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## **OFFICE OF EMERGENCY MEDICAL SERVICES INTERMEDIATE EMERGENCY MEDICAL TECHNICIAN INITIAL COURSE OBJECTIVES**

### **Educational Purpose, Objectives, and Student Learning Outcomes**

#### **Intermediate Emergency Medical Technician (IEMT) Program Purpose:**

The purpose of the IEMT initial course is to educate pre-hospital care providers, to provide EMS service at the IEMT level, and to enhance the safety and quality of the delivery of healthcare in the out-of-hospital setting and hospital settings.

These educational objectives are meant to be covered in a time frame that guides the students to become competent with their knowledge, skills, and abilities as an IEMT. It is the responsibility of the Course Coordinator and Medical Director to ensure competency for each student.

The IEMT builds on the knowledge, skills, and abilities learned during the Advanced Emergency Medical Technician (AEMT) course. For a candidate to enter into an IEMT course, they must have completed a Wyoming Division approved AEMT course to include psychomotor testing. Prior to in-class lab sessions and clinical activities performing skills on a live subject, the student **MUST** hold a current Wyoming AEMT license.

#### **Educational Objectives:**

The educational objectives are designed to prepare the student to:

1. Comprehend, apply, and evaluate information relative to the role and responsibilities of an entry level IEMT.
2. Demonstrate technical proficiency in all skills necessary to fulfill the role of an entry level IEMT.
3. Demonstrate personal behaviors consistent with professional expectations of an entry level IEMT.

#### **Learning Objectives:**

1. Derive an ability to understand, interpret, and apply EMS and general medical knowledge necessary to function as an IEMT.
2. Summarize the IEMT roles and responsibilities as defined in Wyoming Emergency Medical Services Rules, Chapter 17, Scopes of Practice.



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3. Describe how the roles and responsibilities differ between EMS provider levels, as described in Wyoming Emergency Medical Services Rules, Chapter 17, Scopes of Practice.
4. Demonstrate the ability to perform a board range of IEMT skills both difficult and routine.
5. Employ the ability to conduct oneself in an ethical and professional manner and show proficiency in interpersonal relations and communication.
6. Illustrate critical thinking and communication skills.

**Assessment Activities:**

The knowledge of the IEMT student will be evaluated using formal cognitive and psychomotor assessments.

**Student Learning Outcomes #1, 2 and 3:** An ability to understand, interpret and apply EMS and general medical knowledge to function in a healthcare setting. Define the roles and responsibilities within the Wyoming EMS system and describe how the roles and responsibilities differ between EMS provider levels.

- Office of Emergency Medical Services (OEMS), IEMT cognitive exam is the comprehensive written exam that prospective IEMT candidates must take after completion of ALL course requirements before they are granted a license to practice within Wyoming.

**Student Learning Outcome #4:** An ability to perform a board range of IEMT skills both difficult and routine.

- The IEMT psychomotor exam is the skills exam that every student must pass in order to complete the course.
- The IEMT psychomotor exam is the exam administered by the OEMS that IEMT students shall take after successfully completing the IEMT program. Successful completion of this exam is required to obtain a license to practice within the state of Wyoming.

**Required Psychomotor Skills Exam**

1. Ventilatory Management Adult
2. Ventilatory Management Pediatric
3. Needle decompression
4. Dynamic Cardiology
5. Static Cardiology

**Student Learning Outcome #5:** An ability to conduct oneself in an ethical and professional manner and show proficiency in interpersonal relations and communication.

- **Externship Final Benchmark Assessment: Professionalism** is the final evaluation filled out by the Course Coordinator on each student as they complete their externship. The evaluation is based on both the preceptor evaluations and on the student's required paperwork that has been submitted to the Primary Instructor and Course Coordinator.

- **Professionalism:** The student is consistently on time, prepared and demonstrates professional behavior.

**Required additional courses:**

- Basic Life Support (BLS)
  - Approved course as listed on the WYOEMS-10 Evaluated CPR-ACLS Programs-Approved document.
- Advanced Cardiac Life Support (ACLS)
  - Approved course as listed on the WYOEMS-10 Evaluated CPR-ACLS Programs-Approved document.

**Unit Objectives**

**I. Unit 1 Wyoming Intermediate Roles and Responsibilities**

At the completion of this unit, the IEMT student will:

- a. Define and explain the primary roles and responsibilities of IEMT's
- b. Define and describe how to integrate expected characteristics of professionalism into the practice of EMS providers
- c. Describe examples of behaviors that demonstrate the expected professional attitudes and attributes of EMS.
- d. Describe and contrast how these roles and responsibilities differ from other EMS provider levels in the EMS community
- e. Interpret the role of medical direction in the prehospital environment
- f. Defend the importance of personal wellness in EMS
- g. Create a healthy lifestyle model of peers
- h. Define injury prevention
- i. Discuss how EMS providers can take an active role with injury prevention
- j. Identify the importance of primary injury prevention activities as an effective way to reduce death, disabilities and health care cost
- k. Evaluate legal issues that impact decision made in the out-of-hospital environment

**II. Unit 2 Critical Thinking, Decision Making and Patient Assessments: Use of judgment and independent decision making while working under pressure**

At the completion of this unit, the IEMT student will:

- a. Describe how the scene size-up integrates into the overall context of the emergency
- b. Identify the individual components of a comprehensive scene size-up including;
  - i. scene safety
  - ii. standard precautions
  - iii. determination of needed resources
  - iv. mechanism of injury/nature of illness
- c. Primary and Secondary Assessments (patient assessments shall be incorporated throughout the IEMT course)

- i. Preparation
  - ii. Response
  - iii. Scene size-up
  - iv. Patient assessment
  - v. Gathering, general impression, identify components on how to perform assessments according to patients age and condition, evaluating and synthesizing of information
  - vi. Identify clinical need of cervical stabilization during the primary assessment
  - vii. Assess and manage respiratory and cardiovascular system
  - viii. Assess baseline mental status
  - ix. Obtain pertinent history
    1. OPQRST-ASPN
  - x. Vital signs
  - xi. Secondary assesses/Reassessment identify and integrate findings from the anatomic region exam into the primary and differential diagnosis
  - xii. Use clinical reasoning skills to establish patient priorities by developing and implementation of differential diagnosis and treatment plan
  - xiii. Disposition and transfer
  - xiv. Documentation
  - xv. Clean-up and maintenance
- d. Describe using proper communication techniques while obtaining history and reviewing of body systems
  - e. Describe alteration in assessments techniques when caring for pediatrics and geriatric age groups
  - f. Review of actions after each call
  - g. Understand and implementation of the “Six R’s” of critical thinking

**III. Unit 3 Respiratory, Airway Management and Ventilation: Integration of knowledge of airway anatomy, pathophysiology, and assessments to develop a treatment plan with the goal of adequate ventilation and respirations for patients of all ages**

At the end of this unit the IEMT student will be able to:

- a. Describe basic airway anatomy and physiology
  - i. Upper and lower airway
  - ii. Respiratory Cycle
  - iii. Oxygen and carbon dioxide transport
  - iv. Clinical difference in pediatric airway
- b. Describe and perform primary airway assessments
  - i. Upper airway obstructions and abnormal airway sounds
  - ii. Patency and ventilatory adequacy
- c. Describe basic airway management, positioning, administering supplemental oxygen with a variety of devices and inserting basic airway adjuncts
- d. Identify and explain nonlinear thinking and action in assessment and management of problems with and ventilation
- e. Describe the use and benefits of noninvasive respiratory gas monitoring for identifying ventilation and oxygenation sufficiency

- f. Describe indications and contraindications, procedures and limitations of supraglottic vs endotracheal airway devices
- g. Identify in multiple ways to confirm the patient is receiving proper ventilation regardless of airway device is being used
- h. Identify and interpret normal and abnormal capnography waveforms and readings
  - i. Understanding of acid-base balances
  - ii. Differences between respiratory and metabolic acid-base disorders
- i. Identify the differences between CPap and BiPap
  - i. Describe the indications and contraindications of CPap and BiPap
    - 1. Identify advantages and disadvantages if CPap
    - 2. Explain how CPap can affect blood pressure
  - ii. Describe of CPap assists patients with acute respiratory distress
    - 1. COPD
    - 2. CHF
    - 3. Asthma
  - iii. Describe and demonstrate the application of CPap to a patient, including how to coach a patient to breathe with and not against
    - 1. Identify reasons patients may resist
- j. Airway Assessments: *LEMON, Mallampati and HEAVEN*
  - i. Define the LEMON Airway assessment
  - ii. Explain how LEMON assist in airway management
  - iii. Define the 4 classes of Mallampati and how each affects the ability to successfully intubate a patient
  - iv. Using LEMON, be able to contrast the levels of difficulty for endotracheal intubation
  - v. Heaven
    - 1. H-Hypoxia
    - 2. E-Extremes of size
    - 3. A-Anatomic Abnormalities
    - 4. V-Vomit
    - 5. E-Exsanguination
    - 6. N-Neck Mobility
- k. Endotracheal Intubation:
  - i. Describe advantages, disadvantages, indications, contraindications, complications, equipment and techniques of endotracheal intubation
  - ii. Identify and demonstration of traditional and alternative approaches to endotracheal intubation, retrograde, digital and lighted stylet intubation
    - 1. Including proper equipment
    - 2. Explain the parts and function of the endotracheal tube
    - 3. Proper size intubation tube
    - 4. Demonstrate and explain the steps in correct order including securing the endotracheal tube
  - iii. Demonstrate preparation of the patient
  - iv. Proper vs improper tube placement
    - 1. Vocal cord visualization
    - 2. Auscultation of bilateral lungs and epigastric

3. Misting in the tube
4. End tidal CO<sub>2</sub>
- v. Identify and discuss special considerations of anatomy, equipment and procedure when intubating and ventilating pediatric patients
- vi. Describe and manage if post-intubation agitation and field extubation
- vii. Describe and recognize predictors of a difficult airway and ventilation, what techniques that can increase first attempt intubation success rates
- viii. Assessment and management of airway and ventilation in a patient with a stoma
- ix. Provide scenarios of patients requiring airway or ventilator management for patients with and without difficult airways and how to employ techniques to achieve adequate oxygenation

**IV. Unit 4 Traumatic Chest Injury Review and Needle Decompression; Integration of knowledge of assessment findings, principles of epidemiology, pathophysiology to implement a treatment and disposition of patients with thoracic trauma.**

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

- a. Describe the anatomy and physiology of the thorax and structures within it
- b. Identify blunt and penetrating mechanisms can result in thoracic trauma
- c. List and describe common pulmonary, and chest wall injuries. Cardiac and vascular injuries that can occur secondary to thoracic trauma that including but not limited to
  - i. Pulmonary embolism
  - ii. Acute pericarditis
  - iii. Acute aortic dissection
  - iv. Rib Fracture
  - v. Diaphragmatic injuries
  - vi. Traumatic Aortic Disruption
  - vii. Pulmonary Contusion
  - viii. Blunt Cardiac Injury
  - ix. Hemothorax
  - x. Pneumothorax Simple
  - xi. Tension Pneumothorax
- d. Describe and demonstrate the assessment steps for patients that have suffered chest wall trauma
- e. Explain the decision to implement or avoid performing a chest needle compression
- f. Describe complications of Pneumothorax and Tension Pneumothorax, not limited to:
  - i. Respiratory failure
  - ii. Cardiac arrest
  - iii. Pneumopericardium
  - iv. Pneumoperitoneum
  - v. Hemothorax

- g. Management of traumatic and tension pneumothoraxes require a high level of cooperation among interprofessional healthcare team members. The timely and accurate evaluation leads to early interventions decreasing mortality and morbidity. In these situations, care coordination is vital, and having different team members trained and ready to act promptly is life-saving. The first-line responders when a patient develops a traumatic or tension pneumothorax vary depending on the situation and underlying etiology.
  - i. Define and demonstrate procedure for chest needle decompression
  - ii. Prepare necessary equipment
  - iii. Demonstrate the steps outlined on the currently approved psychomotor skill sheet
- h. Design a variety of scenarios to discuss and demonstrate the management of patients with thoracic injuries

**V. Unit 5 Principles of Pharmacology: Integrate knowledge of pharmacology to formulate a treatment plan for the patient.**

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

- a. Describe the chemical, generic, brand, and official names of drugs, and the four main sources of materials from which drugs are created
- b. Describe components of a drug profile and identify reference material for drug information and the key principles of pharmacokinetics
- c. Describe processes for drug research and development for marking, FDA classification and newly approved drugs
- d. Explain and demonstrate responsibilities to administering medications, including medication delivery to special patient populations
- e. Explain and demonstrate the routes of drug administration
- f. Describe the various forms of drugs and any storage considerations
- g. Describe the unintended adverse effects of drug administration and how various factors, such as age, body mass, concurrent medications, and others, can alter drug responses
- h. Describe the effects of the drug on the various body systems;
  - i. Central nervous system
  - j. Autonomic nervous system
  - k. Cardiovascular system
  - l. Respiratory System
  - m. Gastrointestinal System
  - n. Eyes and ears
  - o. Endocrine System
  - p. Male and female reproductive systems and affect sexual behaviors
- q. Describe characteristic of drugs used to treat cancer, infections, inflammation, supplement diet, poisoning and overdoses
- r. This outline is from the "*National Emergency Medical Services Education Standards Paramedic Instructional Guidelines.*" Developed by the National



Highway Transportation Safety Administration. This outline has been adapted for the IEMT level in Wyoming.

- s. Medication Safety
- t. Medication Legislation
  - i. Pure Food and Drug Act
  - ii. Federal Food, Drug and Cosmetic Act
  - iii. Harrison Narcotic Act
  - iv. Controlled Substance Act
  - v. Drug Enforcement Agency
  - vi. Development of Pharmaceuticals
    - 1. Food and Drug Administration approval process
    - 2. Special Considerations
      - a. Pregnancy
      - b. Pediatrics
      - c. Geriatrics
  - vii. Drug Forms
    - 1. Liquids
    - 2. Solids
    - 3. Gases
- u. Naming
  - i. Chemical
  - ii. Generic
  - iii. Proprietary/trade
  - iv. Official
- v. Authoritative Sources of Drug Information
  - i. United States Pharmacopeia (USP)
  - ii. Physician's Desk reference (PDR)
  - iii. Drug package inserts
  - iv. Drug handbooks
- w. Classifications
  - i. Body System Affected
  - ii. Class of Agent
  - iii. Classification by Body System
    - 1. Central nervous system
      - a. Autonomic pharmacology
        - i. cholinergic
        - ii. anticholinergic drug definitions
        - iii. adrenergic
        - iv. antiadrenergic
          - 1. alpha- adrenergic blockers
          - 2. beta-adrenergic blockers
      - b. Analgesics
        - i. opioid agonists



- ii. opioid antagonists
    - iii. non-steroidal anti-inflammatory drugs
  - c. Sedative/hypnotic
    - i. benzodiazepines
    - ii. barbiturates
  - d. Anticonvulsants
  - e. Stimulants
- 2. Cardiovascular drug definitions
  - a. Anti-dysrhythmic
  - b. Cardiac glycosides
  - c. Antihypertensive
  - d. Antianginal drugs
- 3. Drugs affecting the blood
- 4. Psychiatric medication
- 5. Respiratory system
  - a. Mucolytic
  - b. Cholinergic antagonists
  - c. Sympathomimetic
  - d. Xanthine derivatives
  - e. Antihistamines
- 6. Endocrine System- drugs affecting the pancreas
  - a. Insulin preparations
  - b. Oral hypoglycemic agents
  - c. Glucagon
  - d. IV Dextrose D10 vs D50
- 7. Herbal preparations
  - a. Potential Implication
    - i. Interactions with pharmaceuticals
    - ii. Idiosyncratic reactions
    - iii. Manufacturing error
    - iv. Contamination
    - v. Substitution
  - b. Adulteration
    - i. Incorrect preparation
    - ii. Incorrect labeling
- 8. Over the counter medications (OTC)
  - a. Drugs affecting the central nervous system
  - b. Sedatives
  - c. Stimulants
  - d. Hallucinogenic (dextromethorphan)
  - e. Drugs affecting the respiratory system
  - f. Asthma treatment products
  - g. Cold and allergy products

- h. Supplements
- i. Herbs
- j. Vitamins
- k. Minerals
- l. Other
- x. Storage and Security
  - i. Factors Affecting Drug Potency
    - 1. Temperature
    - 2. Light
    - 3. Moisture
    - 4. Shelf Life
  - ii. Locking and Double Locking of Medications
  - iii. Documentation of controlled substances
  - iv. Proper wasting of controlled substances
- y. Drug Terminology
  - i. Antagonism
  - ii. Bolus
  - iii. Contraindications
  - iv. Cumulative Action
  - v. Depressant
  - vi. Habituation
  - vii. Hypersensitivity
  - viii. Idiosyncrasy
  - ix. Indication
  - x. Potentiation
  - xi. Refectory
  - xii. Side Effects
  - xiii. Stimulants
  - xiv. Synergism
  - xv. Therapeutic Action
  - xvi. Tolerance
  - xvii. Untoward Effect
- z. Pharmacological Concepts
  - i. Pharmacokinetics
    - 1. Absorption
    - 2. Distribution
    - 3. Biotransformation
    - 4. Metabolism and Excretion- organs of elimination
      - a. Kidneys
      - b. Intestine
      - c. Lungs
      - d. Exocrine glands
  - ii. Pharmacodynamics

1. Mechanism of action
  - a. Drug receptor interaction
    - i. Agonists
    - ii. Antagonists
    - iii. Affinity
    - iv. Efficacy
  - b. Drug enzyme interaction
2. Medication response relationship
  - a. Plasma levels
  - b. Biologic half-life
  - c. Therapeutic threshold
  - d. Therapeutic index
  - e. LD 50
  - f. Factors altering drug response
    - i. age
    - ii. sex
    - iii. body mass index
    - iv. pathologic state
    - v. genetic factors
    - vi. time of administration
    - vii. psychological factors
    - viii. predictable responses
      1. tolerance
      2. cross tolerance
    - ix. iatrogenic responses
    - x. drug allergy
    - xi. anaphylactic reaction
    - xii. delayed reaction (“serum sickness”)
    - xiii. hypersensitivity
    - xiv. idiosyncrasy
    - xv. cumulative effect
    - xvi. drug dependence
    - xvii. drug antagonism
    - xviii. summation (addition of additive effect)
    - xix. synergism
    - xx. potentiation
    - xxi. interference
3. Medication interaction
4. Toxicity

**VI. Unit 6 Medication Administration: To gain and integrate knowledge of pharmacology to mitigate emergencies and formulate a treatment plan intended to improve the overall health of the patient**

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

- a. Explain, demonstrate and document the different Routes/Techniques of Medication Administration, the “Rights” of medications and reassessment
- b. Describe, demonstrate and document drug dose calculations
- c. Describe the chemical, generic, brand, and official names of drugs, and the four main sources of materials from which drugs are created
- d. Describe components of a drug profile and identify reference material for drug information and the key principles of pharmacokinetics
- e. Describe processes for drug research and development for marking, FDA classification and newly approved drugs
- f. Explain and demonstrate responsibilities to administering medications, including medication delivery to special patient populations
- g. Describe the various forms of drugs and any storage considerations
- h. Describe the unintended adverse effects of drug administration and how various factors, such as age, body mass, concurrent medications, and others, can alter drug responses
- i. Describe the effects of the drug on the various body systems;
  - i.** Central nervous system
  - ii.** Autonomic nervous system
  - iii.** Cardiovascular system
  - iv.** Respiratory System
  - v.** Gastrointestinal System
  - vi.** Eyes and ears
  - vii.** Endocrine System
  - viii.** Male and female reproductive systems and affect sexual behaviors
- j. Describe characteristic of drugs used to treat cancer, infections, inflammation, supplement diet, poisoning and overdoses
- k. Routes of Administration: Identify and explain the different routes
  - i. Enteral Routes
    1. Oral (PO)
    2. Orogastic/nasogastric tube (OG/NG)
    3. Sublingual (SL)
    4. Buccal
    5. Rectal (PR)
  - ii. Parenteral Route
    1. Intravenous (IV)
    2. Endotracheal (ET)
    3. Intraosseous (IO)
    4. Umbilical
    5. Intramuscular (IM)
    6. Subcutaneous (SC, SQ, Sub Q)
    7. Inhaled/nebulized
    8. Topical

9. Transdermal
10. Nasal
11. Instillation
12. Intradermal
1. Rights of Medication Administration
  - i. Right patient
  - ii. Right Medication
  - iii. Right dose
  - iv. Right time
  - v. Right route
  - vi. Right documentation
- m. How to calculate drug doses
  - i. System of weights and measure
  - ii. Drug calculations
    1. Desired dose
    2. Concentration on hand
    3. Volume on hand
  - iii. Calculate
    1. Volume base bolus
    2. IV drip rate
- n. Demonstrate proper Techniques of medication administration (Advantages, Disadvantages), based on dosage and route
  - i. IV
  - ii. Endotracheal
  - iii. Intraosseous
  - iv. Intramuscular (manual)
  - v. Subcutaneous (manual)
  - vi. Aerosolized
  - vii. Nebulized
  - viii. Sublingual
  - ix. Intranasal
- o. Describe and explain understanding the importance of reassessment after medication administration
  - i. Data- Indication for medication
  - ii. Action- Medication administration
  - iii. Response- Effect of Medication
  - iv. Documentation

**VII. Unit 7 Respiratory Emergencies: To gain and integrate knowledge, assessment findings and basic and advanced life support interventions to recognize and manage patients with pulmonary disorders**

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

- a. Recognize signs and symptoms of airway compromise, respiratory distress, and respiratory failure
- b. Uses clinical reasoning to guide and interpret the assessment findings and develop a management/treatment plan for patients with pulmonary disorders in the prehospital setting
- c. Describe and explain the following:
  - i. Snoring respiration
  - ii. Stridor
  - iii. Rales/rattles
  - iv. Rhonchi
  - v. Wheezing
- d. Describe and explain by comparing and contrasting the signs and symptoms of the disease processes
  - i. Upper Respiratory Infection
  - ii. Epiglottitis
  - iii. Croup
  - iv. ARDS
  - v. COPD
    1. Chronic bronchitis
    2. Emphysema
  - vi. Upper respiratory infections
    1. Pneumonia
    2. SARS
  - vii. Toxic Inhalation(s)
  - viii. Pulmonary Embolism
  - ix. Pulmonary Edema
  - x. Asthma

**VIII. Unit 8 Seizures and Comas: To gain and integrate knowledge, assessment findings to recognize and manage patients with neurological disorders/emergencies involving seizures and coma of unknown origin**

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

- a. Adapt a scene size-up, primary assessment to arrive at a field impression and differential diagnoses for neurological emergencies
- b. Use clinical reasoning to guide the patient assessment findings to develop and manage a treatment plan in the prehospital setting
- c. Describe multiple different causes of altered mental status
- d. Describe and useful assessment aids to help in identifying common causes of altered mental status “AEIOU-TIPS”
- e. Describe major forms of seizures
  - i. General Seizures
    1. Tonic-Clonic and the phases
      - a. Aura
      - b. Loss of consciousness

- c. Tonic Phase
    - d. Hypertonic Phase
    - e. Clonic
    - f. Post-seizure
    - g. Postictal
  - 2. Absence Seizure
  - 3. Pseudo seizures
  - 4. Partial Seizures
    - a. Simple partial seizures
    - b. Complex partial seizures
  - 5. Status Epilepticus
- ii. Integrate in the assessment
  - 1. History of seizures
  - 2. Recent history of head trauma
  - 3. Any alcohol and/or drug abuse
  - 4. Recent history of fever, headache, or stiff neck
  - 5. History of diabetes, heart disease or stroke
  - 6. Current medications
- f. Define Benzodiazepine medications and when they are warranted and when to without the medication
  - i. Diazepam
  - ii. Lorazepam
  - iii. Midazolam
- g. Describe the indications and contraindications of the benzodiazepine medication
- h. Comas of unknown origin
- i. Describe and discuss the effects of alcohol withdrawal
  - i. Describe and document the use of Thiamine for alcohol withdrawal
  - ii. Thiamine and its use with 50% Dextrose for patients experiencing coma, of unknown origin, alcoholism and delirium tremens

**IX. Unit 9 Pain Management: To gain and integrate knowledge, assessment findings to recognize and manage patients with pain.**

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

- a. Adapt a scene size-up, primary assessment to arrive at a field impression and differential diagnoses for managing pain
- b. Use clinical reasoning to guide the patient assessment findings to develop and manage a treatment plan in the prehospital setting
- c. Describe the necessity of pain control
  - i. Visceral pain
  - ii. Somatic pain
  - iii. Referred pain
  - iv. Pain from hollow organs tends to be vague and nondescript, whereas pain from solid organs tends to be localized
- d. Describe symptoms of pain, primary and secondary assessments



- i. SAMPLE
  - ii. OPQRST-ASPN
- e. Describe the effects of pain, affecting assessment findings
- f. Describe the indication, contraindications, benefits, similarities and differences of the following medications:
  - i. Morphine
  - ii. Fentanyl
- g. Explain the importance of considering
  - i. Antiemetics
  - ii. Narcotic antagonists (Naloxone) along with the pain medication
- h. Discuss alternatives to opiates (ALTO)
  - i. Acetaminophen
  - ii. Ibuprofen
  - iii. Ketorolac
  - iv. Nitrous Oxide

**X. Unit 10 Cardiovascular: To gain and integrate knowledge, assessment findings to recognize and manage patients with cardiac disorders.**

This outline is from the “National Emergency Medical Services Education Standards, Paramedic Instructional Guidelines.” Developed by the National Highway Transportation Safety Administration. This outline has been adapted for the IEMT level in Wyoming.

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

- a. Describe the anatomy and physiology of the cardiovascular system, to include cardiac cycle physiology, electrophysiology and ECG rhythm generation
- b. Describe electrocardiographic monitoring, rhythm acquisition, types of leads and ECG paper
- c. Describe a systematic analysis of ECG rhythms, apply knowledge of abnormal cardiac rhythms, interpret ECG arrhythmias, and identify potential causes these arrhythmias
- d. Describe treatments general indicated in the pre-hospital environment
- e. Anatomy of the Cardiovascular System
  - i. Location
    - 1. Layers
    - 2. Myocardium
    - 3. Endocardium
    - 4. Pericardium
      - a. Visceral (epicardium)
      - b. Parietal
      - c. Pericardial fluid
  - ii. Chambers
    - 1. Atria

- 2. Ventricles
- iii. Valves
  - 1. Atrioventricular (AV) valves
    - a. Tricuspid (right)
    - b. Mitral (left)
  - 2. Semilunar valves
    - a. Pulmonic (right)
    - b. Aortic (left)
- iv. Papillary muscles
- v. Chordae tendineae
- vi. Myocardial blood supply
  - 1. Arteries
    - a. Left Coronary artery
      - i. Anterior descending conduction system (LAD)
        - 1. Distribution to the conduction system
        - 2. Distribution to the left and right ventricles
      - ii. Circumflex Artery
        - 1. Distribution to the left ventricle
        - 2. Distribution to the left atrium
    - b. Right Coronary Artery
      - i. Posterior Descending Artery
        - 1. Distribution to the conduction system
        - 2. Distribution to left and right ventricles
      - ii. Marginal Artery
        - 1. Distribution to the conduction system
        - 2. Distribution to the right ventricle
        - 3. Distribution to the right atrium
  - 2. Veins
    - a. Coronary
    - b. Great cardiac vein
- vii. Conduction System
  - 1. Sinoatrial node
  - 2. Atrioventricular node
  - 3. Atrioventricular bundle (Bundle of His)
  - 4. Bundle branches
    - a. Left anterior fascicle
    - b. Left posterior fascicle
    - c. Right
  - 5. Purkinje system
  - 6. Internodal and interatrial pathways
    - a. Atrioventricular node
    - b. Left Atrium (Bachmann's bundle)
    - c. Middle internodal tract (Wenckebach's Tract)

- d. Posterior internodal tract
- viii. Vascular system
  - 1. Aorta
    - a. Ascending
    - b. Thoracic
    - c. Abdominal
  - 2. Arteries
  - 3. Arterioles
  - 4. Capillaries
  - 5. Venules
  - 6. Veins
  - 7. Vena Cava
    - a. Superior
    - b. Inferior
  - 8. Venous return (preload)
    - a. Skeletal muscle pump
    - b. Thoracoabdominal pump
    - c. Respiratory cycle
    - d. Gravity
    - e. Effects of IPPB, PEEP, CPAP, and BiPAP in venous return
  - 9. Systemic vascular resistance and capacitance (afterload)
  - 10. Pulmonary
- f. Physiology
  - i. Cardiac cycle
  - ii. Consists of systole and diastole of atria and ventricles
  - iii. Cycle occurs in about 0.8 seconds and 70-80 cycles/minutes average
  - iv. Events that occur in 1 cardiac cycle:
    - 1. Atrial systole
      - a. AV valves open and SL valves closed
      - b. Ventricles relaxed
      - c. Preceded by P wave on ECG
    - 2. Isovolumetric Contraction
      - a. Between start of ventricular systole and opening of SL valves
      - b. Ventricular volume remains constant
      - c. Onset coincides with R wave and ECG
      - d. First heart sound (S1)
        - i. Caused by ventricles contracting and closure of mitral and tricuspid valves
        - ii. “lubb” sound
    - 3. Ejection- Initial, shorter, rapid ejection followed by longer phase of reduced ejection

- a. Residual volume of blood remains in ventricles following ejection phase
- b. Residual volume increases in states of heart failure
- 4. Isovolumetric relaxation
  - a. Period between closure of SL valves and opening of AV valves
  - b. Ventricles are relaxing
  - c. Second heart sound heard during this phase (S2)
    - i. Caused by closure of SL valves
    - ii. “dub” sound
  - d. Rapid ventricular filling
  - e. Reduced ventricular filling (diastasis)
- v. Cardiac Output
  - 1. Heart rate X stroke volume
  - 2. Starling’s law
  - 3. Contractility
- g. Electrophysiology
  - i. Characteristics of myocardial cells
    - 1. Automaticity
    - 2. Excitability
    - 3. Conductivity
    - 4. Contractility
  - ii. Electrical potential
    - 1. Action potential- important electrolytes
      - a. Sodium
      - b. Potassium
      - c. Calcium
      - d. Chloride
      - e. Magnesium
    - 2. Excitability
      - a. Thresholds
      - b. Depolarization
      - c. Repolarization
        - i. Relative refractory period
        - ii. Absolute refractory period
    - 3. Neurotransmitters
      - a. Acetylcholine
        - i. Effects on myocardium
        - ii. Effects on systemic blood vessels
      - b. Cholinesterase
        - i. Effects on myocardium
        - ii. Effects on blood vessels
  - iii. Autonomic nervous system relationship to cardiovascular system

1. Medulla
  2. Carotid sinus and baroreceptor
    - a. Location
    - b. Significance
  3. Parasympathetic system
    - a. Inhibitory
    - b. Vagal release of acetylcholine
  4. Sympathetic system
    - a. Stimulatory
    - b. Release of norepinephrine
    - c. Alpha receptors
    - d. Beta receptors
      - i. Inotropic effect
      - ii. Dromotropic effect
      - iii. Chronotropic effect
- h. Epidemiology
- i. 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
  - ii. Morbidity/Mortality
    1. Reduced with early recognition
    2. Reduced with early access to the EMS system
  - iii. Risk factors
    1. Age
    2. Family history
    3. Hypertension
    4. Lipids
      - a. Hypercholesterolemia
      - b. LDL/HDL ratios
    5. Gender
    6. Smoking
    7. Carbohydrate intolerance
  - iv. Possible contributing risks
    1. Diet
    2. Gender
    3. Obesity
    4. Oral contraceptives
    5. Sedentary living
    6. Personality types
    7. Psychosocial tensions
  - v. Prevention strategies
    1. Early recognition

2. Education
3. Alteration of life style
- i. Electrocardiographic (ECG) monitoring
  - i. Electrophysiology and waveforms
    1. Origination
    2. Production
    3. Relationship of cardiac events to wave forms
    4. Intervals
      - a. Normal
      - b. Clinical significance
    5. Segments
  - ii. 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
  - iii. Standardization
    1. Amplitude
    2. Height
    3. Rate
      - a. Duration
      - b. Wave form
      - c. Segment
      - d. Complex
      - e. Interval
  - iv. Waveform analysis
    1. Isoelectric
    2. Positive
    3. Negative
    4. Calculation of ECG heart rate
      - a. Regular rhythm
        - i. ECG strip method
        - ii. “300”/triplicate method
  - v. Lead systems and heart surfaces
    1. ECG rhythm analysis
      - a. Value
      - b. Limitations
    2. Heart surfaces

- a. Inferior
- b. Left lateral
- c. Precordial
- 3. Acute signs of ischemia, injury and necrosis
  - a. Rationale
  - b. Possible early identification of patients with acute myocardial infarction for intervention (thrombolysis PTCA)
- 4. Advantages/Disadvantages
- 5. ST segment elevation
  - a. Height, depth and contour
  - b. ST (acute changes)
    - i. Anterior wall- significant ST elevation in V1-V4 may indicate anterior involvement
    - ii. Inferior wall- significant ST elevation in II, III, and aVF may indicate inferior involvement
  - c. ST segment depression in eight or more leads
  - d. ST segment elevation in aVR and V1
- 6. Q waves
  - a. Depth, duration and significance
    - i. Greater than 5 mm, greater than .04 seconds
    - ii. May indicate necrosis
    - iii. May indicate extensive transient ischemia
- vi. 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
      - i. Contour
      - ii. Elevation
      - iii. Depression
    - e. Q-T interval
      - i. Duration
      - ii. Implication of prolongation
      - iii. No relationship
    - f. T waves



- g. U waves
- 2. Interpretation of the ECG
  - a. Origin of complex
  - b. Rate
  - c. Rhythm
  - d. Clinical significance
- 3. Arrhythmias originating in the sinus node
  - a. Sinus bradycardia
  - b. Sinus tachycardia
  - c. Sinus arrhythmia
  - d. Sinus arrest
- 4. Arrhythmias originating in the atria
  - a. Premature atrial complex
  - b. Atrial (ectopic) tachycardia
  - c. Reentrant tachycardia
  - d. Multifocal atrial tachycardia
  - e. Atrial flutter
  - f. Atrial fibrillation
  - g. Atrial flutter or fibrillation with junctional rhythm
  - h. Atrial flutter or atrial fibrillation with preexcitation syndromes
- 5. Arrhythmias originating within the AV junction
  - a. First degree AV block
  - b. Second degree AV block
    - i. Type I (Wenckebach)
    - ii. Type II (Hay)
  - c. Complete AV block (third degree block)
- 6. Arrhythmias sustained or originating in the AV junction
  - a. AV node reentrant tachycardia
  - b. AV reciprocating tachycardia
    - i. Narrow
    - ii. Wide
  - c. Junctional escape rhythm
  - d. Premature junctional complex
  - e. Accelerated junctional rhythm
  - f. Junctional tachycardia
- 7. Arrhythmias originating in the ventricles
  - a. Idioventricular rhythm
  - b. Accelerated idioventricular rhythm
  - c. Premature ventricular complex (ventricular ectopic)
    - i. R on T phenomenon
    - ii. Paired/couplets
    - iii. Multiform

- iv. Frequent uniform
    - d. “Rules of bigeminy” pertaining to precipitating ventricular arrhythmias
    - e. Ventricular tachycardia
      - i. Monomorphic
      - ii. Polymorphic (including Torsades de Pointes)
    - f. Ventricular fibrillation
    - g. Ventricular standstill
  - 8. Asystole
  - 9. Abnormalities originating within the bundle branch system
    - a. Incomplete or complete
    - b. Right bundle branch block
    - c. Left bundle branch block
  - 10. Pulseless electrical activity
    - a. Electrical mechanical dissociation
    - b. Mechanical impairments to pulsations/cardiac output
    - c. Other possible causes
  - 11. Other ECG phenomena
    - a. Accessory pathway
    - b. Pre-excitation phenomenon (WPW)
    - c. Aberration versus ectopy
  - 12. ECG changes due to electrolyte imbalances
    - a. Hyperkalemia
    - b. Hypokalemia
  - 13. ECG changes in hypothermia
- j. Management of the patient with an arrhythmia
  - i. Assessment
    - 1. Symptomatic
    - 2. Hypotensive
    - 3. Hypoperfusion
  - ii. Transport
    - 1. Indications for rapid transport
    - 2. Indications for non-transport required
    - 3. Indications for referral
  - iii. Support and communications strategies
    - 1. Explanation for patient, family, significant others
    - 2. Communications and transfer of data to the physician
- k. Acute Coronary syndrome
  - i. Epidemiology
  - ii. Precipitating causes
    - 1. Atherosclerosis
    - 2. Vasospastic (Prinzmetal’s)
  - iii. Morbidity/Mortality

1. Not a self-limiting disease
2. Chest pain may dissipate, but myocardial ischemia and injury can continue
3. A single angina episode may be a precursor to myocardial infarction
4. May not be cardiac in origin
5. Must be diagnosed by a physician
6. Related terminology
  - a. Define as a brief discomfort has predictable characteristics and is relieved promptly- no change in this pattern
  - b. Stable
    - i. Occurs at a relative fixed frequency
    - ii. Usually relieved by rest and/or medication
  - c. Unstable
    - i. Occurs without fixed frequency
    - ii. May or may not be relieved by rest and/or medication
  - d. Initial- first episode
  - e. Progressive-accelerating in frequency and duration
  - f. Pre infarction angina
    - i. Pain at rest
    - ii. Sitting or lying down
7. Management
  - a. Position of comfort
  - b. Refer to ILCOR Consensus for treatment- International Liaison Committee of Resuscitation
  - c. ECG
    - i. 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 pain-free period
    - ii. Measure, record, and communicate ST segment changes
  - d. Indications for rapid transport
    - i. Sense of urgency for reperfusion
    - ii. No relief with medications
    - iii. Hypotension/hypo perfusion with CNS involvement
    - iv. Significant changes in ECG
1. Acute myocardial infarction / Angina
  - i. Epidemiology
  - ii. Precipitating causes (as with angina)
    1. Atherosclerosis
    2. Persistent angina

- 3. Occlusion
- 4. Non-traumatic
  - a. Recreational drugs
- 5. Trauma
- iii. Morbidity/mortality
  - 1. Sudden death
  - 2. Extensive myocardial damage
  - 3. May result in ventricular fibrillation
- iv. Management
  - 1. Position of comfort
  - 2. Refer to ILCOR Consensus for treatment
  - 3. Transport
    - a. Criteria for rapid transport
      - i. No relief with medications
      - ii. Hypotension/hypoperfusion
      - iii. Significant changes in ECG
        - 1. Ectopy
        - 2. Arrhythmias
    - b. ECG criteria for rapid transport and reperfusion
      - i. Time of onset of pain
      - ii. ECG rhythm abnormalities
  - 4. Indications for “non-transport”
    - a. Refusal
    - b. No other indications for non-transport
  - 5. Support and communication strategies
    - a. Explanation for patient, family and significant others
    - b. Communications and transfer of data to the physician
- m. Heart failure
  - i. Epidemiology
  - ii. Precipitating causes
    - 1. Left-sided failure
    - 2. Right-sided failure
    - 3. Myocardial infarction
    - 4. Pulmonary embolism
    - 5. Hypertension
    - 6. Cardiomegaly
    - 7. High output failure
    - 8. Low output failure
  - iii. Related terminology
    - 1. Preload
    - 2. Afterload
    - 3. Congestive heart failure
    - 4. Chronic versus acute

- a. First time event
  - b. Multiple events
- iv. Morbidity/mortality
  - 1. Pulmonary edema
  - 2. Respiratory failure
  - 3. Death
- v. Management
  - 1. Position of comfort
  - 2. Refer to ILCOR Consensus for treatment
  - 3. Transport
    - a. Refusal
    - b. No other indication for non-transport
  - 4. Support and communications strategies
    - a. Explanation for patient, family and significant others
    - b. Communications and transfer of data to the physician
- n. Hypertension Emergencies
  - i. Epidemiology
  - ii. Precipitating causes
    - 1. History of hypertension
    - 2. Non-compliance with medication or any other treatment
    - 3. Toxemia of pregnancy
  - iii. Morbidity/mortality
    - 1. Hypertensive encephalopathy
    - 2. Stroke
  - iv. Management
    - 1. Position of comfort
    - 2. Airway and ventilation
    - 3. Refer to ILCOR Consensus for treatment
    - 4. Rapid transport
      - a. Refusal
      - b. No other indication for non-transport
  - v. Support and communication strategies
    - 1. Explanation for patient, family and significant others
    - 2. Communications and transfer of data to the physician
- o. Cardiogenic Shock
  - i. Pathophysiology
  - ii. Precipitating causes
    - 1. Myocardial infarction
    - 2. Age
    - 3. Trauma
- p. Cardiac Arrest
  - i. Pathophysiology
  - ii. Precipitating causes

1. Trauma
  2. Medical conditions (for example)
  3. End stage renal disease
  4. Hyperkalemia with renal disease
- iii. 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 a pulse without CPR; may or may not have return of spontaneous respirations; patient may or may not 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
  7. Rapid transport
- iv. Support and communication strategies
1. Explanation for patient, family and significant others
  2. Communication and transfer of data to the physician
- v. Termination of resuscitation efforts
1. Inclusion criteria (for example)
    - a. 18 or older
    - b. Arrest is presumed cardiac in origin and not associated with a condition potentially responsive to hospital treatment
      - i. EXAMPLES
        1. Hypothermia
        2. Drug overdose
        3. Toxicological exposure
        4. Etc.
    - c. Endotracheal intubation has been successfully accomplished and maintained
    - d. Standard advanced cardiac life support (ACLS) measures have been applied throughout the resuscitative effort
    - e. On-scene ALS resuscitation efforts have been sustained for 25 minutes or the patient remains in asystole through four of appropriate ALS medications
    - f. Patient has a cardiac rhythm of asystole or agonal rhythm at the time the decision to terminate is made and this rhythm persists until the arrest is actually terminated

- g. Victims of blunt trauma in arrest whose presenting rhythm is asystole, or who develop asystole while on scene
- 2. Exclusion criteria- for example
  - a. Under 18 years of age
  - b. Etiology for which specific in-hospital treatment may be beneficial
  - c. Persistent or recurrent ventricular tachycardia or fibrillation
  - d. Transient return of pulse
  - e. Signs of neurological viability
  - f. Arrest was witnessed by EMS personnel
  - g. Family or responsible party opposed to termination
- 3. Criteria NOT to be considered as inclusionary or exclusionary
  - a. Patient age- Geriatrics
  - b. Time of collapse prior to EMS arrival
  - c. Presence of a non-official do-not-resuscitate (DNR) order
  - d. "Quality of Life" valuations
- 4. Procedures (according to local protocols)
  - a. Direct communication with medical oversight
    - i. Medical condition of the patient
    - ii. Known etiologic factors
    - iii. Therapy rendered
    - iv. Family present and apprised of the situation
    - v. Communicate any resistance or uncertainty on the part of the family
    - vi. Maintain continuous documentation to include the ECG and medications administered
    - vii. Mandatory review after the event
      - 1. Grief support (according to local protocol)
        - a. EMS assigned personnel
        - b. Community agency referral
      - 2. Law enforcement (according to local protocol)
        - a. On-scene determination if the event/patient requires assignment of the patient to the medical examiner
        - b. On-scene law enforcement communicates with attending physician for the death certificate
        - c. If there is any suspicion about the nature of the death, or if the physician refuses to hesitates to sign the death certificate
        - d. No attending physician is identified



**XI. Unit 11 Burns: To gain and integrate knowledge of assessment findings to formulate a field impression to implement comprehensive treatment principles and provide prehospital management for patients with burns**

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

- a. Describe assessment principles for burn injuries of depth and extent of body surface area involved
  - i. Burn depth
    1. Superficial burn
    2. Partial thickness burns
    3. Full thickness burns
  - ii. Body Surface Area
    1. Rules of nine
    2. Rules of Palms
- b. Delineate the various depths of thermal, electrical, chemical radiation and inhalation burns
  - i. Burn depth
    1. Superficial burn
    2. Partial thickness burns
    3. Full thickness burns
- c. Describe systemic complications of burns and how to manage them
  - i. Hypothermia
  - ii. Hypovolemia
  - iii. Eschar
  - iv. Infection
  - v. Organ Failure
  - vi. Special Factors
    1. Age-affects patients' response
      - a. Pediatric patients have higher ratio of BSA to body weight, fluid reserves needed to deal with burns in low
      - b. Geriatric patients have reduced mechanisms for fluid retention and lower fluid reserves
        - i. Less able to combat infection and more apt to have underlying diseases
- d. Describe proper treatment
  - i. Thermal burns
  - ii. Electrical
  - iii. Chemical radiation
  - iv. Inhalation
  - v. Toxic inhalation
  - vi. Carbon monoxide poisoning
  - vii. Airway thermal burns

**XII. Unit 12 Documentation: Integrate comprehensive knowledge of assessment, treatment plan, to create complete, well-written patient care reports (PCRs)**

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

- a. Explain the importance of proper spelling, terminology, abbreviations and acronyms in written documentation, along with the purpose and goals of the patient care report in EMS
- b. Describe and demonstrate the differences in documentation for special situations such as mass casualty incidents and refusals of care
- c. Describe and demonstrate acronyms to help ensure completeness of documentation and identify main sections of a PCR
- d. Instructor shall provide different PCRs to identify elements of good documentation
- e. Students shall demonstrate documentation of PCRs throughout the IEMT course that coincides with skill labs

**XIII. Unit 13: Skills Lab/Competencies (time frame may vary due to class size and the students need for adequate practice to ensure each student has mastered each skill)**

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

- a. Use universal precautions and BSI procedures during medication administration
- b. Demonstrate intraosseous needle placement and infusion
- c. Demonstrate clean technique during medication administration
- d. Demonstrate administration of medication by the inhalation route
- e. Demonstrate administration of oral medications
- f. Demonstrate preparation and administration of parenteral medications
- g. Demonstrate preparations and techniques for obtaining a blood sample
- h. Perfect disposal of contaminated items and sharps