 5 seconds of the communication.
4. History of present illness
  - a. Witnessed or not, and time without CPR
  - b. Initial rhythm
  - c. Total time worked up to now
5. Patient Status
  - a. Current Rhythm
  - b. Airway status
  - c. If ROSC has been obtained at any time
6. Acknowledge necessary treatment plan. (May not be complete at time of communication.)
7. Determine destination (facility and location).

## Resuscitation of Pulseless Rhythms Protocol

The successful resuscitation of patients in cardiac arrest is dependent on a systematic approach to resuscitation. ACLS medications are a key factor in successful resuscitation of the pulseless patient when the initial rhythm is not ventricular fibrillation (VF) or in cases where defibrillation has not been successful. It is important that providers understand the value of effective CPR and a Paramedic intercept in providing the patient with ACLS therapy.

### EMR Care

Not applicable. EMR's are not equipped with ACLS medications and shall treat the patient in accordance with the *Cardiac Arrest Protocol*.

### EMT Care

Not applicable. EMT providers are not equipped with ACLS medications and shall treat the patient in accordance with the *Cardiac Arrest Protocol*.

### Ventricular Fibrillation (VF) or Pulseless Ventricular Tachycardia (VT)

#### A-EMT/ EMT-I Care

1. Initiate *Cardiac Arrest Protocol* and *Pit Crew Procedure*.
2. If pulseless V-fib/V-tach: **Defibrillate** at J setting per manufacturer's recommendations (or use maximum available per ACLS guidelines) every 2 minutes.
3. **Epinephrine 1:10,000**: 1mg IV/ IO if patient is pulseless and repeat every **3-5 minutes** as needed.
4. Continue with *Cardiac Arrest Protocol* and *Pit Crew Procedure*.
5. **Lidocaine**: 1.5mg/kg IV/IO for persistent VF or VT. Repeat bolus: 1.5mg/kg IV/IO in **3-5 minutes** to a total of 3mg/kg if patient remains in VF or VT.
6. **D10W**: 250 mL IV if blood sugar is < 60mg/dL.
7. Initiate Paramedic intercept and transport when resources are available.

### Paramedic Care

1. Paramedic Care includes all components of *A-EMT/ EMT-I Care*.
2. **Amiodarone**: 300 mg IV/IO for persistent VF/VT. Repeat bolus of 150 mg IV/IO in 3-5 minutes to a total of 450 mg if patient remains in VF/VT. **Not for use in pregnant females**. If known pregnancy, refer to Lidocaine above.
3. Be alert for changes in patient condition that require additional Paramedic Care. Treat based on appropriate protocol. Contact the receiving hospital as soon as possible.



## Resuscitation of Pulseless Rhythms Protocol

### Pulseless Electrical Activity

#### A-EMT/ EMT-I Care

1. Initiate *Cardiac Arrest Protocol and Pit Crew Procedure*.
2. **Epinephrine 1:10,000:** 1mg IV/IO every **3-5 minutes**.
3. **IV Fluid Therapy:** 500mL fluid bolus for suspected hypovolemia.
4. **D10W:** 250 mL IV if blood sugar is < 60mg/dL.
5. Initiate Paramedic intercept and transport when resources are available.

#### Paramedic Care

1. Paramedic Care includes all components of *A-EMT/ EMT-I Care*.
2. **Calcium Gluconate:** 1gm IV/IO if known Calcium Channel Blocker overdose, known beta blocker overdose, patient suffers from Chronic Renal Failure, or if a known Dialysis Patient.
3. **Sodium Bicarbonate:** 50meq IV/IO if known Tricyclic Antidepressant (TCA) overdose, known Aspirin (ASA) overdose, patient suffers from Chronic Renal Failure, or is known Dialysis Patient. *Sodium Bicarbonate may form a solid with Calcium Gluconate – ensure the line is properly flushed before and after if giving both medications.*
4. **Needle chest decompression:** for a patient in *traumatic* cardiac arrest with suspected tension pneumothorax.
5. Search for and treat potential causes.
6. Contact the receiving hospital as soon as possible.
7. Be alert for changes in patient condition that require additional Paramedic Care. Treat based on appropriate protocol.

### Asystole

#### A-EMT/ EMT-I Care

1. Initiate *Cardiac Arrest Protocol and Pit Crew Procedure*.
2. **Epinephrine 1:10,000:** 1mg IV/IO every **3-5 minutes**.
3. **IV Fluid Therapy:** 500mL fluid bolus for suspected hypovolemia.
4. **D10W:** 250mL IV if blood sugar is < 60mg/dL.
5. Initiate Paramedic intercept and transport as resources are available.

## Resuscitation of Pulseless Rhythms Protocol

### Asystole (Cont.)

#### Paramedic Care

1. Paramedic Care includes all the components of *A-EMT/ EMT-I Care*.
2. **Calcium Gluconate:** 1gm IV/IO if known Calcium Channel Blocker overdose, known Beta Blocker overdose, patient suffers from chronic renal failure, or is a known Dialysis patient.
3. **Sodium Bicarbonate:** 50meq IV/IO if known Tricyclic Antidepressant (TCA) overdose, known Aspirin (ASA) overdose, patient suffers from Chronic Renal Failure, or is a known Dialysis Patient. *Sodium Bicarbonate may form a solid with Calcium Gluconate – ensure line is properly flushed before and after if giving both medications.*
4. **Needle chest decompression:** for a patient in *traumatic* cardiac arrest with suspected tension pneumothorax
5. Search for and treat possible causes.
6. Consider Termination of Resuscitation (*refer to TOR Protocol*)
7. Contact the receiving hospital as soon as possible.
8. Be alert for changes in patient condition that require additional Paramedic Care. Treat based on appropriate protocol.

#### Possible Causes of Pulseless Electrical Activity (PEA) / Asystole

- Hypovolemia
- Hypoxia
- Hydrogen Ions (Acidosis)
- Hypokalemia/Hyperkalemia
- Hypothermia
- Hypoglycemia
- Toxins / Tablets (Drug Overdose)
- Tamponade (Pericardial Tamponade)
- Tension Pneumothorax
- Thrombosis (Acute Coronary Syndrome or Pulmonary Embolism)
- Trauma

#### Pearls

- Consider underlying etiologies and treat according to appropriate protocols (e.g., airway obstruction, metabolic shock, hypovolemia, central nervous system injury, respiratory failure, anaphylaxis, drowning, overdose, poisoning, etc.).
- If EMS personnel witness the cardiac arrest, start CPR and defibrillate immediately after Fast Patches or Quick Combos are placed for V-fib/pulseless V-tach.

## Withholding of Resuscitation

The EMS provider is responsible to make every effort to preserve life. In the absence of an advanced directive, resuscitative measures shall be attempted if there is any chance that life exists.

When EMS personnel arrive on scene and discover the patient is pulseless and breathless and CPR is not in progress, resuscitation (at minimum CPR) must be initiated unless one or more of the following conditions exist in addition to Asystole noted in 2 EKG leads:

- Obvious signs of biological death are present:
  - Decapitation
  - Rigor mortis **without** profound hypothermia
  - Dependent lividity
  - Obvious mortal wounds with no signs of life
  - Decomposition
  - Cold to touch, not associated with environmental temperature
- Death has been declared by the patient's physician or the coroner.
- A valid DNR/POLST order is present, and the EMS provider has made reasonable effort to verify the identity of the patient named in the order (*i.e.* identification by another person, ID band, photo ID or facility, home-care or hospice nursing staff).
- If the above signs of death are recognized, EMS personnel should contact the appropriate law enforcement and/or coroner's office.
- The EMS provider should immediately institute resuscitative treatment measures and **Contact Medical Control** for further direction if he or she has concerns regarding the validity of the DNR/POLST orders, the degree of life-sustaining treatment to be withheld or the status of the patient's condition.

When EMS personnel arrive on scene and discover that CPR is in progress, the EMS provider should:

1. Assess circulation, airway and breathing and analyze EKG activity at the next pause in CPR cycle.
2. Determine if obvious signs of death are present or a valid DNR/POLST exists. Continue resuscitation if signs of death are not obvious and a valid DNR/POLST is not provided.

### Critical Thinking Elements

- **Pediatric patients and patient with hypothermia may have no signs of life but still be viable. Prolonged resuscitative efforts are indicated in these cases. No Cease Efforts Order will be given.**
- **Traumatic arrest patients may meet criteria for resuscitation if immediately accessible.**
- **In situations where decision to cease efforts is not believed to be a safe option for EMS, the patient should be treated based upon most appropriate treatment protocol and transported. Information about such decision should be included in the communication to receiving facility.**

## Field Termination of Resuscitation

Transport to the hospital prior to achieving ROSC has been associated with lower survival rates and worse outcomes. Therefore, to provide the best care for patients with out of hospital cardiac arrest, **resuscitative efforts should be continued on scene for a minimum of 30 minutes** prior to considering a decision to terminate resuscitation.

Termination of resuscitation (TOR) may be done by a **Paramedic Care** Unit in conjunction with **online Medical Control** if all the following criteria are met, and the patient does not fall into exclusion criteria:

### Termination of Resuscitation Criteria:

- Resuscitation has been attempted for **30 minutes or longer** with the following:
  - High quality chest compressions
  - Advanced airway has been placed and confirmed (ETT or i-gel)
  - IO/IV access obtained.
  - 3 rounds of epinephrine given
  - Adequate personnel present (using pit crew CPR model when possible)
- PEA/Asystole on the monitor
- ETCO<sub>2</sub> < 20 mmHg at time of termination
- All reversible causes have been considered and addressed.
- All team members agree.

### **Patients who are excluded from Field TOR:**

- **Pediatric patients (Age <18)**
- **Pregnant patients**
- **EMS personnel witnessed cardiac arrest**
- **Shockable rhythm (V-fib or pulseless V-tach) AT ANY TIME** during resuscitation
- **ROSC achieved AT ANY TIME** during resuscitation.
- Cardiac arrest is due to **hypothermia**.
- Cardiac arrest is due to **toxins**.
- Cardiac arrest is due to **trauma**.

## Field Termination of Resuscitation

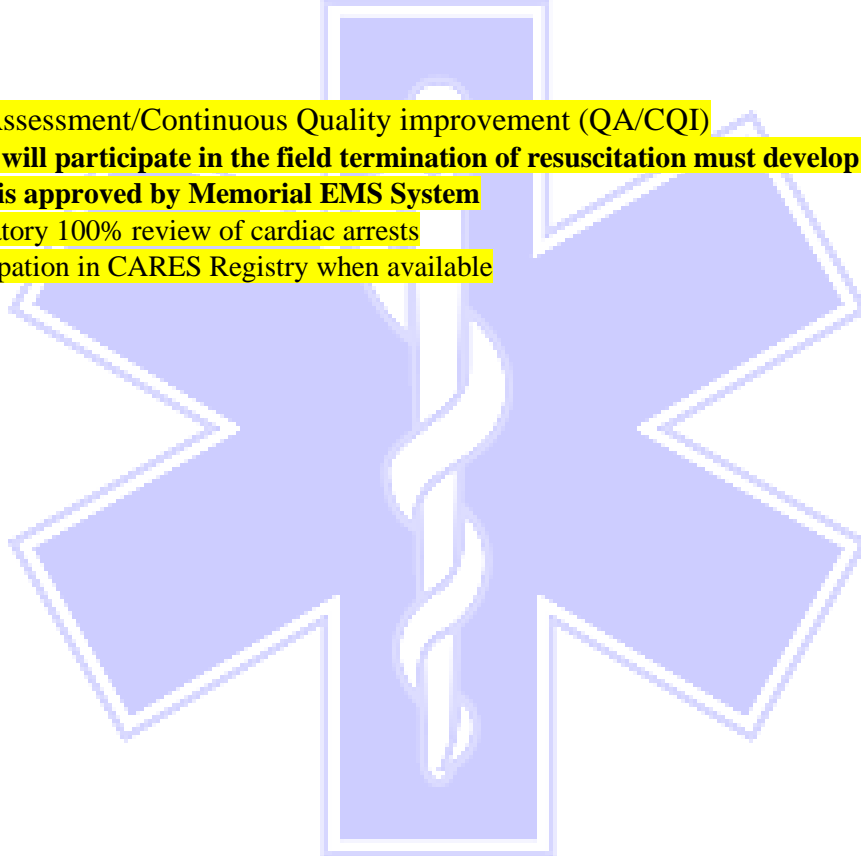
If the scene is unsafe or there is concern for impending provider safety, the patient may be transported to the nearest appropriate facility while performing high quality cardiopulmonary resuscitation.

After termination of resuscitation:

1. Console the family and/or bystanders.
2. Notify Coroner/ Law Enforcement
3. Stay with the patient until appropriate authorities have arrived and can take custody of the remains. Do not remove any equipment directly in contact with the deceased.
  - If the patient is in a transport unit when resuscitation is terminated, that unit must remain on-scene with the deceased until custody has been transferred to the Coroner.

Mandatory Quality Assessment/Continuous Quality improvement (QA/CQI)

- **Agencies who will participate in the field termination of resuscitation must develop a robust internal QA/CQI that is approved by Memorial EMS System**
  - Mandatory 100% review of cardiac arrests
  - Participation in CARES Registry when available



## Unstable Bradycardia Protocol

Bradycardia is defined as a heart rate less than sixty beats per minute (< 60 bpm). Determining the stability of the patient with bradycardia is a key factor in patient care decisions. The assessment of the patient with bradycardia includes evaluation for signs and symptoms of hypoperfusion.

The patient is considered **stable** if the patient is asymptomatic (i.e., alert and oriented with warm, dry skin and a systolic BP > 100mmHg).

The patient is considered **unstable** if he/she presents with:

- An altered level of consciousness (ALOC).
- Diaphoresis.
- Dizziness.
- Chest pain or discomfort.
- Ventricular ectopy.
- **Symptomatic** hypotension (systolic BP < 100mmHg).

### EMR Care

EMR Care should be focused on assessing the situation and initiating routine patient care to treat for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. **Oxygen:** If respiratory distress is noted, 15 LPM via NRM or if unable to tolerate the mask, 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress is noted, apply a pulse ox. If  $\geq 94\%$  and no signs/ symptoms of respiratory distress, no Oxygen is required. If  $\leq 94\%$  apply nasal cannula at 2-6 LPM or 15 LPM via NRM as needed to raise pulse ox to  $\geq 94\%$ .

### EMT Care

EMT Care should be directed at conducting a thorough patient assessment, initiating routine patient care to treat for shock and preparing the patient for or providing transport.

1. EMT Care includes all components of *EMR Care*.
2. Initiate Paramedic intercept and transport as soon as possible.
3. Apply **combo defib/pace pads** in anticipation of Cardiac Arrest. Place pads so that a 12 lead can be obtained next.
4. Obtain **12-Lead EKG** and transmit to receiving hospital if capabilities exist.
5. Apply **Waveform Capnography** (if equipped).

## Unstable Bradycardia Protocol

### A-EMT/ EMT-I Care

A-EMT/ EMT-I Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion, and preparing for or providing patient transport.

1. A-EMT/ EMT-I Care includes all components of *EMT Care*.
2. **IV Fluid Therapy:** 500mL fluid boluses to achieve and maintain BP > 100 mmHg.
3. Initiate Paramedic intercept and transport as soon as possible. (*Transport can be initiated at any time during this sequence*).
4. If stable: monitor for worsening symptoms. Do not provide aggressive treatment.
5. If unstable: treat to correct cause of symptoms.
6. **Atropine:** 1mg IVP concurrently to the fluid bolus if the patient's perfusion does not improve, if the patient is hemodynamically unstable, or if the cardiac rhythm is an AV block (other than a 3<sup>rd</sup> degree block). May repeat 1mg IV every **5 minutes** as needed up to a total of 3mg.
7. **Immediate Transcutaneous Pacing (TCP):** If the patient is in a **3<sup>rd</sup> degree AV block** (or in a **Type II 2<sup>nd</sup> degree AV block** unresponsive to Atropine).
  - a. Target heart rate should be set at **70 bpm**.
  - b. Current should be set at minimum to start and increased until both electrical and mechanical capture are achieved.
  - c. Once successfully initiated, TCP is not to be stopped until the receiving facility **ensures** that they have equipment in place to transition. This should be a coordinated effort. If possible, continue to utilize the monitor with which capture occurred.
8. **Midazolam (Versed):** 2.5mg IV/IO for patient comfort after pacing is initiated. (May give intranasal, see dosing sheet) if IV or IO cannot be established. Re-check vital signs 5 minutes after administration. May repeat dose one time if systolic BP > 100mmHg and respiratory rate is > 10 rpm. Additional doses require **Medical Control order**.
9. Contact receiving hospital (or Medical Control if needed) as soon as possible.

### Paramedic Care

Paramedic Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion, and preparing for or providing patient transport.

1. Paramedic Care includes all components of *A-EMT/ EMT-I Care*.
2. Repeat assessment to determine patient stability and response to care provided.

## Unstable Bradycardia Protocol

### Paramedic Care (Cont.)

3. **Norepinephrine:** If patient remains hypotensive, MUST use 60 gtts/mL tubing
  - Begin infusion at 4mcg/min (15 gtts/min) IO or large bore IV.
  - May increase by 4mcg/min (15 gtts/min) every 5 min to maintain SBP>90mmHg or MAP>65mmHg.
  - Maximum rate 20mcg/min (75 gtts/min).

### DOSING CHART BASED ON 60 GTT/mL TUBING

Desired Dose (mcg/min)	4 mcg/min	8 mcg/min	12 mcg/min	16 mcg/min	20 mcg/min
Drip rate (drops/min)	15 gtts/min	30 gtts/min	45 gtts/min	60 gtts/min	75 gtts/min

- Norepinephrine is 4mg in 250mL of D5W (typical) giving a concentration of 16mcg/mL.
  - Norepinephrine and 60 gtt tubing must be stored together in drug bag.
  - Monitor IV site for any signs of medication extravasation. If concerns for norepinephrine extravasation, discontinue use of involved IV site (for any use) and notify receiving hospital staff of extravasation at patient handoff. Leave the IV cannula in place.
4. Transport as soon as possible (*Transport can be initiated at any time during this sequence*).
  5. Contact receiving hospital as soon as possible.

### Pearls

- **Treat the patient – not the monitor. *Bradycardia does not necessarily mean that the patient is unstable or requires intervention.***
- **Treat underlying etiologies according to protocol.**
- **Atropine is NOT to be given if the patient's blood pressure is normal or elevated.**
- ***Bradycardia may be present due to increased intracranial pressure from a stroke or head injury. Contact Medical Control.***
- **Factors to consider during the assessment of the patient who presents with bradycardia include: patient health & physical condition (e.g., an athlete), current medications (e.g. beta blockers), trauma or injury related to the event (e.g. a head trauma patient exhibiting signs of herniation or *Cushing's response*), and other medical history.**
- **Assess for underlying causes (e.g., hypoxia, hypovolemic shock, cardiogenic shock, or overdose).**
- **Fluid bolus should not delay Atropine administration or TCP if the patient is unstable.**
- **If the patient's presenting rhythm is a 3<sup>rd</sup> degree block, immediately prepare to pace. If the patient is symptomatic, pacing should be started without delay.**



## Narrow Complex Tachycardia Protocol

Tachycardia is defined as a heart rate > 100 bpm. Once the heart rate reaches 150 bpm, the patient is at risk for shock. A narrow QRS complex indicates that the rhythm may be originating in the atrium. Determining the stability of the patient with tachycardia is a key factor in patient care decisions.

The patient is considered **stable** if the patient is alert and oriented with warm & dry skin and has a systolic BP > 100mmHg.

The patient is considered **unstable** if the patient has an altered level of consciousness, diaphoresis, dizziness, chest pain or discomfort, ventricular ectopy and/or is hypotensive.

### EMR Care

EMR Care should be focused on assessing the situation and initiating routine patient care to treat for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. **Oxygen:** If respiratory distress is noted, 15 LPM via NRM or if unable to tolerate the mask, 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress is noted, apply a pulse ox. If  $\geq 94\%$  and no signs/ symptoms of respiratory distress, no Oxygen is required. If  $\leq 94\%$  apply nasal cannula at 2-6 LPM or 15 LPM via NRM as needed to raise pulse ox to  $\geq 94\%$ .

### EMT Care

EMT Care should be directed at conducting a thorough patient assessment, initiating routine patient care to treat for shock and preparing the patient for or providing transport.

1. EMT Care includes all components of *EMR Care*.
2. Obtain **12-Lead EKG** and transmit to receiving hospital if capabilities exist.
3. If unstable, place combo defib/pace pads.
4. Apply **Waveform Capnography** (if equipped)
5. Initiate Paramedic intercept and transport as soon as possible.

### A-EMT/ EMT-I Care

A-EMT/ EMT-I Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. A-EMT/ EMT-I Care includes all components of *EMT Care*.
2. Obtain **IV/ IO access**.
3. If stable: monitor for worsening symptoms. Do not initiate aggressive treatment.
4. If unstable: treat to correct cause of symptoms.

## Narrow Complex Tachycardia Protocol

### A-EMT/ EMT-I Care (Cont.)

5. **Vagal Maneuvers:** if the patient is alert and oriented, has a systolic BP  $\geq 100$ mmHg, has a HR  $\geq 150$ bpm and is *obviously* not in atrial fib or atrial flutter. Having the patient attempt to move the plunger of a 12 or 20ml syringe by blowing from the small end is one technique. Having the patient “bear down” similar to having a bowel movement is another technique.
6. **Adenosine:** 6mg IV {rapid IV push} (**with Medical Control order only**) if the patient is alert and oriented, has a systolic BP  $\geq 100$ mmHg, has a HR  $\geq 150$ bpm and is *obviously* not in atrial fib or atrial flutter. If no response after **2 minutes**, administer 12mg IV {rapid IV push} (**with Medical Control order only**).

### Paramedic Care

Paramedic Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient’s perfusion, and preparing for or providing patient transport.

1. Paramedic Care includes all components of A-EMT/ EMT-I Care.
2. **Adenosine:** 6mg IV {rapid IV push} if the patient is alert and oriented, has a systolic BP  $\geq 100$ mmHg, has a HR  $>150$ bpm and is *obviously* not in atrial fib or atrial flutter. If no response after **2 minutes**, administer 12mg IV {rapid IV push}.
3. **Midazolam (Versed):** 2.5mg IV/IO **in preparation for synchronized cardioversion** if the patient has a respiratory rate greater than 10 rpm. (May give intranasal, see dosing sheet) if IV or IO cannot be established. If the patient’s respiratory rate is less than 10 rpm, proceed to immediate synchronized cardioversion without sedation.
4. **Synchronized Cardioversion:** If the patient has an altered level of consciousness, diaphoresis, dizziness, chest pain or discomfort, ventricular ectopy and/or is hypotensive:
  - a) Synchronized cardioversion based on J setting per manufacturer recommendations.
  - b) Repeat as needed with increase in J setting per manufacturer recommendations.
5. Contact the receiving hospital as soon as possible.

### Pearls

- **Treat the patient – not the monitor. Tachycardia does not necessarily mean that the patient is unstable or requires intervention.**
- **Assess for underlying causes (e.g., hypovolemic shock) and treat according to protocol.**
- **When administering Adenosine be prepared for immediate defibrillation if the rhythm converts to v-fib.**
- **DO NOT administer Adenosine if the heart rate is  $< 150$  bpm without consulting Medical Control.**

## Wide Complex Tachycardia Protocol

Tachycardia is defined as a heart rate > 100 bpm. Once the heart rate reaches 150 bpm, the patient is at risk for shock. A wide-complex QRS indicates the rhythm may be of ventricular origin. Determining the stability of the patient with tachycardia is a key factor in patient care decisions. The assessment of the patient with tachycardia includes evaluation for signs and symptoms of hypoperfusion.

The patient is considered **stable** if the patient is alert & oriented with warm & dry skin and a systolic BP > 100mmHg. The patient is considered **unstable** if the patient has an altered level of consciousness, diaphoresis, dizziness, chest pain or discomfort, ventricular ectopy and/or hypotension.

### EMR Care

EMR Care should be focused on assessing the situation and initiating routine patient care to treat for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. **Oxygen:** If respiratory distress is noted, 15 LPM via NRM or if unable to tolerate the mask, 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress is noted, apply a pulse ox. If  $\geq 94\%$  and no signs/ symptoms of respiratory distress, no Oxygen is required. If  $\leq 94\%$  apply nasal cannula at 2-6 LPM or 15 LPM via NRM as needed to raise pulse ox to  $\geq 94\%$ .

### EMT Care

EMT Care should be directed at conducting a thorough patient assessment, initiating routine patient care to treat for shock and preparing the patient for or providing transport.

1. EMT Care includes all components of *EMR Care*.
2. Obtain **12- Lead EKG** and transmit to receiving hospital if capabilities exist.
3. If unstable, place combo defib/pace pads.
4. Apply **Waveform Capnography** (if equipped)
5. Initiate Paramedic intercept and transport as soon as possible.

### A-EMT/ EMT-I Care

A-EMT/ EMT-I Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion, and preparing for or providing patient transport.

1. A-EMT/ EMT-I Care includes all components of *EMT Care*.
2. Obtain **IV/ IO access**.
3. If the patient becomes pulseless at any time, refer to the *Resuscitation of Pulseless Rhythms Protocol (V-fib or Pulseless V-tach)*.

## Wide Complex Tachycardia Protocol

### Paramedic Care

Paramedic Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. Paramedic Care includes all components of *A-EMT/ EMT-I Care*.
2. If stable: monitor for worsening symptoms. Do not provide aggressive treatment, treat pharmacologically.
3. **If stable, Amiodarone:** 150mg/10min IV. (Draw contents of 1 vial (150 mg) Amiodarone and inject into 100 mLs of D5W. Do NOT over agitate when mixing. Hang the bag and infuse it at 618 mL/ hr, using the filter provided. The infusion should run at 5 gtts/ 2 seconds with 15 drop tubing OR 5 gtts/ 3 seconds with 10 drop tubing). **If pregnant female, refer to Medical Control order regarding Amiodarone usage.**
4. If unstable: treat to correct cause of symptoms
5. **If unstable, Midazolam (Versed):** 2.5mg IV/IO for patient comfort prior to cardioversion. (May give intranasal (see dosing sheet) if IV or IO cannot be established). Re-check vital signs 5 minutes after administration. May repeat dose one time if systolic BP > 100mmHg and respiratory rate is > 10 rpm. Additional doses require **Medical Control order**.
6. **Synchronized Cardioversion\*\*:** If the patient has an altered level of consciousness, diaphoresis, chest pain or discomfort, pulmonary edema and/or is hypotensive:
  - a) Synchronized cardioversion, repeat as necessary.
7. **Contact Medical Control** as soon as possible.
8. If the patient becomes pulseless at any time, refer to the *Resuscitation of Pulseless Rhythms Protocol (V-Fib or Pulseless V-tach)*.

\*\*Agencies must follow manufacturer recommendations for J settings.

### Pearls

- Factors to consider during the assessment of the patient with tachycardia include: patient health & physical condition, trauma or injury related to the event, current medications and medical history. A patient may have a stable bundle branch block, and be tachycardic for other reasons, giving the appearance of a wide complex tachycardia.
- A 12 lead EKG is IMPERATIVE prior to initiating definitive treatment.
- Assess for underlying causes (e.g. hypovolemic shock) and treat according to protocol.
- If the patient becomes pulseless at any time, refer to the "V-fib and Pulseless V-tach" section of the *Resuscitation of Pulseless Rhythms Protocol*.
- Watch for signs of respiratory depression when giving sedatives.

## Implanted Cardiac Defibrillator (AICD) Protocol

An implanted cardiac defibrillator (AICD) is a device that delivers an internal defibrillation (shock) whenever the patient's heart rate exceeds defined limits for > 10 seconds. Persons in contact with the patient at the time the device delivers the defibrillation will receive a shock of approximately 3 Joules. This energy level constitutes no danger to EMS personnel.

### EMR Care

EMR Care should be focused on assessing the situation and initiating routine patient care to treat for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. **Oxygen:** If respiratory distress is noted, 15 LPM via NRM or if unable to tolerate the mask, 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress is noted, apply a pulse ox. If  $\geq 94\%$  and no signs/ symptoms of respiratory distress, no Oxygen is required. If  $\leq 94\%$  apply nasal cannula at 2-6 LPM or 15 LPM via NRM as needed to raise pulse ox to  $\geq 94\%$ .

### EMT Care

EMT Care should be directed at conducting a thorough patient assessment, initiating routine patient care to treat for shock and preparing the patient for or providing transport.

1. EMT Care includes all components of *EMR Care*.
2. Obtain **12-Lead EKG** and transmit to receiving hospital if capabilities exist.
3. Initiate Paramedic intercept and transport as soon as possible.
4. Apply **Waveform Capnography** (if equipped)

### A-EMT/ EMT-I Care

A-EMT/ EMT-I Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion, and preparing for or providing patient transport.

1. A-EMT/ EMT-I Care includes all components of *EMT Care*.
2. Obtain **IV/ IO access**.
3. Initiate Paramedic intercept and transport as soon as possible (*transport can be initiated at any time during this sequence*).
4. If the patient becomes pulseless at any time, refer to the *Resuscitation of Pulseless Rhythms Protocol*.

### Paramedic Care

Paramedic Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion, and preparing for or providing patient transport.

1. Paramedic Care includes all components of *A-EMT/ EMT-I Care*.
2. Treat arrhythmias per applicable protocol.

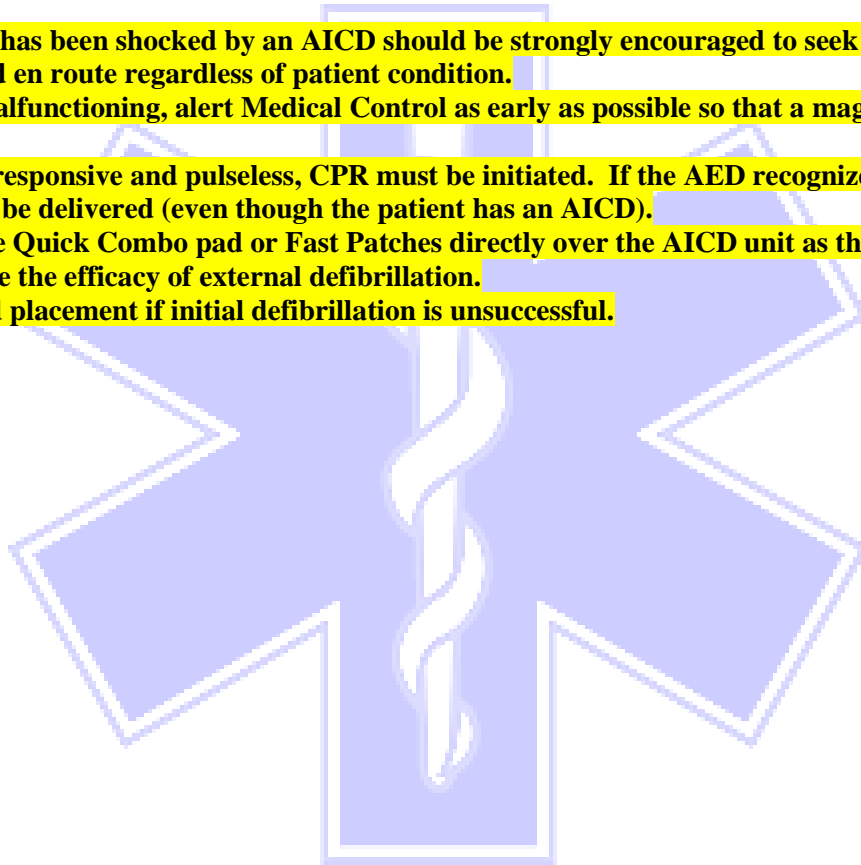
## Implanted Cardiac Defibrillator (AICD) Protocol

### Paramedic Care (Cont.)

3. Manage pain, nausea and vomiting based on *Pain Control Protocol*. Contact the receiving hospital as soon as possible.
4. If the patient becomes pulseless at any time, refer to the *Resuscitation of Pulseless Rhythms Protocol*.
5. Contact the receiving hospital as soon as possible.

### Pearls

- Any patient who has been shocked by an AICD should be strongly encouraged to seek medical attention and closely monitored en route regardless of patient condition.
- If the AICD is malfunctioning, alert Medical Control as early as possible so that a magnet can be available upon arrival.
- If a patient is unresponsive and pulseless, CPR must be initiated. If the AED recognizes a shockable rhythm, the shock should be delivered (even though the patient has an AICD).
- Avoid placing the Quick Combo pad or Fast Patches directly over the AICD unit as this could damage the device and reduce the efficacy of external defibrillation.
- Slightly alter pad placement if initial defibrillation is unsuccessful.



## VAD (Ventricular Assist Device)

**NOTE: Pulse may not be palpable, manual blood pressure often cannot be measured, and pulse oximetry may be unreliable. The patient's automated blood pressure will usually be hypotensive and pulse pressure will be narrow.**

### CRITERIA:

1. Presence of a left, right, or bilateral ventricular assist device
2. Serious signs or symptoms, including:
  - a. Respiratory difficulty
  - b. Pulmonary edema
  - c. Chest pain
  - d. Signs or symptoms of shock
  - e. Potentially lethal dysrhythmia
  - f. Altered LOC/ syncope

### EMR Care

EMR Care should be focused on assessing the situation and initiating routine patient care to treat for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. **Oxygen:** If respiratory distress is noted, 15 LPM via NRM or if unable to tolerate the mask, 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress is noted, apply a pulse ox. If  $\geq 94\%$  and no signs/symptoms of respiratory distress, no Oxygen is required. If  $\leq 94\%$  apply nasal cannula at 2-6 LPM or 15 LPM via NRM as needed to raise pulse ox to  $\geq 94\%$ .

### EMT Care

EMT Care should be directed at conducting a thorough patient assessment, initiating routine patient care to treat for shock and preparing the patient for or providing transport.

1. EMT Care includes all components of *EMR Care*.
2. Obtain **12-Lead EKG** and transmit to receiving hospital if capabilities exist.
3. Initiate Paramedic intercept and transport as soon as possible.
4. Apply **Waveform Capnography** (if equipped)

### A-EMT/ EMT-I Care

A-EMT/ EMT-I Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion, and preparing for or providing patient transport.

1. A-EMT/ EMT-I Care includes all components of *EMT Care*.
2. Auscultate the heart. Continuous whirling noise indicates VAD is working, but even a carotid pulse may not be palpable.
3. Monitor ECG. If there is a pulse, the rhythm may not correlate with it.
4. Obtain **IV/ IO access**.
  - a. If patient is dehydrated and lungs are clear administer 250 ml fluid bolus over 10 minutes. May repeat once, up to a total of 500ml or until BP  $\geq 90$  Systolic
5. Initiate Paramedic intercept and transport as soon as possible (*transport can be initiated at any time during this sequence*).

## VAD (Ventricular Assist Device)

### A-EMT/ EMT-I Care (cont.)

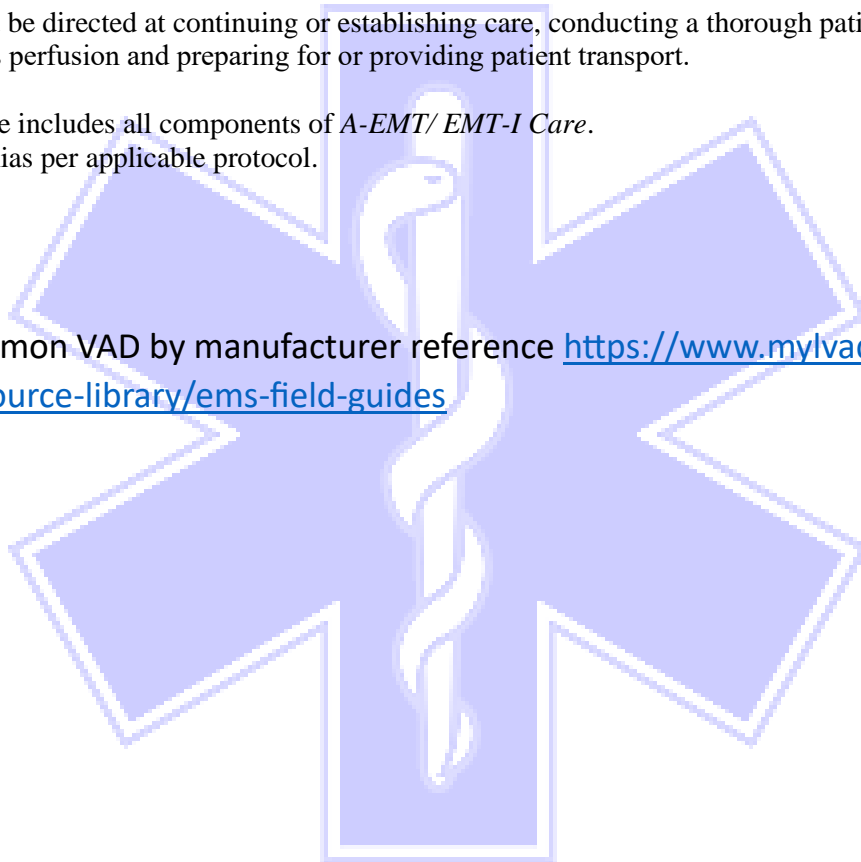
6. Be sure patient brings back up power sources (batteries, charger, etc.), and hand pump (if applicable).
7. Strongly consider transporting a VAD knowledgeable family member with patient.
8. Inspect VAD control for model name and alarms.
9. **Contact Medical Control** for guidance.

### Paramedic Care

Paramedic Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. Paramedic Care includes all components of *A-EMT/ EMT-I Care*.
2. Treat arrhythmias per applicable protocol.

Link for EMS, common VAD by manufacturer reference <https://www.mylvad.com/medical-professionals/resource-library/ems-field-guides>





## Post Return of Spontaneous Circulation Care

The period immediately following ROSC is critical to ensuring survival and good neurological outcomes. Patients who have achieved ROSC following CPR may have critical findings including hypotension, tachycardia, obtundation/comatose and inability to protect airway. It is important to address these conditions **prior** to initiating transport. Therefore, ***treating in place for a MINIMUM of 5 minutes post ROSC*** will ensure the patient's needs have been addressed and the patient is more stable for transport. It is imperative everything possible is done to avoid re-arrest.

### EMR Care

1. Render Initial care in accordance with *Routine Patient Care Protocol*
2. Continue monitoring the patient's pulse.
  - a. One provider should always have a hand on the pulse.
3. **Oxygen:** 15 L/min via NRB mask. If the patient is unable to tolerate a mask, then 6 L/min via nasal canula. BVM/ OPA at a rate of 8-12 breaths per minute as needed, do not hyperventilate.
4. Maintain control of the scene until additional support arrives.
5. Call immediately for Paramedic intercept.

### EMT Care

1. EMT Care includes all components of *Emergency Medical Responder Care*
2. Support the airway and optimize oxygenation and ventilation.
  - a. **SGA:** Target SpO2 94-98%, with ventilations between 8-12 breaths per minute. DO NOT HYPERVENTILATE.
3. **Waveform Capnography:** (if equipped)
4. **12- Lead EKG:** (if equipped) and transmit to the receiving hospital if capabilities exist.
5. **Blood glucose:** Follow appropriate protocols for hypoglycemia.
6. Monitor for seizures.

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### A-EMT/ EMT-I Care

1. A-EMT/ EMT-I Care includes all components of *EMT Care*
2. Assess airway.
  - a. **Endotracheal Intubation:** *If the patient is failing to maintain/protect their airway with current adjuncts.*
  - b. Maintain waveform capnography with ETCO<sub>2</sub> between 35-45. Avoid hypocapnia and hypercapnia.
3. Interpret 12 lead EKG and transmit to receiving hospital.
  - a. Declare prehospital STEMI if indicated on EKG.
4. Continuous Cardiac Monitoring.
5. Obtain **IV/ IO access:** (if not already performed).
  - a. Ready IVF on pressure bag.
  - b. **NS IV fluid bolus:** if hypotensive with a goal systolic blood pressure  $\geq 90$  mmHg. *Caution in the setting of CHF (Rales in lungs)*
6. Manage all dysrhythmias according to appropriate protocols.
7. Elevate the head of the bed to 30 degrees *if feasible and the patient is not hypotensive.* This can be done while ventilating.
8. Treat any seizures according to seizure protocol.

### Paramedic Care

1. Paramedic Care includes all components of *A-EMT/ EMT-I Care*
2. Prepare Norepinephrine for possible post-ROSC hypotension.
3. Initiate Norepinephrine if SBP remains  $\leq 90$ mmHg or MAP  $\leq 65$ mmHg.
4. **Norepinephrine:** MUST use 60 gtts/mL tubing.
  - Begin infusion at 4mcg/min (15 gtts/min) IO or large bore IV.
  - May increase by 4mcg/min (+15 gtts/min) every 5 min to maintain SBP>90mmHg or MAP>65mmHg.
  - Maximum rate 20mcg/min (75 gtts/min).
5. **Contact receiving hospital** as soon as possible.

### DOSING CHART BASED ON 60 GTTS/MIN TUBING

Desired Dose (mcg/min)	4 mcg/min	8 mcg/min	12 mcg/min	16 mcg/min	20 mcg/min
Drip rate (drops/min)	15 gtts/min	30 gtts/min	45 gtts/min	60 gtts/min	75 gtts/min

## Post Return of Spontaneous Circulation Care

- Norepinephrine is 4mg in 250mL of D5W (typical) giving a concentration of 16mcg/mL.
  - Norepinephrine and 60 gtt tubing must be stored together in drug bag.
  - Monitor IV site for any signs of medication extravasation. If concerns for norepinephrine extravasation, discontinue use of involved IV site (for any use) and notify receiving hospital staff of extravasation at patient handoff. Leave the IV cannula in place.
6. If the patient has S/S of Post-ROSC combativeness:
- a. **Midazolam (Versed):** 2.5mg IV/IO, Re-check vital signs 5 minutes after administration. May repeat dose one time if needed with systolic BP  $\geq$  100mmHg. Additional doses require **Medical Control order**.

### Critical Thinking Elements

- Factors influencing survival include length of time in cardiac arrest, re-arrest, and hypotension. It is therefore more important to prevent re-arrest and hypotension by providing care on the scene than transporting as soon as ROSC is achieved.
- If transport time is prolonged, consider serial EKG's as additional arrhythmias and/or ischemic changes may appear later during care.
- Hyperventilation is a significant cause of hypotension and recurrence of cardiac arrest in the post resuscitation phase and must be avoided at all costs. Titrate FiO<sub>2</sub> to maintain SpO<sub>2</sub> of  $\geq$  94%.
- Initial End tidal CO<sub>2</sub> may be elevated immediately post-resuscitation but will usually normalize. While goal is 35–45 mmHg, the patient should not be hyperventilated to achieve it.
- Remember to initiate anti-arrhythmic medication if indicated.