

SAEMS
Cardiac Arrest Standing Order
Self-Learning Module

Robert Callan
University Physicians Hospital
September 8, 2009

SAEMS

Standing Order Training Module

Cardiac Arrest

PURPOSE

This SAEMS Standing Order Training Module has been developed to serve as a template for EMS provider training. The intent is to provide consistent and concise information to all providers practicing within the SAEMS Region. The content of the Training Module has been developed by the Protocol Development and Review Committee and includes the specific Standing Order, resource and reference material and instructions for completing the Training Module to obtain continuing education credit. One hour of SAEMS continuing education credit may be issued following successful completion of the module.

OBJECTIVES

1. Review basic cardiac arrest evaluation techniques
2. Recognize cardiac arrest pathology
3. Apply the Cardiac Arrest Standing Order appropriately

Instructions

1. Review the accompanying information, Standing Order and any additional reference material as necessary.
2. Complete the attached posttest and return it to your supervisor or base hospital coordinator.
3. A SAEMS CE Form will be issued to providers scoring greater than _____% on the posttest.
4. Please contact your Base Hospital Manager/Coordinator for questions, suggestions or concerns.

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INTRODUCTION

Cardiac Arrest

Cardiac arrest, also known as cardiopulmonary arrest or circulatory arrest, is the sudden abrupt cessation of normal circulation of the blood due to failure of the heart to contract effectively during systole. The victim may or may not have diagnosed heart disease. It's also called sudden cardiac arrest or unexpected cardiac arrest. Sudden death (also called sudden cardiac death) occurs within minutes after symptoms appear.

Cardiac arrest is different from (but maybe caused by) a heart attack or myocardial infarction where blood flow to the still-beating heart is interrupted (as in cardiogenic shock). Other factors besides heart disease and heart attack can cause cardiac arrest. They include respiratory arrest, electrocution, drowning, choking and trauma. Cardiac arrest can also occur without any known cause.

The most common underlying reason for patients to die suddenly from cardiac arrest is coronary heart disease. Most cardiac arrests that lead to sudden death occur when ventricular tachycardia or ventricular fibrillation occurs. This arrhythmia causes the heart to suddenly stop pumping effectively. Some cardiac arrests are due to extreme slowing of the heart. This is called bradycardia.

Brain death and corporal death start to occur in just 4 to 6 minutes after someone experiences cardiac arrest. Cardiac arrest can be reversed if it's treated within a few minutes. A victim's chances of survival are reduced by 7 to 10 percent with every minute that passes without CPR and defibrillation. Few attempts at resuscitation succeed after 10 minutes.

Characteristics and diagnosis

Cardiac arrest is an abrupt cessation of pump function in the heart (as evidenced by the absence of a palpable pulse). Cardiac arrest can usually be reversed with prompt intervention but, without such intervention, it will almost always lead to death. In certain cases, it is an expected outcome to a serious illness.

However, due to inadequate cerebral perfusion, the patient will be unconscious and will have stopped breathing. The main diagnostic criterion to diagnose a cardiac arrest (as opposed to respiratory arrest, which shares many of the same features) is lack of circulation; however there are a number of ways of determining this.

In many cases, lack of carotid pulse is the gold standard for diagnosing cardiac arrest, but lack of a pulse (particularly in the peripheral pulses) may be a result of other conditions (e.g. shock), or simply an error on the part of the rescuer. Studies have shown that rescuers often make a mistake when checking the carotid pulse in an emergency, whether they are healthcare professionals or lay persons.

Following initial diagnosis of cardiac arrest, healthcare professionals further categorize the diagnosis based on the ECG/EKG rhythm. There are four rhythms which result in a cardiac arrest.

Ventricular fibrillation (VF/VFib) and pulseless ventricular tachycardia (VT) are both responsive to defibrillation and so are colloquially referred to as "shockable" rhythms, whereas asystole and pulseless electrical activity (PEA) are non-shockable. The nature of the presenting heart rhythm suggests different causes and treatment and is used to guide the rescuer as to what treatment may be appropriate (see Advanced Life Support and Advanced Cardiac Life Support, as well as the causes of arrest below).

Causes of cardiac arrest

Cardiac arrest is synonymous with clinical death. All disease processes leading to death have a period of (potentially) reversible cardiac arrest: the causes of arrest are numerous. However, many of these conditions, rather than causing an arrest themselves, promote one of the "reversible causes" (see below), which then triggers the arrest (e.g. choking leads to hypoxia which in turn leads to an arrest). In some cases, the underlying mechanism cannot be overcome, leading to an unsuccessful resuscitation.

Among adults, ischemic heart disease is the predominant cause of arrest, at autopsy 30 percent of victims show signs of recent myocardial infarction. Other cardiac conditions potentially leading to arrest include structural abnormalities, arrhythmias and cardiomyopathies. Non-cardiac causes include infections, overdoses, trauma, cancer and many others.

Reversible causes

Cardiopulmonary resuscitation (CPR) including adjunctive measures such as defibrillation, intubation and drug administration, which is the standard of care for initial treatment of cardiac arrest. However, most cardiac arrests occur for a reason and unless that reason can be found and overcome CPR is often ineffective or if it does result in a return of spontaneous circulation, it is short lived. A variety of disease processes can lead to a cardiac arrest, however they usually boil down to one or more of the "Hs and Ts".

Hs

- **Hypovolemia**
- **Hypoxia**
- **Hydrogen ions (Acidosis)**
- **Hyperkalemia or Hypokalemia**
- **Hypothermia**
- **Hypoglycemia or Hyperglycemia**

Ts

- **Tablets or Toxins**
- **Cardiac Tamponade**
- **Tension pneumothorax**
- **Thrombosis (Myocardial infarction)**
- **Thromboembolism (Pulmonary embolism)**

Treatment

Out of hospital arrest

Most out-of-hospital cardiac arrests occur following a myocardial infarction (heart attack) and present initially with a heart rhythm of ventricular fibrillation. The patient is therefore likely to be responsive to defibrillation and this has become the focus of pre-hospital interventions. Several organizations promote the idea of a "chain of survival" of which defibrillation is a key step. The links are:

- **Early recognition** - If possible, recognition of illness before the patient develops a cardiac arrest will allow the rescuer to prevent its occurrence. Early recognition that a cardiac arrest has occurred is key to survival - for every minute a patient is in cardiac arrest, their chances of survival drop by roughly 10 percent.
- **Early CPR** - This buys time by keeping vital organs perfused with oxygen while waiting for equipment and trained personnel to reverse the arrest. In particular, by keeping the brain supplied with oxygenated blood, chances of neurological damage are decreased.
- **Early defibrillation** - This is the only effective treatment for ventricular fibrillation and also has benefit in ventricular tachycardia and should be employed in such cases if the patient has signs of hemodynamic compromise, or if the patient has pulseless ventricular tachycardia. If defibrillation is delayed, then the rhythm is likely to degenerate into asystole, for which outcomes are markedly worse.
- **Early advanced care** – Early Advanced Cardiac Life Support is the final link in the chain of survival.

If one or more links in the chain are missing or delayed, then the chances of survival drop significantly. In particular, bystander CPR is an important indicator of survival: if it has not been carried out, then resuscitation is associated with very poor results.

Peri-arrest period

The period (either before or after) surrounding a cardiac arrest is known as the peri-arrest period. During this period the patient is in a highly unstable condition and must be constantly monitored in order to halt the progression or repeat of a full cardiac arrest. The preventative treatment used during the peri-arrest period depends on the causes of the impending arrest and the likelihood such an event occurring.

SAEMS

Paramedics in the southeastern region of Arizona are governed by the SAEMS region under direction from the Arizona State Department of Health Services and the Bureau of Emergency Services. SAEMS focuses its attention upon the emergency medical services of the population in southeastern Arizona. It allows the paramedics to work under standing orders established by the Protocol Development and Review Committee (PDR) for review. Once drafted by PDR,

documents are made available for community discussion through established committees and presented for approval at the Medical Directors Committee. The documents are then presented to SAEMS for final approval.

The regional council is responsible under state EMS direction for provider grant funding, training opportunities, data collection and protocol development. It establishes quality assurance and improvement criteria, standards for monitoring and improving the performance and quality of emergency care needs.

Cardiac Arrest Centers

A cardiac arrest center provides comprehensive, technologically advanced care to individuals who have a sudden cardiac arrest.

Cardiac Arrest Centers must meet the following criteria:

- Cardiac intervention capabilities including a Cardiac Cath Lab and an interventional cardiologist available 24 hours a day, seven days a week
- A therapeutic hypothermia method to lower a patient's body temperature for at least 24 hours after a cardiac event, which reduces the risk of brain damage
- A coordinated approach to cardiac care with local Emergency Medical Services (EMS) personnel to provide specific lifesaving protocols before the patient arrives at the hospital

Cardiac arrest is not a heart attack; it is a devastating event in which the heart abruptly ceases to function. Heart disease, which can be a cause of sudden cardiac arrest, is the No. 1 killer of men and women in the United States. Recent data shows each year more than 166,000 people in the U.S. have a cardiac arrest outside a hospital, with less than five percent surviving the incident. Every minute that passes before a cardiac arrest is treated decreases the chance of survival by 10 percent. However, when a person receives bystander CPR (cardiopulmonary resuscitation) or CCR (cardiocerebral resuscitation) before emergency medical personnel arrive to start lifesaving care, and then is transported to a Cardiac Arrest Center, the chance of survival increases to approximately 33 percent.

ADHS has designated 25 Cardiac Arrest Centers at the present, along with a prehospital protocol for Therapeutic Hypothermia. To the best of Arizona's knowledge, no state agency has yet implemented a system to assure that eligible out-of-hospital cardiac arrest patients are receiving standardized, guideline based post cardiac arrest care from bystanders to EMS and then to hospitals.

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Glossary

- 1. Asystole** a life-threatening cardiac condition characterized by the absence of electrical and mechanical activity in the heart.
- 2. Cardiogenic Shock** shock resulting from inadequate cardiac function, as from myocardial infarction or mechanical obstruction.
- 3. DNR** The Prehospital Medical Care Directive form (commonly known as the Do Not Resuscitate or DNR form) is authorized by A.R.S. § 36-3251. The DNR form allows an individual to indicate that he or she does not want to be resuscitated if he or she suffers cardiac or respiratory arrest. The form allows an individual to declare that the following resuscitative measures are not to be used: cardiac compression, endotracheal intubation and other advanced airway management, artificial ventilation, defibrillation, administration of advanced cardiac life support drugs and related emergency medical procedures. The DNR form does not authorize the withholding of other medical interventions, such as intravenous fluids, oxygen, or other therapies deemed necessary to provide comfort care or to alleviate pain.
- 4. PEA** continued electrical rhythmicity of the heart in the absence of effective mechanical function.
- 5. Systole** the period of contraction of the heart. The term specifically designates the contraction of the ventricles, as distinguished from auricular contraction.
- 6. Ventricular Fibrillation** When the ventricles begin to quiver and do not employ coordinated contractions, the heart is said to be fibrillating.
- 7. Ventricular Tachycardia** A rapid heart rate which may originate in either the left or right ventricle, which may or may not produce sufficient forward blood flow to enable survival.
- 8. Corporal** Bodily: affecting or characteristic of the body as opposed to the mind or spirit; "bodily needs"; "a corporal defect"; "corporeal suffering"
- 9. Therapeutic Hypothermia** is a medical treatment that lowers a patient's body temperature in order to help reduce the risk of the ischemic injury to tissue following a period of insufficient blood flow. Therapeutic hypothermia may be induced by invasive means, in which a catheter is placed in the inferior vena cava via the femoral vein, or by non-invasive means, usually involving chilled water blankets in direct contact with the patient's skin.

CARDIAC ARREST CENTER (CAC) TRIAGE PROTOCOL

- I. Patients with an unstable airway should be transported to the closest facility
- II. Any non-traumatic Out of Hospital Cardiac Arrest (OHCA) patient with a Return Of Spontaneous Circulation (ROSC) should be transported to a Regional Cardiac Arrest Center if all of the following inclusion criteria are met:

Inclusion Criteria

- Adult (age 18 or older) not known to be pregnant
- Palpable pulse or other evidence of spontaneous circulation after non-traumatic OHCA
- GCS less than 8 after ROSC
- Less than 30 minutes of CPR performed prior to EMS arrival
- No uncontrolled hemorrhage
- No persistent unstable arrhythmia
- No evidence of severe hypothermia related arrhythmia
- No prehospital advance directive for withholding care

- III. Post Cardiac Arrest Care

A. The following guidelines should be used when transporting to a Cardiac Arrest Center

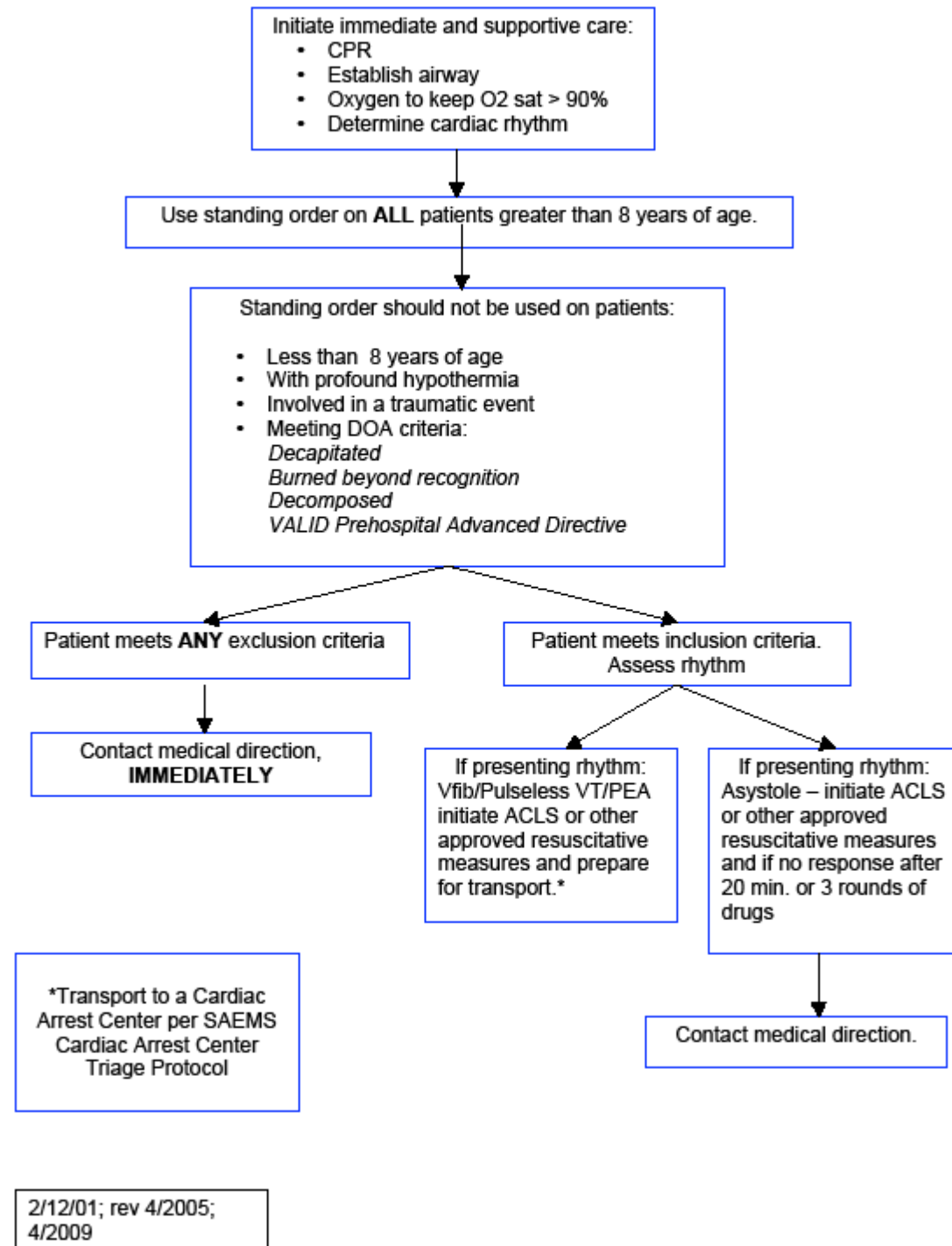
- EMS personnel will notify the CAC as soon as possible
- Maintain ventilation rate of 8 breaths per minute
- Consider antiarrhythmic medication
- Administration of 2000ml cold (4° C / 39.2° F) NS IV fluid bolus if available
- Do NOT actively warm patients
- Apply cold/ice packs to groin/axillae/neck
- Consider dopamine for persistent hypotension

- V. Special Notes

- A. Transport to a CAC when feasible, resources available, and less than 15 minutes is added to the transport time when compared to transport to a non-CAC.
- B. Cardiac Arrest Centers are designated based upon their ability to deliver therapeutic hypothermia and 24/7 cardiac catheterization. (In Tucson: UMC, TMC)
- C. In outlying areas with a transport time of greater than 30 minutes to a CAC, transport the patient to the closest facility, or consider air transport directly to a CAC.

:approved 6/18/08, revised 6-09

CARDIAC ARREST STANDING ORDER



Cardiac Arrest SLP

Post Test

Name: _____ Date _____

1. You are part of the response team for a MCI on the interstate. Your patient is a 12 year old male who has been ejected, has massive head injuries and appears to be in cardiac arrest. This patient is a good candidate for the cardiac arrest standing order.

- A. True
- B. False

2. You are called to the scene of a 75 year old male that appears to be in cardiac arrest. You place him on the monitor, which shows VTach without pulses. Initiation of the cardiac arrest standing order would be appropriate for this patient.

- A. True
- B. False

3. You have been working a cardiac arrest patient less than 30 minutes and have return of spontaneous circulation (ROSC). You have intubated the patient maintaining ventilation rate of 8 breaths per minute. You apply cold/ice packs to the groin/axillae/neck. Heart rate has been consistently 118 but the BP continues to be 60 systolic. What should your next step be?

- A. Package patient for transport to cardiac arrest center
- B. Consider dopamine for persistent hypotension
- C. Consider antiarrhythmic medication
- D. Transport to the nearest hospital

4. You are called to the scene of a possible submersion/drowning. You find a 2 year old that has been pulled out of a swimming pool, is unconscious, unresponsive and is hypothermic. Initiation of the cardiac arrest standing order would be appropriate for this patient.

- A. True
- B. False

5. The cardiac arrest center triage protocol inclusion criteria include all of the following except:

- A. No controlled hemorrhage
- B. No persistent unstable arrhythmia
- C. No prehospital advance directive for withholding care
- D. Anybody over the age of eight

6. Border Patrol has transferred a patient to your care that is unconscious and unresponsive. He appears to be approximately 30 years of age with no apparent trauma. He was found out in the desert early in the morning. He feels cool to touch and is only wearing a T-shirt and light cotton pants. The ambient temperature is 30 degrees Fahrenheit. The patient is determined to be in PEA. Initiation of the cardiac arrest standing order would be appropriate for this patient.

- A. True
- B. False

7. Exclusion criteria for the cardiac arrest standing order include:

- A. Hypothermia
- B. Pt involved in a traumatic event
- C. Decomposition
- D. A and B
- E. All the above

8. Your patient is a 75 year old male in cardiac arrest with asystole on the monitor. You initiate ACLS interventions and proceed with resuscitative efforts on the scene. You have given three rounds of epinephrine and atropine with no response. On scene time is 15 minutes. What is your next step?

- A. Load the patient into the transport unit and proceed to the closest hospital
- B. Continue working the patient on the scene
- C. Contact medical direction authority for orders
- D. Call law enforcement to secure the scene.

9. The single largest killer in the United States is:

- A. Adult Respiratory Distress Syndrome
- B. Cancer
- C. Heart disease
- D. Diabetes
- E. Hypotension

10. Cardiac arrest centers are designated based on their ability to deliver therapeutic _____ and 24/7 cardiac catheterization.

- A. Hyperthermia
- B. Cardiac Massage
- C. Hypothermia
- D. Oxygen

11. Your patient is a 55 year old male involved in a high speed two-car MVC. He is unconscious and unresponsive, with no palpable pulse or blood pressure. The patient is determined to be in PEA. Initiation of the cardiac arrest standing order would be appropriate for this patient.

- A. True
- B. False

12. All the following should be used when transporting to a cardiac arrest center except:
- A. Consider antiarrhythmic medication
 - B. Actively warm patients
 - C. EMS personnel will notify the CAC as soon as possible
 - D. Apply cold/ice packs to groin/axillae/neck
 - E. Maintain ventilation rate of 8 breaths per minute.
13. Most cardiac arrest occurs for a reason. A variety disease processes can lead to a cardiac arrest, however they usually boil down to one or more of the “**Hs and Ts**”. The “**Hs and Ts**” include the following except:
- A. **Hypovolemia, Hypoxia, Hyperthermia, cardiac Tamponade**
 - B. **Tablets, Toxins, Hydrogen ions (acidosis), Hyperglycemia**
 - C. **Hypokalemia, Hyperkalemia, Thrombosis, Thromboembolism**
 - D. **Hypoglycemia, Tension pneumothorax, Hydrogen ions (acidosis), Hypoxia**
14. Your patient is an 80 year old male who is enrolled in a hospice program. His wife called 911 because she found her husband unconscious and unresponsive. He was last seen approximately eight hours ago when he complained of feeling very tired. She has a valid Prehospital Advanced Directive (Orange Form), which she presents to you. You assess the patient and find the presence of rigor, lividity, no palpable pulses or breathing. Initiation of the cardiac arrest standing order would be appropriate for this patient.
- A. True
 - B. False
15. You are on scene of a house fire. The house is engulfed in flames, but firefighters have brought out an unconscious, unresponsive male who appears to be burned over 90 percent of his body. You initiate advanced life support measures for this patient. He remains unconscious, unresponsive, pulseless and apneic. The patient is determined to be in PEA. Initiation of the cardiac arrest standing order would be appropriate for this patient.
- A. True
 - B. False

