

Chapter 1

Adult Cardiac Care

Standard Cardiac Arrest Procedures

Rationale:

It is essential for victims of cardiac arrest to receive rapid care. The rescuer must anticipate cervical injury, assess the scene for hazards, and note the patient's environment.

Assessment Checklist

- Myocardial infarction
- Hemodynamically significant dysrhythmia
- Cardiac Tamponade
- Exsanguination
- Angina pectoris
- Syncope

Level I:

- Note patient's environment.
- Wear appropriate Personal Protective Equipment (PPE).
- Perform primary assessment and emergency treatment.
- Assess for Death Scene Criteria
- Determine pulselessness and apnea.
- Perform CPR with appropriate airway device.
- AED as indicated.
- Perform a secondary assessment.
- Check a blood glucose level.

Level II:

- Determine cardiac rhythm and follow treatments in the appropriate protocol.
- Establish an airway.
- Establish IV/IO.
- Administer 1 mEq/kg Sodium Bicarbonate IV and Calcium Chloride 1 gm IV in all arrested dialysis patients if available.
- Administer 2 mg Narcan if indicated.
- Administer 25 gm D50W Or D10 25 100ml or 250ml IV, if glucose is < 60 mg / dl.
- Establish second IV.
- Transport or terminate code per Death Scene Protocol.

Note:

Comply with Do Not Resuscitate (DNR) orders, refer to Termination of Resuscitation Protocol.

Acute Myocardial Infarction

Rationale:

Patients with acute myocardial infarction are racing against time to stop the evolving infarction. Treatment is directed to rapidly identifying the infarction, providing increased oxygenation, early notification to the Emergency department physician, and rapid transport.

Assessment Checklist

- Dysrhythmia
- Pulmonary embolism
- Pneumonia
- Dissecting aortic aneurysm
- Costochondritis
- Pericarditis
- Chronic Obstructive Pulmonary Disease

Level 1:

- Administer oxygen by appropriate device.
- Place the hypotensive patient in Trendelenburg position.
- An EMT may assist a patient with self administration of prescribed nitroglycerin after ruling out the use of Viagra within 24 hours and Viagra like products within 48 hours.

Level II:

- Administer baby aspirin (81mg) x 4 PO (contraindicated if known hypersensitivity or hemophilia).
- Blood draw if time permits.
- Obtain 12-lead ECG (consider right side 12 lead).
- After ruling out the use of Viagra within 24 hours and 48 hours for Viagra like medications, administer 0.4 mg nitroglycerin SL PRN once every 3 to 5 minutes, or until relief, for a total of three administrations, before administration of analgesics. SBP > 100 mm/Hg before administration of any NTG.
- Administer anti-dysrhythmia medications as necessary.
- Administer morphine sulfate 2 mg IV PRN. Repeat at 5-minute intervals to a total of 10mg for the normotensive patient Or Administer Fentanyl PRN up to 1 mcg/kg (if available), titrate to effect. If administration of Fentanyl, consider administration of Zofran 4mg/IV/IO/IM or Oral Dissolving Troche (ODT) 4mg. Max dose of 4mg.
- Administer Lopressor 5 mg IVP, repeat dose once if indicated, if available (HR > 60, and SBP > 120 mm/Hg). Call for medical direction for Lopressor.
- Issue a **STEMI Alert** if ST elevation > 1mm in 2 or more contiguous leads transmit EKG to Emergency Department receiving the patient and give early report. Unstable patients must be transported to the closest appropriate hospital.
- Issue a **Cardiac Alert** for any patient experiencing a known or suspected cardiac event with abnormal vital signs, EKG changes, or in the paramedic's judgement, signs or symptoms suspicious for cardiac ischemia.
- **IMPORTANT:** If EKG changes in leads, II, III, and AVF indicate an Inferior Wall MI. administer 1 liter bolus of NSS. If patient has a SBP < 140, after the administration of 1-liter NSS, DO NOT ADMINISTER Nitroglycerin, Morphine, or Lopressor.

Asystole

Rationale:

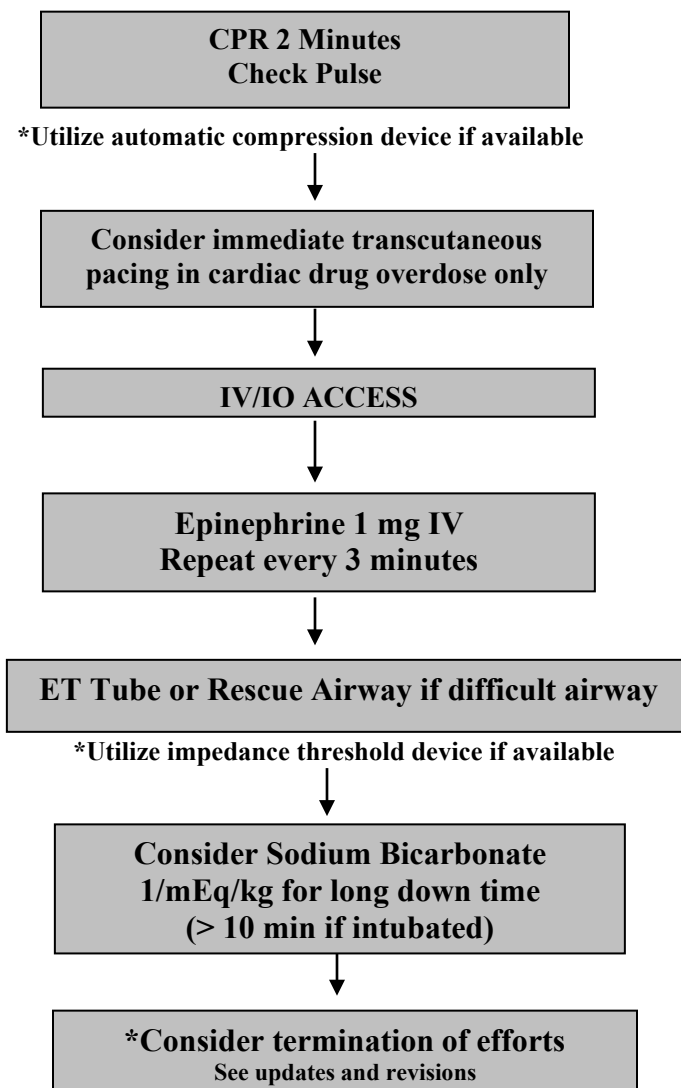
Many victims of cardiac arrest will present with an asystole rhythm by the time rescuers arrive. Consider possible causes of asystole and confirm asystole in two contiguous leads.

Identify and treat 6 H's and 5T's.

Hypoxia - Hydrogen Ion (Acidosis) - Hypo/Hyperkalemia – Hypovolemia – Hypothermia - Hypo/Hyperglycemia
Toxins, Tablets - Tension Pneumothorax -Tamponade, cardiac –Trauma -Thrombosis-pulmonary, coronary

Assessment Checklist

- Cardiac arrest with asystole
- Cardiac arrest with fine ventricular fibrillation
- Pericardial Tamponade
- Pulseless electrical activity



Atrial Fibrillation/Atrial Flutter Rapid Ventricular Rate

Rationale:

Atrial fibrillation/Atrial flutter is the most common cardiac arrhythmia requiring emergent/urgent treatment. Many patients live with A-fib/A-flutter on anti-coagulation therapy to diminish the risk of thromboembolic Cerebral Vascular Accident and on various antiarrhythmic medications as well. A-fib/A-flutter can produce a rapid ventricular rate, which may need to be treated in the pre-hospital setting. New onset A-fib/A-flutter (less than 48 hrs) may be associated with chest pain/acute MI. Long-standing A-fib/A-flutter should be treated with anticoagulation therapy to prevent thromboembolic CVAs. Hemodynamically unstable A-fib/A-flutter with RVR > 150/min should be treated with electrical cardioversion. Minor onset complaints with A-fib RVR such as palpitation and weakness may be treated with Cardizem or supportive care. Suspect long-standing A-fib/A-flutter if the patient is on digoxin therapy. Cardizem should not be used in patients with A-fib/A-flutter RVR and hypotensive/CHF. Consider electrical cardioversion in these patients.

Assessment Checklist

- Cardiac ischemia
- Hypoxia
- Hypotension
- Congestive Heart Failure

Level I:

- Assess patient's temperature.
- Administer oxygen by appropriate device.
- Place patient in upright position.
- Cardiac monitor.

Level II:

- IV established.
- Pulse oximetry.
- Cardizem 0.25 mg/kg IV bolus to a maximum of 25 mg. (if available).
- Amiodarone 150 mg in 100 ml NS over 10 minutes.
- Electrical Cardioversion Atrial Fib 200 joules escalating to 300 joules then 360 joules* as needed, if the patient is hypotensive, has severe chest pain (AMI), or severe dyspnea.
- Electrical Cardioversion Atrial Flutter 50 to 100 joules escalating to 200 joules, 300 joules then 360 joules* as needed, if the patient is hypotensive, has severe chest pain (AMI), or severe dyspnea.
- Versed 1-2 mg IV, IM, IN or Etomidate 5-10 mg IV prior to electrical cardioversion if time allows.

Level III:

- None

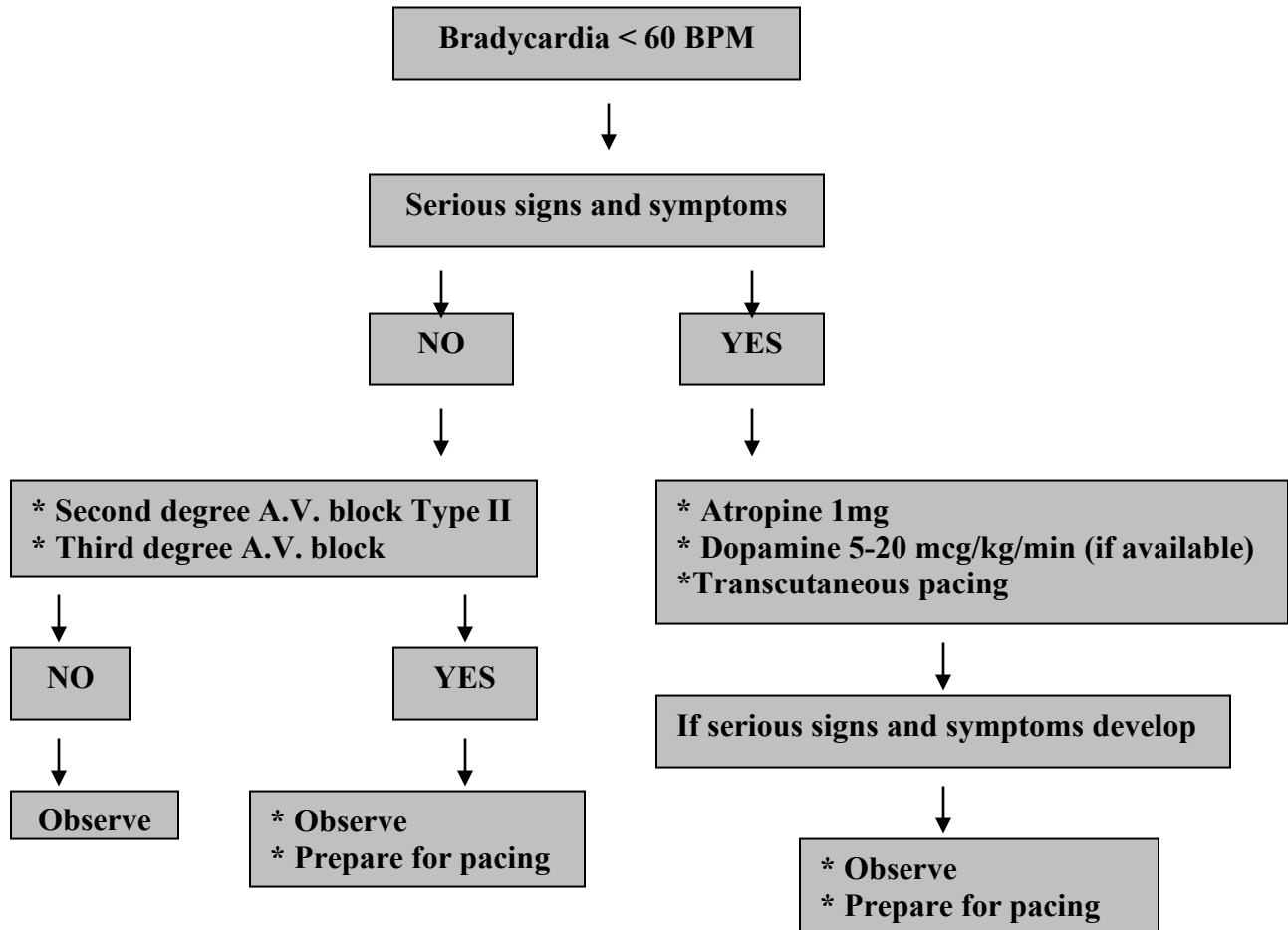
**Follow manufacturers recommendations*

**Reference AHA procedures page for manufacturers recommended Joules setting*

Bradycardia

Rationale:

Some patients are normally bradycardic. Bradycardia is treated only if the patient is medically unstable. Signs and symptoms of instability include ongoing chest pain, shortness of breath, acute altered level of consciousness, SBP < 90 mm/Hg, and/or pulmonary edema.



Notes:

Do not delay transcutaneous pacing while waiting for IV access or for atropine to take effect. Repeat 1 mg doses of atropine at 3-to-5-minute intervals to a maximum of 3 mg (6 mg ET) for the hemodynamically symptomatic patient. Consider shorter intervals in severe clinical conditions. Atropine has been shown to be ineffective in patients who have undergone cardiac transplantation as well as patients presenting with Type II second degree and third degree A.V. blocks.

Administer Versed 1 to 2 mg IV/IM/IN for sedation as time permits. Be prepared to assist the patient with breathing. Use pacing only for heart rate control in the patient with AMI.

Cardiogenic Shock

Rationale:

Cardiogenic shock is a severe life-threatening condition that requires rapid intervention. If lung sounds are clear, consider a fluid challenge before using medications to correct symptomatic hypotension.

Assessment Checklist

- Myocardial infarction
- Syncope
- Consider other causes of shock
- Pulmonary edema
- Cardiac arrhythmias
- Angina pectoris

Level I:

- Administer oxygen by appropriate device.
- Assess signs of shock and cardiac events.
- Place the patient in Trendelenburg position if hypotensive and lung sounds clear.

Level II:

- Establish IV.
- Obtain 12 lead ECG.
- If lung sounds are clear, consider a fluid challenge (250 to 500 ml) for symptomatic hypotension.
- Consider second IV for dysrhythmia control.
- Administer Dopamine by IV infusion at 5 to 20 mcg/kg/min (if available) or Levophed by IV infusion at 0.05-0.1 mcg/kg/min (if available), titrate to effect, for hypotension not corrected by fluid challenge.

Chest Pain

Rationale:

Many patients complain of “chest pain”. Age and patient reports may be poor predictors of significant illness. **When in doubt, treat the patient as if the pain is cardiac in nature.**

Assessment Checklist

- Myocardial infarction
- Significant dysrhythmia
- Pulmonary embolism
- Pneumonia
- Dissecting aortic aneurysm
- Costochondritis
- Pericarditis
- Chronic Obstructive Pulmonary Disease

Level I:

- Administer oxygen by appropriate device.
- Evaluate cardiac risk factors, quality of the pain, and signs of cardiac related origin.
- Inquire about the (male or female) patient’s use of Viagra in the last 24 hours and 48 hours for other Viagra like medications (NTG is contraindicated).
- Place the hypotensive patient in Trendelenburg position.
- An EMT may assist a patient with self-administration of one dose of prescribed Nitroglycerin after ruling out the use of Viagra within 24 hours and 48 hours for other Viagra like medications. No nitroglycerin paste.
- May administer ASA 325 mg. orally

Level II:

- Administer baby aspirin (81 mg) x 4 PO (contraindicated if known hypersensitivity or hemophilia).
- Establish IV.
- Obtain 12-lead ECG (consider right-side 12- lead).
- After ruling out the use of Viagra within 24 hours or Viagra like medications within 48 hours administer 0.4 mg Nitroglycerin SL PRN once every 3 to 5 minutes, or until relief, for a total of three administrations, before administration of analgesics. SBP > 100 mm/Hg prior to administration of any NTG.
- Treat with appropriate dysrhythmia protocol.
- Administer Morphine Sulfate 2 mg IV PRN. Repeat at 5-minute intervals to a total of 10 mg. Or administer Fentanyl PRN up to 1 mcg/kg (if available), titrate to effect. If administration of Fentanyl, consider administration of Zofran 4mg/IV/IO/IM or Oral Dissolving Troche (ODT) 4mg. Max dose of 4mg.
- Issue Cardiac Alert and give report to the Emergency Department for patients with ACS.
- Issue a **STEMI Alert** if ST elevation > 1mm in 2 or more contiguous leads transmit EKG to Emergency Department receiving the patient and give early report. Unstable patients must be transported to the closest appropriate hospital.
- Issue a **Cardiac Alert** for any patient experiencing a known or suspected cardiac event with abnormal vital signs, EKG changes, or in the paramedic’s judgement, signs or symptoms suspicious for cardiac ischemia.
- If EKG changes in leads, II, III, and AVF indicate an Inferior Wall MI. administer 1 liter bolus of NSS. If patient has SBP < 140, after the administration of 1-liter NSS, DO NOT ADMINISTER Nitroglycerin, Morphine, or Lopressor.

Pulmonary Edema / Congestive Heart Failure

Rationale:

Most cases of CHF and Pulmonary Edema will respond to pre-hospital care. This will convert an acute crisis to a controlled illness. Rule out respiratory infection.

Assessment Checklist

- Chronic Obstructive Pulmonary Disease
- Congestive Heart Failure
- Pneumonia

Level I:

- Assess patient's temperature.
- Administer Oxygen by appropriate device.
- Place patient in upright position.
- Check Temp., if febrile (>100.4 F), refer to Sepsis Protocol

Level II:

- Establish IV.
- Obtain 12-lead ECG (consider right-side 12-lead).
- Consider C-PAP.
- Morphine 2 mg to 4 mg IV if patient not tolerating C-PAP well.
- Administer 0.4 mg Nitroglycerin SL every 3 min (if SBP > 100 mm/Hg). Do Not administer NTG if patient is febrile (>100.4 F).
- Patients with bronchial spasms – wheezing should be treated with bronchodilators (cardiac asthma).

Level III:

- None

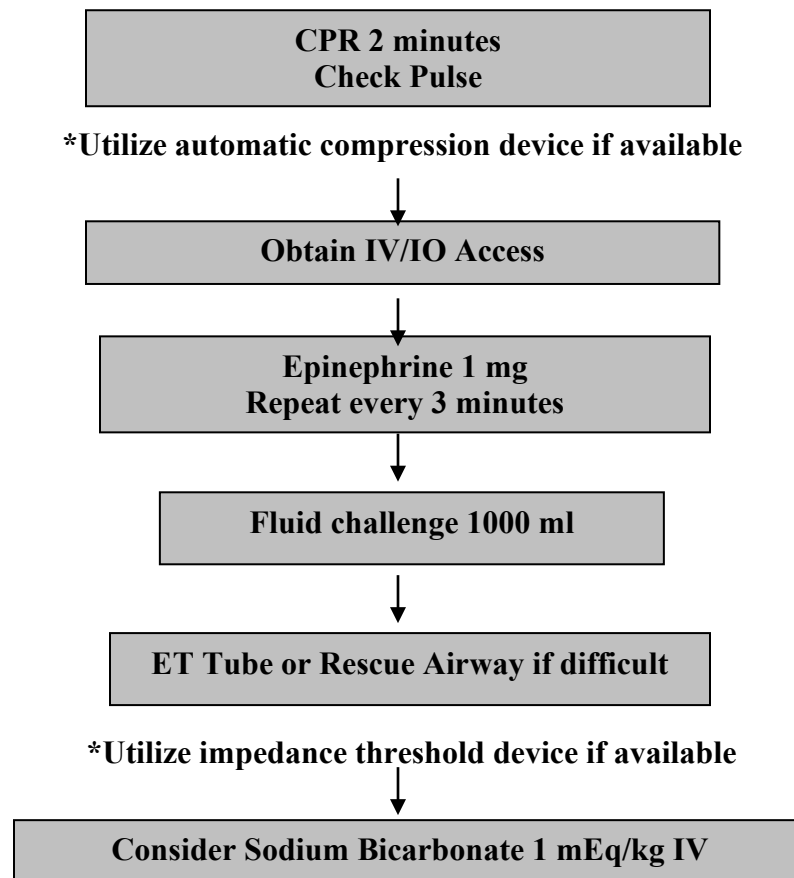
Pulseless Electrical Activity

Rationale:

Pulseless electrical activity (PEA) describes any electrical cardiac activity that is not pulse producing. PEA may be the result of an underlying treatable condition. A very common cause of transient PEA is post defibrillation IVR. Do not treat pulseless ventricular tachycardia with this protocol.

Assessment Checklist

- AMI
- Hypovolemia
- Hypoxia
- Hyperkalemia
- Hypothermia
- Acidosis
- Tension pneumothorax
- Pulmonary embolism
- Overdose (including calcium channel blockers, beta blockers, Tricyclic anti-depressants, and Digoxin)
- Cardiac tamponade



Note:

- *Treat tension pneumothorax with needle decompression.*

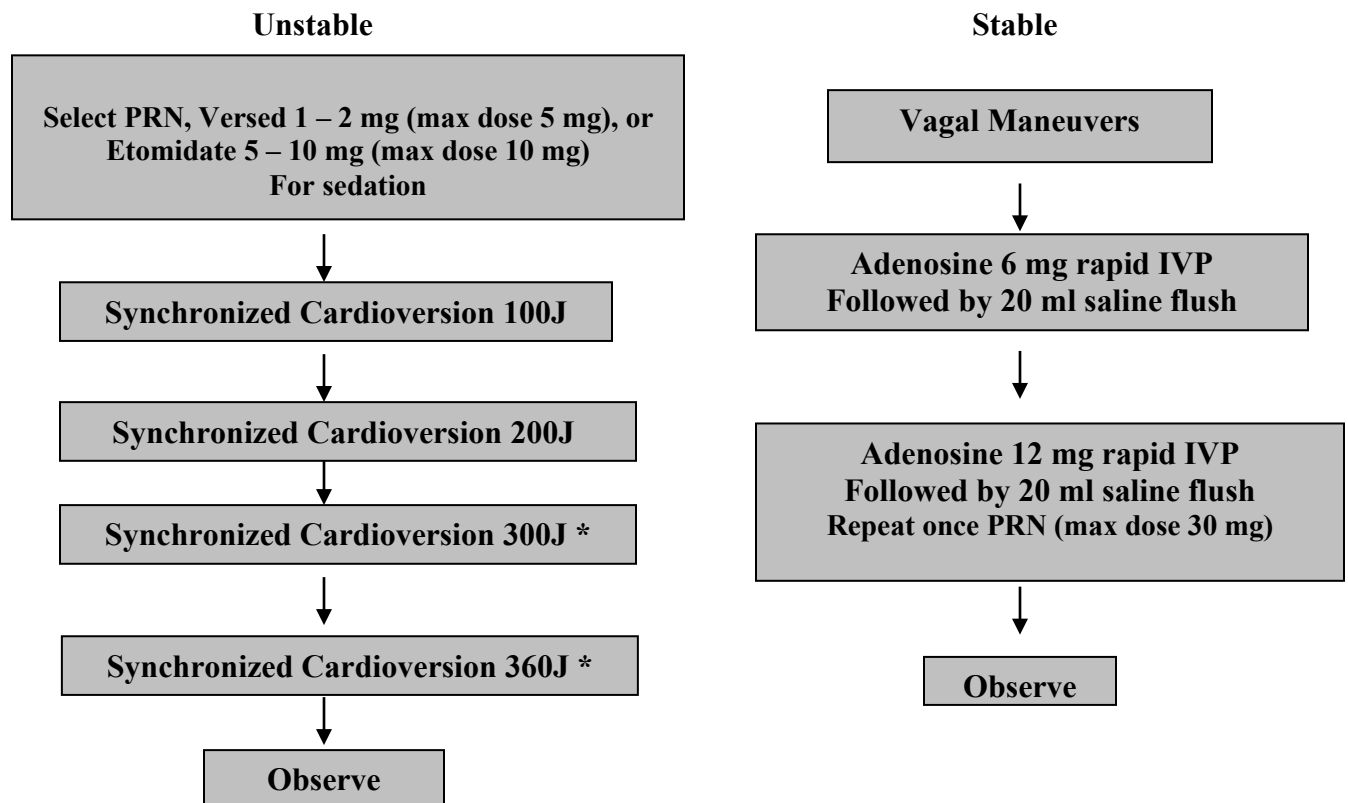
Supraventricular Tachycardia (non-Atrial Fibrillation)

Rationale:

Supraventricular tachycardia (SVT) describes several conditions. Determining the underlying rhythm and cause may be essential for care. Suspect hypovolemia or cardiogenic shock as causes of hypotension. Rapid intervention is required in the unstable patient. Unstable is defined as any of the following: *severe chest pain, dyspnea, hypotension, acute CHF, or acute myocardial infarction.*

Assessment Checklist

- Dysrhythmia
- Myocardial infarction



Note:

- *Adenosine may be harmful when used if WPW or other accessory pathway tachyarrhythmia are present. Transport and observe these patients.*
- *Adenosine is ineffective for slowing the rate of Atrial fibrillation/flutter other than momentarily but this slowed rate may allow for the definitive diagnosis of Atrial fibrillation/flutter as opposed to PSVT.*

**If defibrillator allows for higher energy delivery*

Termination of Resuscitation

This Guideline is divided into separate sections that cover the different situations of death in the field that the paramedic will be presented with. **All patients found in cardiac arrest will receive cardiopulmonary resuscitation unless an exception is met** as outlined in the following sections:

1. Advanced Directives / Do Not Resuscitate Order (DNRO).
2. Determination of Death.
3. Discontinuance of CPR.

I. ADVANCED DIRECTIVES / DO NOT RESUSCITATE ORDER (DNRO).

A. LEGISLATIVE AUTHORITY.

Under Chapter 401.45, Florida Statutes (F.S.) "Denial of Emergency Treatment Civil Liability" a competent adult, or an incompetent adult, through health care surrogate who was previously chosen, or proxy or guardian, has the right to be able to control decisions regarding medical care, including the withdrawal or withholding of life-prolonging procedures. This legislation authorizes EMS personnel to honor a pre-hospital Do Not Resuscitate Order (DNRO). This legislative authority does not include a "Living Will."

B. VALID DO-NOT-RESUSCITATE ORDERS.

1. An original yellow DNRO DOH Form 1896 executed as required by State Statute (with original signatures).
2. A copy on yellow paper (or similar color to the original) of DNRO DOH Form 1896 executed as required by State Statute (with original signatures).
3. The patient is wearing a bracelet, which identifies the patient and indicates the patient has executed a DNRO in accordance with DOH Form 1896.
 - A. In this instance, EMS personnel MUST receive the original DNRO DOH Form 1896, or a copy on yellow paper, which contains original signatures (attach to EMS Run Report).
4. Oral orders from non-physician staff members, or telephoned requests from an absent Physician do not adequately assure Paramedics that the proper decision-making process has been followed and are NOT acceptable.

C. CONFIRMATION AND DOCUMENTATION.

1. The Paramedic must confirm the identity of the patient with a DNRO through a driver's license, other photo identification, or from a witness in the presence of the patient. If a witness is used to identify the patient, this shall be documented in the EMS Run Report and will include:
 - A. The full name of the witness.
 - B. The address and telephone number of the witness.
 - C. The relationship of the witness to the patient.

D. TREATMENT OF PATIENTS WITH DNRO

1. In the event that a patient with no pulse has a valid DNRO form, the following procedures shall be withheld:
 - A. CPR
 - B. Endotracheal Intubation or other advanced airway management
 - C. Artificial ventilation
 - D. Defibrillation
2. If a valid "Do Not Resuscitate Order" (DNRO) is presented on a patient with a pulse, the field EMS provider still needs to perform interventions and care on the patient. The EMS provider shall provide comforting, pain-relieving and any other medically indicated care, short of respiratory or cardiac resuscitation.

II. DETERMINATION OF DEATH.

The EMT or PARAMEDIC may determine that the patient is dead / non-salvageable and decide not to resuscitate the patient under the following guidelines.

1. The patient may be determined to be dead / non-salvageable and will not be resuscitated or transported if all four (4) presumptive signs of death and at least one (1) conclusive sign of death are identified.

A. The four presumptive signs of death that **MUST** be present are:

- Unresponsiveness.
- Apnea.
- Pulseless.
- Fixed pupils.

B. In addition to the four presumptive signs of deaths, at least one (1) of the following conclusive signs of death that **MUST** be present:

- Injuries incompatible with life (e.g., decapitation, massive crush injury, incineration, etc.).
- Tissue decomposition.
- Rigor Mortis of any degree with warm air temperature.
 - a) Hardening of the muscles of the body, making the joints/jaw rigid.
- Livor Mortis (Lividity) of any degree and / or generalized cyanosis.
 - a) Venous pooling of blood in dependent body parts causing purple discoloration of the skin, which does blanch with pressure.

C. Patients with suspected hypothermia, barbiturate overdose, or electrocution require full ALS resuscitation unless there are injuries incompatible with life or tissue decomposition.

2. A trauma victim who does not meet the "Determination of Death" criteria listed above may be determined to be dead / non-salvageable based on the following criteria:

A. Pulselessness and apnea associated with:

- Asystole (confirmed in two leads) and
 - a) Blunt trauma arrest, or
 - b) Prolonged extrication time (> 15 minutes) where no resuscitative measures can be initiated prior to extrication.
- Arrest from a primary brain injury or with no brain-stem reflexes; arrest from blunt multiple injuries.
- Arrest from blunt injury to torso.

B. Consideration should be given for the possibility of organ harvest; however, this should not be the sole reason for resuscitation.

3. Absence of pulse or spontaneous respiration in a multiple casualty situation where EMS resources are required for stabilization of living patients. The local law enforcement agency, which has jurisdiction, will be responsible for the body once death has been determined. The body is to be left at the scene until a disposition has been made by the Medical Examiner's Office or local jurisdiction.

III. DISCONTINUANCE OF CPR.

PARAMEDIC ONLY

1. EMS personnel are **not obligated** to continue resuscitation efforts, which were started inappropriately by others at the scene.
2. When there is a delay in presenting a DNRO to EMS personnel, resuscitation must be started. However, once the DNRO is presented to EMS personnel, the Treating PARAMEDIC may terminate resuscitation.
3. PARAMEDIC may terminate resuscitation provided the following criteria are met:
 - A. Appropriate BLS and ALS have been attempted without restoration of circulation and breathing.
 - B. An advanced airway has been successfully utilized.
 - C. Persistent asystole or PEA EKG patterns are present, and no reversible causes are identified.
 - Patients with suspected hypothermia, barbiturate overdose, or electrocution require full ALS resuscitation, unless there are injuries incompatible with life or tissue decomposition.

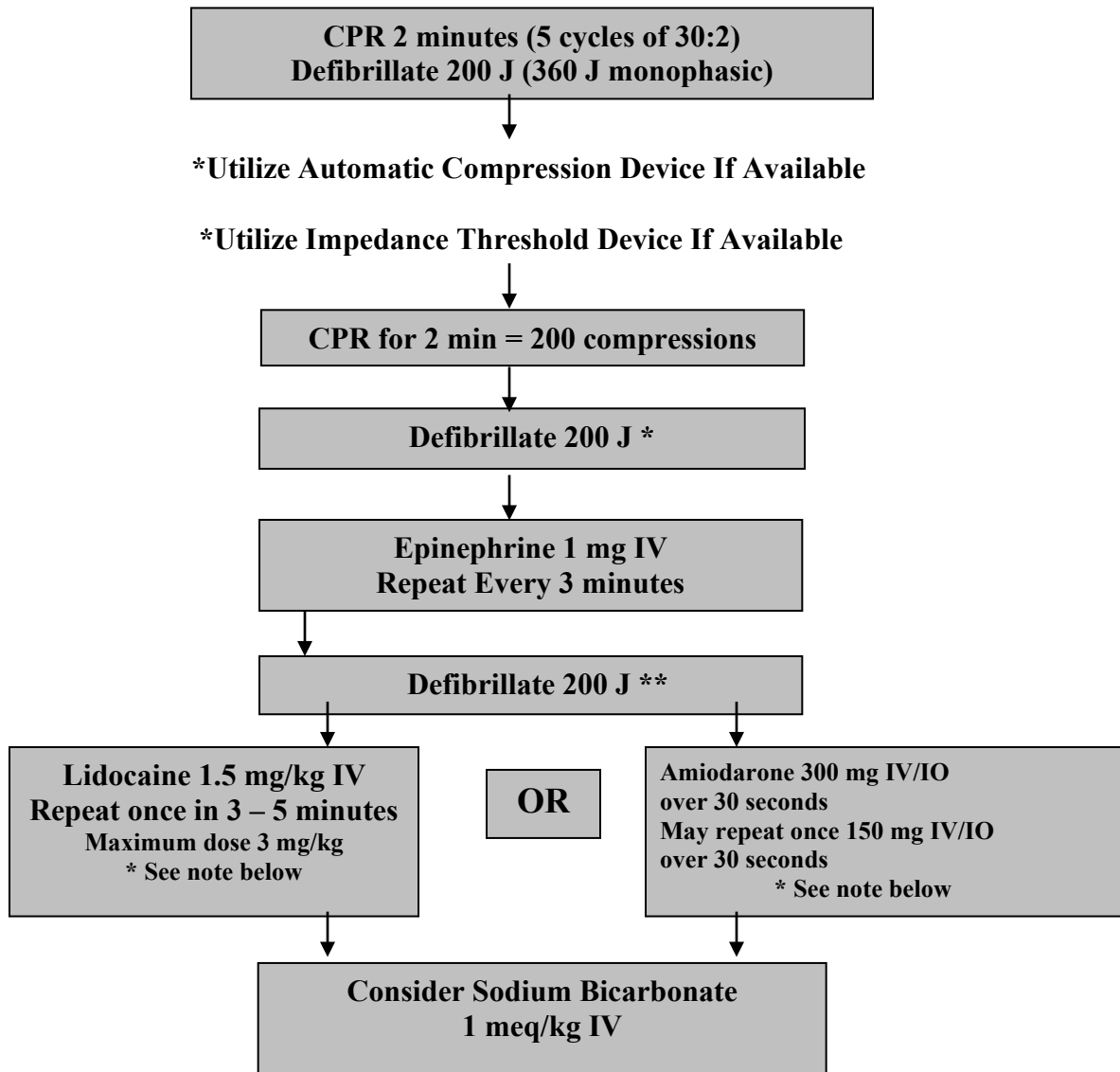
Death in the field, determination of Death (continued)

4. Provide appropriate grief counseling or support to the patient's immediate family, bystanders, or others at the scene.
 - A. Provide family members with appropriate referral information, if available.
5. Deceased preparation.
 - A. Once it has been determined that the patient is dead and resuscitation will not continue, cover the body with an EMS sheet. Do NOT use anything from the scene to cover the body to avoid transference of evidence. DO NOT remove any property from the body or the scene for any purpose.
 - B. If it is determined that the deceased shall be transported to the medical examiner's office, immediately notify the appropriate law enforcement agency. Remain on scene until either law enforcement or the Medical Examiner's contracted transport service arrives.
 - C. EKG rhythm documentation must be attached to the patient care report.
 - D. Consult the patient's family for "Organ Donor" information, if appropriate.

Ventricular Fibrillation & Pulseless Ventricular Tachycardia

Rationale:

Ventricular fibrillation and pulseless ventricular tachycardia require immediate treatment. Attempt to also identify the cause of dysrhythmia and correct it. Chest compressions and rapid defibrillation are a priority. The effect of medication therapy on survival rates is unproven and should not delay good chest compressions and defibrillation. If witnessed cardiac arrest and an AED/cardiac monitor is available, do not delay immediate defibrillation.



**If administered too rapidly may cause irreversible bradycardia*

***Reference AHA procedures page for manufacturers recommended Joules setting*

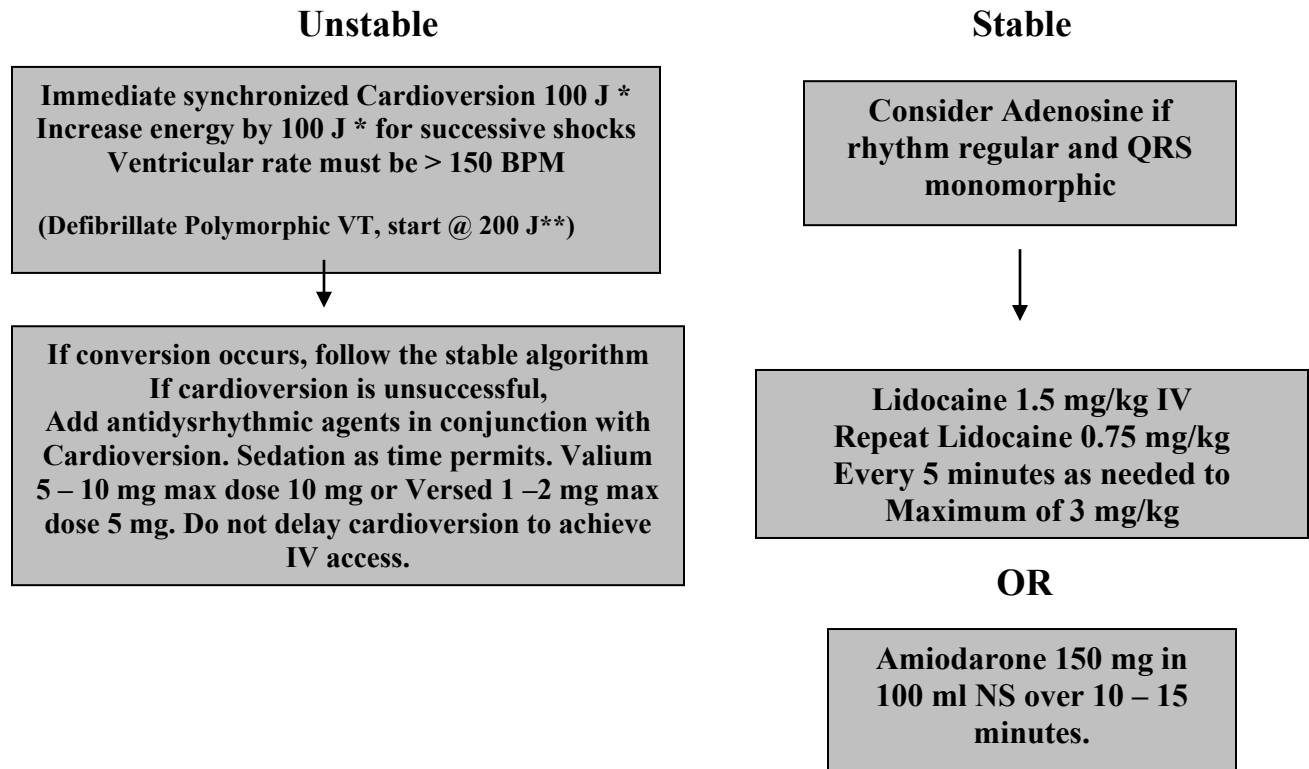
Note:

- *If converted with Lidocaine, establish drip.*

Ventricular Tachycardia

Rationale:

This life-threatening condition is uncommon but responds well to emergency cardiac treatment. Rapid intervention is required in the unstable patient. Unstable is defined as any of the following *requires more than one antidysrhythmic to convert, chest pain, dyspnea, decreased level of consciousness, hypotension, pulmonary congestion, CHF, or acute myocardial infarction.*



** If administered too rapidly may cause irreversible bradycardia*

*** Reference AHA procedures page for manufacturers recommended Joules setting*

Note:

- *If converted with Lidocaine, establish drip.*

Ventricular Tachycardia - Torsades de pointes

Treat the ventricular tachycardia.

Torsades de pointes is a ventricular tachycardia.

UNSTABLE patient: Cardiovert. In the pulseless, defibrillate. (The polymorphic nature of the rhythm may interfere with the defibrillator's ability to synchronize, so cardioversion may not be possible. In that case, in the unstable patient, deliver an unsynchronized shock.

STABLE patient: I think it is reasonable to electrically cardiovert stable ventricular tachycardia, but you can also attempt to treat it medically. Torsades de pointes is caused by a prolonged QT. Almost all of the antiarrhythmics that we normally use to treat ventricular tachycardia, such as amiodarone and procainamide, will prolong the QT further, and therefore can make your patient worse. Do not give amiodarone or procainamide. Lidocaine (1.5 mg/kg load) is a reasonable option.

The medical treatment for stable torsades de pointes is magnesium.

▪ Magnesium

- Loading dose of **2 grams IV**
 - Repeat once if no clinical effect
 - This loading dose is best given slowly (over 10-20 minutes), but in the unstable patient it is reasonable to give it as a slow IV push
- Start an **infusion at 1-4 grams/hr**
 - Monitor magnesium levels: if >2.5 mmol/L cut infusion in half; if >3 mmol/L stop the infusion
 - Monitor clinically: The major side effect of hypermagnesemia is depression neuromuscular function. Monitor reflexes, bradycardia, respiratory distress. Be prepared to intubate

Prevent torsades from recurring.

Converting the patient out of torsades de pointes is only the first step. The underlying cause will still be present and therefore the rhythm is likely to recur. We need to prevent it from recurring while we search for and treat the underlying cause.