

## **PROTOCOL**

### **Routine Cardiac Care**

#### **Chest Pain – Acute Coronary Syndrome with perfusing cardiac rhythm**

##### **Overview:**

Chest pain, suspicious of cardiac origin, includes signs and symptoms of: substernal pain, heaviness, tightness, or discomfort in the chest; radiation of pain or discomfort in the jaw, shoulders and arms. Associated signs and symptoms may include nausea, vomiting, and diaphoresis. Patients 35 years of age and older have increased risk factors. Priorities in the care of chest pain include securing ABC's, determining the quality and severity of distress, contributing factors, and obtaining a medical and medication history including that of illicit drugs. Timely transport to the emergency department chest pain center is an important factor in patient outcome.

**First Responder Care** should be focused on assessing the situation and initiating care to reassure the patient, reduce the patient's discomfort and begin treating for shock.

1. Render initial care in accordance with *Routine Patient Care Protocol*
2. **OXYGEN:** preferably at 15 L/min by mask, if the patient does not tolerate mask, then administer 4-6 L by nasal cannula.

**BLS/ILS/ALS Care** should be directed at conducting a thorough patient assessment, providing care to reassure the patient, reduce discomfort, begin treating for shock, and preparation of the patient for transportation.

1. Render initial care in accordance with the Routine Patient Care Protocol (ILS/ALS may initiate IV line)
2. **OXYGEN:** preferably at 15 L/min by mask, if the patient does not tolerate mask, then administer 4-6 L by nasal cannula.
3. Obtain 12 lead EKG as soon as practical, preferably in the first 5 minutes after arrival to patient's side.
4. **BLS/ILS:** If the interpretation on the 12 lead EKG tracing obtained reads "**Acute MI**", refer to the **CHEST PAIN/STEMI** treatment.
5. **PARAMEDIC ONLY:** If ST-elevation myocardial infarct, new left bundle branch block is noted, refer to **STEMI and Destination Determination Protocol**.
6. If patient has a bifasicular block, apply pacer pads and monitor closely.
7. **ASPIRIN, NITROGLYCERIN: (BLS, ILS, and ALS)**
  - a. Ask the patient specifically about any history of sensitivity to aspirin. *Do not* give aspirin to patients with active bleeding ulcer disease, aspirin induced asthma, or known allergy to aspirin. Ask if patient normally takes aspirin and when dose taken last.
  - b. **BLS/ILS/ALS Administer Aspirin, 4 - 81mg tablets (total 324 mg aspirin):** chewable tablets by mouth. Give a total of 324mg utilizing knowledge of what patient has already taken.

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- c. Ask the patient specifically about any use of erectile dysfunction agents (Viagra, and Levitra) in the last 24 hours or Cialis in the prior 48 hours. **DO NOT GIVE NITROGLYCERIN to patients taking these medications in this time frame as this may cause irreversible drop in blood pressure.** Nitroglycerin may be given prior to contacting Medical Control in patients over age 35 years, have pain consistent with acute MI, and have a systolic blood pressure 100 mmHg or greater. If the patient does not meet criteria, contact medical control prior to administration of nitroglycerin.
  - d. **BLS/ILS/ALS: BLS may assist the patient in taking their own, prescribed nitroglycerin.** Administer one **nitroglycerin 0.4 mg tablet or metered-dose spray sublingual.** May repeat every 3-5 minutes if systolic blood pressure remains >100 mmHg.
  - e. **PARAMEDIC ONLY:** may also consider administration of IV nitroglycerin in place of sublingual at a dose of 5-10 mcg/min and titrate to effect. May increase the nitroglycerin drip in 10 mcg/min increments if BP remains >100 mmHg.
8. **MORPHINE SULFATE (ALS ONLY)**  
Administer **morphine sulfate 2-4 mg IV.** May repeat in 2 mg increments every 5 minutes as necessary to control pain to a total of 10 mg if SBP >100 mmHg. Medical control should be contacted after the administration of 10 mg.
- OR: (Manitowoc Fire Department, Valders Fire Department Ambulance Service only)**
9. **DILAUDID (HYDROMORPHONE) (PARAMEDIC ONLY)**  
Administer **Dilaudid 0.5 mg IV.** May repeat in 0.5mg increments every 5 minutes as necessary to control pain to a total of 1.0mg if SBP > 100 mmHg. Medical control should be contacted after the administration of 1.0 mg.
10. **FENTANYL (ALS ONLY)**  
Administer **50-100 mcg of fentanyl IV** in patients experiencing pain who have a morphine allergy, asthma, or those patients whose blood pressure is labile (<100 mmHg).
10. Transport as soon as practical. Transportation can be initiated at any time during this sequence.

**PROTOCOL  
ST-Elevation Myocardial Infarction (STEMI) with perfusing cardiac rhythm**

**Overview:**

Chest pain, suspicious of cardiac origin, includes signs and symptoms of: substernal pain, heaviness, tightness, or discomfort in the chest; radiation of pain or discomfort in the jaw, shoulders and arms. Associated signs and symptoms may include nausea, vomiting, and diaphoresis. Patients 35 years of age and older have increased risk factors. Priorities in the care of chest pain include securing ABC's, determining the quality and severity of distress, contributing factors, and obtaining a medical and medication history including that of illicit drugs. Timely transport to the emergency department chest pain center is an important factor in patient outcome.

**First Responder Care** should be focused on assessing the situation and initiating care to reassure the patient, reduce the patient's discomfort and begin treating for shock.

1. Render initial care in accordance with *Routine Patient Care Protocol*
2. **OXYGEN:** preferably at 15 L/min by mask, if the patient does not tolerate mask, then administer 4-6 L by nasal cannula.

**BLS/ILS/ALS Care** should be directed at conducting a thorough patient assessment, providing care to reassure the patient, reduce discomfort, begin treating for shock, and preparation of the patient for transportation.

11. Render initial care in accordance with the Routine Patient Care Protocol (ILS/ALS my initiate IV line)
12. **OXYGEN:** preferably at 15 L/min by mask, if the patient does not tolerate mask, then administer 4-6 L by nasal cannula.
13. Obtain 12 lead EKG as soon as practical, preferably in the first 5 minutes after arrival to patient's side.
14. **BLS/ILS:** If the interpretation on the 12 lead EKG tracing obtained reads "**Acute MI**", refer to the **CHEST PAIN/STEMI Treatment and Destination Flow Chart**.
15. **ASPIRIN, NITROGLYCERIN, PLAVIX, METOPROLOL: (BLS, ILS, and ALS)**
  - a. Ask the patient specifically about any history of sensitivity to aspirin. *Do not* give aspirin to patients with active bleeding ulcer disease, aspirin induced asthma, or known allergy to aspirin. Ask if patient normally takes aspirin and when dose taken last.
  - b. **BLS/ILS/ALS Administer Aspirin, 4- 81mg tablets (total 324 mg aspirin):** chewable tablets by mouth. Give a total of 324mg utilizing knowledge of what patient has already taken.
  - c. Ask the patient specifically about any use of erectile dysfunction agents (Viagra, and Levitra) in the last 24 hours or Cialis in the prior 48 hours. **DO NOT GIVE NITROGLYCERIN to patients taking these medications in this time frame as this may cause irreversible drop in blood pressure.** Nitroglycerin may be given prior to contacting Medical Control in patients over age 35 years, have pain consistent with acute MI, and have a systolic blood pressure 100 mmHg or greater. If the patient does not meet criteria, contact medical control prior to administration of nitroglycerin.

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**ST-Elevation Myocardial Infarction (STEMI) with perfusing cardiac rhythm**

- d. **BLS/ILS/ALS: BLS may assist the patient in taking their own, prescribed nitroglycerin.** Administer one **nitroglycerin 0.4 mg tablet or metered-dose spray sublingual.** May repeat every 3-5 minutes if systolic blood pressure remains >100 mmHg.
- e. **PARAMEDIC ONLY:** may also consider administration of **IV nitroglycerin** in place of sublingual at a dose of 5-10 mcg/min and titrate to effect. May increase the nitroglycerin drip in 10 mcg/min increments if BP remains >100 mmHg.
- f. **PARAMEDIC ONLY** – Administer **Plavix (clopidogrel) 600 mg tablets** by mouth. ***Do not give if patient has a Plavix prescription, anemia, or back or abdominal pain. Call medical control prior to administration if transport will be to a Manitowoc or Brown County Medical Facility. Administer without medical control if transport to Theda Clark or Appleton Medical Center.***

**16. MORPHINE SULFATE (ALS only)**

Administer **morphine sulfate 2-4 mg IV.** May repeat in 2 mg increments every 5 minutes as necessary to control pain to a total of 10 mg if SBP >100 mmHg. Medical control should be contacted after the administration of 10 mg.

**OR: (Manitowoc Fire Department, Valders Fire Department Ambulance Service only)**

**17. DILAUDID (HYDROMORPHONE) (PARAMEDIC ONLY)**

Administer **Dilaudid 0.5 mg IV.** May repeat in 0.5mg increments every 5 minutes as necessary to control pain to a total of 1.0mg if SBP > 100 mmHg. Medical control should be contacted after the administration of 1.0 mg.

**18. FENTANYL (PARAMEDIC ONLY)**

Administer **50-100 mcg of fentanyl IV** in patients experiencing pain who have a morphine allergy, asthma, or those patients whose blood pressure is labile (<100 mmHg).

**19. PARAMEDIC ONLY** – If the patient complains of chest discomfort and has hypertension (SBP> 140) or tachycardia, administer **Metoprolol 5 mg slow IV push over 2-5 minutes at 5 minute intervals to a total of 15 mg.** Discontinue administration if BP falls below 100 mmHg or heart rate drops below 60 beats per minute. **Requires Direct Order from medical Control Physician.**

9. Transport as soon as practical, initiate transport at any time during this sequence.

## **PROTOCOL**

### **ST-Elevation Myocardial Infarction (STEMI) with perfusing cardiac rhythm**

#### ST Elevation Myocardial Infarction (STEMI) Destination Determination

1. ST segment elevation or new left bundle branch block (LBBB)
  - a. Inform patient about cardiac catheterization
  - b. Consult medical control regarding most appropriate hospital (if possible, transmit 12 lead EKG)
  - c. Transport to a tertiary hospital with cardiac catheterization expertise and cardiovascular surgery availability per medical control. If possible transmit 12 lead EKG to receiving hospital.
  - d. Consider use of medical helicopter for patients with a transport time of >30 minutes to an appropriate medical facility.
2. ST segment depression/dynamic T-wave inversion strongly suspicious for ischemia
  - a. Consult medical control, if possible, transmit 12 lead EKG
  - b. Transport to appropriate hospital per medical control
  - c. Repeat 12 lead EKG every 5 minutes
3. Nondiagnostic or normal EKG
  - a. Transport to patient's requested hospital
  - b. Repeat 12 lead EKG every 5 minutes

#### **Critical Thinking Elements**

- Initiate ALS intercept of the patient's chest pain is not eliminated after initial oxygen and Nitroglycerin therapy.
- Quick combo or Fast Patch pads should be applied if the patient has altered level of consciousness, significant diaphoresis, signs of hypoxia, bradycardia, 2<sup>nd</sup> or 3<sup>rd</sup> degree heart block more than one block noted on EKG, or hypotension.
- Consider the patient to be in cardiogenic shock if the patient has dyspnea, systolic blood pressure, less than 100mmHg signs of CHF or diaphoresis.
- Administration of aspirin and nitroglycerin should not be withheld due to a delay in IV access if the patient is hemodynamically stable.
- Indication for performing a 12 lead EKG include chest pain, epigastric pain, dyspnea, syncope, cardiogenic shock, and pulmonary edema.
- Pulse oximeter analysis is a tool in determining the degree of patient distress and the effectiveness of EMS interventions. A high pulse oximeter reading should be a factor in withholding oxygen therapy. Apply end-tidal CO<sub>2</sub> in conjunction with pulse oximeter to assess the patient's respiratory perfusion.
- Nitroglycerin that the patient self-administered prior to EMS arrival should be reported to Medical control. Subsequent doses should be provided from EMS stock. Medical control should be contacted prior to administering nitroglycerin and aspirin if the patient is younger than 35 years of age or has uncharacteristic AMI pain, or has a SBP<100mmHg
- Beta blockers block sympathetic activity and stimulation of the heart rate and vasoconstriction

**PROTOCOL**  
**Cardiogenic Shock**  
**(Chest Pain with Hypotension)**

**Overview:** Cardiogenic shock occurs when the “pump” component of perfusion begins to fail. The signs and symptoms of cardiogenic shock includes; pain, heaviness, tightness or discomfort in the chest with hypotension (systolic blood pressure lower than 100); pedal edema; rales or “wet” lung sounds and shortness of breath. Associated signs and symptoms of shock may include nausea, vomiting and diaphoresis. Patients with cardiac (AMI) or congestive heart failure (CHF) history have increased risk factors. Priorities in care of the cardiogenic shock patient include securing ABCs, determining the quality and severity of distress, identifying contributing factors of the event and obtaining a medical and medication history. Timely transportation to the emergency department is an important factor in patient outcome.

**First Responder Care and BLS (NT) 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: preferably 15 L/min by mask.** If the patient does not tolerate a mask, then administer 4-6 L/min by nasal canal. Be prepared to support the patient’s respirations with ventilation via bag-valve-mask.

**BLS/ILS and ALS Care** should be directed at conducting a thorough patient assessment, initiating Routine Cardiac Care to treat for shock and preparing or providing patient transportation.

1. Render initial care in accordance with the Routine Patient Care Protocol (ILS/ALS initiate IV line)
2. **Oxygen: preferably 15 L/min by mask.** If the patient does not tolerate a mask, then administer 4-6 L/min by nasal cannula. Be prepared to support the patient’s respirations with ventilation via bag-valve-mask.
3. **IV Fluids:** ILS and ALS Units
  - a. Administer a **200-300 cc Normal Saline** bolus if lungs are clear.
4. **DOPAMINE:** (Paramedic Units)
  - a. **CONTACT MEDICAL CONTROL**, for orders to administer a **Dopamine infusion.** Dopamine is provided premixed (400 mg) in 250cc D5W solution. This yields a concentration of 1600mcg/ml. The initial rate of infusion is 1 – 10mcg/kg/minute, which can be obtained with a 24gtts/minute-infusion rate. Begin infusion at 24gtts/min and increase by 12gtts/min every 2 minutes to achieve and maintain a systolic BP of at least 100mmHg. Closely monitor vital signs.

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**Cardiac Care**

5. If patient has a cardiac dysrhythmia, treat the underlying rhythm disturbance according to the appropriate procedure.
6. Transport as soon as possible. Transportation can be initiated at any time during this sequence.

**PROTOCOL**  
**Cardiopulmonary Arrest**

**Overview:** The successful resuscitation of patients in cardiopulmonary 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 timely manner. The majority of adults who survive non-traumatic cardiac arrest were resuscitated from ventricular fibrillation with defibrillation. The primary factor for successful defibrillation and resuscitation is decreasing the time interval from onset of cardiac arrest to defibrillation and advanced life support.

**First Responder Care** should be focused on confirming the patient is in cardiopulmonary arrest and in need of CPR. Resuscitative efforts should be initiated by opening the airway, initiating ventilation's and chest compressions while attaching a defibrillator. It is important to assure CPR is being performed correctly.

1. Determine unresponsiveness. Confirm transporting unit and ALS has been activated and in route.
2. Maintain patent airway and assess breathing. If patient is not breathing, give two (2) rescue breaths with BSI (barrier device, etc.).
3. Check for pulse (10 seconds). If no pulse, begin chest compressions and ventilation (CPR).
4. There should always be a strong sense of urgency to access and apply an AED to determine if defibrillation is needed.
5. Continue CPR until the AED is attached and turned on. CPR should be performed for 2 minutes prior to AED use unless the patient goes into cardiac arrest in front of you (this is a witnessed cardiac arrest). If witnessed cardiac arrest proceed immediately to AED use and early defibrillation if indicated.
6. Stop CPR when the AED is analyzing.
7. Initiate Analyze / Defibrillation mode
8. If AED indicates SHOCK ADVISED, call out "CLEAR", check for safety of others, and push the shock button (or stand clear if the AED device does not require shock activation).
9. Resume CPR immediately for 5 cycles. Secure airway with Combitube (if properly trained). Check for pulse and analyze rhythm with AED.
10. If no shock advised resume CPR immediately. Check rhythm every 5 cycles. Continue until ALS providers take over or victim starts to move.
11. If patient has pulse, give 1 breath every 5-6 seconds. Recheck pulse every 2 minutes.
12. Complete all necessary AED documentation and submit to Medical Director.

**BLS Units** should focus on maintaining the continuity of care by confirming the patient is in cardiac arrest and continuing resuscitative efforts initiated by the first responders. ALS intercept should be initiated as soon as possible.

1. BLS transport care includes all the components of First Responder Care.
2. Shocks delivered to the patient prior to the transporting unit's arrival should be taken into consideration during the transition of care. Transporting crews may want to utilize the AED equipment used by the non-transporting first responders if circumstances allow for exchange of equipment or personnel ride-along.
3. Secure airway with Combitube.
4. Prompt transport. Initiate ALS intercept. Contact Medical Control

**ILS Units** should focus on maintaining the continuity of care by confirming the patient is in cardiac arrest and continuing resuscitative efforts initiated by the first responders.

**ALS intercept should be initiated as soon as possible**

1. ILS care includes all the components BLS Care.
2. ILS (I99) units with manual defibrillators:
3. Apply Quick-Combo pads or Fast Patches.
4. Evaluate rhythm
5. If VF or Pulseless V-Tach, Immediately **DEFIBRILLATE with 360 joules** (or 200 joules biphasic equivalent)
6. Resume CPR and continue with Cardiopulmonary Arrest Protocol.
7. Use Combitube to obtain airway control and provide ventilation rate of 6-8 per-minute with high-flow oxygen.
8. Initiate an IV at TKO rate.

**ALS Units** should focus on maintaining the continuity of care by confirming the patient is in cardiac arrest and continuing resuscitative efforts initiated by the first responders. Timely contact with Medical Control is an important factor in transition of care to the hospital staff.

1. ALS care includes all the components of ILS care.
2. Identify and treat cardiac dysrhythmias according to appropriate protocols.
3. If airway has been secured with Combitube prior to ALS arrival, confirmation of placement needed. If no airway has been secured, proceed with endotracheal tube or Combitube placement.
4. Shocks delivered to the patient prior to ALS arrival should be taken into consideration during the transition of care. ALS crews may want to utilize the AED equipment and personnel for subsequent defibrillations.

**Critical Thinking Elements:**

- Do not touch, ventilate or cause motion of the patient while the AED is analyzing.
- Do not exceed 6 shocks without contacting medical control.
- The “Push Analyze” or “Check Patient” voice prompt should be ignored while performing CPR.
- Patients with implanted pacemakers or implanted defibrillators are treated the same as any other patient. Do not place the electrodes on the pacemaker or implanted defibrillator site.
- Treat the patient, not the monitor. A rhythm present on the monitor screen should not be used to determine the 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, begin CPR and load-&-go if the patient is to be resuscitated.
- When changing to ALS monitoring equipment, attach defibrillation cables prior to disconnecting the AED.
- The pre-hospital goal of resuscitating cardiac arrest is to return the patient to a perfusing rhythm and providing stabilizing treatment enroute. Once “first-line” electrical and pharmacological treatments are attempted, the patient should be transported, without delay, to the closest appropriate hospital. Medical Control should be contacted as soon as possible to confirm ALS treatment plans.
- Resuscitation and treatment decisions are based on the duration of the arrest, physical exam and the patient’s medical history.
- Consider underlying etiologies and treat according to appropriate protocols.

**American Heart Association Summary of Basic Life Support for Infants, Children,  
and Adults**

**Manitowoc County EMS Association Prehospital Care Manual**  
**Cardiac Care**

Summary of BLS AED maneuvers for infants, children, and adults (wherein information not included)

Maneuver	Adult Lay rescuer: ≥8 years HCP: Adolescent and older	Child Lay rescuers: 1 to 8 years HCP: 1 year to adolescent	Infant Under 1 year of age
<b>Airway</b>	Head tilt–chin lift (HCP: suspected trauma, use jaw thrust)		
<b>Breathing</b> Initial	2 breaths at 1 second/breath	2 effective breaths at 1 second/breath	
<b>HCP:</b> Rescue breathing without chest compressions	10 to 12 breaths/min (approximate)	12 to 20 breaths/min (approximate)	
<b>HCP:</b> Rescue breaths for CPR with advanced airway	8 to 10 breaths/min (approximately)		
Foreign-body airway obstruction	Abdominal thrusts		Back slaps and chest thrusts
<b>Circulation</b> <b>HCP:</b> Pulse check (≤10 sec)	Carotid		Brachial or femoral
Compression landmarks	Lower half of sternum, between nipples		Just below nipple line (lower half of sternum)
Compression method Push hard and fast Allow complete recoil	Heel of one hand, other hand on top	Heel of one hand or as for adults	2 or 3 fingers HCP (2 rescuers): 2 thumb–encircling hands
Compression depth	1½ to 2 inches	Approximately one third to one half the depth of the chest	
Compression rate	Approximately 100/min		
Compression-ventilation ratio	30:2 (one or two rescuers)	30:2 (single rescuer) HCP: 15:2 (2 rescuers)	
<b>Defibrillation</b> AED	Use adult pads Do not use child pads	Use AED after 5 cycles of CPR (out of hospital). Use pediatric system for child 1 to 8 years if available  <b>HCP: For sudden collapse (out of hospital) or in-hospital arrest use AED as soon as available.</b>	No recommendation for infants <1 year of age

*Note:* Maneuvers used by only Healthcare Providers are indicated by “HCP.”

### BLS Algorithm

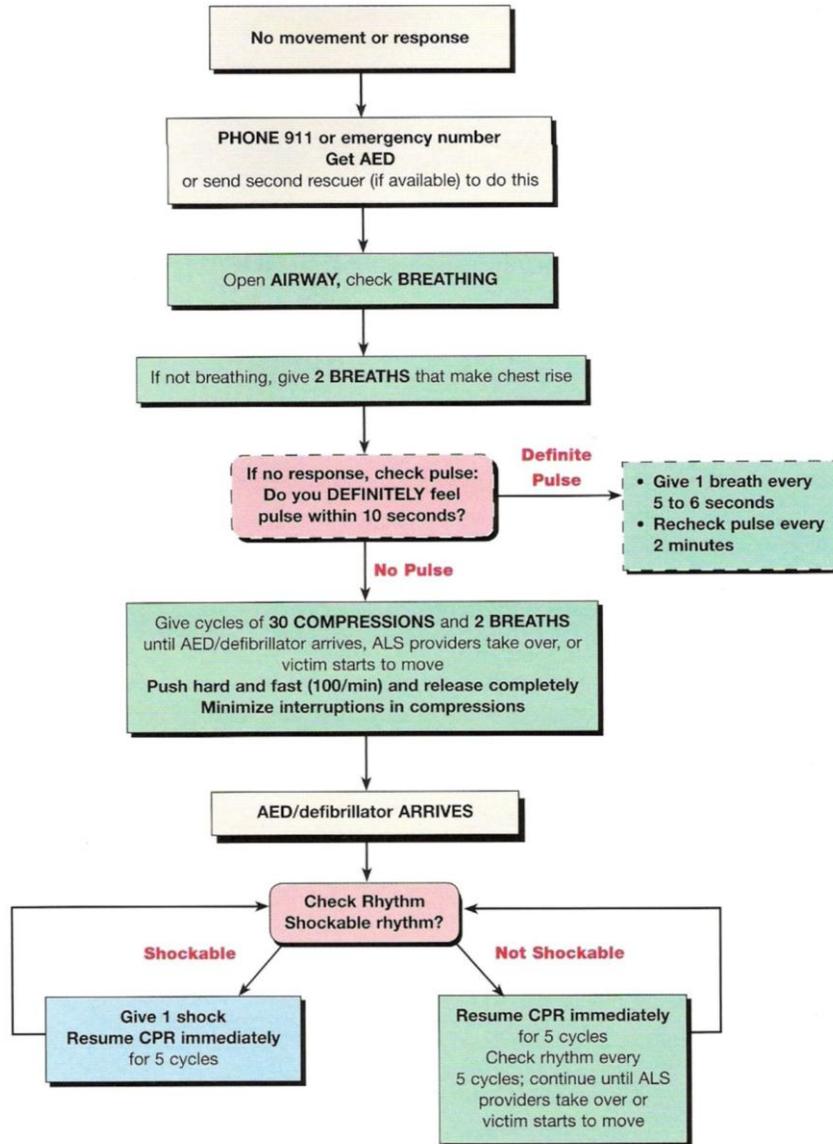


Figure 7. Adult BLS Algorithm.

### **During CPR**

- Push hard and fast (100/min)
- Ensure full chest recoil
- Minimize interruptions in chest compressions
- One cycle of CPR: 30 compressions then 2 breaths; 5 cycles approximately every 2 minutes
- Avoid hyperventilation
- Secure airway and confirm placement
  - After and advanced airway is placed, rescuers no longer deliver cycles of CPR. Give continuous chest compressions without pauses for breaths. Give 8 to 10 breaths/minute. Check rhythm every 2 minutes
- Rotate compressors every 2 minutes with rhythm checks
  
- Search for and treat possible contributing factors:
  - Hypovolemia
  - Hypoxia
  - Hydrogen ion (acidosis)
  - Hypo/Hyperkalemia
  - Hypoglycemia
  - Hypothermia
  - Toxins
  - Tamponade, cardiac
  - Tension pneumothorax
  - Thrombosis
  - Trauma

**PROTOCOL**  
**ALS Resuscitation of Pulseless Rhythms**

**Ventricular Fibrillation**  
**Ventricular Tachycardia without a pulse**  
**Pulseless Electrical Activity (PEA)**  
**Asystole**

**Overview:** The successful revival of patients in cardiopulmonary 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 or defibrillation has not been successful in converting ventricular fibrillation. It is important BLS and ILS providers understand the value of ALS intercept in providing the patient with ACLS therapy.

**First Responder / BLS and ILS (Advanced EMT)** crews are not equipped with ACLS medications and shall treat the cardiac arrest patient in accordance with the Cardiopulmonary Arrest protocol. **ALS (Paramedic & Intermediate (199)) crews** proceed as follows:

**Ventricular Fibrillation and Ventricular Tachycardia without a Pulse**

1. Initiate Cardiopulmonary Arrest Protocol.
2. Manual Defibrillation.
  - a. Apply Quick-Combo pads or Fast Patches.
  - b. Evaluate rhythm
    - i. If VF or Pulseless V-Tach, Immediately **DEFIBRILLATE with 360 joules** (or biphasic 200 joules).
3. Resume CPR and continue with Cardiopulmonary Arrest Protocol.
4. Administer 5 cycles of CPR.
5. Check rhythm. If shockable: **DEFIBRILLATE with 360 Joules** (monophasic) or 200 Joules (biphasic).
6. Resume CPR immediately after the shock. When IV/IO available, give vasopressor during CPR (before or after the shock):
  - a. Administer **Vasopressin 40mg IVP** (one time only) or **Epinephrine 1 mg IVP**; repeat every 3 - 5 minutes as needed. (If unable to establish IV, administer **Epinephrine 2 mg via ET tube** followed by 10ml NS).
7. Administer 5 cycles of CPR.
8. Check rhythm. If shockable: **DEFIBRILLATE with 360 Joules** (monophasic) or 200 Joules (biphasic).
9. Resume CPR immediately after the shock. Consider antiarrhythmics:

10. **Amiodarone 300mg IV/IO**, once, then consider additional 150mg IV/IO, or Lidocaine 1 -1.5 mg/kg, first dose, then 0.5 to 0.75 mg/kg IV/IO, maximum of 3 doses or 3 mg/kg. Consider Magnesium 1 – 2 grams IV/IO for torsades de pointes.
11. Continue 5 cycles of CPR go back to step 6.
12. Paramedic only: If patient converts to perfusing rhythm (and already received lidocaine bolus) administer **Lidocaine drip at 2mg/hr**.
13. CONTACT MEDICAL CONTROL as soon as possible.
14. Prompt Transport

### **Pulseless Electrical Activity (PEA)**

1. Initiate Cardiopulmonary Arrest Protocol.
2. Consider etiology:
  - a. If hypovolemia or tamponade, consider 200 - 300 cc bolus of NS.
  - b. If tension pneumothorax suspected (Signs: absent breath sounds, tracheal deviation away from involved lung, JVD), proceed with Chest Decompression (Refer to Chest Decompression procedure). CONTACT MEDICAL CONTROL
3. **Epinephrine 1 mg IVP**; repeat every 3 - 5 minutes as needed. (If unable to establish IV, administer 2 - 2.5 mg via ET tube).
4. If Bradycardic rhythm, **Atropine 1 mg IVP**; repeat every 3 - 5 minutes to total dosage of 3mg.
5. CONTACT MEDICAL CONTROL and transport as soon as possible.

### **Asystole**

1. Initiate Cardiopulmonary Arrest Protocol.
2. Confirm Asystole in 2 leads and turn up gain.
3. **Epinephrine 1 mg IVP**; repeat every 3 - 5 minutes as needed.
  - a. (If unable to establish IV, administer 2 - 2.5 mg via ET tube).
4. **Atropine 1 mg IVP**; repeat every 3 - 5 minutes to total dosage of 3 mg.
  - a. (If unable to establish IV, administer 2 - 2.5 mg via ET tube).
5. CONTACT MEDICAL CONTROL.
6. Consider the following:
  - a. **Dextrose 50%, 50 cc IVP**.
  - b. **Narcan 2 mg IVP**.
  - c. **Paramedic only: Sodium Bicarbonate 50cc IVP** if the patient is a dialysis patient or suffers from chronic renal failure as may be hyperkalemic.

7. Consider **Defibrillation at 360 Joules** (or 200 Joules biphasic) if considering fine ventricular fibrillation.
8. Consider Cease Effort order (Refer to Cease Effort Policy).
9. Transportation can be initiated at any time during this sequence.

**Critical Thinking Elements:**

- The pre-hospital goal of resuscitating cardiac arrest is to return the patient to a perfusing rhythm and providing stabilizing treatment enroute. Once “first-line” electrical and pharmacological treatments are attempted, the patient should be transported, without delay, to the closest appropriate hospital. Medical Control should be contacted as soon as possible to confirm ALS treatment plans.
- Treat the patient, not the monitor. A rhythm present on the monitor screen should not be used to determine the pulse. If the monitor shows a rhythm and the patient has no pulse, begin CPR.
- Patients with implanted pacemakers or implanted defibrillators are treated the same as any other patient. Do not place the electrodes on the pacemaker or implanted defibrillator site.
- Trauma patients in cardiac arrest should be evaluated for viability, begin CPR and load-&-go if the patient is to be resuscitated.
- When changing to ALS monitoring equipment, attach defibrillation cables prior to disconnecting the AED.
- If ventricular fibrillation or ventricular tachycardia recurs during the arrest sequence, defibrillation is reinitiated at the energy level that previously resulted in successful defibrillation.
- 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; airway obstruction, metabolic shock, hypovolemia, central nervous system injury, respiratory failure, anaphylaxis, drowning, overdose and poisoning.

**Notes:**

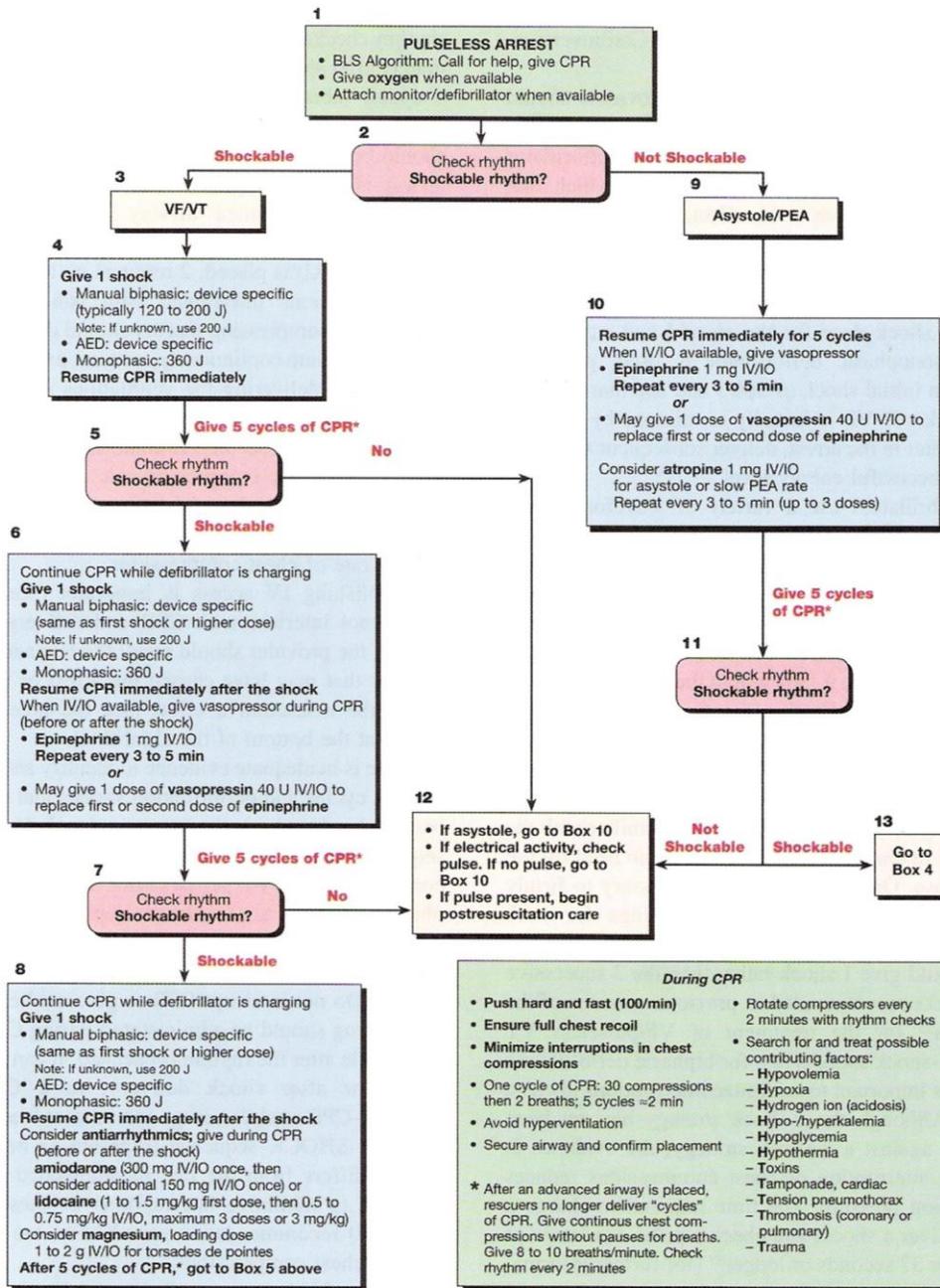
**Tension Pneumothorax** is the presence of air in the pleural space that is escaping from the lungs or entering through a sucking chest wound.

- Signs and symptoms include; restlessness and agitation, severe respiratory distress, increased airway resistance on ventilating patient, JVD, tracheal deviation, subcutaneous emphysema, unequal breath sounds (absent on the affected side), Hyperresonance to percussion on the affected side, hypotension and cyanosis.

**Pericardial tamponade** occurs when blood fills the space around the heart muscle.

- Signs and symptoms include; restlessness and agitation, JVD, hypotension, and a narrowing of the pulse pressure. In the absence of a pneumothorax, the trachea will be midline and breath sounds may sound normal.

## American Heart Association Pulseless Arrest Algorithm



ACLS Pulseless Arrest Algorithm.

## **PROTOCOL**

### **Unstable Bradycardia**

#### **Rate less than 60 (Includes Atrio-Ventricular Blocks)**

**Overview:** Bradycardia is defined as a heart rate (pulse) less than 60 beats-per-minute. Determining the stability of the patient with bradycardia is an important factor in patient care decisions. The assessment of the patient with bradycardia should include evaluation for signs and symptoms of hypoperfusion. The patient is considered stable if the patient is asymptomatic, alert and oriented with warm and dry skin and a systolic blood pressure greater than 100. The patient is considered unstable if the patient has an altered level of consciousness, diaphoresis, dizziness, chest pain or discomfort, ventricular ectopy, and/or hypotensive (systolic less than 100).

**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: preferably 15 L/min by mask.** If the patient does not tolerate a mask, then administer 6 L/min by nasal canal. Be prepared to support the patient's respirations with ventilation via bag-valve-mask.

**BLS and ILS Care** should be directed at conducting a thorough patient assessment, initiating Routine Cardiac Care to treat for shock and preparing or providing patient transportation.

1. Render initial care in accordance with the Routine Patient Care Protocol (ILS/ALS initiate IV line)
2. BLS and ILS should initiate an ALS intercept.
3. **OXYGEN: preferably 15 L/min by mask.** If the patient does not tolerate a mask, then administer 6 L/min by nasal canal. Be prepared to support the patient's respirations with ventilation via bag-valve-mask.
4. IV FLUID THERAPY (ILS Units): Administer a **Normal Saline 200-300 cc IV bolus.**

**ALS Care** should be directed at continuing or establishing BLS/ILS care, conducting a thorough patient assessment and stabilizing the patient's perfusion.

1. **External Transcutaneous Pacing:** If signs or symptoms of poor perfusion (i.e. acute altered mental status, chest pain, hypotension, or other signs of shock), consider immediate external transcutaneous pacing. Target rate of pacing is 60 – 70 beats-per-minute.
2. **ATROPINE:** Administer **Atropine 0.5 mg IVP** if the patient's perfusion does not improve after the fluid bolus, if the patient is hemodynamically unstable or if the cardiac rhythm is an atrial-ventricular block other than third degree. Contact Medical Control as soon as possible and before administering a second dose of Atropine. Atropine 0.5mg IVP may be administered every 5 minutes to a total dose of 3 mg.

3. IV FLUID THERAPY : Administer a 200-300 cc IV fluid bolus
4. CONTACT MEDICAL CONTROL
5. Paramedic only: DOPAMINE: If the patient remains hypotensive (systolic less than 100), consider orders to administer a Dopamine infusion. Dopamine is provided premixed (400 mg) in 250cc D5W solution. This yields a concentration of 1600mcg/ml. The initial rate of infusion is 1-10mcg/kg/minute, which can be obtained with a 24gtts/minute-infusion rate. Begin infusion of **Dopamine 24gtts/min** and increase by 12gtts/min every 2 minutes to achieve and maintain a systolic BP of at least 100mmHg. Closely monitor vital signs.
6. Transport

**Critical Thinking Elements:**

- Treat the patient not the monitor. Bradycardia does not necessarily mean the patient is symptomatic or unstable.
- Factors to consider during the assessment of the patient with bradycardia include; patient health and physical condition, trauma or injury related to event, current mediations (beta blockers) and medical history.
- Assess for underlying causes (i.e., hypovolemic shock, respiratory shock, cardiogenic shock).
- Fluid bolus should not delay Atropine administration if the patient is unstable.
- DO NOT administer LIDOCAINE if pulse rate is less than 60 and patient is having PVC's.
- If presenting rhythm is third degree heart block and the patient is symptomatic, immediately proceed to external transcutaneous pacing.
- Consider underlying etiologies and treat according to appropriate protocols; airway obstruction, metabolic shock, hypovolemia, central nervous system injury, head injury or stroke, respiratory failure, anaphylaxis, drowning, overdose and poisoning.
- Bradycardia may be present in suspected CVA patients due to increased intracranial pressure. ATROPINE is NOT to be given if the BP is normal or elevated. Medical Control should be contacted prior to administration.

**Notes:**

- Heart blocks are partial delays or complete interruptions in cardiac electrical conduction at the AV node.
- **First-Degree AV Block** is a delay in conduction through the AV node and is characterized by a prolonged (greater than 0.20 second) PR interval. The rhythm is usually regular and there is a one-to-one correlation between the P wave and QRS complex. First degree block is of little clinical significance.
- **Second-Degree AV Block Mobitz Type I (Wenckebach)** is an intermittent block that usually occurs at the AV node. The conduction delay progressively increases until the ventricle is blocked. This produces a characteristic cyclical pattern in which

the PR interval gets progressively longer until a P wave occurs that is not followed by a QRS complex. Wenckebach is usually transient and reversible but can also progress to a more serious block and may be an indication of AMI, increased vagal tone, drug toxicity or electrolyte imbalance.

- **Second-Degree AV Block Mobitz Type II** is an intermittent block that usually occurs below the bundle of His. Mobitz Type II is characterized by consecutive P waves being conducted with a constant PR interval before a dropped QRS complex and usually occurs in a regular sequence with a noticeable conduction ratio. Mobitz Type II is considered a serious dysrhythmia and can rapidly lead to hypoperfusion.
- **Third-degree Block** is a complete electrical block at or below the AV node and is sometimes referred to as Complete Heart Block or AV Dissociation. Third-degree heart block is characterized by consecutive P waves being conducted independent of regularly conducted QRS complexes. Third-degree heart block is potentially lethal due to the asynchronous action of the cardiac chambers.
- Bradycardia rhythms that lack the presence of a P wave are usually junctional rhythms and originate below the AV node.

### **American Heart Association Bradycardia Algorithm**

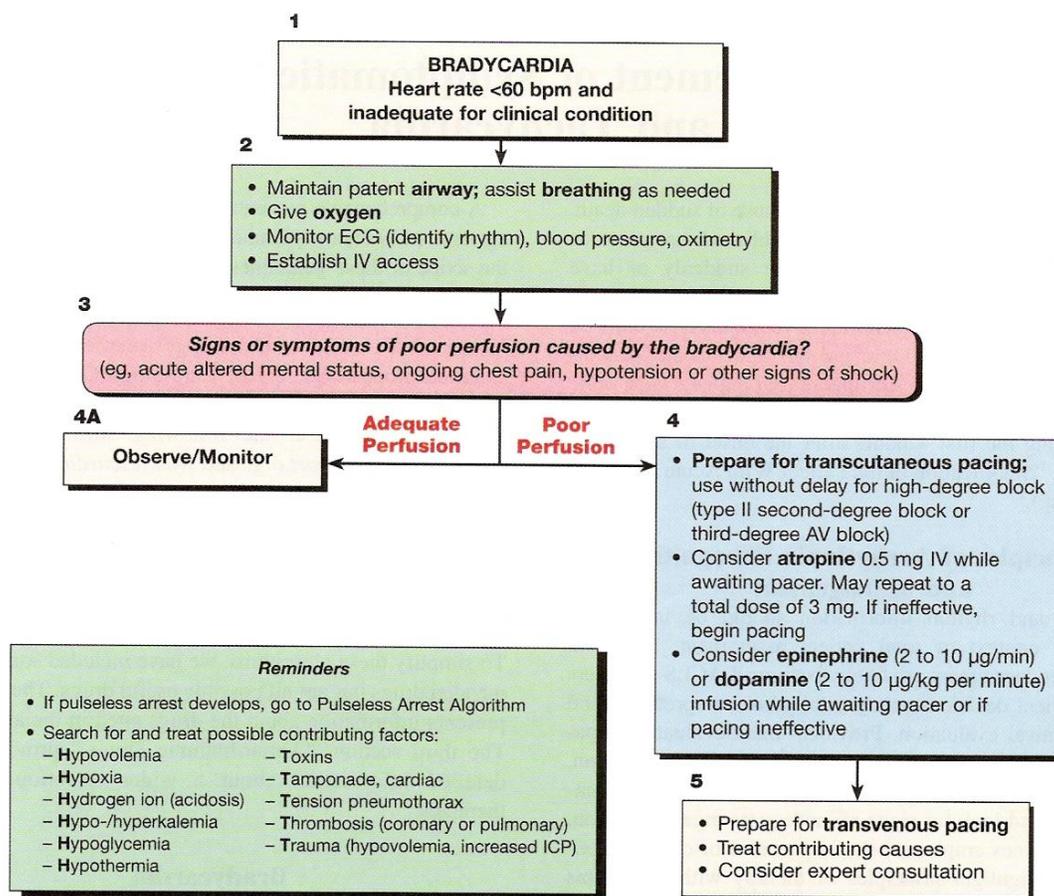


Figure 1. Bradycardia Algorithm.

## **PROTOCOL**

### **Narrow Complex Tachycardia - Rate greater than 150 Atrial/Supraventricular Tachycardia**

**Overview:** Tachycardia is defined as a heart rate (pulse) greater than 100 beats-per-minute. Once the heart rate (pulse) nears 150bpm the patient is at risk for shock. A narrow-complex QRS indicates the rhythm may be of atrial origins. Determining the stability of the patient with tachycardia is an important factor in patient care decisions. The assessment of the patient with tachycardia should include evaluation for signs and symptoms of hypoperfusion. The patient is considered stable if the patient is asymptomatic, alert and oriented with warm and dry skin and a systolic blood pressure greater than 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 hypotensive.

**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: preferably 15 L/min by mask.** If the patient does not tolerate a mask, then administer 4-6L/min by nasal canal.

**BLS and ILS Care** should be directed at conducting a thorough patient assessment, initiating Routine Cardiac Care to treat for shock and preparing or providing patient transportation.

1. Render initial care in accordance with the Routine Patient Care Protocol (ILS/ALS initiate IV line)
2. BLS and ILS should initiate an ALS intercept.
3. **OXYGEN: preferably 15 L/min by mask.** If the patient does not tolerate a mask, then administer 6 L/min by nasal canal. Be prepared to support the patient's respirations with ventilation via bag-valve-mask.
4. IV FLUID THERAPY (ILS Units): Administer a **Normal Saline 200-300 cc IV bolus**, if lungs clear.

**ALS Care** should be directed at continuing or establishing BLS/ILS care, conducting a thorough patient assessment and stabilizing the patient's perfusion.

1. IV FLUID THERAPY: Administer a **Normal Saline 200-300 cc IV bolus** if lungs clear.
2. ADENOCARD: If the patient is alert and oriented with warm and dry skin and a systolic blood pressure greater than 100, and the heart rhythm is not sinus tachycardia, atrial fibrillation or atrial flutter:
  - a. **Adenocard 6mg IVP.**

- b. If no response, **Adenocard 12 mg IVP** (third and subsequent doses require Medical Control orders).
3. Paramedic only: If identified rhythm is Atrial Fibrillation/Flutter with ventricular response less than 150 bpm, but having one or more symptoms consider **Diltiazem 0.25mg/kg IV** over 2 minutes. If no response can use 0.35mg/kg IV over 2 minutes.
4. Paramedic only: If identified rhythm is SVT/PSVT, adenosine did not convert the rhythm, and patient stable, consider **Diltiazem 0.25mg/kg IV** over 2 minutes. If no response can use 0.35mg/kg IV over 2 minutes.
5. SYNCHRONIZEDCARDIOVERSION: If the patient has an altered level of consciousness, diaphoresis, dizziness, chest pain or discomfort, pulmonary edema and/or is hypotensive (systolic less than 100), consider immediate synchronized cardioversion:
  - a. Paramedic only: Consider sedation with **Versed 2.5-5mg Ativan 1-2 mg IVP** if the patient is alert and has adequate respiratory effort.
  - b. **Synchronized cardioversion at 50 joules** (or biphasic equivalent)
  - c. If tachycardia persists, **Synchronized cardioversion at 100 joules** (or biphasic equivalent)
  - d. If tachycardia persists, **Synchronized cardioversion at 200 joules** (or biphasic equivalent)
  - e. If tachycardia persists, **Synchronized cardioversion at 300 joules** (or biphasic equivalent)
  - f. If tachycardia persists, **Synchronized cardioversion at 360 joules** (or biphasic equivalent)
6. CONTACT MEDICAL CONTROL as soon as possible

**Critical Thinking Elements:**

- Treat the patient not the monitor. Tachycardia does not necessarily mean the patient is unstable.
- Factors to consider during the assessment of the patient with tachycardia include; patient health and physical condition, trauma or injury related to event, current medications and medical history.
- Assess for underlying causes (i.e., hypovolemic shock, respiratory shock, cardiogenic shock).
- Consider underlying etiologies and treat according to appropriate protocols; airway obstruction, metabolic shock, hypovolemia, central nervous system injury, respiratory failure, anaphylaxis, drowning, overdose and poisoning.
- Fluid bolus should not delay Synchronized cardioversion if the patient is unstable.
- DO NOT administer Adenocard if the heart rhythm is sinus tachycardia, atrial fibrillation or atrial flutter.

**Notes:**

- Paroxysmal Supraventricular Tachycardia is commonly used to describe a tachycardia that originates in the atria or AV junction, overriding the SA node. PSVT is characterized by repeated episodes (paroxysms) of atrial tachycardia, continuously traveling around the AV node, that often have a sudden onset and abrupt termination. Rheumatic heart disease or mitral valve prolapse are common medical histories that accompany PSVT. PSVT may indicate an underlying heart disease. Cardiac output may be compromised by incomplete ventricular filling that may result in hypoperfusion.

**American Heart Association Tachycardia Algorithm**

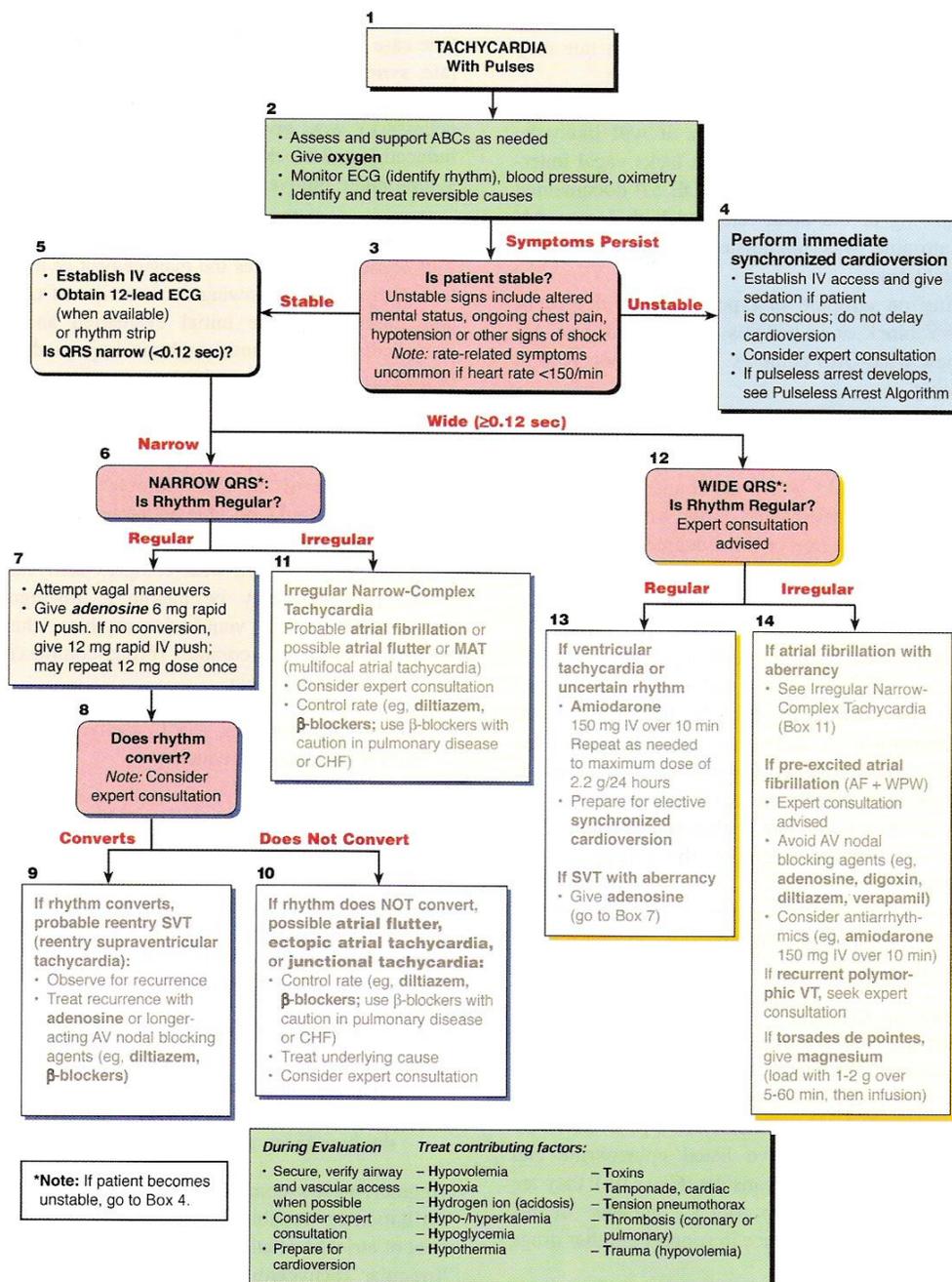


Figure 2. ACLS Tachycardia Algorithm.

## **PROTOCOL**

### **Wide Complex Tachycardia – with a pulse (Ventricular Tachycardia)**

**Overview:** Tachycardia is defined as a heart rate (pulse) greater than 100 beats-per-minute. Once the heart rate (pulse) nears 150bpm the patient is at risk for shock. A wide-complex QRS indicates the rhythm may be of ventricular origins. Determining the stability of the patient with tachycardia is an important factor in patient care decisions. The assessment of the patient with tachycardia should include evaluation for signs and symptoms of hypoperfusion. The patient is considered stable if the patient is asymptomatic, alert and oriented with warm and dry skin and a systolic blood pressure greater than 100. The patient is considered unstable if the patient has an altered level of consciousness, diaphoresis, dizziness, chest pain or discomfort, ventricular ectopy, and/or hypotensive.

**First Responder Care and BLS 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: preferably 15 L/min by mask.** If the patient does not tolerate a mask, then administer 4-6 L/min by nasal canal.

**BLS and ILS Care** should be directed at conducting a thorough patient assessment, initiating Routine Cardiac Care to treat for shock and preparing or providing patient transportation.

1. Render initial care in accordance with the Routine Patient Care Protocol (ILS/ALS initiate IV line)
2. BLS and ILS should initiate an ALS intercept.
3. **OXYGEN: preferably 15 L/min by mask.** If the patient does not tolerate a mask, then administer 4-6 L/min by nasal canal. Be prepared to support the patient's respirations with ventilation via bag-valve-mask.
4. IV FLUID THERAPY (ILS Units): Administer a **Normal Saline 200-300 cc IV fluid bolus**, if lungs clear.

**ALS Care** should be directed at continuing or establishing BLS/ILS care, conducting a thorough patient assessment and stabilizing the patient's perfusion.

1. IV FLUID THERAPY: Administer a **Normal Saline 200-300 cc IV bolus**, if lungs are clear.
2. ANTIARRHYTHMICS: If the patient is alert and oriented with warm and dry skin and a systolic blood pressure greater than 100.
  - a. **AMIODARONE 150 mg IV** over 10 minutes (avoid in prolonged QT rhythm, torsades, or hypotension)—this should be the primary drug of choice.

- b. **Alternatively, LIDOCAINE 1 - 1.5 mg/kg (or 75 - 100mg) IV bolus** may be given slowly over 2 minutes. If no response, administer LIDOCAINE 0.5 mg/kg (50 mg) every 5 minutes up to a total of 3 mg/kg or conversion of rhythm. Paramedic only: If conversion and more than 10 minute transport begin **Lidocaine drip at 2 mg/min**
3. If VT persists, SYNCHRONIZED CARDIOVERSION, upon Medical Control orders only.
4. CONTACT MEDICAL CONTROL
5. SYNCHRONIZED CARDIOVERSION: If the patient has an altered level of consciousness, diaphoresis, dizziness, chest pain or discomfort, pulmonary edema and/or is hypotensive, consider immediate synchronized cardioversion:
  - a. Paramedic only: Consider sedation with **VERSED 2.5-5mg IVP or ATIVAN 1mg IVP** if the patient is alert and has adequate respiratory effort.
  - b. **Synchronized cardioversion at 100 joules** (or biphasic equivalent)
  - c. If tachycardia persists, **Synchronized cardioversion at 200 joules** (or biphasic equivalent)
  - d. If tachycardia persists, **Synchronized cardioversion at 300 joules** (or biphasic equivalent)
  - e. If tachycardia persists, **Synchronized cardioversion at 360 joules** (or biphasic equivalent)
6. UNYSYNCHRONIZED CARDIOVERSION (DEFIBRILLATION): Proceed immediately to **unsynchronized cardioversion at 360J (200J biphasic)** if patient becomes pulseless OR if the Ventricular Tachycardia is found to be Polymorphic in nature.

**Critical Thinking Elements:**

- Factors to consider during the assessment of the patient with tachycardia include; patient health and physical condition, trauma or injury related to event, current mediations and medical history.
- Assess for underlying causes (i.e., hypovolemic shock, respiratory shock, cardiogenic shock).
- Fluid bolus should not delay Synchronized cardioversion if the patient is unstable.
- If at any time the patient becomes pulseless, immediately treat as and refer to the Ventricular Fibrillation Protocol.
- DO NOT administer LIDOCAINE if pulse rate is less than 60 and patient is having ventricular escape beats.
- Specifically question the patient regarding allergies to LIDOCAINE
- Watch for signs of LIDOCAINE toxicity: disorientation, agitation, decreased hearing, tinnitus, seizures, paresthesia, hypotension, muscle twitching, tachycardia, slurred speech.

**American Heart Association Tachycardia Algorithm**

**Manitowoc County EMS Association Prehospital Care Manual**  
**Cardiac Care**

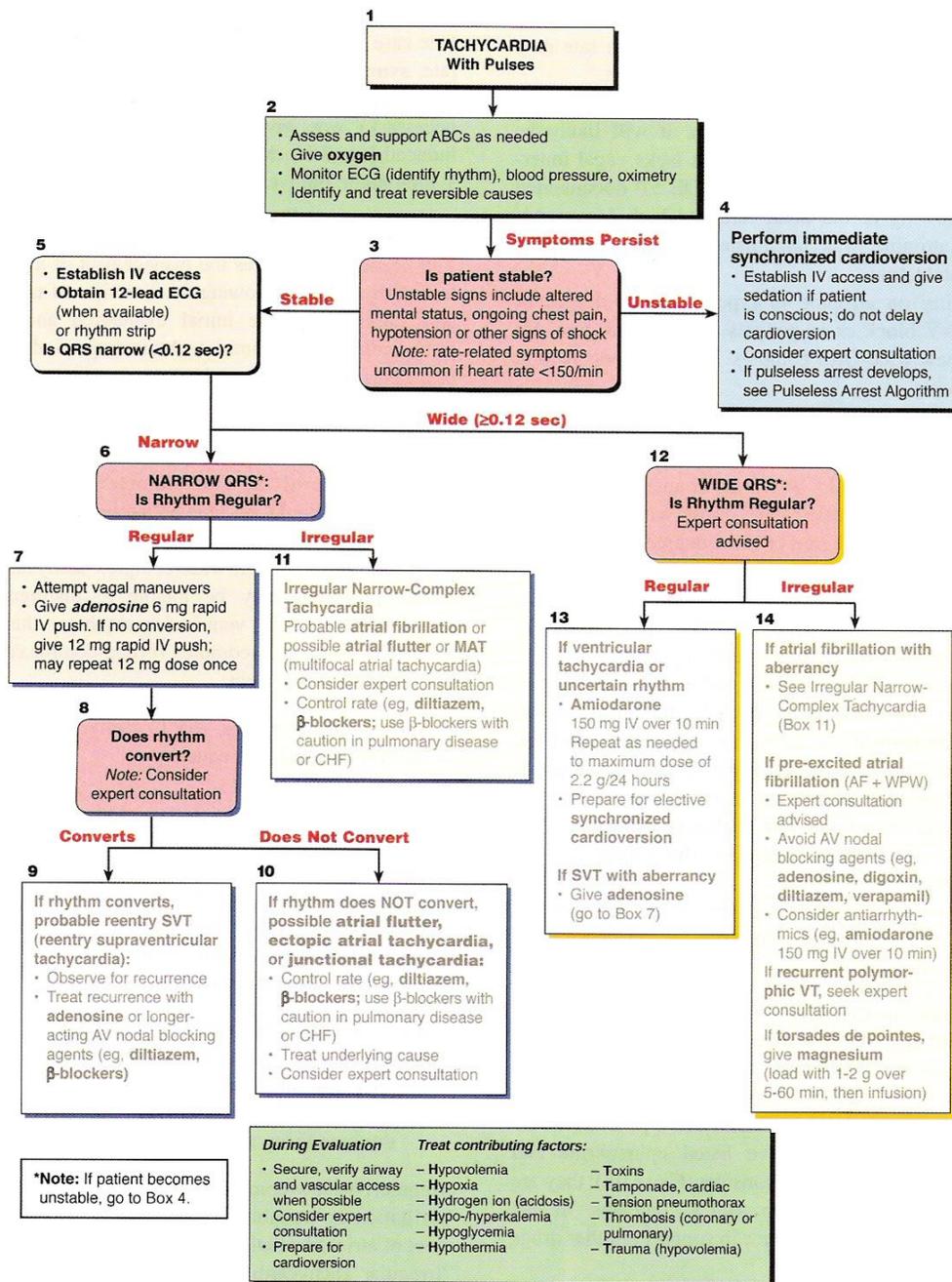


Figure 2. ACLS Tachycardia Algorithm.

**PROTOCOL**  
**Implanted Cardiac Defibrillator Discharge**  
**(ICD, PCD, AICD)**

**Overview:** These devices deliver an internal defibrillation (shock) whenever the patient's heart rate exceeds defined limits for 10 seconds or longer. Persons in contact with the patient at the time the internal device delivers the defibrillation will receive a shock of approximately 3 joules. This energy level constitutes NO DANGER to EMS personnel.

**First Responder / BLS and ILS 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 (BLS/ILS initiate IV line)
2. BLS and ILS should initiate an ALS intercept.
3. **OXYGEN: preferably 15 L/min by mask.** If the patient does not tolerate a mask, then administer 4-6 L/min by nasal canal. Be prepared to support the patient's respiration with ventilation via bag-valve-mask.
4. CONTACT MEDICAL CONTROL AS EARLY AS POSSIBLE.

**ALS Care** should be directed at continuing or establishing BLS/ILS care, conducting a thorough patient assessment and stabilizing the patient's perfusion.

1. Treat dysrhythmias per applicable protocol
2. CONTACT MEDICAL CONTROL AS EARLY AS POSSIBLE.
3. **MORPHINE SULFATE** in 2 mg increments, repeat every 5 minutes to a total of 10 mg IVP for discomfort
4. **DILAUDID (Hydromorphone) (Paramedic Only) (Manitowoc Fire Dept and Valders Fire Dept Only)** in 0.5mg increments, repeat every 5 minutes for a total of 2mg IVP for discomfort.

**Special Considerations:**

- Avoid placing the Combo or Fast-patch pads directly over the ICD unit as this could damage the unit.
- Normal placement of the ICD battery pack is in the LUQ of the abdomen.
- Any patient who has been shocked by an ICD should be strongly encouraged to seek medical attention regardless of the patient's condition.
- If the ICD is malfunctioning, alert Medical Control so a round magnet can be available upon arrival.
- Slightly alter pad placement if initial defibrillations are unsuccessful.

**POLICY  
First Responder AED**

**POLICY STATEMENT:** The Automatic External Defibrillator carried by First Responder Units is used to provide early defibrillation to patients in Manitowoc County. First Responder Units which carry AEDs are to be licensed with the State of Wisconsin as defined in Wisconsin Administrative Code HFS 113.

**GOALS/PURPOSE:** The goal of First Responder AED units is to provide early defibrillation to patients in cardiac arrest. This early defibrillation is to assist in the spontaneous return of a life sustaining cardiac rhythm.

**INDICATIONS:** The AED pads should be placed on all patients presenting with the following symptoms; Patients in cardiac arrest, Patients who are apneic, Unresponsive patients with a carotid pulse less than 40, Unresponsive patients with a carotid pulse rate greater than 120.

**POLICY/PROCEDURE:**

1. The AED pads should be placed on patients with symptoms as listed above.
2. AHA guidelines and Manitowoc County Protocols are to be followed regarding CPR and the use of the AED on patients who are pulseless and apneic.
3. Obtain the approximate time that CPR was initiated if it was prior to EMS arrival.
4. Provide a complete verbal report to the transporting unit including; the time CPR was initiated, if this was a witnessed or un-witnessed arrest, and how many shocks were delivered by the AED prior to the transporting unit's arrival.
5. Provide a code summary from your defibrillator if applicable.
  - a. Continue defibrillation with the First Responder AED until the transporting unit arrives. Transition of the leads to the transporting unit's defibrillator is to be as soon as possible after their arrival without interrupting patient care.

**POST DEFIBRILLATION PROCEDURE:**

1. Complete the Manitowoc County First Responder Defibrillation Report and forward copies to Dr. Todd Nelson and Debra Zupek RN, BSN, Paramedic at Holy Family Memorial Emergency Department within 24 hours of the call. This is to be completed for all calls that had Defib pads placed, the AED turned on, and the Analyze feature used, regardless whether the patient was defibrillated or not.
2. Forward a rhythm analysis of the call to Dr. Todd Nelson as applicable.
3. Quality Assurance review will be performed on all cases. See First Responder AED Quality Assurance Review sheet.

**DEFIBRILLATION TRAINING AND RE-CERTIFICATION:**

1. Initial training for the use of the AED can be obtained through any approved training facility in the State of Wisconsin or as approved by the Medical Director as defined in Wisconsin Administrative Code HFS 113.
2. All First Responder Units and/or First Responders providing defibrillation using an AED must abide by the rules set forth as defined in Wisconsin Administrative Code HFS 113.

**Manitowoc County EMS Association Prehospital Care Manual**  
**Cardiac Care**

3. Continuing education is required for all First Responder Units and is to include all of their responding personnel.
  - a. All First Responder Units and their responding personnel are to complete the continuing educational training every six months. This training can be obtained from an approved training facility, by the Medical Director or any person the Medical Director so designates to administer this continuing education.
4. Records of all personnel completing the initial training and subsequent continuing education every six months are to be kept by each First Responder Unit. Copies of these records are also to be forwarded to the Medical Director.
5. Debra Zupke RN, BSN, Paramedic has been designated by the Medical Director to administer the First Responder AED continuing education and Quality Improvement.

## First Responder AED Quality Assurance Review

First Responder Unit: \_\_\_\_\_

First Responder-D: \_\_\_\_\_

Date of Call: \_\_\_\_\_

<b>Review Criteria:</b>	<b>MET /</b>	<b>NOT MET</b>
The electrocardiogram recorder was activated properly.	<input type="checkbox"/>	<input type="checkbox"/>
Personnel quickly and effectively set up the necessary equipment.	<input type="checkbox"/>	<input type="checkbox"/>
The patient's pulse was checked appropriately throughout the emergency response.	<input type="checkbox"/>	<input type="checkbox"/>
Defibrillation was performed as rapidly as possible for the patient.	<input type="checkbox"/>	<input type="checkbox"/>
Adequate basic life support was delivered and maintained.	<input type="checkbox"/>	<input type="checkbox"/>
The assessment of the need to deliver or not deliver defibrillation was correct.	<input type="checkbox"/>	<input type="checkbox"/>
Following each attempted defibrillation, the patient was assessed accurately and treated appropriately.	<input type="checkbox"/>	<input type="checkbox"/>
The defibrillator was operated safely and correctly.	<input type="checkbox"/>	<input type="checkbox"/>
Care was provided in compliance with the protocol.	<input type="checkbox"/>	<input type="checkbox"/>
Written records and voice and EKG recordings of the call turned in for review in timely manner.	<input type="checkbox"/>	<input type="checkbox"/>

### Additional comments:

### Concerns:

### Follow-up needed:

**PROCEDURE**  
**Semi-Automated Defibrillation**

**Description:** First Responder and BLS agencies in the Manitowoc County EMS System have the capability of providing early defibrillation with semi-automatic defibrillators.

**Indications:** Ventricular Fibrillation or Ventricular Tachycardia without a pulse.

**Contraindications:** Patient has a pulse.

**Materials/Equipment:** PPE, AED Defibrillator, Adequate Power Source, Combo pads or Fast-patches with Cables.

**Procedure:**

1. The AED should be applied immediately upon determining the patient has no pulse, is breathless and is at least 1 year of age or older.
2. The AED should be turned on as soon as the equipment is available at the patient. The first shock, if indicated, should be delivered within 90 seconds of patient contact. CPR should be performed for 2 minutes prior to AED application if patient with unknown downtime or if downtime greater than 4-5 minutes.
3. Apply Combo-pads or Fast-patches with cables as soon as possible. Combo-pads or Fast-patches must be attached to the defibrillator's cables prior to placement on the patient's chest. Combo-pads or Fast-patches have replaced the need to use paddles and have enhanced scene safety. Combo-pads should be used to decrease the time needed to switch from monitor-to-monitor.
4. The standard paddle/patch placement is the anterolateral electrode placement. This is accomplished by placing the negative electrode (sternal) to right of the upper sternum just below the right clavicle and the positive electrode (apex) lateral to the left nipple in the midaxillary line.
5. Make sure no personnel are directly or indirectly in contact with the patient when the AED is analyzing. Emphasize your intention to analyze by loudly stating "CLEAR-ANALYZING." Analyze in accordance with product specifications.
6. If AED indicates SHOCK ADVISED, call out "CLEAR", check for safety of others, and push the shock button (or stand clear if the AED device does not require shock activation).
7. Follow American Heart Association guidelines. See Cardiopulmonary Arrest protocol.
8. If the patient regains a pulse at any time during resuscitation, then maintain the airway and assist ventilations.
9. Immediately turn patient care over to the transporting provider or ALS intercept crew upon their arrival.

10. Complete all necessary cardiac arrest documentation.

**Special Considerations:**

- Initiate Advanced Life Support response as soon as possible.
- The audiocassette tape will record the events of the code. Do not tamper with the recorder.
- If a pulse is felt at anytime, transport the patient without delay.
- Maintain frequent pulse checks and if at anytime you cannot find a pulse, push "ANALYZE" and repeat the AED procedure for analyzing.
- If only one (1) rescuer is available with an AED, verify unresponsiveness, open the airway, give two (2) respirations and check the pulse. If the cardiac arrest is confirmed, the single rescuers should attach the AED and proceed with the algorithm.
- Do not analyze or shock in a moving ambulance!
- AED Agencies utilizing the LIFE-PAK 12 must preprogram the unit to start in the advisory mode.
- Manual modes shall be password protected.

**PROCEDURE  
Manual Defibrillation**

**Description:** Electrical defibrillation is recognized as the most effective method of terminating ventricular fibrillation. It is a vital link in the chain of survival in the case of sudden death from heart attack. Defibrillation is accomplished by passage of an appropriate electrical current through the heart sufficient to depolarize a critical mass of the left ventricular myocardium. Paramedic & Intermediate (I99) only

**Indications:** Ventricular Fibrillation or Ventricular Tachycardia without a pulse.

**Contraindications:** Patient has a pulse.

**Materials/Equipment:** PPE, Cardiac Monitor with Defibrillator, Adequate Power Source, Combo pads or Fast-patches with Cables.

**Procedure:**

1. Defibrillation may be attempted immediately upon determining the patient has no pulse, is breathless and recognition of ventricular fibrillation or ventricular tachycardia.
2. The monitor and defibrillator should be turned on as soon as the equipment is available at the patient.
3. Apply Combo-pads or Fast-patches with cables as soon as possible. Combo-pads or Fast-patches must be attached to the defibrillator's cables prior to placement on the patient's chest. Combo-pads or Fast-patches have replaced the need to use paddles and have enhanced scene safety. Combo-pads should be used to decrease the time needed to switch from monitor-to-monitor.
4. The standard paddle/patch placement is the anterolateral electrode placement. This is accomplished by placing the negative electrode (sternal) to right of the upper sternum just below the right clavicle and the positive electrode (apex) lateral to the left nipple in the midaxillary line.
5. Follow American Heart Association guidelines for energy level to use. See Cardiopulmonary Arrest Protocols.
6. Make sure no personnel are directly or indirectly in contact with the patient. Emphasis your intention to defibrillate by loudly stating "CLEAR". Deliver defibrillation by depressing discharge button(s) in accordance with product specifications.
7. Follow appropriate protocols for any rhythm changes.

**Special Considerations:**

- Patients with implanted pacemakers or implanted defibrillators are treated the same as any other patient. Do not place the electrodes on the pacemaker or implanted defibrillator site.
- Anterior-posterior placement may be necessary if the patient has an implanted defibrillator that is unable to convert the rhythm. Position the positive pad on the anterior chest just to the left of sternum and negative pad posterior just left to the spinal column.
- Shocks delivered to the patient prior to ALS arrival should be taken into consideration during the transition of care. ALS crews may want to utilize the AED equipment and personnel for subsequent defibrillation.
- If ventricular fibrillation or ventricular tachycardia recurs during the arrest sequence, defibrillation is reinitiated at the energy level that previously resulted in successful defibrillation.

**PROCEDURE**  
**Transition of AED Care**

**Description:** It is recognized that early defibrillation is a very important treatment for the cardiac arrest patient. First Responder, EMT-B and EMT-I personnel as well as Public Access Defibrillation (PAD) programs are utilizing AEDs. A smooth transition of care between providers is essential for optimum patient care.

**Indications:** AED trained personnel on scene of a cardiac arrest.

**Procedure:**

1. On arrival of EMS personnel ask for a quick report from the AED user and perform a rapid assessment.
2. Continue care with the initial AED applied; use the original AED for additional shocks until the patient is prepared for transport.
3. Consider the shocks delivered by the AED as part of the Cardiac Arrest protocol. (Subsequent defibrillation should follow AED/ACLS guidelines.)
4. AED personnel can be utilized to provide defibrillation during the arrest in the semi-automatic mode only. If the manual mode is activated, EMS personnel must operate the defibrillator. EMS personnel are encouraged to utilize First Responder-Defibrillator personnel for efficiency in coordinating patient care.
5. Situations when the AED may need to be removed include: patients needing external cardiac pacing, patients needing synchronized cardioversion, patients with the return of spontaneous rhythm.
6. When changing to manual defibrillator, attach cables to the patient before disconnecting the AED.

**PROCEDURE**  
**Cardioversion**

**Description:** 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 ventricular fibrillation that can occur when electrical energy impinges on the relative refractory portion of the cardiac cycle.

**Indications:** A hemodynamically unstable patient in ventricular or supraventricular tachydysrhythmias.

**Contraindications:** Patient is stable or cardioversion is not indicated.

**Materials/Equipment:** PPE, Cardiac Monitor/Defibrillator with power source and synchronizing mode, Combo-pads with cables.

**Procedure:**

1. The procedure is the same as for defibrillation with the following exceptions.
  - a. The energy levels vary in accordance with protocol for specific rhythms and patient presentation.
  - b. The patient may have a pulse and be conscious.
  - c. Administration of an anesthesia or analgesia may be necessary.
  - d. The synchronizer circuit must be activated.
  - e. There may be a delay between pressing the discharge buttons and the countershock due to the synchronization process.
2. Steps in preparing for cardioversion.
  - a. Push the synchronize sensor button on the defibrillator and select the energy setting according to protocol.
  - b. Identify the "R" wave sensor on the cardiac monitor.
  - c. Depress the discharge buttons simultaneously and wait for shock to be delivered.
  - d. Note rhythm and treat according to appropriate protocol.
3. If at anytime during the sequence ventricular fibrillation occurs, immediately:
  - a. Turn off the synchronizer circuit.
  - b. Charge the unit to 200 joules (or 120J if biphasic) and defibrillate.
  - c. Follow appropriate protocol.

## **PROCEDURE**

### **Use of External Cardiac Pacemaker**

**Description:** The external cardiac pacemaker is a device that delivers an electrical stimulus to the heart that substitutes for the conduction system of the heart and intended to result in cardiac depolarization and ultimately myocardial contraction.

**Indications:** External cardiac pacing should be utilized for patients with symptomatic bradycardia, especially Second -degree AV Heart Block Type II and Third-degree Heart Block. Symptomatic bradycardia is defined as a heart rate of < 60 BPM with a systolic blood pressure less than 100 and associated signs and symptoms of shock.

**Contraindications:** The patient is asymptomatic and hemodynamically stable.

**Materials/Equipment:** EKG monitor and leads, Pacemaker electrodes, Valium if patient is conscious

### **Procedure:**

1. Confirm the presence of the dysrhythmia and the patient's hemodynamic status and initiate Routine ALS Care. Regular 3-lead monitoring will need to be established prior to pacing.
2. Attach the pacing electrodes (Combo-pads or Quick-pace pads) to the cable. Connect the cables to the monitor/defibrillator.
3. Apply the pacing pads to the patient using anterior-posterior placement. Place the negative electrode on the anterior chest, halfway between the xiphoid process and the left nipple. The upper edge of the electrode should be below the nipple line. Place the positive electrode on the left posterior chest beneath the scapula and lateral to the spine.
4. If patient is conscious, consider administering Valium 5 mg IVP slowly for patient comfort.
5. Activate the pacemaker mode and observe a marker on each QRS wave. If the marker is not present, readjust the EKG size.
6. Set the target rate at 60-70 BPM.
7. Set the current at minimum.
8. Activate the pacer (start/stop button) and observe pacer spikes.
9. Increase the current slowly until there is evidence of electrical pacing capture.
10. Add 10% to MA
11. Assess for perfusion. Palpate the patient's pulse and check for a blood pressure.

12. Document the patient's rhythm, vitals and tolerance of pacing and report the results to Medical Control.

**Special Considerations:**

- 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).
- External pacing may also be effective for patient in Asystole if performed early and simultaneously with drug administration.

**PROCEDURE**

**12-Lead Electrocardiogram**

**Description:** Early identification of cardiac infarction is crucial because the benefits of thrombolytic therapy are time dependent. The 12-lead EKG may provide early recognition of a cardiac infarct.

**Indications:** Chest pain / epigastric pain, Shortness of breath (suspected cardiac related), Syncope or Near Syncope, Cardiogenic Shock, CHF, Pulmonary edema

**Procedure:**

1. Upon determining a patient has a complaint or symptom(s) that indicates performing a 12-Lead EDG, initiate Routine ALS Care and obtain a 12-Lead ECG during cardiac monitoring.
2. Capture of the ECG should be done, if possible, in a stationary position.
3. CONTACT MEDICAL CONTROL with description of findings when giving report.
4. Upon arrival at the Emergency Department a copy of the 12-Lead ECG should be given to the accepting nurse or physician.
5. Copies of the 12-Lead ECG are to be mounted on hospital paper and included with all other EMS documentation.

**Special Consideration:**

- There should not be a delay in the transport of the patient in order to perform 12-Lead ECG testing
- Attempt to get 12 lead as soon in medical care as possible.