

AEMT Indiana Additional Curriculum Program

EMS Commission Policy on EKG Monitoring, 12-Lead Acquisition and Transmission, and Defibrillation for the Indiana AEMT

Advanced Emergency Medical Technicians seeking to expand their scope of practice to include the administration of 12-lead ECG acquisition and transmission, manual defibrillation, ECG monitoring and recognition of sinus rhythms, ventricular fibrillation, ventricular tachycardia, PEA, and asystole, must have successfully completed a training program which was approved by Indiana Department of Homeland Security and met the EMS Commission approved program requirements and objectives.

Candidate Prerequisites

The following are required prerequisites for individuals seeking to expand their scope of practice to include the administration of 12-lead ECG acquisition and transmission, manual defibrillation, ECG monitoring and recognition of sinus rhythms, ventricular fibrillation, ventricular tachycardia, PEA, and asystole:

1. Must be currently certified as a National Registry Advanced Emergency Medical Technician or Indiana Advanced Emergency Medical Technician (AEMT) **AND**
2. Must be affiliated with an Advanced Life Support Provider Organization with Medical Director approved protocol for the AEMT to utilize any or all of the following: 12-lead ECG acquisition and transmission, manual defibrillation, ECG monitoring and recognition of sinus rhythms, ventricular fibrillation, ventricular tachycardia, PEA, and asystole in their scope of practice.

-OR-

3. An emergency medical technician (or higher) currently enrolled in an Indiana Department of Homeland Security approved AEMT training program.

Instructor Qualifications

Any instructor teaching the additional curriculum shall be an experienced educator, minimally certified or licensed to perform the skills of an Indiana AEMT and approved by the administering Training Institution and Medical Director. Instructors should be capable and able to encourage interactive learning, facilitate discussions on the topic, apply different styles of instruction as needed, and provide remedial education when required.

EKG Monitoring, Interpretation and Manual Defibrillation Minimum Course Requirements

- Didactic:** **Twenty (20) hours**
****Successfully pass the EMS Commission approved AEMT ECG written exam**
- Laboratory:** **Eight (8) hours**
**** Successfully complete Indiana AEMT Cardiac Psychomotor Exam at the conclusion of training (Verified by course instructor. Retain proof of completion in student file).**
- Clinical:** **None required. Optional, at discretion of Training Institution and Medical Director**

Terminal Objective: At the completion of this unit of instruction, the participant shall be able to:

Integrate assessment findings with principles of anatomy, physiology, and pathophysiology to formulate a field impression and implement a treatment/disposition plan for a patient experiencing normal sinus rhythm, ventricular tachycardia, ventricular fibrillation, pulseless electrical activity, and asystole, to include the use of manual defibrillation as indicated.

Enabling Objectives:

1. Describe the anatomy of the cardiovascular system.
2. Describe the Pathophysiology of the cardiovascular system.
3. Describe factors and risks for cardiovascular compromise.
4. Perform an entire cardiovascular assessment (primary survey, Hx and physical exam, secondary survey)
5. Describe how ECG wave forms are produced. Correlate the electrophysiological and hemodynamic events occurring throughout the entire cardiac cycle with the various ECG wave forms, segments and intervals.
6. Identify how heart rates may be determined from ECG recordings.
7. Describe and demonstrate a systematic approach to the analysis and interpretation of cardiac rhythms.
8. Identify the five (5) cardiac rhythms for AEMT interpretation:
 - a. normal sinus rhythm (including sinus bradycardia and sinus tachycardia, as addressed at AEMT level)
 - b. ventricular tachycardia (with and without pulse)
 - c. ventricular fibrillation
 - d. asystole
 - e. pulseless electrical activity
9. List limitations of the ECG
10. List clinical indications for cardiac monitor application and manual defibrillation.
11. Identify specific mechanical, and electrical interventions for patients with dysrhythmias
12. Demonstrate an understanding of implanted defibrillation devices and how they may impact patient management.
13. Identify the critical actions necessary in caring for the patient in cardiac arrest.
14. Discuss assessment and management of a patient experiencing return of spontaneous circulation (ROSC)
15. Display a sense of urgency necessary to protect the window of opportunity for reperfusion during assessment and management of the cardiac patient that may be indicative of acute coronary syndrome.
16. Value the urgency in rapid determination and intervention of patients in cardiac arrest.

17. Demonstrate appropriate application of ECG electrodes and leads for monitoring
18. Given a static and dynamic ECG rhythm, correctly interpret normal sinus rhythm, ventricular tachycardia, ventricular fibrillation, asystole, and PEA
19. Develop, execute, and evaluate a treatment plan based on the field impression for the patient with chest pain that may be indicative of acute coronary syndrome.
20. Synthesize patient history, assessment findings to form a field impression for the patient with chest pain and cardiac dysrhythmias that may be indicative of a cardiac emergency.

12-lead ECG Acquisition and Transmission Minimum Course Requirements

Didactic and Lab: Two and a half (2.5) hours

**** Successful 12-lead ECG acquisition on 5 simulated or live patients** (*Verified by course instructor. Retain proof of completion in student file*).

****Successfully pass the EMS Commission approved AEMT ECG written exam**

Clinical: None required. Optional, at discretion of Training Institution and Medical Director

Terminal Objective: At the completion of this unit of instruction, the participant shall be able to:

Formulate a treatment plan to include the acquisition and transmission of 12-lead ECG, as appropriate, for patient experiencing a suspected cardiac event.

Enabling Objectives:

At the completion of this unit of instruction, the participant shall be able to complete the following for 12-lead ECG acquisition and transmission, as it relates to the scope of practice of the paramedic (reference page 130 of the National Education Standards Paramedic Instructional Guidelines):

1. State the purpose of 12-lead ECG acquisition and transmission
2. Discuss the role of out-of-hospital 12-lead acquisition and transmission
3. List indications for 12-lead ECG acquisition and transmission
4. Discuss the role of the 12-lead for the following conditions:
 - a. Acute coronary syndromes
 - b. Acute MI
 - c. Angina
 - d. Coronary Artery Disease
5. Describe the procedure for successful lead placement for 12-lead ECG acquisition
6. Demonstrate the procedure for successful lead placement for 12-lead ECG acquisition
7. Describe the procedure for 12-lead ECG acquisition and transmission

NES and Indiana Specific Paramedic Instructional Guidelines

Patient Assessment-Monitoring Devices (NES pg 130)

The following Instructional Guidelines in this section include all the topics and material at the AEMT level **PLUS** the following material:

I. Continuous ECG monitoring

- A. Purpose
- B. Indication
 - 1. Patient's presenting with cardiac-related signs and symptoms or potential signs and symptoms of illnesses with cardiac impact
 - 2. Used as advanced monitoring in pre-hospital care
- C. Procedure
- D. Limitation
- E. Interpretation (see Medical Emergency: Cardiology)

II. 12-Lead ECG

- A. Purpose
 - 1. Shorten door to treatment time
- B. Indication
- C. Procedure
- D. How to transmit

Medicine-Cardiology (NES pg 168-201)

The following Instructional Guidelines in this section include all the topics and material at the AEMT level **PLUS** the following material:

I. Anatomy of the Cardiovascular System

- A. Location
 - 1. Layers
 - a. Myocardium
 - b. Endocardium
 - c. Pericardium
 - i. visceral (epicardium)
 - ii. parietal
 - iii. pericardial fluid
 - 2. Chambers
 - a. Atria
 - b. Ventricles
 - 3. Valves
 - a. Atrioventricular (AV) valves
 - i. tricuspid (right)
 - ii. mitral (left)
 - b. Semilunar valves
 - i. pulmonic (right)
 - ii. aortic (left)
 - 4. Papillary muscles
 - 5. Chordae tendineae

6. Myocardial blood supply
 - a. Arteries
 - b. Veins
7. Conduction system
 - a. Sinoatrial node
 - b. Atrioventricular node
 - c. Atrioventricular bundle (Bundle of His)
 - d. Bundle branches
 - i. left anterior fascicle
 - ii. left posterior fascicle
 - iii. right
 - e. Purkinje network
8. Vascular system
 - a. Aorta
 - i. ascending
 - ii. thoracic
 - iii. abdominal
 - b. Arteries
 - c. Arterioles
 - d. Capillaries
 - e. Venules
 - f. Veins
 - g. Vena cava
 - i. superior
 - ii. inferior
 - h. Venous return (preload)
 - i. skeletal muscle pump
 - ii. thoracoabdominal pump
 - iii. respiratory cycle
 - iv. gravity
 - i. Systemic vascular resistance and capacitance (afterload)
 - j. Pulmonary veins

II. Physiology

A. Cardiac cycle

1. Consists of systole and diastole of atria and ventricles
2. Cycle occurs in about 0.8 seconds and 70-80 cycles/minute average
3. Events that occur in 1 cardiac cycle:
 - a. Atrial systole
 - i. AV valves open and SL valves closed
 - ii. ventricles relaxed
 - iii. preceded by P wave on ECG
 - b. Isovolumetric contraction
 - i. between start of ventricular systole and opening of SL valves
 - ii. ventricular volume remains constant
 - iii. onset coincides with R wave on ECG
 - iv. first heart sound heart (S₁)
 - a) caused by ventricles contracting and closure of cuspid valves
 - b) "lubb" sound
 - c. Ejection -- Initial, shorter, rapid ejection followed by longer phase of reduced ejection
 - i. Residual volume of blood remains in ventricles following ejection phase
 - ii. Residual volume increases in states of heart failure

- d. Isovolumetric relaxation
 - i. period between closure of SL valves and opening of AV valves
 - ii. ventricles are relaxing
 - iii. second heart sound heard during this phase (S₂)
 - a) caused by closure of SL valves
 - b) “dubb” sound
 - e. Rapid ventricular filling
 - f. Reduced ventricular filling (diastasis)
- B. Cardiac output
- 1. Heart rate X stroke volume
 - a. Starling’s law
 - b. Contractility

III. Electrophysiology

- A. Characteristics of myocardial cells
 - 1. Automaticity
 - 2. Excitability
 - 3. Conductivity
 - 4. Contractility
- B. Electrical potential
 - 1. Action potential
 - 2. Excitability
 - a. Thresholds
 - b. Depolarization
 - c. Repolarization

IV. Epidemiology

- A. Incidence
 - 1. Prevalence of cardiac death outside of a hospital
 - 2. Prevalence of prodromal signs and symptoms
 - 3. Increased recognition of the need for early reperfusion
- B. Morbidity/mortality
 - 1. Reduced with early recognition
 - 2. Reduced with early access to the EMS system
- C. Risk factors
 - 1. Age
 - 2. Family history
 - 3. Hypertension
 - 4. Lipids
 - a. Hypercholesterolemia
 - b. LDL/HDL ratios
 - 5. Gender
 - 6. Smoking
 - 7. Carbohydrate intolerance
- D. Possible contributing risks
 - 1. Diet
 - 2. Gender
 - 3. Obesity
 - 4. Oral contraceptives
 - 5. Sedentary living
 - 6. Personality type

- 7. Psychosocial tensions
- E. Prevention strategies
 - 1. Early recognition
 - 2. Education
 - 3. Alteration of life style

V. Primary survey for cardiovascular assessment

- A. Level of responsiveness
- B. Airway
 - 1. Patent
 - 2. Debris, blood
- C. Breathing
 - 1. Absent
 - 2. Present
 - 3. Rate and depth
 - a. Effort
 - b. Breath sounds
 - i. characteristics
 - ii. significance
- D. Circulation
 - 1. Pulse
 - a. Absent
 - b. Present
 - i. Pulse deficit
 - ii. Pulsus alternans
 - 2. Skin
 - a. Color
 - b. Temperature
 - c. Moisture
 - d. Turgor
 - e. Mobility
 - f. Edema
 - 3. Blood pressure

VI. History and physical/ SAMPLE format

- A. Chief complaint
- B. Pain
 - 1. OPQRST
 - a. Onset/ origin
 - i. pertinent past history
 - ii. time of onset
 - b. Provocation
 - i. exertional
 - ii. non-exertional
 - c. Quality
 - d. Region/ radiation
 - e. Severity
 - f. Timing
 - i. duration
 - ii. worsening or improving
 - iii. continuous or intermittent
 - iv. at rest or with activity

C. Dyspnea

1. Continuous or intermittent
2. Exertional
3. Non-exertional
4. Orthopneic

D. Cough

1. Dry
2. Productive

E. Related signs and symptoms

1. Level of consciousness
2. Diaphoresis
3. Restlessness, anxiety
4. Feeling of impending doom
5. Nausea/ vomiting
6. Fatigue
7. Palpitations
8. Edema
 - a. Extremities
 - b. Sacral
9. Headache
10. Syncope
11. Behavioral change
12. Anguished facial expression
13. Activity limitations
14. Trauma

F. Past medical history

1. Coronary artery disease
2. Atherosclerotic heart disease
 - a. Abnormal lipid metabolism or excessive intake of saturated fats and cholesterol
 - b. Subendothelial accumulation of fatty streaks
 - c. Altered endothelial function
 - d. Disruption of endothelium
 - e. Formation of mature fibrous plaque
 - f. Resultant diseases:
 - i. angina
 - ii. previous MI
 - iii. hypertension
 - iv. congestive heart failure
3. Valvular disease
4. Aneurysm
5. Pulmonary disease
6. Diabetes
7. Renal disease
8. Vascular disease
9. Inflammatory cardiac disease
10. Previous cardiac surgery
11. Congenital anomalies
12. Current/ past medications
 - a. Prescribed
 - i. compliance
 - ii. non-compliance
 - b. Borrowed

- c. Over-the-counter
 - d. Home remedies
 - e. Recreational
- 13. Allergies
- 14. Family history
 - a. Stroke, heart disease, diabetes, hypertension
 - b. Age at death
- 15. Known cholesterol levels

VII. Secondary survey for cardiovascular assessment

A. Inspection

- 1. Tracheal position
- 2. Neck veins
 - a. Appearance
 - b. Pressure
 - c. Clinical significance
- 3. Thorax
 - a. Configuration
 - b. A-P diameter
 - c. Movement with respirations
- 4. Epigastrium
 - a. Pulsation
 - b. Distention
 - c. Clinical significance

B. Auscultation

- 1. Neck
 - a. Normal
 - b. Abnormal
- 2. Breath sounds
 - a. Depth
 - b. Equality
 - c. Adventitious sounds
 - i. crackles/rales
 - ii. wheezes/rhonchi
 - a) gurgling
 - b) frothing (mouth and nose)
 - i) blood tinged
 - ii) foamy
- 3. Heart sounds
 - a. Auscultatory sites
 - b. Identify S₁, S₂

C. Palpation

- 1. Areas of crepitus or tenderness
- 2. Thorax
- 3. Epigastrium
 - a. Pulsation
 - b. Distention

VIII. Electrocardiographic (ECG) monitoring

A. Electrophysiology and wave forms

- 1. Origination
- 2. Production

3. Relationship of cardiac events to wave forms
 4. Intervals
 - a. Normal
 - b. Clinical significance
 5. Segments
- B. Leads and electrodes
1. Electrode
 2. Leads
 - a. Anatomic positions
 - b. Correct placement
 3. Surfaces of heart and lead systems
 - a. Inferior
 - b. Left lateral
 - c. Anterior/ posterior
 4. Artifact
- C. Standardization
1. Amplitude
 2. Height
 3. Rate
 - a. Duration
 - b. Wave form
 - c. Segment
 - d. Complex
 - e. Interval
- D. Wave form analysis
1. Isoelectric
 2. Positive
 3. Negative
 4. Calculation of ECG heart rate
 - a. Regular rhythm
 - i. ECG strip method
 - ii. "300"/triplicate method
 - b. Irregular rhythm
 - i. ECG strip method
 - ii. "300"/triplicate method
- E. Lead systems and heart surfaces
1. ECG rhythm analysis
 - a. Value
 - b. Limitations
 - c. The role of out-of-hospital 12-lead ECG is not universally available but is appropriate in most EMS settings with proper medical oversight
 - a. After transmission, Medical Control identification of a STEMI may direct crew to an alternate destination for specific cardiac care.
 - b. Advantages/ disadvantages
- F. Cardiac arrhythmias
1. Approach to analysis
 - a. P wave
 - i. configuration
 - ii. duration
 - iii. atrial rate and rhythm
 - b. P-R (P-Q) interval

- c. QRS complex
 - i. configuration
 - ii. duration
 - iii. ventricular rate and rhythm
 - d. S-T segment-**information only**
 - i. What is the S-T segment?
 - ii. Changes in morphology may indicate injury/illness pattern
 - e. Q-T interval
 - i. duration
 - f. Relationship of P waves to QRS complexes
 - i. consistent
 - ii. progressive prolongation
 - iii. no relationship
 - g. T waves
2. Interpretation of the ECG
 - a. Origin of complex
 - b. Rate
 - c. Rhythm
 - d. Clinical significance
 3. Arrhythmia originating in the sinus node
 - a. Sinus bradycardia
 - b. Sinus tachycardia
 4. Arrhythmias originating in the ventricles
 - a. Ventricular tachycardia
 - b. Ventricular fibrillation
 - c. Asystole
 10. Pulseless electrical activity
 - a. Electrical mechanical dissociation
 - b. Mechanical impairments to pulsations/ cardiac output
 - c. Other possible causes

IX. Management of the patient with an arrhythmia

- A. Assessment
 1. Symptomatic
 2. Hypotensive
 3. Hypoperfusion
- B. Electrical interventions
 1. Purpose
 2. Methods
 - a. Hands free defibrillation
 - i. AED
 - ii. SAED
 - b. Manual Defibrillation
 - i. Method
 - ii. Joules
 - c. AICDs/Implanted Pacemakers
 - i. Pacer spikes on an EKG
 - ii. Cardiac arrest/V-fib management
- C. Transport
 1. Indications for rapid transport

- 2. Indications for no transport required
- 3. Indications for referral
- D. Support and communications strategies
 - 1. Explanation for patient, family, significant others
 - 2. Communications and transfer of data to the physician

X. Coronary Artery Disease

- A. Atherosclerosis
- B. Intravascular Lesion
 - 1. Coronary Vasospasm
 - a. Reduced blood flow
 - b. Decreased oxygen delivery to myocardium
 - c. May be drug induced (cocaine)
 - 2. Plaque rupture
 - a. Vasoconstriction
 - b. Platelet Adherence
 - c. Thrombus formation
 - i. partial occlusion
 - ii. complete occlusion

XI. Acute coronary syndrome

- A. Epidemiology
- B. Precipitating causes
 - 1. Atherosclerosis
 - 2. Vasospastic (Prinzmetal's)
- C. Morbidity/ mortality
 - 1. Not a self-limiting disease
 - 2. Chest pain may dissipate, but myocardial ischemia and injury can continue
 - 3. A single anginal episode may be a precursor to myocardial infarction
- D. Must be diagnosed by a physician
- E. Related terminology
 - 1. Stable
 - a. Defined as a brief discomfort, has predictable characteristics and is relieved promptly - no change in this pattern
 - b. occurs at a relative fixed frequency
 - c. usually relieved by rest and/ or medication
 - 2. Unstable
 - a. occurs without fixed frequency
 - b. may or may not be relieved by rest and/ or medication
 - 3. Initial - first episode
 - 4. Progressive - accelerating in frequency and duration
 - 5. Preinfarction angina
 - a. pain at rest
 - b. sitting or lying down
- F. Differential diagnoses
 - a. Cholecystitis
 - b. Acute viral pericarditis or any other inflammatory cardiac disease
 - c. Aneurysm
 - d. Hiatal hernia
 - e. Esophageal disease
 - f. Gastric reflux
 - g. Pulmonary embolism

- h. Peptic ulcer disease
- i. Pancreatitis
- j. Chest wall syndrome
- k. Costochondritis
- m. Pleural irritation
- n. Respiratory infections
- o. Aortic dissection
- p. Pneumothorax
- q. Dyspepsia
- r. Herpes zoster
- t. Chest wall trauma

G. Primary survey findings

1. Airway/ breathing
 - a. Labored breathing may or may not be present
2. Circulation
 - a. Peripheral pulses
 - i. quality
 - ii. rhythm
 - b. Peripheral perfusion
 - i. changes in skin (color, temperature and moisture)

H. History of the present illness/SAMPLE history

1. Chief complaint
 - a. Typical - sudden onset of discomfort, usually of brief duration, lasting three to five minutes, maybe 5 to 15 minutes; never 30 minutes to 2 hours
 - b. Typical - usually relieved by rest and/or medication
 - c. Epigastric pain or discomfort
 - d. Atypical
2. Denial
3. Contributing history
 - a. Initial recognized event
 - b. Recurrent event
 - c. Increasing frequency and/or duration of event

I. Secondary survey findings

1. Airway
2. Breathing
 - a. May or may not be labored
 - b. Breath sounds
 - i. may be clear to auscultation
 - ii. may be congested in the bases
3. Circulation
 - a. Alterations in heart rate and rhythm may occur
 - b. Peripheral pulses are usually not affected
 - c. Blood pressure may be elevated during the episode and normalize afterwards
 - d. ECG Devices
 - i. monitor
 - ii. transmission
 - iii. documentation
 - iv. computerized pattern identification
 - 1) pitfalls
 - vi. common errors
 - e. Findings
 - i. arrhythmias and ectopy may not be present

J. Management

1. Position of comfort
 2. Refer to ILCOR Consensus for treatment
 3. ECG
 - a. Whenever possible, and scene time is not delayed, record and transmit 3-lead and/ or 12-lead ECG during pain, since ECG may be normal during the pain-free period
 - b. Record ST segment changes
 4. Indications for Rapid Transport
 - a. Sense of urgency for reperfusion
 - b. No relief with medications
 - c. Hypotension/hypoperfusion with CNS involvement
 - d. Significant changes in ECG
 5. No transport
 - a. Patient refusal
 - b. Referral
- ## K. Support and communications strategies
1. Explanation for patient, family, significant others
 2. Communications and transfer of data to the physician

XII. Acute myocardial infarction/Angina

A. Epidemiology

B. Precipitating causes (as with angina)

1. Atherosclerosis
2. Persistent angina
3. Occlusion
4. Non-traumatic
 - a. Recreational drugs
5. Trauma

C. Morbidity/ mortality

1. Sudden death
2. Extensive myocardial damage
3. May result in ventricular fibrillation

D. Primary survey findings

1. Airway/ breathing
2. Circulation
 - a. Peripheral pulses
 - i. quality
 - ii. rhythm
 - b. Peripheral perfusion
 - i. changes in skin
 - a) color
 - b) temperature
 - c) moisture

E. History of the present illness/SAMPLE history

1. Chief complaint
 - a. Typical onset of discomfort, usually of long duration, over 30 minutes
 - b. Typically unrelieved by rest and/ or nitroglycerin preparation
 - c. Epigastric pain or discomfort
 - d. Atypical
2. Contributing history
 - a. First time
 - b. Recurrent

- c. Increasing frequency and/ or duration
 - 3. Denial
 - F. Secondary survey findings
 - 1. Airway
 - 2. Breath sounds
 - a. May be clear to auscultation
 - b. Congestion in bases may be present
 - 3. Circulation
 - a. Skin
 - i. pallor during the episode
 - ii. temperature may vary
 - iii. diaphoresis is usually present
 - b. Alterations in heart rate and rhythm may occur
 - c. Peripheral pulses are usually not affected
 - d. Blood pressure may be elevated or lowered
 - e. ECG findings
 - i. cardiac arrhythmias
 - a) sinus tachycardia
 - b) sinus bradycardia
 - c) ventricular fibrillation
 - d) pulseless electrical activity (PEA)
 - e) asystole (confirmed in a second lead)
 - ii. relay to medical control sinus tachycardia or sinus bradycardia
- G. Management
 - 1. Position of comfort
 - 2. Refer to ILCOR Consensus for treatment
 - a. Discuss when to administer:
 - i. Oxygen
 - ii. Nitroglycerin
 - iii. ASA
 - iv. IV/fluids
 - 3. Transport
 - a. Criteria for rapid transport
 - i. no relief with medications
 - ii. hypotension/ hypoperfusion
 - iii. significant changes in ECG
 - a) sinus tachycardia
 - b) sinus bradycardia
 - c) ventricular fibrillation
 - d) pulseless electrical activity (PEA)
 - e) asystole
 - b. ECG criteria for rapid transport and reperfusion
 - i. time of onset of pain
 - ii. ECG rhythm abnormalities
 - 4. Indications for “no transport”
 - a. Refusal
 - b. No other indications for no-transport
 - 5. Support and communications strategies
 - a. Explanation for patient, family, significant others
 - b. Communications and transfer of data to the physician

XIII. Cardiac arrest

- A. Pathophysiology
- B. Precipitating causes
 - 1. Trauma
 - 2. Medical conditions (for example)
 - a. End stage renal disease
 - b. Hyperkalemia with renal disease
- C. Primary survey critical findings
 - 1. Unresponsive
 - 2. Apneic
 - 3. Peripheral pulses absent
 - 4. Heart rate/ rhythm
 - a. Ventricular fibrillation
 - b. ventricular tachycardia
 - c. asystole
 - d. PEA
- D. History of the present illness/SAMPLE history (consider precipitating causes listed above)
 - 1. Witnessed event
 - 2. Witnessed by EMS personnel
 - 3. Bystander cardiopulmonary resuscitation (CPR)
 - 4. Time from discovery to activation of CPR
 - 5. Time from discovery to activation of EMS
 - 6. Past medical history
- E. Management
 - 1. Related terminology
 - a. Resuscitation - to provide efforts to return spontaneous pulse and breathing to the patient in full cardiac arrest
 - b. Survival - patient is resuscitated and survives to hospital discharge
 - c. Return of spontaneous circulation (ROSC) - patient is resuscitated to the point of having pulse without CPR; may or may not have return of spontaneous respirations; patient may or may not go on to survive
 - 2. Indications for WITHHOLDING resuscitation efforts
 - 3. Advanced airway management and ventilation
 - 4. Circulation
 - 5. IV therapy as appropriate
 - 6. Refer to ILCOR Consensus for treatment
 - a. Pulseless Ventricular Tachycardia and Ventricular Fibrillation
 - i. Defibrillation as soon as possible / energy dosage
 - ii. in accordance with type and model of defibrillator
 - iii. determined by child's age and weight
 - b. Pulseless Electrical Activity (PEA) and Asystole
 - i. Confirm pulselessness
 - ii. Cardiopulmonary resuscitation (CPR)
 - iii. Monitor ECG / Basic ECG rhythm
 - iv. Intravenous fluids / Fluid challenge
 - 7. Rapid transport
- F. Return of Spontaneous Circulation
 - 1. Assess and monitor
 - 2. Initiate therapeutic hypothermia (per protocol and medical direction)
 - a. What is therapeutic hypothermia?

- b. How to achieve therapeutic hypothermia
- G. Support and communications strategies
 - 1. Explanation for patient, family, significant others
 - 2. Communications and transfer of data to the physician
- H. Termination of resuscitation efforts
 - 1. Inclusion criteria-contingent on your local protocols for AEMTs.

XIV. Integration

- A. Apply pathophysiological principles to the assessment of a patient with cardiovascular disease
- B. Formulation of field impression; decisions based on:
 - 1. Primary examination
 - 2. History of the present illness/SAMPLE history
 - 3. Secondary examination
- C. Develop and execute a patient management plan based on field impression
 - 1. Initial management
 - a. Airway support
 - b. Ventilation support
 - c. Circulation support
 - d. Non-pharmacological interventions
 - e. Pharmacological interventions
 - f. Electrical interventions
 - 2. Re-assessment
 - 3. Transport criteria
 - a. Appropriate mode
 - b. Appropriate facility
 - 4. Non-transport criteria
 - 5. Advocacy
 - 6. Communications
 - 7. Prevention
 - 8. Documentation
 - 9. Quality assurance