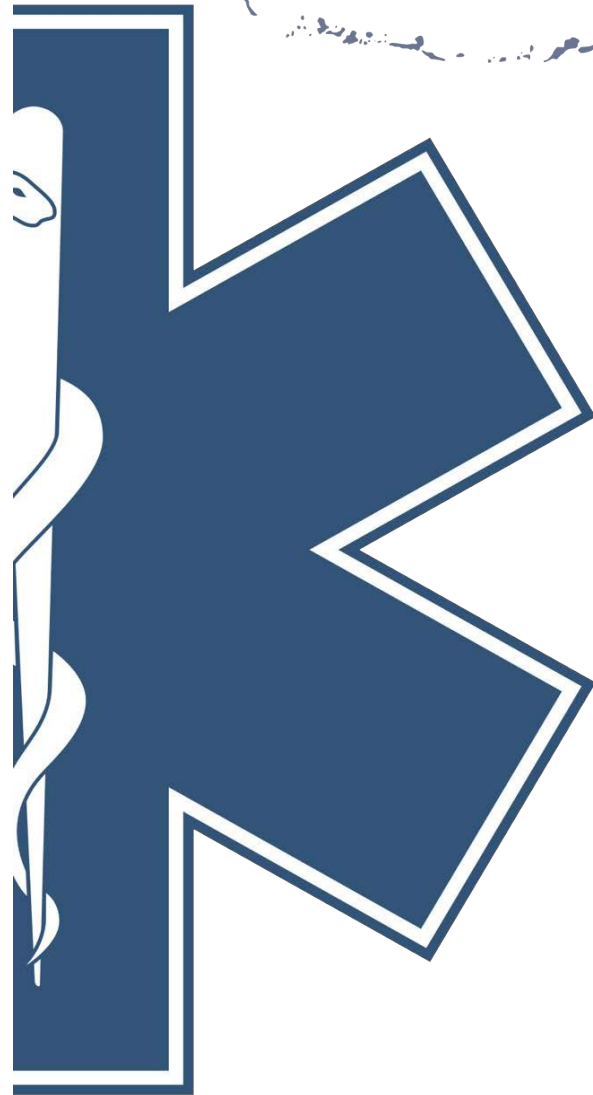


# Alaska EMS EMT-III Course Objectives & Lesson Plan



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## PREFACE

The purpose of this outline is to present a framework for the instruction of Emergency Medical Technician-III initial training program approved by the Alaska Department of Health and Social Services to qualified students. The purpose of the EMT-III level of training is to allow rural communities to provide basic emergency cardiac care.

The EMT-III course contains a very small subset of the Mobile Intensive Care Paramedic training program and focuses on a limited number of interventions and medications that are likely to be effective and may reasonably be taught and learned in a program of this length.

Section 7 AAC 26.040 of the Alaska Administrative Code (regulations) defines the scope of certified activities on which the objectives in this document are based. 7 AAC 26.050 sets forth the criteria for EMT-III course approval, including requiring that EMT-III courses be at least 66 hours in length. This document divides the course content into "sections," each of which has a recommended length. The times for each section are estimates only and will vary with the students' and system's needs.

The instruction of medications and procedures which are not covered in the EMT-III scope of certified activities will, of course, require an increase in the number of hours taught. Steps to have additional medications or procedures approved by the Department of Health and Social Services are outlined in 7 AAC 26.670 and should be read and understood by local physician medical directors, EMS instructors and system administrators.

Agencies which contract with EMT-III instructors for training should carefully consider the local scope of activities when developing proposals and contracts. While 66 hours is adequate to teach core EMT-III material, it is not sufficient to teach the additional skills and procedures used in many communities. Increased attrition and substandard care are likely if the EMT-III training program is of insufficient quality or length. The recommended durations of the sessions include ample time for instructor-developed quizzes. The addition of skills and procedures at the local level must be carefully considered and implemented in a medically and administratively appropriate manner by the physician medical director.

The emergency cardiac medications and procedures in this course are intended to be taught in a manner consistent with the American Heart Association's recommendations for Emergency Cardiac Care. In the event that the contents of the course deviate from current ACLS recommendations regarding emergency cardiac medications and procedures within the EMT-III Scope of Certified Activities, the ACLS recommendations will take precedence, except if specific protocols for the area of conflict, such as the ***Alaska Prehospital Trauma Guidelines***, or the ***Cold Injuries Guidelines***, exist.

This curriculum is designed to build upon the EMT-1 and EMT-II knowledge and skills contained in the Alaska EMT-I and EMT-II courses. Additionally, it outlines what knowledge and skills are expected of an Alaska EMT-III. It does not prohibit the physician sponsor from specifying the scope of activities, whether that be limiting practice to a subset of the EMT-III skills or expanding the EMT-III's skills in accordance with 7 AAC 26.670. Evolving issues should be covered thoroughly by the instructor.

Psychomotor skills in which the EMT-III should be proficient include:

- performing all EMT-I skills;
- performing all EMT-II skills as defined in the EMT-II curriculum;
- cardiac monitoring – 12 & 15 lead electrocardiogram with limited interpretation;
- EKG interpretation (2002 Core Rhythms only);
- transcutaneous pacing;
- cardioversion electrical – unstable symptomatic tachycardia only;
- defibrillation – manual; and
- storing and properly administering aspirin, nitroglycerin, epinephrine 1:1, epinephrine 1:10, antiarrhythmic recommended per current ILCOR Guidelines, opioid analgesic, atropine, intravenous – maintenance of medicated IV fluids- limited to specific medications, as well as EMT-1 and EMT-II medications.

ANY venipunctures performed on people SHALL be performed with a needle manufactured with a “safe” design.

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# LESSON 1: – ROLES AND RESPONSIBILITIES

At the completion of this section, the student will be able to:

## Objectives:

- 1.1 Discuss the role of the EMT-III regarding the possession, use and disposal of controlled substances in accordance with federal laws and regulations.

## Lesson Content:

- A. Controlled Substances
  1. The EMT III will likely have responsibilities that involve the management and safety of controlled substances.
    - a) The EMT III should have an understanding of the federal regulations involving controlled substances.
    - b) Title 21 USC CSA Section 811; 21 CFR 1300-1321; DEA Practitioners Manual and Controlled Substance Security manual.
    - c) The Controlled Substance Act does not specifically address the role of EMS.
  2. DEA Regulations
    - a) The purchasing, use, and control of these substances are strictly regulated by the Drug Enforcement Administration (DEA).
    - b) The DEA may request access to controlled substances in order to conduct inspections. Employees should cooperate with an audit as dictated by the local protocol.
  3. Medical Direction Required
    - a) All controlled substances stocked by an agency are considered by the DEA to be the Medical Director's responsibility and under his/her direct control.
    - b) Failure of personnel to comply with DEA regulations in order to prevent theft, loss, or diversion of the controlled substances could result in the loss of the department use of the physician sponsor's DEA license, criminal or civil penalties, and/or sanctions.
    - c) The Medical Director may take any such means as he/she deems necessary to regulate, audit, survey or monitor the department's storage, use, inventory and safeguarding of those controlled substances.
  4. Authorized Use
    - a) Controlled substances are purchased under the Medical Director's DEA registration and made available for EMS operational use only.
    - b) Individuals who are authorized to administer controlled substances have the responsibility for compliance with all elements of the DEA regulations, Medical Director's and department policies.
  5. Security
    - a) Personnel should be vigilant when handling controlled substances to prevent theft, loss or diversion.
    - b) Departments should provide effective security controls and operating procedures to

guard against theft and diversion of a controlled substance.

- c) Security requirements are set forth in 21 CFR 1301.71 – 1301.76
  - d) Evaluation for compliance of the proposed security system by the DEA may be requested by the Medical Director. Final approval will be given upon completion of installation and on-site review of the system.
  - e) Physical security controls and procedures must be updated if a current system becomes inadequate for any reason.
  - f) Minimum storage standards documented by the DEA for controlled substances can be found in the Controlled Substance Security Manual.
    - 1) Depending on the schedule of the substance and the type of facility, the requirements for the storage area to meet may be different.
    - 2) General starting requirements for the storage container are a UL listed burglary-resistant safe or a GSA class V rated security container.
6. Vendors/Acquisition
- a) Controlled substances will only be requested and accepted from designated vendors. Registration by the department and proper paperwork from the Medical Director or DEA License holder must be completed prior to a vendor supplying a department with controlled substances.
  - b) A Medical Director may designate or limit specific department personnel to request and/or obtain signatures/paperwork and controlled substances from vendors.
  - c) Transportation of a controlled substance from a local vendor to the local facility should always be done in the presence of two department personnel.
7. Local Protocols
- a) Since EMS is not specifically addressed in the Controlled Substance Act, DEA investigators will fall back on the local written policies and procedures set in place.
  - b) Controlled Substance Policies should always be approved by the Medical Director or DEA registrant supplying the controlled substances to the EMS agency.
  - c) Theft, loss or diversion of a controlled substance is an extremely serious offense. Local protocols and procedures should indicate the severity and consequences of this type of situation or actions.
8. Audits and Discrepancies
- a) Audits should be performed routinely and also randomly to ensure the controlled substance count and the paperwork count match.
  - b) Discrepancies should be dealt with immediately. A chain of command for reporting should be identified and clearly stated within the local policy.
  - c) Audits for cause, such as a suspected diversion, should be performed immediately.
  - d) The Medical Director, or responsible party, should be notified any time a discrepancy cannot be immediately resolved, an audit for cause is performed or diversion of a controlled substance is identified.
  - e) Mandatory audits should be conducted every two years.
9. Diversion
- a) Reporting regulations are outlined by the Drug Enforcement Administration in 21 CFR 1301.76(b) and referenced in (a) and (b):
    - 1) Employees who have knowledge of drug theft or diversion from their employer have an obligation to report such information to a responsible security official of

the employer.

- 2) Employers have a responsibility to treat such information as confidential and to take all reasonable steps to protect the confidentiality of the information and the identity of employees furnishing information.
  - b) The discovery of a controlled substance theft or significant loss should immediately be reported the Fire Chief, the Medical Director, the local Police or State Troopers.
  - c) The Medical Director (or registrant) must notify the appropriate DEA field office of a theft or significant loss of any controlled substance. Thefts must be reported whether or not the controlled substances are subsequently recovered and/or the responsible parties identified and action taken against them.
10. Loss or Damage
- a) If obtaining controlled substances from an out of town vendor, the supplier is responsible for reporting transit losses of controlled substances by a common or contract carrier.
  - b) Broken vials
    - 1) Breakage of controlled substances does not constitute a "loss" of the controlled substance.
    - 2) If the contents are recoverable, a second person should be requested and the controlled substance should be recorded as waste/use and witnessed.
    - 3) Documentation of the incident should be provided to the appropriate person within the department.
11. Recordkeeping Requirements
- a) Schedule I and II controlled substances inventories and records must be kept separate from other records maintained by the department.
  - b) Schedule III, IV and V records must be maintained separately or in such a form that they are readily retrievable from the ordinary business records of the department.
  - c) All records related to controlled substances, including DEA Form 222, must be maintained and be available for inspection for a minimum of two years, unless a state requires a longer period.
  - d) Any receipt, administration, destruction, or access of the locked facility that houses the controlled substances will be performed with a second authorized department member present who will sign any required logs, electronic or written, as a witness.
  - e) All use of controlled substances will be documented as defined by the DEA.
  - f) Type and location of documentation for the use of a controlled substance for patient administration, waste, loss, and disposal should be designated by the local department and set out within their operating guidelines.
12. Disposal of Waste and Destruction of Partial Use or Expired Medications
- a) Destruction of controlled substances is regulated by the DEA under Title 21 Code of Federal Regulations Part 1317 Subpart C §1317.95 Destruction procedures.
    - 1) Destruction of controlled substances should follow DEA regulations and a designated department policy.
  - b) Partial Use Vials
    - 1) When controlled substances vial is partially used two designated department personnel should handle and/or observe the handling of any controlled substance until the substance is rendered non-retrievable.

- 2) The same two persons who handle and destroy the drugs (as above) will document the destruction of the controlled substance.
  - 3) No partially used vial or syringe will be placed into the biohazard container with any controlled substances remaining inside.
- c) Expired Medications and Reverse Distribution
- 1) Disposal of out-of-date, damaged, or otherwise unusable or unwanted controlled substances, including samples, may be transferred to a registrant who is authorized to receive such materials. These registrants are referred to as "Reverse Distributors."
  - 2) The local DEA field office will make a list available of authorized Reverse Distributors.
  - 3) Schedule I and II controlled substances should be transferred via the DEA Form 222, while Schedule III–V compounds may be transferred via invoice.
  - 4) Preparation and packaging for shipping should be done with two personnel and the paperwork should be reviewed by both people for accuracy prior to shipment.
  - 5) Copies of records documenting the transfer and disposal of controlled substances should be maintained by the department administration for a period of two years.

Recommended time: 2hrs



## **LESSON 2: EMS SYSTEMS**

No changes in this lesson in 2019 SOP

## **LESSON 3: CARDIOVASCULAR ANATOMY AND PHYSIOLOGY**

### **Objectives:**

At the completion of this section, the student will be able to:

- 3.1 Describe the anatomy of a healthy pediatric heart and common pediatric cardiac illnesses
- 3.2 Discuss medical issues in children with congenital heart disease who may present to the prehospital professional.

### **Psychomotor Objectives:**

There are no psychomotor objectives for this section

### **Lesson Content:**

- A. Pediatrics Specific Cardiac Anatomy and Physiology
  1. Anatomic and physiologic difference in children
  2. Shock in children (compensated vs. decompensated)
  3. Cardiogenic vs. noncardiogenic shock
  4. Congenital heart disease (brief overview)
    - a) Atrial Septal defect
    - b) Ventricular Septal defect
    - c) Tetralogy of Fallot
    - d) Patent ductus arteriosus
    - e) Patent foramen ovale

## **LESSON 4: BASIC ELECTROPHYSIOLOGY AND ELECTROCARDIOLOGY**

At the completion of this section, the student will be able to:

### **Objectives**

### **Psychomotor Objectives**

- 4.1 Identify the following 12-lead strip components:
  - a. Lead placement in relation to cardiac anatomy
  - b. 12-lead ECG waves and intervals
  - c. ST segment changes
  - d. Axis and vector overview

### **Lesson Content**

- 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
  4. Duration
  5. Wave form
  6. Segment
  7. Complex
  8. Interval
  9. Axis and Vector
    - a) QRS direction
    - b) Frontal plane axis
- D. Wave form analysis
1. Isoelectric
  2. Positive
  3. Negative
  4. Calculation of ECG heart rate
    - a) Regular and irregular rhythms
      - 1) ECG strip method
      - 2) "300"/triplicate method
- E. Lead Systems and heart surfaces
1. ECG rhythm analysis
    - a) Value
    - b) Limitations
  2. Heart Surfaces
    - a) Inferior
    - b) Lateral
    - c) Precordial
  3. Acute Signs of ischemia, injury and necrosis
    - a) Rationale
      - 1) possible early identification of patients with acute myocardial infarction for intervention (thrombolysis PTCA)
      - 2) the role of out-of-hospital 12-lead ECG is not universally available but is appropriate in most EMS settings with proper medical oversight
    - b) Advantages/disadvantages
    - c) ST segment elevation

- 1) height, depth and contour
- 2) ST (acute changes)
  - a. anterior wall -- significant ST elevation in V1- V4 may indicate anterior involvement
  - b. inferior wall -- significant ST elevation in II, III and aVF may indicate inferior involvement
- 3) ST segment depression in eight or more leads
- 4) ST segment elevation in aVR and V1

## **LESSON 5: RHYTHM RECOGNITION**

At the completion of this section, the student will be able to:

### **Psychomotor Objectives**

- 1.1 Interpretation of 12 lead ECG limited to STEMI.

### **Lesson Content**

- A. STEMI
  1. Coronary artery perfusion
  2. ST changes
    - a) Reciprocal changes
  3. Pathological Q waves
- B. ECG changes due to electrolyte imbalances
  1. Hyperkalemia
- C. ECG Changes due to other phenomena
  1. Accessory Pathways

## **LESSON 6: CARDIAC PATIENT ASSESSMENT**

### **Objectives**

Upon the completion of this section, the student will be able to:

- 6.1 Discuss the importance of identifying the time of onset of symptoms.
- 6.2 Describe the effect of hyper-oxygenation in the presence of stroke, myocardial infarction and post cardiac arrest.
- 6.3 Describe the importance and limitations of 12-lead recognition of STEMI.
- 6.4 Identify when to obtain 15-lead ECG.
- 6.5 Discuss the medical significance of each of the above listed respiratory sounds
- 6.6 Describe how to assess circulation using the Pediatric Assessment Triangle (PAT), ABCDEs, and additional assessment when caring for a pediatric patient.

### **Psychomotor Objectives:**

In a scenario-based setting

- 6.7 Obtain a 12-lead ECG

### **Lesson Content:**

A. Primary survey for cardiovascular assessment

1. Level of responsiveness
2. Airway
  - a) Patent
  - b) Debris, blood
3. Breathing
  - a) Absent
  - b) Present
  - c) Rate and depth
    - 1) Effort
    - 2) Breath sounds
      - (a) Characteristics
        - (1) Snoring
        - (2) Gurgling
        - (3) Stridor
      - (b) Significance
4. Circulation
  - a) Pulse
    - 1) Absent
    - 2) Present
      - (a) Pulse deficit
      - (b) Pulsus paradoxus
      - (c) Pulsus alternans
  - b) Skin
    - 1) Color
    - 2) Temperature
    - 3) Moisture
    - 4) Turgor
    - 5) Mobility
    - 6) Edema
  - c) Blood Pressure

B. History and physical/SAMPLE format

1. Chief complaint
2. Pain
  - a) OPQRST
    - 1) Onset/origin
      - (a) Pertinent past history
      - (b) Time of onset
    - 2) Provocation
      - (a) External
      - (b) Non-external
    - 3) Quality
    - 4) Region/radiation
    - 5) Severity
    - 6) Timing
      - (a) Duration
      - (b) Worsening or improving
      - (c) Continuous or intermittent
      - (d) At rest or with activity
3. Dyspnea
  - a) Continuous or intermittent
  - b) Exertional

- c) Non-exertional
- d) Orthopneic
- 4. Cough
  - a) Dry
  - b) Productive
- 5. Related signs and symptoms
  - a) Level of consciousness
  - b) Diaphoresis
  - c) Restlessness, anxiety
  - d) Feeling of impending doom
  - e) Nausea/vomiting
  - f) Fatigue
  - g) Palpitations
  - h) Edema
    - 1) Extremities
    - 2) Sacral
  - i) Headache
  - j) Syncope
  - k) Behavioral change
  - l) Anguished facial expression
  - m) Activity limitations
  - n) Trauma
- 6. Past medical history
  - a) Coronary artery disease
  - b) Atherosclerotic heart disease
    - 1) Abnormal lipid metabolism or excessive intake of saturated fats and cholesterol
    - 2) Subendothelial accumulation of fatty streaks
    - 3) Altered endothelial function
    - 4) Disruption of endothelium
    - 5) Formation of mature fibrous plaque
    - 6) Resultant diseases:
      - (a) Angina
      - (b) Previous MI
      - (c) Hypertension
      - (d) Congestive heart failure
  - c) Valvular disease
  - d) Aneurysm
  - e) Pulmonary disease
  - f) Diabetes
  - g) Renal disease
  - h) Vascular disease
  - i) Inflammatory cardiac disease
  - j) Previous cardiac surgery
  - k) IV Drug use (endocarditis)
  - l) Congenital anomalies
  - m) Current/Past medications
    - 1) Prescribed
      - (a) Compliance
      - (b) Non-compliance
    - 2) Borrowed
    - 3) Over-the-counter (OTC)
    - 4) Home remedies

- 5) Recreational
  - n) Allergies
  - o) Family History
    - 1) Stroke, heart disease, hypertension
    - 2) Age at death
    - 3) Known cholesterol levels
- C. Secondary survey for cardiovascular assessment
1. Inspection
    - a) Tracheal position
    - b) Neck veins
      - 1) Assure proper assessment techniques (preferably not supine, etc.)
      - 2) Appearance
      - 3) Pressure
      - 4) Clinical significance
    - c) Thorax
      - 1) Configuration
      - 2) Movement with respirations
    - d) Epigastrium
      - 1) Pulsation
      - 2) Distention
      - 3) Clinical significance
  2. Auscultation
    - a) Breath sounds
      - 1) Depth
      - 2) Equality
      - 3) Adventitious sounds
        - (a) Crackles/rales
        - (b) Wheezes/rhonchi
      - 4) Significance
    - b) Hear Sounds
  3. Palpation/Inspection
    - a) Areas of crepitus or tenderness
    - b) Thorax
    - c) Epigastrium
      - 1) Pulsation
      - 2) Distention
    - d) Abdomen
      - 1) Ascites
    - e) Sacrum
      - 1) Dependent edema
    - f) Hands and Feet
      - 1) Lesions
- D. Pediatric Assessment
1. Appearance
    - a) Abnormal Tone
    - b) Interactiveness
    - c) Consolability
    - d) Abnormal Look/Gaze
    - e) Abnormal Speech/Cry
  2. Work of Breathing
    - a) Abnormal sounds
    - b) Abnormal Position

- c) Retractions
- d) Flaring
- e) Apnea/Gasping
- 3. Circulation to Skin
  - a) Pallor
  - b) Mottling
  - c) Cyanosis
- 4. Temperature
- 5. Exposure
  - a) Undress to look for
    - 1) Rashes
    - 2) Bleeds
    - 3) Injuries
  - b) Avoid heat loss
- 6. Focused exam of relevant systems

## LESSON 7: CARDIOVASCULAR DISORDERS

At the conclusion of this section, the student will be able to:

### **Objectives:**

- 7.1 Identify common causes and state signs and/or symptoms for each of the following conditions:
- a. symptomatic bradycardia of any origin
  - b. symptomatic tachycardia of any origin
  - c. pulmonary embolism
  - d. commotio cordis
  - e. channelopathy
  - f. drowning
  - g. endocarditis
  - h. cardiac arrest
- 7.2 Describe the causes of primary cardiac arrest in the pediatric patient.

### **Psychomotor Objectives:**

- 7.3 Given case scenarios, demonstrate the BLS and ALS treatment for the following medical conditions:
- a. symptomatic bradycardia from any origin
  - b. symptomatic tachycardia from any origin
  - c. pulmonary embolism
  - d. commotio cordis
  - e. channelopathy
  - f. drowning
  - g. endocarditis
  - h. cardiac arrest

### **Lesson Content:**

- A. Commotio Cordis
  1. Pathophysiology
  2. Assessment
- B. Pulmonary Embolism
  1. Should be considered in any adult patient with acute dyspnea and anxiety
  2. Represents a continuum of the same underlying disorder of venous thromboembolism
    - a) Pulmonary thrombo-emboli originate from large thrombi in the deep veins of the lower extremities including the iliac, femoral, superficial femoral and pelvic veins in most cases.
  3. Common after hip fracture
- C. Cardiac Channelopathies and Sudden Death
  1. Two groups of familial diseases responsible for sudden cardiac death
    - a) Cardiomyopathies
    - b) Chanelopathies
      - 1) Prolonged QT syndrome
      - 2) Short QT syndrome
      - 3) Brugada syndrome
      - 4) Catecholaminergic Polymorphic Ventricular Tachycardia
- D. Hypertension Emergencies



1. Epidemiology
2. Precipitating causes
  - a) History of hypertension
  - b) Non-compliance with medication or any other treatment
  - c) Toxemia of pregnancy
3. Morbidity/mortality
  - a) Hypertension encephalopathy
  - b) Stroke
4. Primary examination
  - a) Airway/breathing
  - b) Circulation
  - c) Peripheral pulses
    - 1) Quality
    - 2) Rhythm
  - d) Peripheral perfusion
    - 1) Changes in skin color
    - 2) Changes in skin temperature
    - 3) Changes in skin moisture
5. History of present illness/SAMPLE history
  - a) Chief complaint
  - b) Medication history
    - 1) Prescribed
      - (a) Compliance
      - (b) Non-compliance with medication or treatment
    - 2) Borrowed
    - 3) Over-the-counter (OTC)
    - 4) Home remedies
  - c) Home oxygen use
6. Secondary survey
  - a) Airway
  - b) Circulation
    - 1) Pulse
    - 2) Vital signs
  - c) Diagnostic signs/symptoms
    - 1) General appearance
    - 2) Level of consciousness
      - (a) Unconscious
      - (b) Altered level of consciousness
      - (c) Responsive
    - 3) Skin color
    - 4) Skin hydration
    - 5) Skin temperature
    - 6) Peripheral pulses
    - 7) Edema
    - 8) Paroxysmal nocturnal dyspnea
    - 9) Labored breathing (SOB)
    - 10) Orthopnea
    - 11) Vertigo
    - 12) Epistaxis
    - 13) Tinnitus
    - 14) Changes in visual acuity
    - 15) Nausea/vomiting

- 16) Seizures
- 17) Lateralizing signs
- 18) ECG findings

E. Acute Myocardial Infarction/Angina

1. Epidemiology
2. Precipitating causes (as with angina)
  - a) Atherosclerosis
  - b) Persistent angina
  - c) Occlusion
  - d) Non-traumatic
    - 1) Recreational drugs
  - e) Trauma
3. Morbidity/mortality
  - a) Sudden death
  - b) Extensive myocardial damage
  - c) May result in ventricular fibrillation
4. Primary survey findings
  - a) Airway/breathing
  - b) Circulation
    - 1) Peripheral pulses
      - (a) Quality
      - (b) Rhythm
    - 2) Peripheral perfusion
      - (a) Changes in skin
        - (1) Color
        - (2) Temperature
        - (3) Moisture
5. History of the present illness/SAMPLE history
  - a) Chief complaint
    - 1) Typical onset of discomfort, usually of long duration, over 30 minutes
    - 2) Typical unrelieved by rest and/ or nitroglycerin preparation
    - 3) Epigastric pain or discomfort
    - 4) Atypical
  - b) Contributing history
    - 1) First time
    - 2) Recurrent
    - 3) Increasing frequency and/ or duration
  - c) 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
    - 1) Pallor during the episode
    - 2) Temperature may vary
    - 3) 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

- 1) ST segment elevation
  - (a) Height, depth, and contour
  - (b) ST changes
  - (c) ST segment depression in reciprocal leads
- 2) ECG Rhythm analysis
  - (a) Criteria for patient selection for rapid transport and reperfusion
    - (1) Time of onset of pain
    - (2) ST segment elevation location (leads)
    - (3) Signs of acute ischemia, injury, and necrosis
  - (b) Value
- 3) Cardiac arrhythmias
  - (a) Sinus tachycardia with or without ectopy
  - (b) Narrow or wide QRS complex tachycardia
  - (c) Sinus bradycardia
  - (d) Heart blocks
  - (e) Ventricular fibrillation
  - (f) Pulseless electrical activity
  - (g) Asystole (confirmed in a second lead)

G. Heart failure

1. Epidemiology
2. Precipitating causes
  - a) Left-sided failure
  - b) Right-sided failure
  - c) Myocardial infarction
  - d) Pulmonary embolism
  - e) Hypertension
  - f) Cardiomegaly
3. Related terminology
  - a) Preload
  - b) Afterload
  - c) Congestive heart failure
  - d) Chronic versus acute
    - 1) First time event
    - 2) Multiple events
4. Morbidity/mortality
  - a) Pulmonary edema
  - b) Respiratory failure
  - c) Death
5. Primary survey
  - a) Airway/breathing
  - b) Circulation
    - 1) Peripheral pulses
      - (a) Quality
      - (b) Rhythm
    - 2) Peripheral perfusion
      - (a) Changes in skin
        - (1) Color
        - (2) Temperature
        - (3) Moisture
6. History of the present illness/SAMPLE history
  - a) Chief complaint
    - 1) Progressive or acute SOB

- (a) orthopnea
  - 2) Progressive accumulation of edema
  - 3) Weight gain over short period of time
  - 4) Episodes of paroxysmal nocturnal dyspnea
  - 5) Prescribed medication history
    - (a) Compliance
    - (b) Non-compliance
    - (c) Borrowed
    - (d) Over-the-counter
    - (e) Home remedies
  - 6) Home oxygen use
- 7. Secondary survey findings
  - a) Level of consciousness
    - 1) Unconscious
    - 2) Altered levels of consciousness
  - b) Airway/breathing
    - 1) Dyspnea
    - 2) Productive Cough
    - 3) Labored breathing
      - (a) Most common, often with activity
      - (b) Paroxysmal nocturnal dyspnea (PND)
      - (c) Tripod position
      - (d) Adventitious sounds
      - (e) Retraction
  - c) Circulation
    - 1) Heart rate/ rhythm
      - (a) Any tachycardia with ectopy
      - (b) Any bradycardia with ectopy
    - 2) Changes in skin
      - (a) Color
      - (b) Temperature
      - (c) Moisture
    - 3) Peripheral pulses
      - (a) Quality
      - (b) Rhythm
    - 4) Edema
      - (a) Pitting versus non-pitting
      - (b) Extremities
        - (1) Localized in ankles
        - (2) To the midcalf
        - (3) To the knees
      - (c) Ascites
- 8. Complications
  - a) Pulmonary edema (signs and symptoms)
    - 1) tachypnea
    - 2) wheezing/rhonchi
    - 3) crackles/rales at both bases
    - 4) frothy sputum
    - 5) elevated jugular venous pressure
    - 6) pulsus paradoxus
    - 7) rapid "thready" pulse
    - 8) pulsus alternans

- 9) cyanosis in advanced stages
- 10) abnormalities of apical pulse

#### H. Cardiogenic Shock

1. Pathophysiology
2. Precipitating causes
  - a) Myocardial infarction
  - b) Age
  - c) Trauma
3. Primary survey
  - i. Airway/breathing
  - ii. Circulation
    - 1) Peripheral pulses
      - (a) Quality
      - (b) Rhythm
    - 2) Peripheral perfusion
      - (a) Changes in skin
        - (1) Color
        - (2) Temperature
        - (3) Moisture
4. Secondary Survey
  - a) Critical findings
    - 1) Unconscious
    - 2) Altered levels of consciousness
    - 3) Airway
      - (a) Dyspnea
      - (b) Productive cough
      - (c) Labored breathing
        - (1) Paroxysmal nocturnal dyspnea
        - (2) Tripod position
        - (3) Adventitious sounds
        - (4) Retraction
    - 4) ECG rhythm analysis
      - (a) Any tachycardia
      - (b) Any bradycardia
    - 5) Changes in skin
      - (a) Color
      - (b) Temperature
      - (c) Moisture
    - 6) Peripheral pulses
      - (a) Quality
      - (b) Rhythm
    - 7) Edema
      - (a) Pitting versus non-pitting
      - (b) Extremities
        - (1) Localized in ankles
        - (2) To the midcalf

#### I. Cardiac Arrest

1. Pathophysiology
2. Precipitating causes
  - a) Trauma
  - b) Drowning
  - c) Medical conditions (for example)

- 1) End stage renal disease
    - 2) Hyperkalemia with renal disease
  - 3. Primary survey critical findings
    - a) Unresponsive
    - b) Apneic
    - c) Peripheral pulses absent
    - d) Heart rate/rhythm
      - 1) Ventricular fibrillation
      - 2) Ventricular tachycardia
      - 3) Asystole
      - 4) PEA
  - 4. History of the present illness/ SAMPLE history (consider precipitating causes listed above)
    - a) Witnessed event
    - b) Witnessed by EMS personnel
    - c) Bystander cardiopulmonary resuscitation (CPR)
    - d) Time from discovery to activation of CPR
    - e) Time from discovery to activation of EMS
    - f) Past medical history
- J. Congenital Heart Disease
  - 1. Pulmonary Stenosis
    - a) Stenosis of Pulmonary valve
    - b) Increased Resistance to outflow
    - c) Elevates right ventricular pressure
    - d) Limits pulmonary blood flow
  - 2. Septal Defects
    - a) Atrial – blood from left atrium passes into right atrium
    - b) Ventricular – blood from left ventricle passes into right ventricle
  - 3. Patent Ductus Arteriosus
    - a) Ductus Arteriosus fails to close during embryonic development
    - b) Blood flow continuously from aorta through ductus into the pulmonary artery
    - c) Increases workload of left ventricle
- K. Pediatric Cardiac Arrest
  - 1. Primary cause
    - a) Cardiac (cardiopulmonary) arrest is rare in infants and children, and in contrast to adult cardiac arrest, the cause of pediatric cardiopulmonary arrest typically does not have a primary cardiac cause.
    - b) Pediatric cardiac arrest is most often the end result of progressive respiratory failure or shock, and often times both respiratory failure and shock may be present.
    - c) Strong emphasis on early identification and treatment of respiratory distress/failure and shock in children.

# LESSON 8: PATIENT MANAGEMENT

## Psychomotor Objectives

- 8.1 For each of the following medications, state the generic and trade names, classification, indications, contraindications, precautions, medication form(s), dose, administration action, side effects, re-assessment strategies and demonstrate the administration:
  - a. all EMT 1 and 2 medications
  - b. maintenance of medicated IV fluids
  - c. antiarrhythmic recommended per current ILCOR Guidelines
  - d. opioid analgesic
- 8.2 Demonstrate the correct use of synchronized cardioversion on a manikin/simulator.
- 8.3 Demonstrate the correct use of external pacing on a manikin/simulator.
- 8.4 Demonstrate proper lead placement for 12&15 lead acquisition.

## Lesson Content

- A. Drug Profiles
  - 1. The student will develop a drug profile for the following emergency medications allowed by the Alaska OEMS for administration by the EMT III in Alaska

<b>EMT 1 Medications</b>
<i>Aspirin</i>
<i>Bronchodilators</i>
<i>Epinephrine auto-injector</i>
<i>Epinephrine 1 mg/1ml IM (anaphylaxis no single dose greater than 0.3 ml administered with a 1 ml syringe) Ø</i>
<i>Medical Director Approved Vaccinations</i>
<i>Oral glucose</i>
<i>Oral over the counter (OTC) analgesics for pain or fever</i>
<i>Oxygen</i>
<i>Chemical Hazardous Materials auto-injector antidote</i>
<i>Sublingual nitroglycerin for chest pain of suspected ischemic origin – patient’s own medication</i>
<b>EMT 2 Medications</b>
<i>Dextrose</i>
<i>Diphenhydramine</i>
<i>Glucagon</i>
<i>Lidocaine (analgesic) for IO Flush</i>
<i>Nitrous Oxide</i>

*Ondansetron*

*Sublingual nitroglycerin*

*Transexemic Acid (TXA) With evidence of service coordination with hospital*

## **EMT III Medications**

Antiarrhythmic -Cardiac arrest only, per current guidelines

Opioid analgesic

Atropine

Epinephrine

- B. Management of the patient with an arrhythmia
1. Assessment
    - a) Symptomatic
    - b) Hypotension
    - c) Hypoperfusion
    - d) Mechanical
    - e) Vagal Maneuvers – if the heart rate is too fast
    - f) Stimulation – If heart rate is too slow
    - g) Cough
  2. Pharmacological interventions
    - a) Gases
    - b) Sympathomimetic
    - c) Anticholinergic
    - d) Antiarrhythmic
  3. Electrical interventions
    - a) Purpose
    - b) Methods
      - 1) Synchronized cardioversion
      - 2) Defibrillation
      - 3) Cardiac Pacing
        - (a) Transcutaneous pacing
          - (1) Bradycardia
            - a. Patient is hypotensive/hypoperfusion with CNS involvement
            - b. Refer to ILCOR consensus for treatment
          - (2) Complete AV block
            - a. Patient is hypotensive/hypoperfusion with CNS involvement
            - b. Refer to ILCOR consensus for treatment
    - c) Set-up
      - 1) Placement of electrodes
      - 2) Rate and milliamperes (mA) settings
      - 3) Pacer artifact
      - 4) Capture
      - 5) Failure to sense
        - (a) Causes
        - (b) Implications
        - (c) Interventions
      - 6) Failure to capture



- (a) Causes
      - (b) Implications
      - (c) Interventions
    - 7) Failure to pace
      - (a) Causes
      - (b) Implications
      - (c) Interventions
    - 8) Hazards
    - 9) Complications
  - d) Transport
    - 1) Indications for rapid transport
  - e) Support and communications strategies
    - 1) Explanation for patient, family, significant others
    - 2) Communication and transfer of data to higher level provider or the physician
- C. Acute Myocardial Infarction/Angina Management
1. Position of comfort
  2. Refer to ~~ILCOR~~ current AHA guidelines consensus for treatment
  3. Transport
    - a) Criteria for rapid transport
    - b) No relief with medications
    - c) Hypotension/hypoperfusion
    - d) Significant changes in ECG
      - 1) Ectopy
      - 2) Arrhythmias
    - e) ECG Criteria for rapid transport and reperfusion
      - 1) Time of onset of pain
      - 2) ECG rhythm abnormalities
- D. Cardiac Arrest 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 current AHA guidelines for treatment
  7. Rapid transport
  8. Support and communications strategies
    - a) Explanation for patient, family, significant others
    - b) Communication and transfer of data to higher level provider or the physician
- E. Pediatric Arrhythmia and Cardiac Arrest Management
1. Refer to ILCOR consensus for treatment
  2. Neonatal Resuscitation
    - a) Provide routine care to the newly born infant.
    - b) Perform a neonatal assessment.
      - 1) History:
      - 2) Date and time of birth
      - 3) Onset of symptoms

- 4) Prenatal history:
  - (a) prenatal care
  - (b) substance abuse
  - (c) multiple gestations
  - (d) maternal illness
- 5) Birth history:
  - (a) maternal fever
  - (b) presence of meconium
  - (c) prolapsed or nuchal cord
  - (d) maternal bleeding
- c) Estimated gestational age:
  - 1) May be based on last menstrual period.
- d) Exam
  - 1) Respiratory rate and effort:
    - (a) strong
    - (b) weak, or absent
    - (c) regular or irregular
    - (d) A rate of **30-50 is normal**
  - 2) Signs of respiratory distress:
    - (a) Grunting
    - (b) nasal flaring
    - (c) retractions
    - (d) gasping
    - (e) apnea
  - 3) Heart rate:
    - (a) Fast, slow, or absent.
    - (b) A rate of **120-160 is normal.**
      - (1) Precordium, umbilical stump or brachial pulse may be used, however auscultation of the chest is preferred since palpation of umbilical stump is less accurate.
  - 4) Muscle tone:
    - (a) Poor or strong.
  - 5) Color/Appearance:
    - (a) central cyanosis
    - (b) acrocyanosis
    - (c) pallor
    - (d) normal
  - 6) APGAR score:
    - (a) appearance
    - (b) pulse
    - (c) grimace
    - (d) activity respiratory effort
    - (e) Score may be calculated for documentation but is not necessary to guide resuscitative efforts
  - 7) Estimated gestational age:
    - (a) term
    - (b) late preterm
    - (c) premature
  - 8) Pulse oximetry should be considered if prolonged resuscitative efforts or if supplemental oxygen is administered.
    - (a) The goal for oxygen saturation at 10 minutes is **85-95%**.
- e) Rapidly identify newly born infants requiring resuscitative efforts.

- f) Provide appropriate interventions to minimize distress in the newly born infant.
- g) Recognize the need for additional resources based on patient condition and/or environmental factors.
- h) If immediate resuscitation is required and the newborn is still attached to the mother, clamp the cord in two places and cut between the clamps.
  - 1) If no resuscitation is required, warm/dry/stimulate the newborn and then cut/clamp the cord after 60 seconds or after the cord stops pulsating.
- i) Warm, dry, and stimulate.
- j) Wrap infant in dry towel or thermal blanket to keep infant as warm as possible during resuscitation; keep head covered if possible.
  - 1) **If strong cry**, regular respiratory effort, good tone, and term gestation:
    - (a) Infant should be placed skin-to-skin with mother and covered with dry linen.
- k) **If weak cry**, signs of respiratory distress, poor tone, or preterm gestation:
  - 1) Position airway (sniffing position) and clear airway as needed. If thick meconium or secretions present and signs of respiratory distress, suction mouth then nose.
- l) **If heart rate greater than 100 bpm:**
  - 1) Monitor for central cyanosis - provide blow-by oxygen as needed.
  - 2) Monitor for signs of respiratory distress. If apneic or in significant respiratory distress - Initiate bag-valve-mask ventilation with room air at **40-60 breaths per minute**.
- m) **If heart rate less than 100 bpm:**
  - 1) Initiate bag-valve-mask ventilation with room air at **40-60 breaths per minute**. (Primary indicator of effective ventilation is improvement in heart rate).
  - 2) Rates and volumes of ventilation required can be variable, only use the minimum necessary rate and volume to achieve chest rise and a change in heart rate.
  - 3) If no improvement after 90 seconds, change oxygen delivery to 100% FiO<sub>2</sub> until heart rate normalizes.
- n) **If heart rate less than 60 bpm:**
  - 1) Ensure effective ventilations with supplementary oxygen and adequate chest rise
  - 2) If no improvement after 30 seconds, initiate chest compressions. **Two-thumb-encircling-hands technique is preferred when two rescuers are available.**
  - 3) Coordinate chest compressions with positive pressure ventilation at **3:1 ratio, 90 compressions and 30 breaths per minute**.
- o) Consider checking a blood glucose level for ongoing resuscitation, maternal history of diabetes, ill-appearing or unable to feed.
- p) Hypothermia is common in newborns and worsens outcomes of nearly all post-natal complications.

F. Heart Transplant Patients

1. Consult medical control for appropriate dosing with dealing with pediatric and adult patients with heart transplant.

## LESSON 9: COMPREHENSIVE SKILLS AND KNOWLEDGE REVIEW

### Psychomotor Objectives:

At the completion of this section, the student will be able to:

- 9.1 State the appropriate treatment, when given a scenario involving a patient with acute coronary syndrome (ACS) and each of the following ECG rhythms:
  - a. acute coronary syndrome (ACS)
  - b. normal/regular sinus rhythm (NSR/RSR)
  - c. sinus bradycardia
  - d. unstable symptomatic bradycardia of any origin
  - e. sinus tachycardia
  - f. unstable symptomatic tachycardia of any origin
  - g. ventricular tachycardia
  - h. ventricular fibrillation
  - i. asystole
  - j. pulseless Electrical Activity (PEA)
  - k. premature Ventricular Complexes (PVCs)
  - l. third degree AV block (complete heart block)
  - m. agonal rhythm
  - n. pacemaker rhythms
  
- 9.2 Demonstrate the following procedures:
  - a. basic life support
  - b. placement of an advanced airway device approved by the medical director
  - c. pharmacotherapy indications and sequence
  - d. defibrillation.
  - e. synchronized cardioversion
  - f. transcutaneous pacing
  
- 9.3 State the steps involved in managing pediatric cardiac arrest when given a scenario involving a pediatric Patient.