

**CARDIAC CARE**



MEMORIAL EMS SYSTEM  
ADULT PREHOSPITAL CARE MANUAL

## 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.
- Identifying contributing factors of the event.
- Obtaining a medical history (including medications & allergies).

Timely transportation to the emergency department is an important factor in patient outcome.

### First Responder Care

First Responder 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 noted, 15 LPM via NRM or 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress, apply pulse ox. If  $\geq 94\%$  and no signs/symptoms of respiratory distress, no Oxygen is required. If  $\leq 89\%$  apply nasal cannula at 2-6 LPM. If unable to increase  $\geq 94\%$  move to 15 LPM via NRM.

### BLS Care

BLS 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. BLS Care includes all components of *First Responder 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.**

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**Routine Cardiac Care Protocol**

**BLS Care {Continued}**

3. **Nitroglycerin (NTG):** 0.4mg SL. May repeat every **3-5 minutes** to a total of 3 doses (if systolic BP remains > 100mmHg).
  - NTG (& ASA) may be administered without contacting Medical Control if the patient is age 30 or older, has chest pain consistent with acute myocardial infarction (AMI) and has a systolic BP > 100mmHg. *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) and transmit to receiving hospital **ASAP**.
6. At any time should 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).

**ILS Care**

ILS 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 *BLS Care*.
2. Obtain **peripheral IV** access.
3. Manage pain, nausea and vomiting based on *Pain Control Protocol*.

**ALS Care**

ALS 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. ALS Care includes all components of *ILS 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, and signs of congestive heart failure.
- EKG limb leads should actually be placed **on the patient's limbs!**
- Consider carrying gowns to place the patient in during 12-lead acquisition. It will help the E.D. or cath-lab if needed.
- 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 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)

### 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.**

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**12 Lead Identified STEMI  
Declaration Protocol**

Early identification of 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.
  - a. The EKG should be performed as soon as EMS suspects a potential STEMI.
  - b. If EKG findings are suspicious of STEMI, scene time should be limited, but more importantly report to receiving facility should be completed so that arrangements can be made to take patient directly to the Cardiac Cath Lab, if needed.
  - c. **Concurrent processes of activating the Cardiac Cath Lab 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.

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## Cardiogenic Shock Protocol

Cardiogenic shock (sometimes referred to pulmonary edema or heart failure) 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 an important factor in patient outcome.

### First Responder Care

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. **Oxygen**: If respiratory distress noted, 15 LPM via NRM or 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress, apply pulse ox. If  $\geq 94\%$  and no signs/symptoms of respiratory distress, no Oxygen is required. If  $\leq 89\%$  apply nasal cannula at 2-6 LPM. If unable to increase  $\geq 94\%$  move to 15 LPM via NRM.

### BLS Care

1. BLS Care includes all components of *First Responder 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

### ILS Care

1. ILS Care includes all components of *BLS Care*.
2. Obtain **Peripheral IV** access.

### ALS Care

1. ALS Care includes all components of *ILS Care*.
2. **Dopamine**: Begin infusion at 24gtts/min (2 gtts/ 5 seconds). Increase by 12gtts/min (2 gtts/ 10 seconds) every **2 minutes** to achieve and maintain a systolic BP of at least 100mmHg. Closely monitor vital signs.
  - *Dopamine is provided premixed (400mg in 250mL D<sub>5</sub>W). This yields a concentration of 1600mcg/mL. The initial rate of infusion is 1-10mcg/kg/min which can be achieved with a 24gtts/min infusion rate.*
  - *Dopamine premix and 60 gtt tubing must be stored together in drug bag.*
3. If the patient has a cardiac dysrhythmia, treat the underlying rhythm disturbance according to the appropriate SMO.
4. **Contact receiving hospital** as soon as possible.



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**Cardiac Arrest Pit Crew CPR  
Protocol**

The successful resuscitation of patients in cardiac arrest is dependent on a systematic approach of initiating life-saving CPR and early defibrillation and transferring care to advanced life support providers in a safe, timely, and effective manner. **The majority of 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.**

**First Responder Care**

First Responder 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 ALS 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 20<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. Reminds rescuer to provide the ventilations after every 20<sup>th</sup> compression.
3. Continue based on Pit Crew CPR sequence and roles.

**BLS Care**

BLS 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. BLS care includes all of the components of *First Responder Care*.

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**Cardiac Arrest Pit Crew CPR  
Protocol**

**BLS Care (Continued)**

2. 2 minutes cycles of CPR should be continued. Ventilation via BVM is acceptable method while on scene so long as compliance is obtained.
  - a. Consider placement of OA/NA.
  - b. A Lucas II, rescue pump, or other system approved device can be implemented at any pulse check pause.
3. Place 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 ID possible ROSC

**ILS Care**

ILS 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. ILS care includes all of the components of *BLS Care*.
2. **Continue cycles of CPR.** Providers should be changed out at 2 minute interval or when not performing chest compressions.
  - a. Initial three responder positions should continue to provide the BLS Triangle care.
3. Transition from AED to ILS 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).

**ALS Care**

ALS 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. ALS care includes all of the components of *ILS Care*.
2. Determine appropriateness for transport.
3. Exercise caution so to not detract from high quality CPR and interventions in an attempt to expedite transport. There is greater potential for successful resuscitation if attention to quality supersedes a perceived need to rush to the Emergency Department. **6 rounds of high quality CPR/ care should be the goal prior to considering transport (unless prior ROSC is achieved and maintained).**
4. Place **OG tube** if time permits to relieve gastric distention (if patient is intubated or supraglottic airway is in place).

## Cardiac Arrest Pit Crew CPR Protocol

### Pearls

- If the cardiac arrest is witnessed by EMS personnel, 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; however 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 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-ALS	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</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 20 CC</li> <li>• After clear-pushes Defib button until moved to manual defib</li> </ul>	<ul style="list-style-type: none"> <li>• Count- every 20<sup>th</sup> announced</li> <li>• 2 hand seal on BVM</li> <li>• Insert Oral Airway</li> <li>• Remind 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 ILS until ALS 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 20 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 20<sup>th</sup> announced</li> <li>• 2 hand seal on BVM</li> <li>• Remind 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 20<sup>th</sup> noted</li> <li>• 2 hand seal on BVM</li> <li>• Remind 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>• 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 20<sup>th</sup> announced</li> <li>2 hand seal on BVM</li> <li>Remind 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 20<sup>th</sup> announced</li> <li>2 hand seal on BVM</li> <li>Remind 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 20<sup>th</sup> counted</li> <li>2 hand seal on BVM</li> <li>Remind 1/2 to ventilate during upstroke of CC</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, completed 12 Lead ASAP</li> </ul>
Repeat	As	Needed	Repeat	As	Needed	Repeat

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**Cardiac Arrest Pit Crew CPR  
Protocol**

Assumptions

- BLS CPR is the priority. ILS/ALS interventions begin when qualified personnel arrive and movement to ILS/ALS interventions will not detract from BLS CPR.
- Patient remains in cardiac arrest. If no shock indicated, 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.
- Pit Crew CPR Algorithm is designed based on AHA guidelines, but supersedes AHA ratios to improve upon the quality of CPR given in the minutes after initial arrest.
- 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 ALS 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 patient based on appropriate protocol.

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 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. 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).

Pearls

- **Should ROSC be achieved and the patient is combative, follow Chemical Restraint Protocol 18.B.2**

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**Resuscitation of Pulseless  
Rhythms Protocol**

The successful resuscitation of patients in cardiac arrest is dependent on a systematic approach to resuscitation. ACLS medications are an important 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 BLS providers understand the value of effective CPR and an ALS intercept in providing the patient with ACLS therapy.

**First Responder Care**

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

**BLS Care**

Not applicable. BLS 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)**

**ILS 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 ALS intercept and transport when resources are available.

**ALS Care**

1. ALS Care includes all components of *ILS 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 ALS Care. Treat based on appropriate protocol. Contact the receiving hospital as soon as possible.

## Resuscitation of Pulseless Rhythms Protocol

### Pulseless Electrical Activity

#### ILS 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 ALS intercept and transport when resources are available.

#### ALS Care

1. ALS Care includes all components of *ILS Care*.
2. **Sodium Bicarbonate**: 50meq IV/IO if known tricyclic antidepressant (TCA) overdose, known Aspirin (ASA) overdose or patient suffers from chronic renal failure.
3. **Needle chest decompression** for a patient in *traumatic* cardiac arrest with suspected tension pneumothorax.
4. Search for a treat possible causes.
5. Be alert for changes in patient condition that require additional ALS Care. Treat based on appropriate protocol. Contact the receiving hospital as soon as possible.

### Asystole

#### ILS 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. Consider “cease efforts” order (see *Resuscitation vs. Cease Efforts Policy*).
6. Initiate ALS intercept and transport as resources are available.



## Resuscitation of Pulseless Rhythms Protocol

### Asystole (Continued)

### ALS Care

7. ALS Care includes all the components of *ILS Care*.
8. **Sodium Bicarbonate**: 50meq IV/IO if known tricyclic antidepressant (TCA) overdose, known Aspirin (ASA) overdose or patient suffers from chronic renal failure.
9. Search for a treat possible causes.
10. Consider “cease efforts” order (see *Resuscitation vs. Cease Efforts Policy*).
11. Contact the receiving hospital as soon as possible.
12. Be alert for changes in patient condition that require additional ALS 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.).
- A 20mL fluid bolus should be given after each drug administration to flush the IV line.
- **If the cardiac arrest is witnessed by EMS personnel, start CPR and defibrillate immediately after Fast Patches or Quick Combos are placed for V-fib/pulseless V-tach.**

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## 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 an important 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).

### First Responder Care

First Responder 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 noted, 15 LPM via NRM or 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress, apply pulse ox. If  $\geq 94\%$  and no signs/symptoms of respiratory distress, no Oxygen is required. If  $\leq 89\%$  apply nasal cannula at 2-6 LPM. If unable to increase  $\geq 94\%$  move to 15 LPM via NRM.

### BLS Care

BLS 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. BLS Care includes all components of *First Responder 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 combo defib/pace pads.
5. Apply **Waveform Capnography** (if equipped)

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**Unstable Bradycardia  
Protocol**

**ILS Care**

ILS 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. ILS Care includes all components of *BLS Care*.
2. **IV Fluid Therapy:** 500mL fluid bolus's to achieve and maintain BP > 100 mmHg .
3. Initiate ALS intercept and transport as soon as possible. (*Transport can be initiated at any time during this sequence*).
4. Contact receiving hospital (or Medical Control if needed) as soon as possible.
5. If stable: monitor for worsening symptoms. Do not provide aggressive treatment.
6. If unstable: treat to correct cause of symptoms
7. **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.

**ALS Care**

ALS 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. ALS Care includes all components of *ILS Care*.
2. Repeat assessment to determine patient stability to determine degree of EMS care.
3. **Immediate Transcutaneous Pacing:** 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).
  - Target heart rate should be set at **70 bpm**.
  - Current should be set at minimum to start and increased until capture is achieved.
  - Refer to the *Transcutaneous Pacing Procedure* for additional information and transition of care process.
4. **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**.

## Unstable Bradycardia Protocol

### ALS Care {Continued}

5. **Dopamine:** If the patient remains hypotensive. Begin infusion at 24gtts/min. Increase by 12gtts/min every **2 minutes** to achieve and maintain a systolic BP of at least 100mmHg. Closely monitor vital signs.
  - Dopamine is provided premixed (400mg in 250mL D<sub>5</sub>W). This yields a concentration of 1600mcg/mL. The initial rate of infusion is 1-10mcg/kg/min which can be achieved with a 24gtts/min infusion rate.
  - Dopamine premix and 60 gttp tubing must be stored together in drug bag.
6. Transport as soon as possible (*Transport can be initiated at any time during this sequence*).
7. 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.

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## 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 an important 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 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.

### First Responder Care

First Responder 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 noted, 15 LPM via NRM or 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress, apply pulse ox. If  $\geq 94\%$  and no signs/symptoms of respiratory distress, no Oxygen is required. If  $\leq 89\%$  apply nasal cannula at 2-6 LPM. If unable to increase  $\geq 94\%$  move to 15 LPM via NRM.

### BLS Care

BLS 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. BLS Care includes all components of *First Responder 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 ALS intercept and transport as soon as possible.

### ILS Care

ILS 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. ILS Care includes all components of *BLS 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

### ILS Care {Continued}

5. **Vagal Maneuvers:** if the patient is alert and oriented, has a systolic BP greater than 100mmHg, has a HR greater than 150bpm 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 (Adenocard):** 6mg IV {rapid IV push} (**with Medical Control order only**) if the patient is alert and oriented, has a systolic BP greater than 100mmHg, has a HR greater than 150bpm 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**).

### ALS Care

ALS 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. ALS Care includes all components of *ILS Care*.
2. **Adenosine (Adenocard):** 6mg IV {rapid IV push} if the patient is alert and oriented, has a systolic BP greater than 100mmHg, has a HR greater than 150bpm 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 Adenocard, be prepared for immediate defibrillation if the rhythm converts to v-fib.**
- **DO NOT administer Adenocard if the heart rate is < 150 bpm without consulting Medical Control.**

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## 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 an important 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.

### First Responder Care

First Responder 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 noted, 15 LPM via NRM or 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress, apply pulse ox. If  $\geq 94\%$  and no signs/symptoms of respiratory distress, no Oxygen is required. If  $\leq 89\%$  apply nasal cannula at 2-6 LPM. If unable to increase  $\geq 94\%$  move to 15 LPM via NRM.

### BLS Care

BLS 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. BLS Care includes all components of *First Responder 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 ALS intercept and transport as soon as possible.

### ILS Care

ILS 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. ILS Care includes all components of *BLS 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

### ALS Care

ALS 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. ALS Care includes all components of *ILS Care*.
2. If stable: monitor for worsening symptoms. Do not provide aggressive treatment, treat pharmacologically.
3. **If stable, Amiodarone:** 150 mg/10min IV. (Draw contents of 1 vial (150 mg) Amiodarone and inject into 100 mLs of D5W. Do NOT over agitate when mixing. Hang bag and infuse at 618 mLs/ hr. Using filter provided. The infusion should run at 5 gtts/ 2 seconds with 15 gtt tubing or 5 gtts/ 3 seconds with 10 gtt tubing.) **(Medical Control Only). 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.**



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**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.

**First Responder Care**

First Responder 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 noted, 15 LPM via NRM or 6 LPM via nasal cannula.
  - a. If no obvious respiratory distress, apply pulse ox. If  $\geq 94\%$  and no signs/symptoms of respiratory distress, no Oxygen is required. If  $\leq 89\%$  apply nasal cannula at 2-6 LPM. If unable to increase  $\geq 94\%$  move to 15 LPM via NRM.

**BLS Care**

BLS 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. BLS Care includes all components of *First Responder Care*.
2. Initiate ALS intercept and transport as soon as possible.
3. Apply **Waveform Capnography** (if equipped)

**ILS Care**

ILS 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. ILS Care includes all components of *BLS Care*.
2. Obtain **IV/ IO access**.
3. Initiate ALS 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*.

**ALS Care**

ALS 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. ALS Care includes all components of *ILS Care*.
2. Treat arrhythmias per applicable protocol.

## Implanted Cardiac Defibrillator (AICD) Protocol

### ALS Care {Continued}

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.

## Cardioversion Procedure

Electrical cardioversion is the therapy of choice for hemodynamically unstable ventricular or supraventricular tachydysrhythmias with a pulse. Synchronization of the delivered energy reduces the potential for induction of V-fib that can occur when electrical energy impinges on the relative refractory period of the cardiac cycle.

1. Apply Quick Combo pads or Fast Patches according to protocol and apply regular limb leads.
2. Push the synchronize sensor button on the defibrillator.
3. Confirm that the monitor is sensing “R” waves on the monitor screen (this is denoted by the darker mark on the screen with each complex).
4. Select the appropriate energy setting\*\*.
5. Press the charge button.
6. Depress the discharge buttons simultaneously and wait for the shock to be delivered.
7. Note the rhythm and treat according to the appropriate protocol.
8. If the patient becomes pulseless at any time, turn off the synchronizer circuit and refer to the *Resuscitation of Pulseless Rhythms Protocol*.

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

### Critical Thinking Elements

- **The energy levels vary in accordance with protocol for the presenting rhythm.**
- **Administration of *Versed* IV/IO/IN may be necessary.**
- **Most monitors are programmed so that the synchronize function reverts to defibrillation after the countershock is delivered. Providers must ensure they know the programming of the monitors they work with.**
- **There may be a delay between pressing the discharge buttons and delivery of the countershock due to the synchronization process.**
- **You must apply the limb leads so the monitor can sense the rhythm and deliver the shock at the same time.**

## Transcutaneous Pacing (TCP) Procedure

Transcutaneous pacing (TCP) is used to deliver an electrical stimulus to the heart that acts as a substitute for the heart's conduction system and is intended to result in cardiac depolarization and myocardial contraction.

TCP should be utilized for patients with symptomatic bradycardia, namely Type II 2<sup>nd</sup> Degree AV Block and 3<sup>rd</sup> Degree AV Block (Complete Heart Block).

1. Confirm the presence of the arrhythmia and the patient's hypoperfusion status.
2. Initiate *Routine ALS Care*, including application of the cardiac monitor using the regular limb leads.
3. Apply the pacing pads to the patient using anterior-posterior placement. Place the negative electrode on the anterior chest between the sternum and left nipple (the upper edge of the pad should be below the nipple line). Place the positive electrode on the left posteriorly to the left of the spine beneath the scapula.
4. Activate the pacer mode and observe a marker on each QRS wave. If the marker is not present, adjust the EKG size.
5. Set the target rate at **70 bpm**.
6. Set the current at **minimum** to start.
7. Activate the pacer and observe pacer spikes.
8. Increase the current slowly until there is evidence of electrical and mechanical capture.
9. Palpate patient's pulse and check BP.
10. If the patient is conscious, you may administer **Versed** 2mg IV/IO for patient comfort. (Intranasal Versed may be administered if IV/IO not available—see dosing sheet)
11. Document the patient's rhythm, vitals & tolerance of pacing and report the results to Medical Control.
12. Once successfully initiated, TCP is not to be stopped until receiving facility **ensures** that they have equipment in place to transition. This should be a coordinated effort. If at all possible, continue to utilize the monitor with which capture occurred.

### Critical Thinking Elements

- **Remember to evaluate the effectiveness of external pacing by assessing the electrical capture (presence of pacer spikes on the EKG) and mechanical capture (presence of a pulse).**
- **TCP may also be effective for a patient in asystole if performed EARLY.**