CARDIAC ARREST MANAGEMENT

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KNOWLEDGE OBJECTIVES:

Upon completion of the class, each participant will independently do the following with a degree of accuracy that meets or exceeds the standards established for their scope of practice:

1. state the steps to initiate a cardiac arrest in an effective, confident manner.
2. discuss the various roles of the cardiac arrest team members.
3. explain EMS responsibilities associated with cardiac arrest management.
4. describe the BLS steps in initial cardiac arrest management.
5. sequence the critical steps to effectively maintain an ALS airway, ventilations, and circulation in a cardiopulmonary arrest.
6. explain the drugs that should be given in the order of their priority for VF, asystole, and patients in PEA.
7. identify special cardiac arrest situations and drugs that must be administered to these patients in order to optimize their resuscitation:
   - Patient taking beta blockers
   - Tricyclic antidepressant OD
   - Hyperkalemic patient
   - DKA or preexisting acidosis patient
8. list situations in which resuscitation should not be initiated.
9. list the criteria that must be met for a cardiac arrest to be stopped in the field.
10. describe methods to provide emotional support to family and friends of a cardiac arrest victim.
11. identify the components of a factual, accurate, complete and timely medical record of a resuscitation event.
12. correlate the cardiac rhythm with patient assessment findings to determine the emergency treatment for each rhythm.

DISCLAIMER: This outline was prepared BEFORE the October release of the AHA guidelines. Some elements are subject to change at the conference based on the new guidelines.

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I. **Cardiac arrest/sudden death**

A. **Pathophysiology**

1. This is one of the major clinical syndromes of coronary artery disease and accounts for 60% of all deaths from this disorder. On an average day in the U.S., 1,000 adults die from sudden cardiac arrest (250,000 deaths/year). Sudden death is defined as **death within one hour of onset of symptoms** (usually due to VF). Almost 2/3 (63.4%) of cardiac-related deaths are unexpected and about half (47%) never make it alive to a hospital.

2. Pre-arrest conditions that may lead to a cardiac arrest

   a. **Acute coronary syndromes:** Actual infarction is often not present, but atherosclerotic disease is common. Prognosis is better if an acute MI is the cause of arrest as ventricular electrical instability is common in the first few hours after infarct. It is a transient phenomenon that generally resolves with evolution of the infarction. Cardiac arrest may be the first manifestation of cardiac disease in a significant number of patients.

   b. Respiratory failure

   c. Stroke

3. **Other cardiac causes**

   a. Conduction abnormalities
   b. Structural disease
   c. Myocarditis
   d. Drugs

4. **Non-cardiac causes**

   a. Drowning; electrocution/lightning

   b. Electrolyte imbalance; hypo/hyperthermia

   c. Trauma; acid-base imbalances; hypoxia

   d. Drug toxicity (arrhythmogenesis): May affect heart's conduction system, affect the autonomic NS, or result from physiological changes such as hypotension or electrolyte disorders. Those at increased risk include the elderly and patients taking multiple medications (Wooten, 2002). Cisapride (Propulsid), astemizole (Hismanal), and terfenadine (Seldane) were removed from the market because they caused life-threatening arrhythmias. Droperidol (Inapsine) had the risk of prolonged QT intervals and torsades added to its labeling.

5. Unknown causes 30-40%

B. **Dysrhythmias or conditions associated with cardiac arrest**

1. Ventricular fibrillation (VF)
2. Ventricular tachycardia (VT)
3. Pulseless electrical activity (PEA) - condition, not a rhythm
4. Asystole

II. **Cardiac arrest equipment/maintenance**

A. Appropriate resuscitation equipment such as airway equipment, suction, oxygen, SpO_2, capnography, monitor/defibrillator and appropriate electrodes/defib pads, impedance threshold device (ResQPod), vascular access equipment, drug bag/box should be brought to the point of patient contact.

B. This emergency equipment should be located, organized, and replaced in a manner to assure efficiency and uniformity in managing cardiac arrests.

C. **Emergency equipment should be checked and maintained daily**

1. Check that monitor cable and lead wires are present and in good condition
2. Ensure an adequate inventory of pre-gelled electrodes and pace/defib pads
3. Check portable oxygen tank and ensure that PSI is above minimum level.
4. Routine defibrillator checks are a good idea. Directions for each defibrillator should be maintained by the EMS agency. The defibrillator is checked by discharging the paddles on battery once every 24 hours. If paddles are present, check paddle electrode plates to be sure they are free of any old dried gel on their surface.

D. Check dates on all items. If items are outdated or within days of expiration, restock.

E. All disposable supplies should be restocked immediately after use.

F. Extra supplies need not be kept in the ambulance.

II. Cardiac arrest management

A. **Responsibilities**: **Team member roles** (Sample assignments)

1. **First rescuer (Performs primary ABCD assessment and stays)**
   a. Establish responsiveness
   b. Place the victim in a supine position on a hard surface
   c. Begin CPR as appropriate
      (1) Open airway using manual maneuvers
      (2) Assess for spontaneous ventilations
      (3) Assess pulse
   d. This rescuer may place an advanced airway after initial defibrillations
2. **2nd rescuer**
   a. Assists with placing resuscitation board beneath patient's torso if not already done
   b. Assists with 2nd rescuer CPR - chest compressions
3. **3rd rescuer** - often becomes the cardiac arrest team leader
   a. Applies cardiac monitor electrodes and leads
   b. After 2 min of CPR - Checks cardiac rhythm
   c. Ensures that CPR is being performed properly, femoral pulse is felt w/ compressions; good capnography waveform, rate adequate etc.
   d. Ensures appropriate electrical therapy (defib) is administered
   e. Ensures that patient is being properly ventilated and oxygenated
   f. Ensures that pulse is checked with any rhythm changes
   g. Ensures that appropriate drugs are administered
   h. Ensures that possible etiologies of the cardiac arrest are considered and treated (Hs & Ts)
4. **4th rescuer**
   a. Prepares suction
   b. Establishes vascular access
   c. Administers IV fluid or IV medications per SOP
5. **5th rescuer** – Recorder: Records all medications, defibrillations, resuscitation efforts and names of people responding to the call

III. **Adult Basic Life Support**

A. **All care is organized around 2 minute cycles of good CPR**

B. **Beware of a self-fulfilling prophecy**: If those who perform the resuscitation do not believe it will work, efforts might be less than maximal, and the success rate will be low.

C. **Everything starts with good BLS**

1. Prompt recognition and actions for MI and stroke to prevent respiratory and cardiac arrest
2. Recognition and relief of foreign body airway obstruction
3. Rescue breathing for victims of respiratory arrest
4. Uninterrupted chest compressions for victims of cardiopulmonary arrest
5. Defibrillation of patients with VF or VT with an AED

D. **Primary ABCD Survey and steps – Focus: Good CPR and defibrillation**

1. Check responsiveness (determine unresponsiveness)
2. **A** = Airway: open the airway using manual maneuvers
3. **B** = Breathing: Check breathing, provide two ventilations
4. **C** = Circulation: Check for pulse, if no pulse, begin chest compressions
5. **D** = Defibrillation: Assess for and shock VF/pulseless VT

E. **Airway**

1. Remove obstructions
2. **Open airway** using jaw thrust, head tilt - chin lift, tongue-jaw lift
3. **Suction as necessary.** Patients in cardiac arrest frequently vomit. Have large bore suction immediately available and ready for use.
4. **Insert non-invasive airway adjuncts**

a. Nasopharyngeal airways (2 preferred)
b. Oropharyngeal airway if needed

F. **Rescue breathing – This is subject to change**

1. Determine breathlessness- **no more than 10 sec.**
2. **How should the initial ventilations be provided?**

If rescue breathing indicated: 2 breaths (1 sec. each) w/ just enough volume to produce visible chest rise if pocket mask/BVM immediately available – (do not delay start of compressions); give O_2 when available.

a. This supports adequate oxygen saturation but reduces the risk of gastric inflation. Smaller ventilation volumes can be associated with hypercarbia and acidosis.

b. Decrease gastric distention by applying Sellick's maneuver during rescue breaths.

c. **BVM advantages**

(1) Provides immediate ventilation and oxygenation
(2) Operator gets sense of compliance and airway resistance
(3) May provide excellent short-term support of ventilation
(4) High oxygen concentrations are possible
(5) Can be used to assist spontaneous respirations

d. **Potential complications**

(1) Hypoventilation
(2) Gastric distention
(3) ***Death by hyperventilation***

3. **At what rate should an adult in respiratory arrest be ventilated prior to advanced airway placement?**

4. **Why is gastric distention a problem when performing CPR?**

5. **If air is leaking around the face mask when attempting to ventilate with a BVM, what action is indicated?**

6. **Have there been any documented cases of either HIV or HB transmission by mouth-to-mouth ventilation?**

G. **Pulse check (5-10 sec)** – adults & children - carotid; infants - brachial or femoral

H. **No pulse – begin chest compressions**

1. **Compression landmarks**

   a. **Adults & children:** Lower half of sternum, between nipples

   b. **Infants**: Just below nipple line

2. **Compression method:** Push hard and fast; ensure full chest recoil. For chest compressions, the faster the better in terms of blood flow and blood pressure. Frequent interruptions in compressions significantly reduce overall blood flow, with longer periods of no to very low flow. Rescuers tend to drift toward slower rates, especially with fatigue after several minutes of compressions. Recommending that the compressors switch every 2 minutes is meant to maintain effective compressions at an effective rate.

   a. Adult: Heel of one hand, other hand on top

   b. Child 1-8 years: Heel of one hand or as for adults

   c. Infant: 2 fingers or (w/ 2 rescuers) 2 thumbs – encircling hands

3. **Compression depth**

   a. Adult: 1½ to 2 inches

   b. Child & infant: About ⅓ to ½ depth of chest

4. **What does CPR actually do?**

   Early and effective CPR is the best treatment for cardiac arrest. CPR may

   a. prevent VF from deteriorating to asystole;
   b. increase the chance of successful defibrillation;
   c. contribute to preservation of heart and brain function; and
   d. improve survival.

5. **When performing chest compressions, what is the optimal rate for an adult and child?**

6. **What is the proper compression to ventilation ratio in an adult prior to advanced airway placement?**

7. **What is the proper compression to ventilation ratio in children and infants with 2 rescuers prior to advanced airway placement?**

8. **Properly performed CPR achieves a cardiac output that is approximately _____% of normal. What can be added to improve this?**

9. Chest compressions should not be interrupted for more than _____seconds.
   a. Rotate person providing compressions every _____ minutes during ECG rhythm checks. Change should take 5 seconds or less. Compressor changes with person providing ventilations.
   b. Pts should not be moved while CPR is progress unless in a dangerous environment or pt is in need of intervention not immediately available. CPR is better and has fewer interruptions when resuscitation is conducted where the pt. is found.

10. How can the effectiveness of CPR be enhanced?

I. If arrest was not witnessed by EMS personnel or response time > 4-5 min, **perform 2 min of CPR before rhythm check or defibrillation.** For witnessed arrest, use AED/defibrillator as soon as possible. **Apply pads** with chest compressions in progress.

1. **BLS**: AED: **AEDs** are easy to use, accurate in the diagnosis of VF, reliable in performance, and only require 4 hours of training to use. They are being used by police, firefighters, and the lay public. After 2004, all commercial aircraft with 20 or more passengers and a flight attendant were required to carry an AED. ACLS-trained healthcare providers should know how to interface with PAD providers.
2. **ALS:** Cardiac monitor – defib pad placement

J. **Good CPR and early defibrillation are the greatest determinants of survival for adult patients experiencing VF or VT**. Immediate bystander CPR and defibrillation within 3 to 5 minute of collapse have resulted in survival rates of 41% to 74% for victims of witnessed VF arrest in airports, casinos, and first-responder programs with police officers (AHA, 2005). For every one minute defibrillation is delayed, it is 10% less likely to be successful.

1. Goal: Interval from collapse to 1st shock **< 3 minutes** in > 90% of arrests.
2. **What is the joule setting for the first shock?**
   a. Monophasic defibrillator:_____
   b. Biphasic defibrillator:_____
   c. AED:_____
3. Continue CPR while defibrillator is charging.
4. Clear patient and deliver shock
5. Resume chest compressions immediately after shock; continue for 2 minutes
6. **Should the ECG and pulse be checked immediately after the shock?**
7. What should paramedics do if the patient wakes or begins to move extremities?
8. **Should intubation or vascular access be attempted before the first shock?** Why?

K. **After 2 min of CPR: Check rhythm. –** Shockable rhythm? Not shockable → asystole/PEA

IV. Advanced Life Support

A. Secondary ABCD Survey overview

1. **A =** Airway: Insert advanced airway devices as soon as able
2. **B =** Breathing: Confirm TT placement: primary and secondary methods

   B = Breathing: Confirm effective oxygenation/ventilation by SpO_2, $EtCO_2$
3. **C =** Circulation: Check for pulse, if no pulse, continue chest compressions

   C = Circulation: Identify rhythm → monitor

   C = Circulation: Give rhythm and condition-appropriate drugs
4. **D =** Defibrillation: Shock VF/pulseless VT
5. **D =** Differential diagnosis: search for and treat identified reversible causes

B. Securing an airway

1. **Advantages of advanced airway**
   a. Reduces risk of aspiration of foreign material
   b. Facilitates ventilation and oxygenation
   c. Prevents gastric inflation if used with cuff
   d. Allows faster chest compressions
2. **ACLS guidelines**
   a. Determine if advanced airway is needed after 2nd defibrillation
   b. Intubation should be done by most experienced person
   c. Do not take longer than _____ seconds per attempt. **An ETI attempt is defined as every time a laryngoscope blade is placed in the mouth**.
3. **Confirm tube placement**
   a. Visualization of tube passing through the cords
   b. EDD: Bulb or syringe
   c. $EtCO_2$ detector: Purple → tan → yellow within 6 breaths. If none or poor perfusion, color change will generally only get to tan even if tube is in the trachea.
   d. Waveform capnography preferred
   e. 5-point auscultation
   f. Bilateral chest expansion
4. **Secure tube**: prevent dislodgment
   a. Note depth of insertion: 3 X ID of tube
   b. Use a commercial tube holder
   c. Immobilize head and neck in neutral position
   d. Continuously monitor $EtCO_2$ or capnography to detect tube displacement
5. Use of rescue airways: Example - **King LTS-D**

   ENSURE THAT 18 Fr SUCTION catheter IS IMMEDIATELY AVAILABLE.

C. **B** = Breathing: Confirm effective oxygenation and ventilation: SpO_2, capnography. After advanced airway is placed, ventilate at _____BPM.

DO NOT pause compressions to give breaths.

D. **C** = Circulation - **Establish vascular access as able**: Use any peripheral vein that appears accessible. It is not practical to start an EJ IV while someone else is intubating. If 2 attempts at IV access are unsuccessful or no veins are visible or palpable, insert an IO line.

E. **Drug administration - vasopressors**

1. Because of the frequency of administration of some drugs in cardiac arrest, **designate one team member to be responsible for drug preparation and administration**.
2. The person administering the meds must call out loud the name and dose of any medication given and be certain that the team leader and recorder have heard the statements and accurately noted the times given.
3. **What should be the timing of drug administration in a pulseless arrest?**
4. **Should chest compressions be paused for drug delivery?**
5. **When pushing IVP drugs into a peripheral line inserted in the arm, what should be done to facilitate entry of the drug into the central circulation?**
6. The carotid artery has two branches, the external and internal. The external carotid supplies blood to the tongue, face, scalp, and neck. The internal carotid supplies the brain. When CPR is performed without a vasoconstricting drug on board, blood is preferentially shunted to the external carotid. Thus, the tongue is perfused, but the brain is not. Similarly, the coronary arteries are perfused during diastole but only as long as the mean arterial pressure > 60 mmHg. CPR can generate a systolic BP of > 100 mmHg, but the diastolic BP and coronary artery perfusion remain low unless vasopressors are administered to increase coronary artery filling.

   What vasoconstricting drug(s) should be prepared?
7. **What is the concentration, dose and route for epinephrine in pulseless arrest?**
8. **How often should epinephrine be repeated in pulseless cardiac arrest?**

F. **After 2 minutes of CPR; check rhythm**. Shockable rhythm?

1. Continue CPR while defibrillator is charging
2. Give 1 shock
   a. Manual biphasic: Device specific (Same as 1st shock or higher dose)
   b. AED: Device specific
   c. Monophasic: 360 J
3. Resume chest compressions immediately after shock & continue for 2 minutes – NO pulse or rhythm check yet

G. **Consider antiarrhythmics**: give during CPR before or after the shock

1. **Amiodarone 300 mg IVP/IO** (does not need to be diluted for VF and can be pushed fast): Results of the Amiodarone versus Lidocaine in Prehospital Ventricular Fibrillation Evaluation (ALIVE) trial, published in the New England Journal of Medicine (Dorian, 2002) reveal that significantly more cardiac arrest patients with shock-resistance VF survived to hospital admission when they were given amiodarone instead of lidocaine as an adjunct to ACLS (22.8% vs. 12%).
2. **LIDOCAINE -** NOT the preferred drug

3. **Can amiodarone be repeated in adults?**

H. Sodium bicarbonate considerations

I. **How often should defibrillation be done during pulseless VT/VF?**

J. **What are the Hs & Ts that should be searched for and treated as possible contributing factors to a pulseless arrest?**

- Hypovolemia
- Hydrogen ion (acidosis)
- Hypoxia
- Hyper/hypokalemia
- Hypothermia
- Hypoglycemia
- Toxins (drug OD/poisoning)
- Tamponade, cardiac
- Tension pneumothorax
- Thrombosis, coronary or pulmonary
- Trauma

V. **Asystole/PEA**: Secondary ABCD Survey

A. Scene size up: Is there any evidence that EMS personnel should not attempt resuscitation? DNR order, long-term indications of death (000), already pronounced?

B. Effective CPR is the mainstay of asystole care while trying to identify reversible causes

C. **When IV/IO available, give vasopressor during CPR**

D. **<u>If asystole or slow PEA rhythm rate (< 60):</u>**

1. **ATROPINE 1 mg rapid IVP/IO** . No IV/IO**:** 2 mg ET
2. Repeat every 3-5 minutes to a total of 3 mg IVP or 6 mg ET

E. If asystole persists:

1. Consider quality of resuscitation
2. Atypical clinical features present?
3. Recognize indications for stopping resuscitative efforts: If normothermic, intubated patient remains in persistent monitored asystole 10 minutes or longer despite steps 1-5 in asystole SOP, and no reversible causes are identified seek medical control physician's approval to terminate resuscitation.

F. **Common perils and pitfalls**

1. Not assessing the patient
2. Not considering possible causes of PEA
3. Only treating with epinephrine
4. Not troubleshooting ventilation/intubating patient
5. Not giving volume infusion
6. Defibrillating the patient
7. Not performing chest compressions effectively – frequent pauses; inadequate rate & depth

VI. **Outcome of cardiac arrest**

A. **Is there any way to predict who will experience return of spontaneous circulation** (ROSC)?

Efforts have been directed at developing a non-invasive easy to perform technique for assessing the efficacy of ongoing resuscitation and predicting survival. Currently, investigation is focusing on monitoring end tidal CO_2 by capnography. It works by

measuring the CO_2 in the patient's exhaled gas. Studies have shown it to have a 71% sensitivity and 98% specificity for predicting ROSC.

B. **How likely is it that someone will survive cardiac arrest?**

Overall survival statistics for out-of-hospital arrests vary from 2-25% and 3-33% for VF depending on the study. If a patient converts to a rhythm with a pulse > 100, the survival is > 40%. Statistics for in-hospital recovery is poorer than out-of-hospital. This is because in-hospital patients are usually sicker with a poorer prognosis. About 1-2% of hospitalized patients will arrest. Resuscitation will be attempted on about 1/3. Half (50%) of those are initially resuscitated. One third (33%) are alive the next day.

Fifteen percent leave the hospital alive. Those who arrest in the ED and ICUs often do better. This is probably because the time to discovery is minimized. Another factor associated with survival was the skill and knowledge of the Code director. Post-arrest clinical assessment of neuro function does not become a reliable prognostic indicator of final outcome (neuro recovery or survival) until at least 48-72 hours have elapsed since the resuscitation.

C. **Should age be used alone as a criteria for your aggressiveness in resuscitation?**

1. Age should never be used to exclude a patient for consideration for resuscitation. Even if the prognosis is poorer, many elderly patients are successfully resuscitated.

2. Proper consideration must be given to perceived "quality of life", a perception that is highly individualized. It is important to realize that some elderly patients are extremely satisfied with a sedentary seemingly uneventful existence that might be perceived as meaningless and boring to younger individuals.

D. **Return of spontaneous circulation guidelines**

1. **A** = Maintain open, protected airway

2. **A** = Stabilize airway devices during transport, avoid dislodgment

3. **B** = Monitor ventilations (CO_2) and oxygenation (SpO_2)

4. **C = Remove ITD (ResQPod); monitor ECG & VS**

5. **C** = If post-resuscitation rhythm has an acceptable HR, but **low BP**, support ABCs: Rx hypotension w/ UNWARMED IVF challenges up to 2 L (pressure infusers). If BP < 90 after 10 min (regardless of amount of IVF infused); add **DOPAMINE** 2-20 mcg/kg/min IVPB. Avoid hyperthermia & hyperglycemia. If the post-shock non-VF rhythms are bradycardic with hypotension, begin pacing. If unsuccessful, use atropine.

   Aortic root pressures must be maintained at a minimum MAP of 60 mmHg to create a pressure head for the distribution of blood to the coronary vessels. If MAP < 60 mmHg, most patients will die. This may be done at the temporary expense of other target organs.

   C = Indications and benefits of therapeutic hypothermia

6. **D** = If defibrillation occurred after use of antiarrhythmic agent, then hospital should continue maintenance infusion of the same agent

VII. **Special situations**

A. You find a patient pulseless and non-breathing. The monitor shows IVR at a rate of 30. The patient is taking Inderal (propranolol), Lopressor, Corgard, and Tenormin. What additional medication should be tried during resuscitation to re-establish pulses?

B. What is the difference between PEA and IVR?

C. A patient presents in VF who takes amitriptyline (Elavil). What should be added to the drug treatment?

Why?

D. A patient presents in asystole who is taking Vicodin and Percocet. What should be added to the treatment?

1. Drug:
2. Why?

E. A diabetic patient presents in cardiac arrest (VF) following a three-day decline into coma. Her glucose level is 580 and she appears very dehydrated. This patient may need:

F. A renal failure patient on dialysis treatment becomes pulseless while waiting for dialysis. The patient is found in IVR with a rate of 40 with very tall, peaked T waves. In addition to the regular resuscitation drugs, what additional medications should be given to treat her hyperkalemia?

G. **Should family members be allowed to view the resuscitation?**

Studies have supported giving family members the option of being present during resuscitation. Two-thirds felt it helped them in the grieving process and may have been beneficial to the dying family member. More then one-third emphatically declared it their right to be present during the resuscitation of a loved one. Fears that people might be horrified by resuscitative efforts, that family members might try to interfere, and observation may reveal failure/weakness in medical care and increase the risk of lawsuits are NOT supported by the facts.

H. **Working with the family**

1. If resuscitation is to continue into a hospital, be very clear to family members which hospital you are going to.
2. Many resuscitations fail despite our best efforts
3. Survival to discharge rates are rarely > 15%
4. If a cardiac arrest is called in the field, survivors should be informed with compassion by a knowledgeable healthcare professional in person, not over the phone (AHA, I-19).
5. Obtain as much information as possible about the patient and the circumstances surrounding the death.
6. Address the closest relative. Use appropriate words and body language. Sit down if possible. Briefly discuss the circumstances leading to the termination of resuscitation. Go over the sequence of EMS events. Avoid euphemisms such as

“he’s passed on,” “she’s no longer with us,” or “he’s left us.” Instead, use the words “death”, “dying” or “dead”.

7. Allow time for the shock of the news to be absorbed. Make eye contact, use touch appropriately – only above the waist, on the shoulder, or forearm. Convey your feelings with a phrase such as “You have my (our) sincere sympathy” rather than “I am so sorry.” They will only hear a fraction of the words you say to them and may misinterpret your meaning.
8. Allow as much time as necessary for questions and discussion. Go over the events again if necessary so everything is understood.
9. Allow family members to see their relative. If equipment is still connected, let the family know what they can expect to see.
10. With ethically diverse patient populations, it is helpful to use standard protocols customized for different cultures that can offer guidelines on the choice of words and appropriate approaches
11. Provide assistance, as needed, in giving survivors information about transportation of the body if you are not doing the removal.
12. Make every effort to leave someone at the scene who can clean the resuscitation area; remove all evidence of the resuscitation (sharps, opened packages, etc).

VIII. **Documentation:** Typical information to be included on the patient care report of a patient experiencing a pulseless arrest:

A. Estimated patient age; gender
B. Date, time, type, cause, location of arrest if known
C. Witnessed or unwitnessed arrest
D. Who discovered the patient
E. Bystander CPR? Use of AED on scene prior to EMS arrival?
F. Time when first EMS responders arrived, time when CPR was begun by EMS
G. Initial absence of vital signs; presenting rhythm
H. Time of all defibrillations & joule settings
I. Airway device inserted; tube verification methods used; FiO_2 delivered; ventilatory rates
J. Vascular access method; type and amount of fluid infused
K. Name, dose, route, and time of all drugs infused
L. Changes in patient's vital signs, cardiac rhythm
M. Patient's responses to interventions
N. Time resuscitation ended (if applicable)
O. Patient outcome
P. Patient disposition
Q. Times: Left scene, arrived at hospital
R. Names of all team members