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ABSTRACT

Developed to aid students enrolled in an emergency medical technician (EMT) training course, this document accompanies a course guide and a set of instructor lesson plans which update a basic training program for EMTs. The course consists of twenty-five lessons involving a minimum of seventy-one hours of classroom and field training plus ten hours of in-hospital observation and training. This student guide includes the following elements for each lesson: the purpose of the lesson, student objectives, an overview of the lesson content, study suggestions, and references. (BM)

Basic Training Course/ Emergency Medical Technician

(1977 Edition)

Student Study Guide

U. S. Department of Transportation
National Highway Traffic Safety Administration
Washington, D. C. 20590

Contents

Foreword

The National Highway Traffic Safety Administration has assumed responsibility for the development of training programs that are responsive to the standards established by the Highway Safety Act of 1966. Since these training programs are designed to provide national guidelines for training, it is NHTSA's intention that they be of the highest quality and be maintained in a current and up-to-date status from the point of view of both technical content and instructional strategy. To this end, NHTSA supported the current study which involved revision of selected curriculum packages that are of high value to the States in carrying out their annual work programs.

The original package of the current training program was prepared in 1969 and was titled "Basic Training Program for Emergency Medical Technician—Ambulance." In general, the coverage of the revised program reflects that of the original training program. Technical facts have been updated. Detailed outlines of lesson contents are included in the revised **instructor's lesson plans** document. The **course guide** has been updated to reflect the revised program and to be more responsive to the specific needs of the course coordinator. The **student study guide** has been prepared as an aid for the student. The original training package did not contain a **student study guide**.

Dr. Aaron Adams of NHTSA's Manpower Development Division served as Contract Technical Manager. Mr. Robert E. Motley of NHTSA's Emergency Medical Services Branch served as project advisor.

NHTSA is indebted to the American Academy of Orthopaedic Surgeons which provided prepublication copies of its text on emergency medical care for use in preparing the revised curriculum package. This text, entitled "Emergency Care and Transportation of the Sick and Injured," served as the basic medical reference for the training program.

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Introduction

This **student study guide** is one of three documents prepared for the **Basic Training Program for Emergency Medical Technicians** (EMT's). It was designed as a training aid for the student. As such, it provides an overview of the objectives and content of each course lesson and includes study suggestions to aid trainees in achieving course objectives. Two other documents complete the training package: a **course guide** which contains planning and management information required by the course coordinator to administer the training program and an **instructor's lesson plans** document which contains detailed outlines of course content and guidance for teaching each course lesson.

The training course covers all emergency medical techniques currently considered to be within the responsibilities of the basic EMT providing emergency care with an ambulance service. The course consists of 25 lessons involving a minimum of 71 hours of classroom and field training plus 10 hours of in-hospital observation and training. The titles and minimum time required for each of the 25 course lessons are given on the following page.

This **student study guide** includes a section for each course lesson. For lessons in which new skills and knowledges are taught, the following are included:

An introductory paragraph describing the purpose and need for the lesson.

Objectives that students should be able to achieve upon completion of the lesson.

An overview of lesson contents—although each overview outlines lesson contents and provides certain specific facts, the emphasis is on sign and symptom recognition and emergency care procedures.

Study suggestions directed largely toward simulation of performance required on the job.

The reference(s) on which the technical content of the lesson was based.

Course Lessons

1. Introduction to Emergency Care Training—Course Scope, EMT Functions, Legal Considerations, Anatomy and Physiology, and Vital Signs (3 hrs.)
2. Airway Obstruction and Respiratory Arrest (3 hrs.)
3. Cardiac Arrest (3 hrs.)
4. Mechanical Aids to Breathing and Resuscitation (3 hrs.)
5. Bleeding, Shock and Practice on Airway Care, Pulmonary Resuscitation and Cardiopulmonary Resuscitation (3 hrs.)
6. Practice, Test and Evaluation—Airway Care, Pulmonary Arrest, Cardiac Arrest, Bleeding and Shock (3 hrs.)
7. Wounds (3 hrs.)
8. Principles of Musculoskeletal Care and Fractures of the Upper Extremity (3 hrs.)
9. Fractures of the Pelvis, Hip and Lower Extremity (3 hrs.)
10. Injuries of the Head, Face, Neck and Spine (3 hrs.)
11. Injuries to the Eye, Chest, Abdomen and Genitalia (3 hrs.)
12. Practice, Test and Evaluation—Injuries I (3 hrs.)
13. Practice, Test and Evaluation—Injuries II (2½ hrs.)
14. Medical Emergencies I (3 hrs.)—ingested and inhaled poisons, bites and stings, heart attack, stroke, dyspnea
15. Medical Emergencies II (2½ hrs.)—diabetes, acute abdomen, communicable diseases, patients with abnormal behavior, alcohol and drug abuse, epilepsy
16. Emergency Childbirth (2½ hrs.)
17. Environmental Emergencies (2½ hrs.)—burns; exposure to heat, cold and water hazards
18. Lifting and Moving Patients (3 hrs.)
19. Field Exercise: Extrication from Automobiles (3 hrs.)
20. Practice, Test and Evaluation—Medical Emergencies, Emergency Childbirth, Environmental Emergencies, Lifting and Moving (3 hrs.)
21. Operations—Driving and Maintaining an Emergency Vehicle, Records and Reports, Communications, and Procedures at Emergency Departments (3 hrs.)
22. Responding to an Ambulance Call: A Review of Factors Affecting Ambulance Run Efficiency and Patient Assessment (2 hrs.)
23. Situational Review (3 hrs.)
24. Final Written Test (2 hrs.)
25. Final Practical Evaluation of Skills (3 hrs.)

Lesson 1

Introduction to Emergency Care Training—Course Scope, EMT Functions, Legal Considerations, Anatomy and Physiology, and Vital Signs

Introduction

The EMT typically represents the first component of the emergency medical care system. With proper training, he will be able to provide basic life support to victims of emergencies as well as minimize discomfort and further injury. This course has been designed to provide that training. This introductory lesson provides an overview of the EMT training course, EMT roles and responsibilities, legal problems relative to emergency care, anatomy and physiology and signs and symptoms.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Describe course scope and emphasis

Define the roles and responsibilities of the EMT

Describe personal attitudes and conduct expected of an EMT

Identify legal aspects of emergency care

Identify the major body systems and their general functions

Use the terminology of topographic anatomy

Describe the difference between a sign and a symptom

Identify the diagnostic signs and their normal states

Identify the medical identification symbol

Overview of Lesson Contents

Course Overview

The course emphasizes emergency medical care skills and attempts to teach these skills in a job-related context. The following **medical conditions** are included: inadequate airway, cardiac arrest, external and internal bleeding, shock, injuries to all body parts, fractures, dislocations, sprains, poisons, heart attack, stroke, diabetes, acute abdomen, communicable diseases, patients with abnormal behavior, alcohol and drug abuse, the unconscious state, emergency childbirth, burns (chemical, electrical, heat and radiation), emergencies caused by hot and cold environmental conditions and emergencies resulting from water hazards. In addition, the program includes training in the use of the following **equipment and materials:** suctioning devices, airways, bag-mask resuscitation devices, oxygen equipment and delivery systems, sphygmomanometer and stethoscope, splints of all types (including backboards), and bandages.

The first lesson introduces the student to the course and to the emergency medical technician's job. It is followed by lessons on basic life support (Lessons 2-6); injuries to various body parts (Lessons 7-13); and common medical emergencies, emergency childbirth, environmental emergencies, techniques of lifting and moving patients and field practice in "packaging" individuals with suspected spine and other injuries and removing them from vehicles (Lessons 14-20). Each of these three lesson blocks or modules has its own practice test and evaluation session. The operational aspects of the EMT's job are covered in Lesson 21. It is followed by two lessons that provide for an integration of operational and medical knowledge by a discussion of considerations involved in planning an emergency ambulance run, reviews of vital signs and patient examination, and triage (Lesson 22) and a review of field situa-

tions that could be encountered by an EMT (Lesson 23). The course concludes with a written test of knowledges (Lesson 24) and a practical evaluation of skills (Lesson 25). In the program, the student will find an early and continuing emphasis on patient assessment and reinforcement of the basic sequence of emergency care procedures.

EMT Roles and Responsibilities

EMT functions include the following:

Patient examination

Prompt and efficient patient care

Appropriate patient handling

Safe and efficient patient transport

Orderly patient transfer to emergency department

Communications

Reporting and record keeping

Vehicle driving, maintenance and care

If rescue crews are absent, gaining access to and disentangling the patient

If police are absent, controlling the accident scene.

The EMT is expected to carry out these responsibilities in a professional manner. He should be well groomed and properly attired and exhibit appropriate concern for the patient.

Legal Aspects of Emergency Care

The EMT need to keep up-to-date relative to legal requirements in the area in which he provides services. Specifically, he should be knowledgeable about his responsibilities relative to the following:

Duty to act or respond to the need for care

Standards of care, including:

Comparisons with other hypothetical persons of similar training and experience

Standards imposed by force of law

Professional or institutional standards

Consent

Actual consent

Implied consent

Minor's consent

Consent of the mentally ill

Right to refuse treatment

Immunities

Government immunities

Good Samaritan laws

EMT and paramedic statutes

Exemption from the Medical Practice Act

Effect of licensing and certification

Overview of Anatomy and Physiology

The major body systems and their functions are as follows:

The ***skeletal system*** consists of the bones that form the supporting framework of the body. They also protect body organs.

The ***muscular system*** consists of the tissue that contracts and relaxes to permit body movement or function.

The ***nervous system*** consists of the brain, spinal column and nerves that control and permit all body activities and sensations.

The ***respiratory system*** consists of the organs of the body which permit us to breathe. It provides for the intake of oxygen needed by the body to survive and the release of carbon dioxide and other substances.

The ***circulatory system*** consists of the heart (a pump) and a system of arteries which transport blood containing oxygen to all body systems, capillaries through whose thin walls oxygen and other products are exchanged with body cells, and veins which transport blood containing waste products from body cells to be eliminated.

The ***digestive system*** consists of the organs which permit us to eat, digest, and eliminate foods.

The ***genitourinary system*** consists of the organs which permit us to eliminate certain waste materials filtered from the blood and to reproduce.

Topographic Anatomy

The language of topographic anatomy permits accurate transmission of location information about the body. The terms are:

Right and left—the patient's right and left.

Surface:

Anterior—front

Posterior—rear

Midline—a vertical line dividing the body into right and left halves.

Proximal and distal:

Proximal—location on an extremity which is nearer to the trunk; location on the trunk which is nearer to the midline or to the point of reference named.

Distal—opposite of proximal.

Superior and inferior:

Superior—toward the head

Inferior—toward the feet

Diagnostic Signs

A **sign** is something the rescuer sees, hears or feels; for example, a pale face, no respirations, cold skin. A **symptom** is something the patient tells about himself, that is, he feels nauseous, his back hurts, he has no sensation in the extremities. The important diagnostic signs and their normal states are:

Pulse. The pulse is the pressure wave generated by the heartbeat and carried along the arteries. The normal pulse rate for adults is 60 to 80 beats per minute; a normal rate for children is 80 to 100 beats per minute.

Respirations. The normal respiratory rate can vary widely. It is usually between 12 and 20 breaths per minute.

Blood pressure. Blood pressure is the pressure that the circulating blood exerts against the walls of the arteries. It is measured in mm Hg at two levels: systolic or contraction of the heart, and diastolic or relaxation of the heart. In the male, normal systolic is about 100 plus the age of the

patient up to 140 to 150 mm Hg. Normal diastolic is 65 to 90 mm Hg. Both pressures are 8 to 10 mm Hg lower in females.

Temperature. Normal body temperature is 98.6°.

Skin color. Skin color for lightly pigmented people depends primarily on the presence of circulating blood in subcutaneous blood vessels. In deeply pigmented people, skin color depends primarily on the pigment.

Pupils of the eyes. The pupils of the eyes are normally equal in size and constrict when exposed to light.

State of consciousness. The normal person is alert, oriented and responds to vocal or physical stimuli.

Ability to move on command—an indicator of paralysis. The normal conscious person can move his body when requested to do so.

Reaction to pain—an indicator of paralysis. The normal person can feel someone touch his body.

People with special medical problems frequently wear a medical identification symbol on which the nature of the problem is identified. The EMT should always search for such symbols on unconscious or stuperous patients.

Study Suggestions

1. Describe what you expect to be able to do as a result of successfully completing the course.
2. There is a big gash in the patient's arm and it is bleeding severely. The patient refused treatment even though he appears weak and about to faint. Explain what you would do and why.
3. Identify the body system to which each of the following belongs and explain the function of each system: heart, stomach, uterus, lung, skull, biceps muscle, spinal cord.
4. Is a flushed face a sign or a symptom? Why?
5. Describe the position of the thumb relative to the wrist.
6. Describe the position of the heart relative to the stomach.
7. Describe the position of the chest relative to the back.
8. The accident victim has no visible wounds and says he is feeling all right. Describe the signs you would check and what you would expect to find if the patient's condition is normal.

Lesson Reference

The medical and legal contents of the lesson were based on information contained in the following reference:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 1, 2, 3, 4, 5, 7, 13, 15, 21, 25, and 28.

Lesson 2

Airway Obstruction and Respiratory Arrest

Introduction

All living cells of the body require oxygen to survive. For cells in the brain and nervous system, oxygen is particularly important; without oxygen, they may die in 4 to 6 minutes. It is the respiratory system that provides the means by which oxygen enters the body and carbon dioxide and other waste gases are removed. A non-breathing person or a person with breathing difficulties is a true emergency. Speedy recognition of the patient's problem and prompt and correct performance of the skills taught in this lesson may mean the difference between life and death to the patient.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Describe the importance of oxygen to the body, particularly the brain.

Identify components of the respiratory system and explain how the system works.

Describe the signs of adequate and inadequate breathing.

Describe airway care and resuscitation procedures for patients with and without spine injuries, for laryngectomees (neck breathers), and for infants and small children.

Demonstrate on a manikin the techniques for opening an airway obstructed by the tongue for patients with and without suspected spine injuries.

Demonstrate on a manikin use of blows to dislodge foreign objects from the airway for patients with and without suspected spine injuries.

Demonstrate on an upright and supine manikin the abdominal and chest thrust methods for dislodging foreign objects from the airway.

Demonstrate on an adult manikin the mouth-to-mouth and mouth-to-nose techniques of pulmonary resuscitation.

Demonstrate on an infant manikin the mouth/nose technique of pulmonary resuscitation.

Overview of Lesson Contents

Although the overview includes general lesson contents and certain specific facts, the emphasis is on sign and symptom recognition and emergency care procedures.

The Respiratory System

Each of the following system elements functions to permit the process of respiration:

Phatynx

Trachea

Epiglottis

Larynx

Bronchi

Lungs

Diaphragm and rib muscles

Pleura

The brain is the control center for breathing. It adjusts the rate and depth of inspiration depending on oxygen and carbon dioxide levels in the body.

Signs

Signs of adequate breathing are:

Chest and abdomen rise and fall as air is breathed in and out.

In most cases, air can be heard coming from the mouth.

Air can be felt coming from the nose and mouth.

Signs of inadequate breathing are:

No air can be felt or heard at nose and mouth, or the patient is struggling to breathe and muscles on the front of the neck stand out prominently.

The breathing is noisy or has a bubbling sound.

The breathing is slow.

The patient is cyanotic.

Opening the Airway

Techniques for maintaining an open airway are:

Head-tilt maneuver. By placing one hand on the patient's forehead and the other under his neck, the head is tilted back and the neck is extended.

Chin-lift head-tilt maneuver. The EMT lifts the lower jaw by the fingers of one hand and tilts the head back by pressing the forehead with the other hand.

Jaw-thrust maneuver. The EMT places his fingers behind the angles of the patient's lower jaw, forcefully brings the jaw forward, tilts the head backward and pulls the lower lip down with the thumbs.

Face-down position. Placing the patient on his side permits the tongue to fall forward and the airway to open.

For patients with suspected cervical spine injuries, the following technique is recommended:

Modified jaw-thrust maneuver. The EMT places his hands on either side of the patient's head (so that the neck is maintained in a fixed neutral position without being extended) and uses the index fingers to move the jaw forward.

Pulmonary Resuscitation

If breathing does not start spontaneously with an open airway, pulmonary resuscitation will be required. Attempts at resuscitation always should be started prior to attempting to remove foreign material from the airway. The rescuer can deliver oxygen from his own exhaled breath to the patient by the mouth-to-mouth or mouth-to-nose technique:

Mouth-to-mouth technique. Procedures are:

Open the airway—place one hand on the patient's forehead and one under the neck to hyperextend the neck.

Pinch the nose closed using thumb and index finger of hand exerting pressure on the forehead.

Open mouth widely, take a deep breath, make a tight seal around the patient's mouth, and blow air into the patient's mouth until the chest rises.

Remove the mouth to allow air to come out of the patient's airway.

To start, give four breaths in rapid succession without waiting for the lungs to deflate completely.

Ventilate the lungs 12 times per minute (once every 5 seconds).

Mouth-to-nose technique. It may be difficult or impossible to use the mouth-to-mouth technique for many reasons; for example, there may be a severe injury in the mouth region; the rescuer may not be able to make a tight seal because the patient has a large mouth, no teeth, etc. Procedures are:

Tilt the patient's head back with one hand on the forehead.

Use the other hand to lift the patient's lower jaw; this seals the lips.

Take a deep breath, seal the lips around the patient's nose and blow until chest rises.

Remove mouth and let patient exhale.

If necessary, open patient's mouth during exhalation.

Give four deep and quick breaths to start and then repeat cycle every 5 seconds as with the mouth-to-mouth technique.

Variations for infants and children. Procedures are:

Do not exaggerate the head tilt since forceful backward tilting may obstruct breathing passages.

Make a seal around **both** mouth **and** nose.

Use less volume to inflate the lungs.

Inflate lungs once every 3 seconds.

Variations with jaw thrust maneuver. Procedures are:

For mouth-to-mouth resuscitation, use the cheek to seal the nose—this is difficult and tiring to perform.

For mouth-to-nose resuscitation, use the cheek to seal the mouth and do not retract the lower lips with the thumbs.

Artificial ventilation frequently causes **distention** of the stomach. Slight distention should be ignored. If there is marked distention, moderate pressure should be exerted by one hand between the navel and the rib cage.

The Laryngectomee (Neck Breather)

Some persons have all or part of their larynx removed through surgery. Laryngectomees are rare; however, the rescuer should be aware that such individuals exist and how to care for them.

Airway care procedures for a laryngectomee are:

Remove all coverings (e.g., scarves, ties, necklaces) from the stoma area.

Clear the stoma of foreign matter.

Make a seal with the mouth over the stoma and blow until the chest rises.

If the chest does not rise, suspect a partial neck breather and seal the nose and mouth with one hand and repeat the process. To seal the nose and mouth, pinch off the nose between the third and fourth fingers, seal the lips with the palm of the hand, place the thumb under the chin and press upward and backward.

When the chest rises, remove the mouth from the stoma and permit the chest to fall.

Airway Obstruction

As indicated previously, the rescuer should **not** look for foreign bodies in the airway unless their presence is known or strongly suspected. Attempts to ventilate the lungs will reveal whether foreign bodies are present.

To remove **loose** material, the EMT should:

Turn the patient's head to one side.

Open the patient's mouth using the cross-finger technique. With the **cross-finger technique**, the patient's mouth is forced open by applying pressure with the thumb on the upper back molars and with the index finger on the lower back molars.

Clear the patient's mouth and throat with the fingers.

If a spinal injury is suspected, the patient's head and neck should be maintainted in a strict alignment with the body during the move.

If the patient is choking from a **lodged** foreign object, emergency care procedures include back blows and manual thrusts.

Back blows. The EMT should deliver sharp blows with the heel of the hand to the patient's spine between the shoulder blades.

Note: Infants and small children should be picked up and inverted over the EMT's arm. The EMT should deliver light blows between the shoulder blades.

Abdominal thrust

Standing or seated patient. Procedures are:

1) Stand behind the patient and wrap arms around his waist.
2) Grasp one fist with the other hand and place the fist, thumbside, against the patient's abdomen, slightly above the navel and below the rib cage.
3) Press the fist into the patient's abdomen with a quick upward thrust.

Note: The pressure should be diminished for a child.

Supine patient. To perform the technique on a supine patient:

1) Place one hand on the other.
2) Place the heel of the bottom hand on the abdomen as above.
3) Press into the abdomen with a sharp upward thrust.

Chest thrust (For obese patients or patients in advanced stages of pregnancy)

Standing or seated patient. Procedures are:

1) Stand behind the patient and wrap arms around the patient's lower chest.
2) Grasp one fist with the other hand and place the fist, thumbside, against the lower sternum above the xiphoid.
3) Press the fist into the patient's chest with a quick backward thrust.

Supine patient. To perform the technique on a supine patient:

1) Place one hand on either side of the lower chest with the heels of the hands in line with the armpits and the fingers wrapped around the side of the patient's chest.
2) Squeeze the chest with a quick downward thrust of the arms and inward thrust of the hands.

Procedures for combining back blows, manual thrusts and ventilation as appropriate are as follows:

Conscious adult (or witnessed)

Identify complete obstruction

Alternate back blows and manual thrusts until effective or patient loses consciousness

Patient becomes unconscious

Place patient supine

Open airway and attempt ventilation

If unsuccessful, give back blows, perform manual thrusts and check for foreign bodies

If unsuccessful, reposition head and attempt ventilation

Repeat last two steps as necessary

Patient found unconscious

Establish unresponsiveness—shake and shout

Open airway and attempt to ventilate

If unsuccessful, reposition head and attempt ventilation again

If unsuccessful, check for foreign bodies

If unsuccessful, give back blows, perform manual thrusts and check for foreign bodies

If unsuccessful, reposition head and attempt ventilation

Repeat last two steps as necessary

Study Suggestions

1. Describe how you would check a patient for signs of adequate breathing.
2. Describe how you would resuscitate a patient with a badly swollen tongue.
3. Describe what you might suspect if a patient's chest appears to be moving normally but no exhaled air can be felt at nose and mouth.
4. Practice the five techniques of opening the airway. Use a classmate or friend as a "patient."
5. Practice opening your own mouth using the cross-finger technique.
6. Practice correct positioning of your hands and body for performance of the abdominal and chest thrusts on a standing/seated and supine patient. Use a classmate or friend as a "patient." Do **not** perform the actual thrusts.
7. Practice the steps involved in dislodging a foreign object in the airway for conscious and unconscious patients. Use a classmate or friend as a "patient." Simulate procedures; **do not** perform actual maneuvers.

8. If an adult manikin is available, practice mouth-to-mouth and mouth-to-nose pulmonary resuscitation. If a manikin is not available, simulate performance of the skills on a classmate or friend as follows:

   Establish unresponsiveness

   Properly position your hands and fingers on the "patient."

   Open your mouth an appropriate amount and start the ventilation process by delivering **into the air** the proper number of breaths at the proper volume.

   Maintain ventilation at the proper rate and volume. Have the "patient" time your ventilations.

9. If an infant manikin is available, practice the steps involved in pulmonary resuscitation. If a manikin is not available, simulate performance of the skill on a doll or other small object. If no appropriate simulation object is available, practice opening your mouth to the appropriate size and delivering ventilations into the air at the proper rate and volume. Time your ventilations.

10. Practice sealing the nose and mouth of a partial neck breather. Use a classmate or friend as a "patient."

Lesson References

The medical content of the lesson was based on the following references:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 5 and 10.

Standards for cardiopulmonary resuscitation (CPR) and emergency cardiac care (ECC). **JAMA**, Vol. 227, No. 7 (Supplement), 18 February 1974.

For review and evaluation lessons, only a brief description of the lesson is provided in this document.

Thus, as indicated previously, this document has been prepared as a training aid for the student. Although it contains many specific facts, it is **not** a student text. Rather, it has been prepared to inform the student of lesson objectives, coverage and procedures and to assist him in acquiring the skills and knowledge required for competent on-the-job performance as an EMT. Thus, the student can use the document in conjunction with assigned reading as a means of preparing for each lesson. In addition, augmented by classroom notes and assigned reading, the study guide will assist the student in reviewing and reinforcing knowledge and skills learned in the classroom.

Lesson 3

Cardiac Arrest

Introduction

The circulatory system provides the means by which oxygen and other nutrients are distributed to body cells and carbon dioxide and other waste products are removed. As with the previous lesson, cardiac arrest represents a true emergency. Speedy recognition of the patient's problem and prompt and correct performance of the skills taught in the lesson may mean the difference between life and death to the patient.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Describe how the circulatory system and heart function to supply the body cells with oxygen.

Describe the signs of cardiac arrest.

Describe the technique of cardiopulmonary resuscitation and variations in technique for infants and small children.

Identify organs near the heart and dangers to the patient if cardiopulmonary resuscitation is not performed correctly.

Describe when CPR should not be initiated and when it should be terminated.

Demonstrate on a manikin cardiopulmonary resuscitation for a witnessed and unwitnessed arrest by a lone rescuer.

Demonstrate cardiopulmonary resuscitation on an infant manikin.

Demonstrate on a manikin cardiopulmonary resuscitation as a member of a team performing both as a ventilator and as a compressor, including changing positions during resuscitation and transporting the manikin on a stretcher while continuing CPR.

Overview of Lesson Contents

Although this overview includes general lesson contents and certain specific facts, the emphasis is on emergency care procedures.

The Circulatory System

Each of the following system elements serves to permit the process of circulation:

The heart

Arteries

Veins

Capillaries

The Heart as a Pump

The heart is a two-sided pump. The left side receives oxygenated blood from the lungs and pumps it out to all body parts through a system of arteries. The right side receives from the veins blood that is circulated through the body and pumps it to the lungs to be re-oxygenated. A system of one-way valves keeps blood moving in the proper direction.

Signs of Cardiac Arrest

The signs of cardiac arrest are:

The patient is not breathing.

The patient has no carotid pulse.

Cardiopulmonary Resuscitation

The heart is located in the chest cavity under the sternum. Pressure on the sternum will compress the heart and produce an artificial circulation. Cardiopulmonary resuscitation may be performed by one or two rescuers. Procedures vary for infants and small children and for witnessed arrests as follows:

General procedures. General procedures for adults are:

Place patient on a firm surface.

Adequately ventilate the lungs.

Locate the hands on the lower half of the sternum avoiding the xyphoid process (the lowest 1 to 1½ inches).

Place the heel of one hand on top of the other, with fingers raised.

Lean over the patient with elbows straight so that the weight of the body is assisting in compression of the sternum.

Compress the sternum about 1½ to 2 inches vertically downward.

Compress the sternum approximately 60 to 80 times per minute in a rhythmic fashion.

One-man technique. Procedures are:

Check for responsiveness—shake and shout.

Open airway; check for breathing.

Ventilate the lungs quickly 4 times.

Check pulse.

Perform 15 compressions of the sternum at the rate of 80 per minute.

Alternate 15 compressions with 2 quick and full ventilations.

Two-man technique. Procedures are:

Ventilator checks for responsiveness.

Ventilator opens airway; checks for breathing.

Ventilator checks pulse.

Ventilator ventilates the lungs quickly 4 times.

Second rescuer performs 5 compressions of the sternum at the rate of 60 per minute.

Ventilator imposes one breath after each 5 compressions.

Ventilator and compressor effect a smooth change in positions during resuscitation.

Variations for infants and children. Procedures are:

Provide additional support beneath the back.

For small children, use only the heel of one hand and compress the sternum ¾ to 1½ inches.

For infants, use only the tips of the index and middle fingers and compress the sternum ½ to ¾ inch.

Perform compressions at the rate of 80-100 per minute.

Exert pressure over the midsternum.

Witnessed cardiac arrest. If the rescuer witnesses a cardiac arrest, the heart may still be oxygenated and respond to a precordial thump. To deliver a precordial thump, the rescuer should:

Raise the fist 8 to 12 inches from the chest and deliver a sharp, quick **single** blow to the mid-sternum hitting with the bottom, fleshy portion of the fist.

Follow the thump by 4 quick ventilations.

If a pulse is not detected, initiate standard CPR techniques.

CPR should not be interrupted for more than 5 seconds unless it is necessary to move a patient up and down a stairway. Such interruptions should not exceed 15 seconds.

The following are signs that CPR efforts are successful:

A carotid pulse can be felt.

Pupils constrict when exposed to light.

Skin color improves.

There may be spontaneous gasping respirations.

There may be spontaneous movement of the patient's arms or legs.

The heart may resume normal beating.

If not performed correctly, CPR can result in:

Broken ribs

Broken sternum

Lacerations of the liver, spleen, lungs or heart

Damage to the pleura resulting from broken ribs

CPR is not indicated for a patient known to be in the terminal stages of an incurable condition. Once started, CPR should be terminated only when one of the following occurs:

The patient's heart resumes normal beating.

A physician or other properly trained person responsible for emergency medical services assumes responsibility for the patient.

The rescuer is exhausted and unable to continue.

Study Suggestions

1. Describe how you would check a patient for cardiac arrest.

2. Explain what you could do if you saw a rescuer attempt to perform CPR with his hands placed over the xyphoid process. Give the reasons for your actions.

3. You have started cardiopulmonary resuscitation and suddenly suspect that the patient has a broken rib on his right side near the sternum. Explain what you would do and why.

4. If an adult manikin is available, practice one-man cardiopulmonary resuscitation for a witnessed cardiac arrest. If a manikin is not available, **simulate** performance of the skill on a classmate or friend as follows:

Check for responsiveness.

Open airway, check breathing and pulse.

Find the spot on the sternum where you would deliver the precordial thump.

Position your hands and fingers on the "patient's" head and neck and start the ventilation process by delivering **into the air** the proper number of breaths at the proper volume.

Check the carotid pulse.

Position the hands on the sternum and **count aloud** the proper number of compressions at the correct rate.

Alternate "ventilations" and "compressions" at the correct rate. Time your "compressions."

To practice compressions, place a firm pillow, mattress or similar object on the floor and, with the elbows straight, simulate compressing the object at the proper rate.

5. If an adult manikin is available, practice the steps involved in two-man cardiopulmonary resuscitation with a classmate. If a manikin is not available, follow simulation procedures suggested in Item 4, above. Include changing positions during resuscitation.

6. If an infant manikin is available, practice the steps involved in cardiopulmonary resuscitation of an infant. If no manikin is available, use a doll or other small object. Deliver ventilations into the air at the proper rate and volume and compress the "sternum" at the proper rate.

Lesson References

The medical content of the lesson was based on the following references:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 7 and 10.

Standards for cardiopulmonary resuscitation (CPR) and emergency cardiac care (ECC). **JAMA,** Vol. 227, No. 7 (Supplement), 18 February 1974.

Lesson 4

Mechanical Aids to Breathing and Resuscitation

Introduction

A person can be given basic life support without the use of mechanical aids. In many cases, however, mechanical aids make airway care and ventilation easier and more effective. If oxygen is required, mechanical aids are a necessity. EMT's must be thoroughly knowledgeable about the design and use of the equipment available to them.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Describe the purpose, design requirements, aseptic procedures and use (on adults, children, infants and laryngectomees as appropriate), assemble as appropriate and demonstrate use on a manikin of the following equipment:

Oropharyngeal airways

Nasopharyngeal airways

Portable suction unit

Oxygen equipment

Oxygen delivery system—nasal cannula, facemask, mask and bag, and/or venturi mask

Resuscitator and oxygen delivery system—pocket mask with oxygen-inlet valve, bag-valve-mask resuscitator and demand valve resuscitator.

Demonstrate on a manikin one- and two-man CPR and simultaneous administration of oxygen using the following equipment:

Pocket mask with oxygen inlet valve

Bag-valve-mask resuscitator

Overview of Lesson Contents

Although the overview includes general lesson contents and certain specific facts, the emphasis is on equipment use.

Oropharyngeal Airways

Oropharyngeal airways can be used to maintain an open airway on deeply unconscious patients. Care is required in inserting the airway since it can force the tongue back into the pharynx and cause an obstruction. Procedures for inserting the airway are:

Open the patient's mouth using the cross-finger technique.

Insert the airway with the tip facing upward (toward the roof of the patient's mouth).

When halfway in, rotate it 180° and insert it until the flange rests on the lips or teeth (the curve of the airway follows the patient's tongue).

Nasopharyngeal Airways

A nasopharyngeal airway will not stimulate vomiting and may be used on a conscious patient who cannot maintain an open airway. Procedures for use are:

Lubricate the airway.

Insert it through a nostril until the flange rests against the nostril.

Suction Unit

A suction unit permits removal of blood and other liquid materials from the airway. Procedures for use are:

Inspect unit to insure that all parts are assembled.

Switch on suction, clamp tubing and assure that pressure dial registers over 300 mm Hg.

Attach flexible catheter or rigid tonsil sucker.

Open patient's mouth with the cross-finger technique.

Insert the catheter into the pharynx—length of insertion is distance from mouth to lobe of ear. Insert rigid tonsil sucker with convex side along the roof of the mouth until the pharynx is reached.

Apply suctioning only after catheter is in position—suctioning should not exceed 15 seconds.

Oxygen

Oxygen is usually supplied as a compressed gas in seamless steel cylinders. Pressure of a full oxygen cylinder will be 2000 to 2200 psi; it must be reduced to 40 to 70 psi before administration to a patient.

Operating procedures are:

Remove protective cap.

"Crack" the valve.

Attach regulator-flowmeter.

Attach humidifier.

Reduce the pressure.

Regulate the flow.

Connect administering apparatus.

Shut down the apparatus.

Equipment for Oxygen Delivery

Nasal cannula. If the flowmeter is set between 5 and 8 liters per minute, oxygen concentrations in inspired air can range from 35 to 50%.

Facemask. With flowrates of 6 to 10 liters per minute, oxygen concentrations of 35 to 60% can be obtained in inspired air.

Mask and bag. Gas inflow must be set at whatever level will prevent complete collapse of the bag. Oxygen concentrations in excess of 60% in inspired air can be obtained with this system.

Venturi masks. They are designed to deliver specific concentrations of inspired oxygen of either 24, 28, 35 or 40%.

Equipment for Ventilation and Oxygen Delivery

Pocket-mask with oxygen inlet valve (mouth-to-mask system). Five liters of oxygen per minute will provide the patient with approximately 50% oxygen; 15 liters per minute, with approximately 55% oxygen. Procedures for use are:

Stand behind patient's head and open airway with a backward tilt.

Apply mask to the face with the apex over the bridge of the nose and the base between the lips and chin.

Place thumbs on dome of mask and hold patient's mandible with remaining fingers.

Maintain an airtight seal with firm pressure between thumb and fingers.

Maintain an open airway by an upward and forward pull of fingers behind the jaw.

Breathe through open port in chimney.

Remove mouth and allow patient to exhale passively.

Bag-valve-mask resuscitator. This system permits delivery of high concentrations of oxygen and patient ventilation at the same time. It will deliver more than 90% oxygen. It should be used with an oropharyngeal airway in place. Procedures for use are:

Select correct mask size.

Inflate collar if necessary.

Open airway with cross-finger technique and insert oropharyngeal airway.

Apply mask over the patient's face with its apex over the bridge of the nose and its base between the lower lip and chin.

Hold the mask firmly in position by placing three fingers of one hand on the mandible between the angle and the lobe of the ear while the index finger is held over the lower portion of the mask and the thumb over the upper portion of the mask.

With the other hand, compress the bag in a rhythmical manner once every five seconds.

Demand valve resuscitator. This system can be used to assist or control ventilation. It can deliver 100% oxygen. Procedures for use are:

Preset pressure initially at 10 to 20 cm H_2O or 8 to 15 mm Hg. Increase as necessary during use.

Apply mask; assure an airtight fit.

Ventilate patient by periodically depressing valve button.

Monitor manual control at all times.

Study Suggestions

1. Simulate and describe aloud the steps involved in using each piece of equipment covered in the lesson.

2. Describe under what conditions (medical or otherwise) you would use each piece of equipment covered in the lesson.

Lesson References

The technical content of the lesson was based on the following references:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 10 and 11.

Standards for cardiopulmonary resuscitation (CPR) and emergency cardiac care (ECC). **JAMA,** Vol. 227, No. 7 (Supplement), 18 February 1974.

Lesson 5

Bleeding, Shock and Practice on Airway Care, Pulmonary Resuscitation and Cardiopulmonary Resuscitation

Introduction

This lesson covers two additional life-threatening emergencies—bleeding and shock. Proper emergency care for these conditions can mean the difference between life and death for the patient. The lesson also includes practice in performing a patient examination for life-threatening problems as well as practice in all skills thus far learned in the course in preparation for the upcoming practice, test and evaluation lesson (Lesson 6).

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Describe the design, functions and components of the circulatory system.

Describe the meaning and importance of blood pressure as as vital sign.

Describe the meaning of shock, signs of shock, and emergency care for shock.

Identify the types of shock and their causes.

Describe the differences between arterial, venous and capillary bleeding.

Identify and describe means of controlling external bleeding including nosebleeds.

Describe the signs, symptoms and emergency care for internal bleeding.

Perform an examination for life-threatening problems.

Take blood pressure measurements.

Apply a tourniquet.

Overview of Lesson Contents

Although this overview includes general lesson contents and certain specific facts, the emphasis is on sign and symptom recognition and emergency care procedures.

Mechanics of Circulation

As indicated in the previous lesson, each of the following system elements serves to permit the process of circulation:

The heart

Arteries

Veins

Capillaries

Blood travels through the circulatory system carrying oxygen to body tissues and removing waste products. The term perfusion means the circulation of blood within an organ.

Each time the heart pumps, a pulse can be felt throughout the arterial system. The pulse can be felt most easily where a large artery is close to the skin surface.

Blood Pressure

Blood pressure is the pressure that the blood exerts against the walls of the arteries as it passes through them. The pressure wave has high and low points, called systolic pressure and diastolic pressure.

Blood pressure is measured with a sphygmomanometer. Procedures are:

Fasten cuff of sphygmomanometer about either arm above the elbow and inflate with the rubber bulb until the mercury column or the needle of the dial stops moving with the pulse (usually between 150 and 200 mm Hg).

Place the stethoscope diaphragm or bell over the brachial artery.

Release air slowly from the bulb and observe the mercury column fall or aneroid dial return to zero.

Record as the systolic pressure the point on the gauge at which the sound of the pulse is first heard.

Record as the diastolic pressure the level on the gauge at which the sounds disappear.

Shock

Shock is a failure of the circulatory system to provide sufficient circulation to every body part. Perfusion of organ systems fails.

Types of shock are:

Hemorrhagic (hypovolemic) shock—blood loss

Respiratory shock—inadequate breathing

Neurogenic shock—loss of vascular control by the nervous system

Psychogenic shock—fainting

Cardiogenic shock—inadequate functioning of the heart

Septic shock—severe infection

Anaphylactic shock—acute allergic reaction

Metabolic shock—bodily loss of fluid

The signs and symptoms of shock are:

Restlessness and anxiety

Weak and rapid (thready) pulse

Cold and clammy skin

Profuse sweating

Pale or cyanotic face

Breathing shallow, labored, rapid, possibly irregular or gasping

Eyes dull or lusterless with dilated pupils

Marked thirst

Possible nausea or vomiting

Gradual and steady drop in blood pressure

Possible fainting in cases of rapidly developing transient shock

Anaphylactic shock has special signs and symptoms. They are:

The skin may burn, flush, itch or break out. The face and tongue may swell. Cyanosis may be visible around the lips.

Breathing is difficult. There is a tightness or pain in the chest and persistent coughing.

Blood pressure drops and the pulse becomes weak or imperceptible.

Faintness and coma may ensue.

Certain principles of initial treatment may be applied to all patients in shock:

Secure a clear airway and administer oxygen.

Control bleeding.

Elevate lower extremities if injuries to them do not make this inadvisable.

Splint fractures.

Avoid rough handling.

Prevent loss of body heat.

Keep the patient supine unless he is personally more comfortable in another position.

Record blood pressure, pulse and other vital signs at 5-minute intervals.

Do not feed the patient or give him anything to drink.

Note: The basic emergency care for shock is to care for the whole patient to **prevent** shock. Intravenous fluid administration is required for any type of shock in which there is an insufficient volume of fluid traveling in the circulatory system.

Note: The only effective treatment for anaphylactic shock is an injection to combat the agent causing the reaction.

External Bleeding

The types of external bleeding and their signs are:

Artery. Bleeding from an artery spurts and is bright red in color.

Vein. Bleeding from a vein is steady and is dark bluish-red in color.

Capillary. Blood oozes from a capillary and is similar in color to venous blood.

Techniques of controlling bleeding include:

Direct pressure

Provide pressure with the hand over the wound using a universal dressing or gauze pad.

Hold the dressing in place with a bandage.

Note: Elevation may help control bleeding of an extremity.

Pressure points. If pressure dressings are not available, pressure points may be used to control severe bleeding in the arm or leg:

Press the brachial artery against the bone to stop bleeding below the pressure point.

Press the femoral artery against the pelvis to stop bleeding in the leg.

Splints. When a fracture is present, much damage is caused to tissues by broken bones. Splinting may allow prompt control of bleeding associated with the injury.

Pressure pants and splints. Pressure splints and pants can aid markedly in controlling severe hemorrhage when massive lacerations of muscle and tissue and multiple fractures have occured.

Tourniquet. A tourniquet is used **only** in a severe emergency when other means will not stop bleeding in an extremity. If a tourniquet **must** be used:

Use a bandage 3 to 4 inches wide and 6 to 8 layers deep.

Wrap it around the extremity twice and tie a half knot.

Place a stick on top of the knot and complete tieing a square knot.

Twist the stick until the bleeding stops, and tie it in position.

Mark TK on the patient's forehead and notify all emergency personnel who take charge of the patient that a tourniquet has been applied.

Nosebleeds can be serious enough to cause shock from blood loss. Emergency care procedures are:

Pinch the nostrils or place a bandage between the upper lip and the gum and press.

Keep patient in sitting position.

Keep patient quiet.

If available, apply ice over the nose.

Caution: Bleeding from the nose or ears may mean there is a skull fracture. This type of bleeding should not be stopped.

Internal Bleeding

The signs of internal bleeding are similar to those of shock. In addition, the patient may cough up or vomit bright red blood, vomit dark blood (the color of coffee grounds), pass dark stools, pass bright red blood, or have a tender abdomen that enlarges.

The patient suffering from severe internal bleeding is a serious case and the rescuer can do very little for him at the accident scene. If bleeding is suspected in an extremity, it may be controlled by a pressure dressing or by application of a splint. Fast transportation to a hospital is a must. If available, oxygen should be administered.

Checking for Life-Threatening Problems

At the emergency scene, the EMT must perform a patient examination. It is performed in two stages: checking for and controlling life-threatening problems (the primary survey) and checking for and stabilizing illnesses/injuries not threatening to life. If there are multiple casualties, the primary survey will be conducted on each patient first; the EMT will stop only to administer to those with life-threatening problems.

The procedures for conducting a life-threatening survey are performed simultaneously not sequentially. He does all of the following essentially at the same time:

Check state of consciousness

Establish responsiveness

Check pupils

Check respiration

Observe chest and feel for exhaled air at mouth and nose

Assess rate, quality, quantity

Don't forget the special case of the laryngectomee

Check pulse

Establish existence

Assess rate and quality

Check for bleeding /shock

Observe for life-threatening external bleeding

Observe for signs of internal bleeding and shock

The EMT should remember to check for medical identification symbols.

Study Suggestions

1. Simulate and describe aloud the steps involved in taking blood pressure. If a sphygmomanometer and stethoscope are available, take as many blood pressure measurements on your friends as you can.

2. Practice taking the pulse at the carotid, radial and femoral arteries. Practice on yourself and as many friends as you can.

3. Review the types of shock and the causes and results of each.

4. The patient's upper leg is crushed and blood is spurting from the femoral artery. Describe what you might do for the patient and why.

5. The patient has sustained a severe blow to the head. He is barely conscious and is bleeding from the nose and ears. Describe how you would care for this patient and why.

6. The patient has several external bruises, has vomited dark red blood and appears to be going into shock. Describe what might be wrong with the patient and what you might do for him.

7. Perform as many examinations for life-threatening problems as you can. Use classmates or friends as "patients." As you perform the examinations, explain aloud what you are doing and implications of what you find. Simulate any actions you would take.

Lesson Reference

The medical content of the lesson was based on the following reference:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 4, 7, 8, and 9.

Lesson 6

Practice, Test and Evaluation— Airway Care, Pulmonary Arrest, Cardiac Arrest Bleeding and Shock

This lesson provides for interim evaluation of student knowledge and skills. Each student completes a written examination designed to evaluate attainment of knowledge objectives specified for Lessons 1 through 5. Each student practices the skills taught in Lessons 1 through 5 until he feels prepared to be evaluated on each skill. He then performs each skill for an instructor and is evaluated on his performance.

Lesson 7

Wounds

Introduction

Soft-tissue injuries will be frequently observed in accident situations. Proper care of wounds can control bleeding, prevent infection, prevent shock and aid in patient comfort and well-being. This lesson covers emergency care for wounds and includes practice in dressing and bandaging selected body parts. It also includes a review of results of the written and practical examinations administered in the previous lesson.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Describe the design and functions of the skin including the epidermis, dermis and subcutaneous tissue

Identify the various wound types and describe their signs and significance

Describe emergency care appropriate to each wound type

Dress and bandage open wounds of the following body parts:

Top of head, forehead, scalp, ear, cheek, jaw

Neck

Arm, including shoulder, elbow and hand

Leg, including hip, knee and foot

Overview of Lesson Contents

Although the overview includes general lesson contents and certain specific facts, the emphasis is on emergency care procedures.

The Skin

The skin protects the body from bacteria and regulates body temperature. It has two major layers: epidermis and dermis. Beneath the skin is a layer of tissue composed largely of fat.

Closed Soft-Tissue Injuries

Closed soft-tissue injuries may be minor or severe. A contusion develops in the damaged tissue. A hematoma may form. For severe injuries, control bleeding by pressure. If bleeding is associated with a fracture, splinting is required.

Open Soft-Tissue Injuries

Open soft-tissue injuries include abrasions, lacerations, avulsions and puncture wounds. Emergency care procedures are:

Control bleeding

Prevent further contamination

Immobilize the part

Keep patient quiet

Preserve avulsed parts

Do not remove impaled objects

Dressing and Bandaging

A dressing is used to stop bleeding, prevent further damage to the wound, and prevent further contamination. It is held in place by a bandage. Procedures for applying a dressing and bandage are:

- Cover wound with sterile dressing handled in aseptic manner
- Apply hand pressure over wound until bleeding stops
- Apply firm roller bandage
- Check for bleeding and circulation
- Apply additional dressings and bandages as necessary
- Assure that there are no loose ends that could get caught in other objects as patient is moved

Study Suggestions

1. Practice dressing and bandaging each of the body parts covered in this lesson. Use a classmate or friend as a "patient."
2. Tape a small stick to your leg and practice bandaging an impaled object.
3. Two of the patient's fingers have been severed—one is severed completely and one is hanging by a flap of skin. Describe how you would care for the patient.
4. The patient has suffered a severe blow to the arm and a large lump has developed. What has happened? How would you care for this patient?
5. You have dressed and bandaged a severe open wound of the leg. You suddenly notice that the bandage is soaked with blood. What would you do and why?
6. You are about to move an unconscious patient whose arm has been bandaged. The hand is white. What would you do and why?
7. Review the types of open wounds and be prepared to identify each from an illustration or simulation. Be prepared to describe or demonstrate how you would care for each wound type.

Lesson Reference

The medical content of the lesson was based on the following reference:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 12, 14 and 17.

Lesson 8

Principles of Musculoskeletal Care and Fractures of the Upper Extremity

Introduction

Various types of fractures will be encountered in accident situations. Proper care of the fracture patient will improve his recovery time by preventing or minimizing the following complications: damage to muscles, nerves, blood vessels or skin tissue; restriction of blood flow; excessive bleeding; pain; and even paralysis. This lesson covers general concepts of fractures and dislocations and includes practice in immobilizing fractures of the upper extremity.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Describe the design and functions of the skeletal system

Name all bones in the upper extremity

Identify muscle types and give examples of each

Identify and describe the types of fractures

Define fractures, dislocations and sprains and identify their signs and symptoms

Describe procedures for examining patients for extremity fractures

Describe reasons for splinting fractures

Identify general splinting rules

Describe causes, signs and techniques of care for fractures of the upper extremity

Immobilize fractures and dislocations of the upper extremity

Overview of Lesson Contents

Although the overview includes general lesson contents and certain specific facts, the emphasis is on sign and symptom recognition and emergency care procedures.

The Muscular System

Muscle is a special form of tissue that contracts or shortens when stimulated. There are three major types of muscle:

Voluntary

Involuntary

Cardiac

The Skeletal System

The skeletal system gives form to the body and permits an erect posture. It protects body organs. In addition, muscles attached to the skeleton permit body motion. The skeleton normally has 206 bones and consists of the following parts:

Skull

Spinal column

Thorax

Upper extremity

Pelvis and lower extremity

Fractures

Fractures are breaks in a bone. They may be open or closed. They are also classified by appearance as follows:

Greenstick

Traverse

Oblique

Spiral

Comminuted

Impacted

Signs of a fracture are:

Deformity

Tenderness

Grating sound upon movement

Swelling and discoloration

Loss of use or painful use of body part

Exposed fragments

Dislocations

Dislocations are displacements of bone ends that form joints. Signs are similar to those of fractures, the most important being:

Deformity of the joint

Pain or swelling

Loss of movement

A joint locked in a deformed position

Sprains

A sprain is a partial tear or stretching of a ligament. Signs are similar to those for fractures and dislocations except there are never protruding bone fragments or deformities at joints.

Examining the Patient

Procedures for examining a patient for fractures, dislocations and sprains are:

Observe for a deformity or open wound

Have the patient try to move each extremity

Question and check the patient regarding tenderness or pain

Palpate extremities

For unconscious patients, feel carefully for deformities

As indicated in Lesson 5, a patient examination is performed in two stages: a primary survey for life-threatening problems and a secondary survey for illnesses/injuries not threatening to life. The preceding procedures are **only** for examining patients for extremity fractures. A complete survey for injuries requires head-to-toe examination as outlined below.

The EMT must always start his examination by establishing rapport with conscious patients. He should identify himself and obtain and use the patient's name. He should explain all intended movements and procedures and constantly reassure the patient. Procedures for the head-to-toe examination are as follows:

Head

Check for confusion, unresponsiveness, unconsciousness

Check pupils for dilation, constriction, variation in size

Check for black eyes

Observe for lacerations and contusions about the face and scalp

Feel gently for depressions in the skull

Check ears and nose for drainage.

Check mouth for bleeding and loose objects

Neck

Observe for cuts, bruises, deformities

Feel for areas of tenderness, deformities

Upper extremities

Check for cuts, bruises, pain, deformities, unusual positions

Check for sensation

Ask patient if he can move arms

Chest

Check for bruises, pain, deformities

Check that both sides of the chest expand normally upon inspiration

Back and buttocks

Check for cuts, bruises, pain, deformities

Abdomen and pelvis

Check abdomen for tenderness, rigidity

Compress pelvis **gently**

Lower extremities

Check for cuts, bruises, pain, deformities, unusual positions

Check for sensation

Ask patient if he can move his legs

Medical alert symbols

Check for tags, bracelets, etc.

The student is advised that he does not know the implication of all signs for all injuries at this point in the course since many of them will be covered in subsequent lessons. However, it is important that he know the general procedures for performing a head-to-toe examination early in his emergency care studies. By early and constant practice, he will develop proficiency in patient examination and assessment.

Purpose of and Rules for Splinting

Splinting prevents motion of bone fragments or dislocated joints. It therefore prevents or minimizes pain and complications such as damage to body tissue, restriction of blood flow, excessive bleeding and possible paralysis. General rules for splinting are:

Remove or cut away clothing

Cover all wounds with a sterile dressing

Do not replace protruding bones

Note and record circulation and neurological status distal to the injury

Straighten deformities near joints with gentle steady traction unless pain is significant or resistance to correction is encountered

Straighten an angulated fracture before splinting—use gentle traction

Correct neck and spine deformities only if necessary to maintain an open airway

Pad each splint carefully to prevent pressure and discomfort to the patient

Immobilize the joint above and below the fracture or dislocation

Splint the patient **before** moving him

When in doubt, splint

Splinting the Upper Extremity

Procedures for immobilizing fractures and dislocations of various parts of the upper extremity are:

Fractures of the clavicle—apply a sling

Fracture of the scapula—apply a sling

Dislocations of the acromioclavicular joint—apply a sling

Anterior dislocations of the shoulder joint—place a pillow or rolled blanket between area and chest, apply sling and swathe

Fractures of the humerus

Proximal end—apply sling and swathe or bind arm to trunk

Shaft—apply sling and swathe

Distal end—apply sling and swathe or long-arm padded splint; check circulation

Dislocations of the elbow joint—apply sling and swathe or long-arm padded splint; check circulation

Fractures of the proximal ulna and radius—apply air splint, folded pillow, long-arm padded splint, or sling and swathe

Fractures of the forearm—apply air splint or long-arm padded splint; apply sling

Fractures of the wrist—apply padded board splint or air splint; apply sling

Dislocations of the wrist—straighten gently; apply air splint or long-arm padded splint; apply sling

Fractures and dislocations of the hand and fingers—splint in position of function—place roll of gauze in palm; apply air or padded splint

Study Suggestions

1. Practice immobilizing the following fractures and dislocations. Use a classmate or friend as a "patient." Where rigid splints are required, improvise if you do not have splints available. Be sure to pad all splints adequately.

   Fracture of the clavicle

   Fracture of the humerus

   Fracture of the elbow

   Fracture of the forearm

   Dislocation of the shoulder

   Fracture of the hand

2. Practice performing an examination for fractures, dislocations and sprains. Use a classmate or friend as a "patient." As you perform the examination, describe aloud what you are doing and why.

3. Review the types of fractures and be prepared to identify each from an illustration or simulation.

Lesson Reference

The medical content of the lesson was based on the following reference:

American Academy of Orthopaedic Surgeons. **(Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 4, 13, 15, 16, 17 and 18.

Lesson 9

Fractures of the Pelvis, Hip and Lower Extremity

Introduction

Fractures of the femur can result in severe blood loss. Fractures of the pelvis can result in injuries to internal organs with resultant blood loss and shock. Proper care of all fracture patients will improve their recovery time and minimize additional damage to injured tissues.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Name the bones in the lower extremity

Identify causes, signs, dangers and emergency care for:

Fractures of the pelvis

Anterior and posterior dislocations of the hip

Fractures of the hip

Fractures of the shaft of the femur

Sprains, dislocations and fractures of the knee

Dislocations of the patella

Fractures of the tibia or fibula shaft

Injuries about the ankle

Fractures of the foot

Immobilize fractures and dislocations of the hip and lower extremity

Practice performing an examination for injuries

Overview of Lesson Contents

Although the overview includes general lesson contents and certain specific facts, the emphasis is on sign and symptom recognition and emergency care procedures.

Fractures of the Pelvis

When the pelvis is fractured, the patient complains of pain. Pain is felt when the sides of the pelvis are compressed. The patient should be transported on a long spineboard.

Dislocations of the Hip

Dislocations may be anterior or posterior as follows:

Anterior dislocation. The thigh is stretched out from the side of the body, lies flat and is externally rotated away from the body.

Posterior dislocation. The knee is typically drawn up and the thigh is rotated inward toward the body. The patient may be unable to raise his toes or his foot if the sciatic nerve has been damaged.

Emergency care procedures are:

Support the limb by pillows or rolled blankets and long straps

Transport the patient on a rigid stretcher

Fractures of the Hip

The patient will usually lie with the foot turned outward. The leg may appear to be shortened. Application of a traction splint is best. Adequate immobilization can be obtained by placing pillows or folded blankets between the legs and tying the legs together.

Fractures of the Shaft of the Femur

There is a marked deformity. The leg below the fracture will be severely angulated or rotated. Fractures are often open. The leg should be gently straightened and immobilized with a traction splint.

Injuries About the Knee

For ***sprains,*** the leg may be bent at an awkward angle away from the knee joint. The leg should be gently straightened and a long-leg rigid splint or air splint applied.

For ***dislocations,*** deformity is grotesque. Circulation in the foot may be impaired. The deformity should be gently straightened and the leg immobilized with a traction splint (no traction), a rigid long-leg splint, an air splint, or pillow or blanket splint. A deformity should not be straightened if it causes increased pain to the patient.

For ***fractures,*** there is usually much pain and swelling and there may be significant deformity. Circulation in the foot may be impaired. The deformity should be gently straightened, and a splint applied as for dislocations.

For a ***dislocation of the patella,*** the knee is usually flexed. The leg should be gently straightened and immobilized in a long-leg splint or air splint.

Fractures of the Tibia or Fibula Shaft

The leg may be severely deformed. Fractures of the tibia are frequently open. Circulation in the foot may be impaired. The deformity should be gently straightened. A traction splint, long-leg rigid splint or air splint may be applied.

Injuries About the Ankle

There may be severe deformity. It will probably not be possible to differentiate between a dislocation and a fracture. Deformities should be gently straightened. A long- or short-leg rigid splint, air splint or pillow splint should be applied.

Fractures of the Foot (Tarsals, Metatarsals, Phalanges)

There is usually pain and swelling. A spine injury should be suspected if heel pain is associated with back pain. The foot should be immobilized in a rigid short-leg splint, air splint or pillow splint.

Study Suggestions

1. Working with a classmate, or alone, as appropriate, practice immobilizing the following fractures and dislocations. Use a classmate or friend as a "patient." When rigid splints are required, improvise if you do not have splints available. Be sure to pad all splints adequately.

   Fracture of the hip

   Fracture of the femur

   Dislocation of the knee

   Fracture of the tibia

   Fracture of the ankle

2. Review the signs of fractures and dislocations of the pelvis, hip and lower extremity, and be prepared to identify each from an illustration or simulation.

3. Following the procedures outlined in Lesson 8, perform as many complete examinations for injuries as you can. Use classmates or friends as "patients." Remember to establish rapport with your "patients" and explain your intended movements and procedures.

Lesson Reference

The medical content of the lesson was based on the following reference:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 4, 17 and 19.

Lesson 10

Injuries of the Head, Face, Neck and Spine

Introduction

Head injuries can result in brain damage, spine injuries in paralysis, and face and neck injuries in severe airway difficulties. It is especially important that the rescuer be knowledgeable about the signs, seriousness and management of these patients. The lesson includes student practice in immobilizing patients with suspected spine injuries or both short and long backboards.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Describe the design and function of the nervous system

Describe the main danger associated with fractures of the spine and complications that can result from spine injuries

Describe how to examine a patient for spine injuries

Describe what cerebrospinal fluid is and why no attempt should be made to stop bleeding from the nose or ears when a skull fracture is suspected.

Describe the signs of a skull fracture and of brain injuries

Describe management of patients with skull fractures and with brain injuries

Describe procedures for continuous monitoring and evaluation of the unconscious patient and implications of data obtained

Describe means for managing injuries to the face and neck

Practice immobilizing patients with suspected spine injuries on short and long backboards.

Overview of Lesson Contents

Although the overview includes general lesson contents and certain specific facts, the emphasis is on sign and symptom recognition and emergency care procedures.

The Nervous System

The nervous system consists of the brain, spinal cord and nerves. The brain is the controlling organ of the body and the center of consciousness. Nerves are motor or sensory. Some activities of the nervous system are automatic, some are reflex, and some are performed only after thinking and conscious decision by the brain.

Injuries to the Spine

The following signs and symptoms may be indicative of spinal cord injury:

Pain

Tenderness

Painful movement

Deformity—a rare sign

Cuts and bruises on the head, face, shoulders, back or abdomen

Paralysis or lack of sensation in a body part

To check a **conscious** patient for spinal cord injury, the following procedures should be used:

Ask what happened, where does it hurt, can you move your hands and feet, can you feel me touching your hands (feet)?

Look for bruises, cuts, deformities

Feel for areas of tenderness, deformities

Have patient move if he can do so comfortably. Never try to move the injured area for the patient

For an **unconscious** patient, procedures are:

Look for cuts, bruises, deformities

Feel for deformities

Ask others what happened

Observe breathing for paralyzed chest muscles

Starting with the feet, prick patient lightly with pin and observe face for a grimace

Observe positioning of arms

Check blood pressure, it may be below 100 systolic without other signs of hypovolemic shock

Observe male for possible penile erection

Emergency care procedures include:

Immobilize the patient before moving him. Use a cervical collar and spine board or special stretcher.

Splint the neck or back in the original position of deformity unless there is a compelling reason to change the patient's position

Remove helmets unless it is difficult to do so, there is increased pain, or the patient is unconscious

Procedures for immobilizing a patient on a short backboard are:

Support patient's head

Apply cervical collar

Position short backboard behind patient and pad the board as appropriate

Attach straps to patient's forehead, chin and thighs

Procedures for immobilizing a supine patient on a long backboard are:

Support patient's head

Apply cervical collar

Straddle patient and lift shoulders slightly (board positioned at patient's head)

Shove board beneath patient

Pad board as appropriate and secure straps

Injuries to the Skull and Brain

Skull fractures may be open or closed; the skull may be penetrated by foreign objects. Signs of a skull fracture include:

Deformity of the skull

Blood or clear fluid (cerebrospinal fluid) draining from ears or nose

Black eyes

A ***concussion*** is a temporary loss of function for some or all of the brain. Signs are:

Patient may be confused or staggering or become totally unconscious

A ***concussion*** is a temporary loss of function for some or all of the brain. Signs are:

Patient may be confused or staggering or become totally unconscious and unable to breathe for a short period of time

Patient has some loss of memory for events surrounding the accident

A ***contusion*** implies that bleeding from injured blood vessels has occured. Signs are:

Patient may lose consciousness

Paralysis may be present on one side of body or of all four limbs

One pupil may dilate

Vital signs may progressively deteriorate

Cerebral ***hematomas*** are blood clots which cause pressure on brain tissues. Signs are the same as those for contusions.

Emergency care procedures for patients with suspected head injuries are:

Correct life-threatening problems—maintain respiration and circulation

Check for cervical or other spine injury

Control bleeding—not drainage

Dress and bandage open wounds—minimize pressure

Position according to associated injuries:

Head elevated if possible (no pillows)—be prepared for vomiting

On the side with head down if there is bleeding or mucus so that it can drain

Protect patient from hurting himself if he convulses

Baseline data and constant evaluation of vital signs should be recorded on a neural watch chart to aid hospital personnel in determining whether an operation is required.

Injuries to the Face and Neck

The ***face and scalp*** are richly supplied with arteries and veins and wounds of these areas bleed heavily. Control bleeding by direct pressure. For cheek wounds, it may be necessary to hold a gauze pad inside the cheek as well as outside. Special considerations are:

Suspect brain or neck injuries for any wounds of the head

Check the mouth for loose objects that might impair the airway

Check for bleeding into the mouth or throat that might impair the airway

Cover exposed nerves, tendons, or blood vessels with a moist bandage

The main danger of ***facial fractures*** lies in airway problems. Bone fragments and blood may obstruct the airway. Emergency care is the same as for soft tissue injuries, that is, maintain the airway, control bleeding, and dress and bandage open wounds.

For ***neck wounds,*** arterial bleeding should be controlled by direct pressure. If a large vein is torn, apply pressure above

and below the point of bleeding to prevent air from entering the circulatory system. A neck fracture should be suspected.

Signs of a ***laryngeal and tracheal injury*** are:

Loss of voice

Severe airway obstruction—possibly fatal

Crackling sensation due to air leakage in soft tissue of the neck

The patient should be kept calm and breathing slowly. Oxygen should be administered.

Study Suggestions

1. Practice immobilizing the neck with a cervical collar or blanket. Use a classmate or friend as a "patient."
2. Practice examining a conscious patient for spine injury. Use a classmate or friend as a "patient."
3. Describe how you would examine an unconscious patient for spine injury.
4. As unconscious patient is slumped over the steering wheel. He has multiple bruises about the face and blood is draining from his nose. Discuss what might be wrong with the patient, how you would examine him, and how you would care for him.
5. The unconscious motorcycle rider is lying on his back in the road. You have examined him, and in addition to a closed fracture of the fibula, he appears to have a cervical fracture. Describe how you would care for the patient.
6. In examining an unconscious victim with severe facial injuries, you note that the pupil of one eye is dilated. What might you suspect?
7. The unconscious patient has a fractured jaw. What would you check for and why?
8. Complete a neural watch chart on a simulated patient. Be prepared to discuss your patient and what the findings on the chart suggest.
9. The patient has multiple bruises about the face and neck, is having severe breathing difficulties and is unable to speak. What might you suspect is wrong with the patient and what would you do to care for him?

Lesson Reference

The contents of the lesson were based on the following references:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 20, 21, 22, 24 and 47.

Patient handling manual. Prepared by Dunlap and Associates, Inc., for the U. S. Department of Transportation (DOT HS 800 504), January 1972. Available from U. S. Government Printing Office, Washington, D. C. Chapter 7.

Lesson 11

Injuries to the Eye, Chest, Abdomen and Genitalia

Introduction

Injuries to the eye can result in loss of sight. Injuries to the chest and abdomen can be life-threatening if internal organs are injured. Recognizing the potential seriousness of these injuries and providing appropriate care can make the patient more comfortable, minimize the extent of damage, and possibly save his life. In addition to knowledge on causes, signs, dangers and techniques of care for injuries to these body parts, the lesson includes practice in dressing and bandaging eye and chest wounds as well as practice in performing a complete patient examination.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Describe the parts, design and function of the eye, thorax, digestive system, and genitourinary system

Describe dangers and techniques of care for foreign bodies in the eye, burns of the eye, eye lacerations and contusions, extruded eyeballs, and blunt trauma to the eye

Describe causes, signs, dangers, and techniques of care for:

Rib fractures
Flail chest
Pneumothorax
Spontaneous pneumothorax
Tension pneumothorax
Hemothorax
Sucking chest wounds
Subcutaneous emphysema
Traumatic asphyxia
Pericardial tamponade
Lacerations of great vascular vessels
Traumatic emphysema

Describe types, causes, signs, dangers and techniques of care for injuries to the abdomen and genitalia

Demonstrate proficiency in dressing and bandaging a lacerated eye with protruding object and a sucking chest wound with multiple rib fractures

Demonstrate proficiency in performing a complete patient examination for life-threatening problems and injuries

Overview of Lesson Contents

Although the overview includes general lesson contents and certain specific facts, the emphasis is on sign and symptom recognition and emergency care procedures.

The Eye

The following parts of the eye function to permit sight and to protect the eye:

Vitreous humor
Iris
Pupil
Cornea
Sclera
Conjunctiva
Eyelids
Tear glands

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Procedures for caring for various types of eye injuries are:

Small foreign bodies—remove the object with a cotton-topped applicator; do not remove objects on the cornea

Impaled objects—do not remove impaled objects; cover eye with an eye shield; bandage both eyes

Chemical burns—flush eye copiously with water before bandaging

Heat and light burns—cover eye with a sterile moist dressing

Lacerations and contusions—apply pressure but not to the eyeball itself

Extruded eyeball—cover eye with a moist dressing; do not replace eyeball

Blunt trauma—cover eye

The Chest

The rib cage includes the ribs, thoracic vertebrae, and sternum. General signs of a chest injury are:

Pain at the site of injury

Pain with breathing

Dyspnea

Failure of one or both sides of chest to expand normally with inspiration

Coughing up blood

Rapid weak pulse and low blood pressure

Cyanosis

The types of chest injuries, their signs and techniques of care are:

Rib fractures. Common finding is localized pain. Simple fractures should not be bound, strapped or taped. With multiple fractures, the patient may be more comfortable with the arm strapped to the chest with a swathe..

Flail chest. When each of three or more ribs is broken in two places, the resultant portion will not move with the rest of the rib cage when the patient attempts to breaths. Immobilizing the ribs may improve respirations. The EMT should be prepared to use resuscitative measures.

Penetrating wounds. These consist of open chest wounds in which the chest wall is torn—typically by a foreign object. The wound must be closed quickly since it can result in air outside the lung in the chest cavity.

Compression injuries. Compression can increase intra-thoracic pressure, cause rib fractures, a flail chest, and traumatic asphyxia.

Injuries to the back of the chest. Major concern is spine injury. Other than fractures, they are usually muscle strains and lacerations.

Chest injuries may result in the following conditions:

Pneumothorax—air enters the chest cavity through a sucking wound or leaks from a lacerated lung and the lung collapses.

Spontaneous pneumothorax—air leaks into the chest from a congenitally weak area in the lung surface and the lung collapses. This condition is not usually the result of injury.

Tension pneumothorax—air continuously leaks out and the

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lung collapses completely. Pressure rises and the collapsed lung is forced against the heart and other lung. The tension must be relieved by a hypodermic needle. Release of a bandage on a chest wound may be effective.

Hemothorax—blood leaks into the chest cavity from lacerated vessels or the lung itself and the lung compresses.

Sucking chest wounds—air enters the chest cavity through an open wound. The wound must be closed immediately with an airtight dressing.

Subcutaneous emphysema—a fractured rib has lacerated a lung.

Traumatic asphyxia—severe compression puts pressure on heart and forces blood back into veins of the neck.

Pericardial tamponade—blood or other fluid in the pericardial sac outside the heart exerts pressure on the heart.

Lacerations of the great vessels—a major blood vessel is torn.

Traumatic emphysema—a sudden compression injury occurs when the glottis is closed; air sacs are ruptured and leak air.

The Abdomen and Genitalia

The abdominal cavity contains the organs of digestion, excretion and female reproduction. The digestive system is composed of the following parts:

Mouth
Salivary glands
Pharynx
Esophagus
Stomach
Pancreas
Liver
Gallbladder and bile ducts
Small intestine
Large intestine
Appendix
Rectum and anus
Spleen

The urinary system consists of the following:

Kidneys
Ureter
Urinary bladder and urethra

The male reproductive system organs are:

Testicles
Vasa deferentia
Seminal vesicles
Prostate gland
Urethra
Penis

The reproductive system organs for the female are:

Ovaries

Fallopian tubes

Uterus

Vagina

Injuries to the abdomen may be open or closed and may result in injuries to hollow and solid organs. Signs of abdominal injuries are:

Patient will be still, usually with legs drawn up

Breathing will be rapid and shallow

Skin wounds and penetrations may be evident

Pulse may be rapid and blood pressure low

Patient may be nauseated and may vomit

Organs may protrude

Fractures may be evident

There may be blood in the urine

Emergency care procedures for abdominal injuries are:

Suspect shock and work to prevent it

Constantly monitor and evaluate vital signs

Be alert for vomitus

Do not remove penetrating objects

Do not touch protruding organs. Cover them with a sterile dressing and keep the dressing moist

Injuries to the male genitalia may be bruises, lacerations, penetrating objects and avulsions. Emergency care rules are essentially the same as those for all other bodily injuries, that is:

Control bleeding by direct pressure

Cover with moist compresses

Do not remove penetrating objects

Preserve avulsed parts

Internal female genitalia are rarely injured except in the pregnant female. Blunt injuries may rupture the uterus, cause loss of life of the fetus and severe hemorrhage and peritonitis. Injuries to external female genitalia are similar to those of injuries to other body parts and emergency care is the same. Nothing should be placed in the vagina.

Study Suggestions

1. Practice dressing and bandaging an eye with an extruded eyeball. Use a classmate or friend as a "patient."

2. Practice dressing and bandaging a sucking chest wound. Use a classmate or friend as a "patient."

3. The patient has a knife in his chest. Describe how you would manage this patient and what you would watch for. Describe **all possible** complications.

4. You suspect the patient has internal abdominal injuries. Describe the patient and what made you come to this conclusion.

5. As you approach the scene, you see a rescuer attempting to replace a patient's protruding intestine. What would you do and why?

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6. Lye has been thrown in the patient's face. What would you do and why?

7. Why would you cover both eyes if only one were injured?

8. The patient has suffered a severe blow to the back. What might you suspect and how would you manage the patient?

9. Following the procedures outlined in Lessons 5 and 8, perform as many complete patient examinations (for life-threatening problems and injuries) as you can. Use classmates or friends as "patients." Remember to establish rapport with your "patients" and explain your intended movements and procedures.

Lesson Reference

The medical content of the lesson was based on the following reference:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 6, 23, 24, 25, 26, 28 and 29.

Lesson 12

Practice, Test and Evaluation—Injuries I

This lesson provides for interim evaluation of student knowledge and skills. Each student completes a written examination designed to evaluate attainment of knowledge objectives specified for Lessons 7 through 11. Each student practices dressing and bandaging skills and the skill of performing a complete patient examination until he feels prepared to be evaluated on each skill. He then performs each skill for an instructor and is evaluated on his performance.

Lesson 13

Practice, Test and Evaluation— Injuries II

This lesson provides for additional interim evaluation of student skills. Each student practices immobilizing fractures and dislocations of the upper and lower extremity until he feels prepared to be evaluated on each skill. He then performs each skill for an instructor and is evaluated on his performance.

Lesson 14

Medical Emergencies I

Introduction

This lesson covers common medical emergencies including ingested and inhaled poisons, bites and stings, heart attack, stroke and dyspnea. Severe cases can be life-threatening. The EMT should be able to recognize these conditions and render appropriate emergency care. The lesson also includes a review of results of the written and practical examinations administered in the previous two lessons and provides an opportunity for students to practice as needed the skill of cardiopulmonary resuscitation and use of mechanical aids to airway care and resuscitation.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to describe the causes, signs and emergency care for the following:

Poisons—ingested and inhaled

Bites and stings

Heart attack

Stroke

Dyspnea

Overview of Lesson Contents

Although this overview includes general lesson contents and certain specific facts, the emphasis is on sign and symptom recognition and emergency care procedures.

Ingested Poisons

Signs are variable depending on the substances. There may be burns, odors or stains about the mouth. Other common signs include:

Nausea/vomiting

Abdominal pain

Diarrhea

Dilation or constriction of pupils

Excessive salivation or sweating

Abnormal respiration

Unconsciousness

Convulsions

The poisonous substance should be located, if possible, and the Poison Control Center contacted to determine the most effective emergency care procedure. Typical procedures are:

Dilute substance

Induce vomiting (do **not** induce vomiting if the substance is an acid, alkali or petroleum product or if the patient is not fully conscious or is convulsing)—follow latest Poison Control Center recommendations

Administer absorbent under direction of the Poison Control Center

Administer soothing agent

Inhaled Poisons

For inhaled poisons, such as carbon monoxide, the major concern is removing the patient from the source. Oxygen and cardiopulmonary resuscitation should be administered as required.

Bites and Stings

For bites from ***bees, wasps and ants,*** the major danger arises when the patient has an allergic reaction. In addition to basic life support, emergency care procedures are:

Place a constricting band above an injury in an extremity

If present, carefully scrape stinger and venom sac away

Place an ice pack over the bitten area

For ***spider*** bites, death has rarely been reported. Severe cases should receive basic life support, application of a cold pack to the bite and immediate transport. Antivenins are available for black widow and brown recluse spider bites, and identification of the insect is important.

Venomous ***snakes*** include the pit viper (rattlesnake, cottonmouth and copperhead) and coral snake. The coral snake is especially dangerous since its bite affects the central nervous system.

Signs of envenomation by a ***pit viper*** are severe burning pain and immediate swelling about the fang marks. Bleeding under the skin and discoloration of the area may occur within several hours of envenomation. Hemorrhagic blisters and some local numbness will follow. Emergency care procedures are:

Calm patient

Cleanse wound

Wrap soft rubber tubing about the extremity above and below fang marks to occlude **only** superficial venous flow

Splint the extremity

Check vital signs

Prevent shock

Apply ice pack to the wound if directed by a physician

Incise wound and massage or suction with a cup only **if** wound occurred within previous 30 minutes, **if** patient shows signs of envenomation, and **if** directed to do so by a physician

Following envenomation by a ***coral snake,*** there are only minimal local signs of pain and swelling. Discoloration and decay of tissue usually do not occur. The patient may complain of depression or apprehension or may be euphoric. Emergency care for the coral snake is identical to that for the pit viper except that the constricting band is placed above the wound only and incisions and suction are not recommended.

Heart Attack

When an artery becomes blocked, that part of the muscle which it serves dies and the patient has what is known as a heart attack, or ***myocardial infarction.*** An acute myocardial infarction may have the following signs:

Sudden onset of weakness, nausea and sweating without a clear cause.

Pain—usually described as squeezing. It is substernal and perceived as radiating to the jaw, left arm or both arms.

Arrythmia and fainting.

Pulmonary edema.

Sudden death.

The pulse will usually increase although occasionally it slows. The blood pressure falls. Respirations are normal unless pulmonary edema develops; then respirations are rapid and shallow. The patient appears frightened and may be sweaty and pale gray in color.

For patients suspected of having a heart attack, emergency care procedures are:

Place the patient in a semi-reclining position

Administer oxygen by face mask

Do not allow the patient to assist in moving himself

Comfort and reassure patient

Loosen patient's clothing and make him comfortable

Obviously, CPR must be performed for a cardiac arrest.

Angina pectoris is pain which occurs when the heart needs more oxygen than is available. The patient suffers pain in the chest; it radiates to the jaw or arms. It is felt as a pressure or squeezing sensation. Patients are usually aware of their condition and have been given medication (nitroglycerine) by their physician to relieve the pain—assist them in taking any prescribed medication. The condition is usually relieved by rest.

Congestive heart failure results when the heart does not pump blood efficiently to the body. Fresh blood cannot enter the heart from the lungs, and blood and other fluids accumulate in the lungs. Signs include the following:

Shortness of breath

Anxiety

Rapid heart rate

Rales or wheezing sounds

Normal or somewhat high blood pressure

Emergency care is the same as that for heart attack patients.

Stroke

A stroke is also known as a cerebrovascular accident of CVA. Part of the brain has been damaged due to a blood clot or rupture of an artery. A clot may have formed elsewhere in the body and traveled to the brain as an embolus. Signs are:

Numbness or paralysis of the extremities

Confusion or dizziness

Difficulty with speech or vision

Diminished consciousness; coma

Convulsions

Headache alone

Care will depend on the signs exhibited by the particular patient. Major consideration is calm treatment and careful handling, particularly of paralyzed parts.

Dyspnea

Dyspnea is a sensation of shortness of breath. Causes may be medical or traumatic. Included here are discussions of three medical causes not covered elsewhere in the EMT

course: chronic obstructive lung disease, bronchial asthma and hyperventilation.

With **chronic obstructive lung disease,** the respiratory center may be so depressed that the patient does not have a stimulus to breathe. The patient is typically elderly and thin with a barrel-like chest. Signs are:

Semiconsciousness or unconsciousness

Respiratory distress—rapid or slow

Muscles of neck and shoulders being used to expand chest

Lips pursed to puff air out

Pulse rapid, possibly irregular

Emergency care procedures include reassuring the patient, administering oxygen and assisting breathing as necessary.

A ***bronchial asthma*** attack is an abnormal spasm of the airway passages. The patient is normal between attacks. Signs are:

Respiratory distress—wheezing on expiration; difficult expiration; increased respiratory rate

Tension and anxiety

Blood pressure possibly slightly elevated

Emergency care procedures include reassuring the patient, administering oxygen, and assisting the patient in taking his own medication.

Hyperventilation is overbreathing usually due to psychological stress. Signs are:

Anxiety—terrified of death

Dizziness and fainting

Numbness or tingling of hands and feet

Stabbing chest pain

Rapid breathing

High pulse rate

Emergency care procedures include reassuring the patient and assisting him in breathing into a paper bag.

Study Suggestions

1. You have examined each patient (and questioned relatives and/or bystanders as appropriate) and suspect that each is suffering from one of the conditions listed below. Describe what made you suspect each condition and how you would care for the patient.

*a. Heart attack

b. Chronic obstructive lung disease

c. Anaphylactic shock

d. Bronchial asthma

e. Bite by a coral snake

2. You have patients exhibiting the signs and/or symptoms listed below. What might be wrong with each patient (include all possible conditions)? What other signs or symptoms might you check for? How would you care for each patient?

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a. The patient is dizzy and has a headache. His speech is slurred and he appears confused.

b. The patient is breathing rapidly and has a stabbing chest pain.

c. The patient has obvious respiratory distress and is wheezing on expiration.

d. The patient is in a closed car with the engine running. He is unconscious and his face is pink.

e. From the odor, the child appears to have swallowed gasoline from the lawn mower.

f. The patient is in obvious respiratory distress. He is elderly and has a barrel-like chest.

Lesson Reference

The medical content of the lesson was based on the following reference:

American Academy of Orthopaedic Surgeon. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 30, 31, 33 and 45.

Lesson 15

Medical Emergencies II

Introduction

This lesson continues coverage of common medical conditions. It includes discussions of causes, signs and emergency care for diabetic conditions, the acute abdomen, communicable diseases, patients with abnormal behavior, alcohol and drug abuse and epilepsy. It also includes a review of common problems in caring for child patients and practice in assessing a patient's condition. The EMT should be able to recognize medical conditions and special problems in children in order to render appropriate emergency care.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Describe the causes, signs and emergency care for the following:

Diabetic coma and insulin shock

Acute abdomen

Communicable diseases

Patients with abnormal behavior

Alcohol and drug abuse

Epileptic convulsion

Identify special techniques and problems in dealing with child patients

Overview of Lesson Contents

Although this overview includes general lesson contents and certain specific facts, the emphasis is on sign and symptom recognition and emergency care procedures.

Diabetes

Diabetes is a condition in which the body is unable to use sugar normally. Body cells need sugar to survive. Insulin in the body permits sugar to pass from the bloodstream to body cells. If there is insufficient insulin, there will be insufficient sugar in the body cells and **diabetic coma** will result. If there is too much insulin, the sugar will leave the blood rapidly and there will be insufficient sugar for brain cells. **Insulin shock** will result.

The onset of ***diabetic coma*** is gradual over a period of days. Signs are:

A sweet or fruity (acetone) odor

Dehydrated (dry), warm skin

Rapid, weak pulse

Air hunger—rapid, deep breathing

Varying degrees of unresponsiveness, up to coma

Normal or slightly low blood pressure

The onset of ***insulin shock*** is sudden; it may occur within minutes. Signs are:

Pale, moist skin

Full, rapid pulse

Normal breathing

Dizziness; headache

Fainting; seizures; disorientation; coma

Normal blood pressure

Both patients need immediate transportation to a medical facility. However, the patient in insulin shock desperately needs sugar before brain damage and death occur. A sugar cube placed under the tongue of an unconscious patient should arouse him; sugar in any form can be given to a conscious patient. If the EMT can't distinguish between diabetic coma and insulin shock and sugar is available, have the patient take it. It can't appreciably hurt the patient in diabetic coma and may save the life of a patient in insulin shock.

Acute Abdomen

The term acute abdomen means abdominal disease causing irritation and inflammation of the peritoneum. Signs are:

Abdominal pain, local or diffuse

Abdominal tenderness, local or diffuse

Patient is quiet and reluctant to move

Rapid shallow breathing

Rapid pulse

Low blood pressure

Tense, often distended, stomach

Position of the patient in bed—patient with appendicitis may draw up his right knee; patient with pancreatitis may lie curled up on his right side

The patient needs speedy transportation to a medical facility. Care includes:

Keep airway clear

Administer oxygen if necessary

Permit no liquids, food or medication

Position patient comfortably

Prevent shock

Communicable Diseases

In the control of communicable diseases; the EMT should protect himself, other persons and patients and the vehicle from contamination. He should routinely:

Have a yearly physical (including chest X-ray)

Keep vaccinations up-to-date

Wash hands before and after working with a patient

Air and clean the vehicle and its equipment after each patient transportation

If the nature of the call is known in advance, he should:

Wear a disposable gown and mask

Remove all unnecessary equipment from the vehicle

Use as much disposable equipment as possible

Upon return from a run in which he has transported a patient with a communicable disease, he should perform the following as appropriate:

Boil clothing

Shower

Disinfect vehicle and equipment

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If exposed to:

Small pox—get revaccinated

Meningitis—check with physician

Syphilis—check with physician if bitten or scratched

Patients with Abnormal Behavior

Patients as well as relatives and bystanders may exhibit abnormal behavior in a time of crisis. In addition, persons with certain physical disorders (e.g., diabetes, head injury, severe infection) as well as persons under the influence of or being withdrawn from alcohol or drugs will exhibit abnormal behavior. The EMT should always be alert to the fact that there may be a medical or physical reason for an individual's behavior.

When dealing with the emotionally disturbed, the EMT should adhere to state laws regarding their management. General rules of conduct include the following:

Evaluate the situation considering causes and possible dangers

Display an attitude of sincerity, calmness, confidence and willingness to help

Reassure, calm and encourage patient

Don't rush; give the patient time to quiet down

Don't leave the patient alone

Don't use force

Alcohol

Alcohol is a depressant that affects a person's judgment, vision, reaction time and coordination. In very large quantities, it can cause death by paralyzing the respiratory center in the brain. Signs of intoxication are:

Odor of alcohol of breath

Swaying/unsteadiness

Slurred speech

Nausea/vomiting

Flushed face

Aggressiveness/irritability

The alcoholic state is sometimes indistinguishable from that caused by diabetes, head injuries, cerebral palsy, infections with delirium, and toxic reactions. The intoxicated patient should be given the same attention given to patients with other illnesses/injuries. He needs constant watching to be sure that he doesn't aspirate vomitus and that he maintains respirations.

An alcoholic who suddenly stops drinking can suffer from severe withdrawal problems. Sudden withdrawal will often result in DT's (delirium tremens). Signs include:

Shaking hands

Restlessness

Confusion

Hallucinations

Sometimes maniacal behavior

The patient must be protected from hurting himself.

Drugs

Drugs are typically classified as uppers, downers and hallucinogens as follows:

Uppers—stimulants of the central nervous system. They include amphetamines, cocaine, caffeine, antiasthmatic drugs and vasoconstrictor drugs. Signs are excitement, restlessness, irritability and talkativeness. Respiratory failure can occur with use of cocaine.

Downers—depressants of the central nervous system. They include barbiturates, tranquilizers, marijuana, inhaled solvents and opiates. Respiratory depression can occur.

Hallucinogens—these include LSD, mescaline, psilocybin and peyote. Marijuana also has some hallucinogenic properties. They produce changes in mood, hallucinations and sometimes panic behavior.

Withdrawal from barbiturates can result in anxiety, tremors, nausea, fever, delirium, convulsions and ultimate fatality. Withdrawal from opiates can cause intense agitation, dilated pupils, increased breathing, increased body temperature and a strong craving for a "fix."

Emergency care procedures for drug abuse patients are:

Induce vomiting if the overdose was taken in the preceding 30 minutes

Protect hyperactive patients from hurting themselves

Maintain the level of consciousness

Carefully monitor respirations

Instill confidence—assure patient that he will be alright

Evaluate further injuries

Be alert for possible allergic reactions and shock

Preserve evidence

Provide prompt transportation

Epilepsy

Types of epilepsy are:

Grand Mal (major seizure)—convulsions usually followed by unconsciousness

Petit Mal (minor seizure)—frequently undetectable

The major emergency care procedure is to protect the patient from hurting himself.

Problems of Child Patients

Principles of care for children are the same as those for adults. There are variations in techniques, for example, in cardiopulmonary resuscitation; these variations are covered in the lesson in which the specific medical condition or skill is covered.

In children, shock is assumed to be present if the systolic blood pressure is below 50 in the pre-school child, below 60 in the child under 12 and below 70 in the teenager or young adult. Shock is usually the result of loss of blood or tissue fluids (dehydration).

The most common serious cause of abdominal pain is appendicitis. The only signs may be that the child is fussy and has lost his appetite. In very young children, intussus-

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ception is another relatively common cause of severe abdominal pain.

A fever of 103° to 104°F and above can be dangerous. In some children, a high fever is usually accompanied by a convulsion. The EMT should cool the patient before and during transport by removing the clothing and wrapping the child in a towel saturated with tepid water. Do not use ice water or rubbing alcohol. Do not submerge the child in water. If the child convulses, protect him from hurting himself and observe which parts of the body are twitching (it will be helpful to the physician who attends the patient).

Sudden Infant Death Syndrome (SIDS) is the leading cause of death in infants after the first few weeks of life. Parents will be distraught, and CPR efforts to assist the baby will help parents.

Child abuse is a common occurrence. The EMT should be alert to an adult's story that does not ring true or which does not account for all injuries observed. The EMT should voice any suspicions to medical personnel as well as other agencies required by state law.

In the case of sexual molestion, the EMT should not examine the genitalia unless there is obvious bleeding and a bandage is required. The parents and child should be advised that there should be no washing, douching, urinating or defecating until after the physician has examined the patient.

Children are apt to be afraid and unable to communicate either from fear or from the fact that they are too young to talk clearly or understand what has happened. The EMT should use simple language and be very gentle.

Study Suggestions

1. You have examined each patient (and questioned relatives and/or bystanders as appropriate) and suspect that each is suffering from one of the conditions listed below. Describe what made you suspect each condition and how you would care for the patient.
   a. Diabetic coma
   b. Alcohol withdrawal
   c. Grand Mal seizure
   d. Heroin overdose
   e. Appendicitis.

2. You have patients exhibiting the signs and/or symptoms listed below. What might be wrong with each patient (include all possible conditions)? What other signs or symptoms might you check for? How would you care for each patient?
   a. The patient is dizzy and has a headache. His speech is slurred and he appears confused.
   b. The patient smells of beer and is very unsteady.
   c. The child has fallen from a tree. He has no obvious fractures. He is unconscious, and his systolic blood pressure is 55 mm Hg.
   d. The baby has been found in his crib by his parents. He has no respirations or pulse.

e. When you enter the patient's bedroom, he announces that he has just taken all his sleeping pills. An empty bottle is on the bedside table.

3. The child is unconscious and has multiple severe bruises all over his body. His parents tell you he fell down the stairs.

4. You have been informed that the patient you will be transporting has chicken pox. Describe precautions you would take before, during and after the run to protect yourself and minimize spread of the disease.

5. You have just made an ambulance run in which you transported a patient with small pox. Describe precautions you would take to protect yourself and minimize spread of the disease.

Lesson References

The medical content of the lesson was based on the following references:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 27, 32, 34, 35, 37, 38 and 39.

The American National Red Cross. **Drugs and their abuse.** 1971.

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Lesson 16

Emergency Childbirth

Introduction

A childbirth can be an emergency event and knowledge of appropriate procedures will permit better care of both patient and baby. The lesson covers normal and abnormal births and provides for students to practice skills in assisting in deliveries and caring for the mother and the newborn.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Describe the meaning and function as appropriate of each of the following terms: fetus, uterus, birth canal, placenta, umbilical cord, amniotic sac, cervix, vagina, perineum, crowning, bloody show, stages of labor, presenting part, abortion, live birth certificate, fetal death certificate.

Identify predelivery emergencies and their care.

Describe how to determine if delivery is imminent.

Describe procedures for assisting the mother in a normal childbirth.

Describe procedures for resuscitating the newborn.

Describe procedures for a breech delivery, prolapsed cord, excessive bleeding, abortion, and multiple birth.

Describe typical characteristics and techniques of care for the premature infant, including use of the infant carrier.

Demonstrate on an obstetrical manikin correct procedures for both normal and abnormal births.

Demonstrate on a resuscitation manikin procedures for resuscitating the newborn, including administration of oxygen.

Overview of Lesson Contents

The emphasis of this overview is on emergency care procedures.

Relevant Anatomy, Physiology and Terms

The birth process involves use of the following anatomical organs and terms:

Fetus

Uterus

Birth canal

Placenta (afterbirth)

Umbilical cord

Amniotic sac (bag of waters)

Cervix

Vagina

Perineum

Crowning

"Bloody show"

Labor—first, second and third stage

Presenting part

Abortion

Live birth certificate

Fetal death certificate

Predelivery Emergencies

For ***convulsions*** resulting from epilepsy or toxemia, the EMT should:

Place padded tongue depressor or folded towel in mouth.

Place mother on side.

When mother regains consciousness, elevate shoulders and head.

Give oxygen.

For ***heart/lung*** complications, the patient should be given oxygen.

If the patient is ***hemorrhaging,*** procedures are:

Do **not** examine vaginally.

Administer oxygen.

Maintain body temperature.

Encourage mother to lie on her side.

Initial Considerations

It is generally best to transport the mother unless the delivery is expected in a few minutes. To determine when delivery is expected, ask:

Has the mother had a baby before?

Does she feel she has to strain or move her bowels?

Is the vagina bulging or is baby crowning?

Precautions include:

Look, do not touch.

Do not let mother go to bathroom.

Do not hold mother's legs together.

Normal Delivery

Procedures are:

Have mother lie with knees drawn up and spread apart.

Place sheet, blanket, or newspaper under buttocks to lift them about 2 inches off the surface.

Fold sterile towel and place under buttocks.

Place another sterile towel on patient's abdomen and one on surface below opening of vagina.

When the baby's head appears, place the fingers of the gloved hand on its head and exert **very gentle** pressure.

If the amniotic sac does not break, use clamp to puncture sac and push sac away from baby's mouth and nose.

When the head is born, check if umbilical cord is around neck; slip over shoulder or clamp, cut and unwrap.

Place hand under baby's head for support and suction baby's mouth two or three times and each nostril once.

As the abdomen and hips are born, place the other hand under those parts—there are now two hands supporting the baby.

When feet are born, grasp feet.

Wipe blood and mucus from mouth and nose with a sterile gauze, suction mouth and nose again.

Clamp, cut and tie umbilical cord. Wrap baby in a blanket and place on its side, head slightly lower than trunk.

Massage uterus.

Observe mother for delivery of placenta—a few to 30 minutes; if over 20 minutes, transport. If heavy bleeding, transport. Massage uterus, administer oxygen, place sterile pad over vagina.

When delivered, wrap placenta in towel and put in plastic bag; ½ pint blood normal. Place sterile pad over vaginal opening, lower mother's legs, help her hold them together.

Record time of delivery and transport mother, baby and placenta to hospital.

Note: If baby does not deliver after 20 minutes of contractions every 2 to 3 minutes, transport immediately.

Resuscitation of the Newborn

Procedures are:

Suction airway as previously described.

Lay baby on side, head lower than body.

Snap index finger against bottom of feet; if no response—

Apply **gentle** mouth-to-mouth/nose resuscitation.

Continue resuscitation until breathing starts, then oxygen.

Apply cardiopulmonary resuscitation if no pulse after two minutes.

Continue cardiopulmonary resuscitation until baby breathes or is pronounced dead by a physician.

Breech Delivery

Procedures are:

Make same preparations as for normal delivery.

Allow buttocks and trunk to deliver spontaneously.

Support legs and trunk.

Allow head to deliver spontaneously.

If head does not deliver in three minutes, transport immediately. Do not pull baby out.

After head delivers, continue as in normal birth.

If only a foot or arm protrudes, transport to hospital immediately.

Prolapsed Cord

Procedures are:

Put mother in shock position—legs elevated, give oxygen, keep mother warm, have her lie on one side.

Wrap a sterile towel around the visible portion of the cord Do not replace or put pressure on cord.

Transport immediately.

Excessive Bleeding

If more than 5 pads are soaked, bleeding is excessive.
Procedures are:

Prevent shock.

Place sterile sanitary napkin at opening of vagina; save blood-filled pads.

Do not hold legs together or put hand or anything in vagina.

Preserve any tissue passed.

Transport immediately.

Abortion (miscarriage)

Procedures are:

Prevent shock.

Immediately transport.

Save any passed tissue.

Multiple Birth

Procedures are the same as for single births.

Premature Infant

Procedures are:

Keep the baby warm.

Keep the mouth and throat clear of fluid and mucus.

Ensure cord does not bleed.

Administer oxygen.

Don't infect infant.

Alert hospital.

Premature Infant Carrier

Procedures are:

Fill hot water bottles, cover and place in carrier.

Wrap infant in blanket or napkin.

Make sure carrier is secure in ambulance.

Study Suggestions

1. You are transporting an expectant mother to the hospital when she starts to convulse. Describe how you would care for her.

2. You have arrived at the scene and find the expectant mother straining as if she has to move her bowels. What would you do?

3. If an obstetrical manikin is available, practice procedures involved in normal and breech deliveries. Have a classmate maneuver the infant manikin.

4. Identify all equipment and materials required for delivery of a baby and describe their use.

5. Describe what is meant by a prolapsed cord and the care you would provide in the event of such an emergency.

6. You have assisted in the delivery of a baby. You have suctioned the infant's airway but no respirations are apparent. Explain what you would do.

7. You have assisted in the delivery of a premature infant. Describe how you would care for the infant before and during transport.

8. The baby's head has delivered but the amniotic sac is intact. What would you do and why?

9. The baby's head has delivered and the umbilical cord is around his neck. What would you do and why?

Lesson Reference

The medical content of the lesson was based on the following reference:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapter 36.

Lesson 17

Environmental Emergencies

Introduction

Proper management of patients suffering from burns, exposure to cold and problems resulting from water hazards can save lives and limbs as well as minimize suffering. This lesson covers emergency care procedures for environmental emergencies.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Describe skin damage and appearance of first-, second- and third-degree heat burns.

Use the rule of nines in estimating percentage of body burned.

Indicate factors affecting the seriousness of a heat burn.

Estimate the seriousness of a heat burn given a description of each factor affecting seriousness.

Describe heat burn management procedures.

Describe causes, seriousness and management for chemical burns.

Describe appearance and management of electrical burns.

Describe EMT role in electrically hazardous situations.

Identify the ICC symbol for radioactive materials.

Describe actions EMT can take to control his exposure to radiation.

Describe radiation emergency care procedures for patient and EMT.

Describe causes, signs, seriousness and care for patients suffering from heat cramps, heat exhaustion and heat stroke.

Identify and describe the five major ways in which the body loses heat.

Identify and describe the stages of emergency cooling of the body (hypothermia).

Describe emergency care for a patient suffering from general cooling of the body (hypothermia).

Describe signs, seriousness and emergency care for frostnip, superficial frostbite and deep frostbite.

Describe physiological effects of drowning.

Describe management for the drowning patient.

Describe the problem, signs and care for patients suffering from air embolism and decompression sickness.

Overview of Lesson Contents

Although the overview includes a general lesson contents and certain specific facts, the emphasis is on sign and symptom recognition and emergency care procedures.

Burns

Heat burns are classified by degree of damage to the skin as follows

First-degree burns—the top layer of the skin is burned and the skin becomes reddened.

Second-degree burns—there is some damage to the dermis and characteristically the skin blisters.

Third-degree burns—the entire thickness of the skin is burned down to the subcutaneous fat.

The skin usually is dry, pale or white but may be brown or even charred.

There is a loss of sensation in the area due to a destruction of nerve endings.

The seriousness of a burn can be estimated from the following:

Degree of the burn

Percentage of body burned

Location of burn

Accompanying complications

Age of patient

The rule of nines provides a means of estimating the percentage of the body that is burned as follows:

	Adult	Infant
Head	9%	18%
Arms	9% each	9% each
Torso front	18%	18%
Torso back	18%	18%
Genitalia	1%	1%
Legs	18% each	13.5% each
	100%	100%

The following burns are considered critical:

Burns complicated by respiratory tract injuries and other major injuries or fractures.

Third-degree burns involving the critical areas of the face, hands and feet.

Third-degree burns covering more than 10% of the body surface.

Second-degree burns covering more than 30% of the body surface.

Emergency care procedures for heat burns are:

Cover the area with a clean dressing.

Use cold, wet applications to relieve pain.

With the exception of lime, chemicals in contact with the skin should be washed off with copious amounts of water as clothing is removed. Lime should be brushed off. For chemicals in the eye, the eye should be rinsed for up to 20 minutes.

Electrical burns commonly result in two wounds where the burn enters and leaves the body. Respiratory and cardiac arrest are the major problems.

The amount of damage from ***radiation*** burns depends on:

Strength of the source.

Type of radiation delivered—alpha and beta particles are dangerous only if swallowed or inhaled—they damage internal organs. Gamma rays are very penetrating and dangerous.

Duration of exposure.

Area of body affected.

Distance between person and source.

Shielding between person and source.

Emergency care procedures for exposure to radiation include:

Remove yourself and the patient from the area as quickly as possible if a hazardous radiation level exists.

Remove and dispose of clothing in properly labeled metal containers with tight lids.

Shower and follow standard decontamination procedures.

Decontaminate ambulance under direction of local regulatory body for radioactive material.

Exposure to Heat

A patient may suffer painful muscle spasms (***heat cramps***) in the extremities after strenuous exercise. The cramps will usually be relieved if the patient takes a salt solution.

Heat exhaustion can occur when a person works hard in a hot environment. The patient is usually weak, dizzy or faint, has a headache, no appetite and nausea. He may appear gray and skin may be cold and clammy. Vital signs are usually normal. The patient should be treated as if he were in shock and transported to a medical facility as soon as possible.

In a ***heat stroke,*** the patient's sweating mechanism has broken down and he is unable to lose body heat through the skin. Important signs are:

Very hot, dry skin.

Coma or near coma.

Very high body temperature.

Drowning

For drowning victims, the immediate concern is resuscitation. Oxygen should be administered. Typically only a small amount of water enters the lungs. If large amounts of fresh water enter the lungs, pulmonary membranes may rupture. If large amounts of salt water enter the lungs, pulmonary edema may result.

Diving Problems

Two ascent problems require recompression when serious: air embolism and bends (decompression sickness). Signs of ***air embolism*** are:

Blotching or itching of skin.

Froth in nose and mouth.

Pain in muscles, joints, tendons, abdomen.

Difficult breathing with chest pain.

Dizziness and vomiting.

Difficulty in seeing properly.

Possible paralysis and coma.

Emergency care procedures are:

Provide basic life support and oxygen.

Place patient on his left side with head and chest lower than feet.

Signs of ***bends*** range from minor skin rashes and joint pains to serious central nervous system complaints. It is called the

bends since patient typically bends over from joint pain. The patient should be given basic life support with oxygen.

Study Suggestions

1. You have examined each patient (and questioned relatives and/or bystanders as appropriate) and suspect that each is suffering from one of the conditions listed below. Describe what made you suspect each condition and how you would care for the patient.

   Electrical burn

   Heat stroke

   Frostbitten extremities

   Air embolism

   Bends

2. The patient has second-degree burns covering both legs. There is an open fracture of the tibia on the right leg. How would you care for him?

3. The patient has been playing tennis at midday. He is dizzy and has a headache. His speech is slurred and he appears confused. List all possible conditions that might be wrong with the patient. What other signs or symptoms would you check for? How would you care for the patient?

4. What would you do if your vehicle was exposed to gamma rays?

5. The patient fell asleep in the sun. He was wearing bathing trunks. He is shivering and has first-degree burns covering all exposed parts of the front of his body. How would you care for him?

Lesson Reference

The medical content of the lesson was based on the following reference:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 40, 41, 42 43 and 44.

Lesson 18

Lifting and Moving Patients

Introduction

Proper patient handling will minimize injuries and discomfort for both patient and EMT. This lesson includes principles of moving patients; types, uses and distinguishing features of stretchers; practice in lifting and moving patients with and without suspected spine injuries; and practice in loading and unloading ambulances.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Identify considerations involved in deciding the type of move to be made.

Describe emergency moves.

Identify principles of lifting and moving that minimize EMT body strain.

Describe use and distinguishing features of wheeled stretchers, portable stretchers, stair chairs, long backboards, scoop stretchers.

Perform a direct two-man lift of a patient from the ground and position him on a stretcher.

Perform a two-man extremity lift of a patient from the ground and position him on a stretcher.

Immobilize the neck and spine of a patient on a short backboard.

Immobilize a patient on a long backboard, move patient and backboard to a stretcher, and position on stretcher.

Load stretchers on and unload stretchers from ambulances.

Overview of Lesson Contents

This overview emphasizes procedures involved in various types of moves.

General Considerations

All injured parts should be immobilized as much as possible prior to movement. All injured parts should be protected as much as possible during movement.

A patient should not be moved until he is ready for transportation to a hospital unless:

There is a fire or danger of fire.

Explosives or other hazardous materials are involved.

It is impossible to protect the accident scene.

It is impossible to gain access to other victims in a vehicle who need life-saving care.

Emergency Moves

Considerations include:

Make every effort to pull the patient in the direction of the long axis of the body to provide as much protection to the spine as possible.

If the patient is on the floor or ground, drag him away from the scene by tugging on his clothing in the neck and shoulder area, or pull the patient onto a blanket and then drag the blanket away from the scene.

EMT Protection

In order to protect himself, the EMT should use the following principles in all non-emergency moves:

Keep in mind physical capabilities and limitations and do not try to handle too heavy a load. When in doubt, seek help.

Do not attempt to lower a patient if you feel you could not lift him.

Keep yourself balanced when carrying out all tasks.

Maintain a firm footing.

Maintain a constant and firm grip.

Lift and lower by bending the legs and not the back—keep the back as straight as possible at all times; bend knees and lift with one foot ahead of the other.

When holding or transporting, keep the back straight and rely on shoulder and leg muscles; tighten muscles of the abdomen and buttocks.

When performing a task that requires pulling, keep the back straight and pull using the arms and shoulders.

Carry out all tasks slowly, smoothly and in unison with your partner.

Move body gradually; avoid twisting and jerking when conducting the various patient-handling tasks.

When handling a patient, try to keep the arms as close as possible to the body in order to maintain balance.

Do not keep muscles contracted for a long period of time.

Direct Ground Lift, No Spine Injury, Two or Three Rescuers

Procedures are:

Rescuers line up on one side of the patient.

Rescuers drop one knee to the ground (the same knee for each rescuer).

The patient's arms are placed on his chest if possible.

The head rescuer places one arm under the patient's neck and shoulder and cradles the patient's head.

The head rescuer places his other arm under the patient's lower back.

A second rescuer places one arm under the patient's knees and one arm above the buttocks.

Note: If there is a third rescuer, he places both arms in the waist area and the other two rescuers slide their arms up to the mid-back or down to the buttocks as appropriate.

On signal, rescuers lift the patient to their knees and roll him in toward their chests (the rescuers' backs are not straight and they are supporting the patient by their arms and chests).

On signal, the rescuers stand, move the patient to a stretcher.

To replace the patient on the ground or on a low cot, the procedure would be reversed.

Extremity Lift, No Fractures (or All Fractures Splinted), Two Rescuers

Procedures are:

One rescuer kneels at the head of the patient and one at the side by the patient's knees.

The head rescuer places one hand under each of the patient's shoulders while the foot rescuer grasps the patient's wrists.

The foot rescuer pulls the patient to a sitting position; the head rescuer assists by pushing the patient's shoulders up and supporting his back and head with his body.

The head rescuer slips his hands under the patient's arms and grasps the patient's wrists.

The foot rescuer slips his hands under the patient's knees.

Both rescuers crouch on both feet.

They stand simultaneously and move with the patient to a stretcher.

Immobilization on Short and Long Backboards

Procedures for immobilizing patients on short and long backboards were given in Lesson 10.

Study Suggestions

1. Using a classmate or friend as a "patient," practice the one-man emergency moves covered in the lesson.

2. Working with another classmate and using a classmate or friend as a "patient," practice the direct ground lift and extremity lift.

3. If short and long backboards are available, practice immobilizing patients on the boards. Work with another classmate and use a classmate or friend as a "patient." If backboards are unavailable and no appropriate simulation object is available, practice the procedures involved in supporting the patient's head and applying a cervical collar.

4. Describe how you would position the following patients on a stretcher:

   Heart attack patient.

   Unconscious patient with a head injury.

   Patient with a suspected spine injury.

   Patient in shock.

   Expectant mother who is convulsing.

Lesson Reference

The content of this lesson was based on the following reference:

Patient handling manual. Prepared by Dunlap and Associates, Inc., for the U. S. Department of Transportation (DOT HS 800 504). Available from U. S. Government Printing Office, Washington, D. C. Chapters 1, 2, 4, 5, 6 and 7.

Selected procedures on use of the short and long backboards were obtained from: American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapter 47.

Lesson 19

Extrication from Automobiles

Objectives

The EMT may be the first at the accident scene and should know simple procedures for gaining access to and disentangling patients. Proper patient packaging and removal will minimize danger of further injury or aggravation of existing injuries. The lesson provides basic hints on gaining access to and disentangling patients from vehicles. However, the lesson emphasizes practice in packaging patients with suspected spine and other injuries and removing them from vehicles.

Lesson Objectives

At the completion of the lesson and any required assignments, the student should be able to:

Describe the role of the EMT in extrication.

Describe techniques that the EMT can use to gain access to or disentangle patients from vehicles.

Package patients with spine and other injuries in a vehicle and remove them from a vehicle.

Overview of Lesson Contents

Gaining Access and Disentanglement

The EMT's responsibility is to administer necessary care to the patient before extrication and to assure that the patient is removed from the vehicle in such a way as to minimize further injury. While waiting for rescue crews, he should use available prying and cutting tools to gain access to the patient. If doors cannot be opened, simple procedures might include:

Cutting around the door lock or cutting the roof with a sharp tool and hammer.

Shattering a rear window.

Removing the molding from front and rear window glass of older cars with a screwdriver.

Overturned vehicles should be left in the position found. They should be shored up as necessary with any available materials. Doors should be tied open.

If patients are pinned, a jack may be used to raise the vehicle. Blocks and pry bars can also be used. Knives and pliers can be used to break glass away from body parts thrown through car windows. It may be possible to free a caught foot by removing a shoe. Seats may be moved to gain additional working space. Knives can be used to cut seat belts.

If rescue crews are present, the EMT should cooperate with their activities but should not allow their activities to endanger the patient. The EMT should attend to the needs of the patient while rescue activities proceed if possible.

Packaging and Removal

In this part of the lesson, the instructors demonstrate and students practice packaging and removing patients with suspected spine injuries from within and beneath vehicles. Activities and procedures for handling patients with spine injuries are as follows:

Removing an unconscious patient from the front seat.
Procedures are:

Support patient's head.

Apply cervical collar.

Slide short backboard behind patient—pad backboard as appropriate.

Attach straps to patient's forehead, chin and thighs.

Rotate patient's torso and legs.

Slide patient onto long backboard—pad board as appropriate.

Loosen thigh straps of short board and strap patient securely on long board.

Removing an unconscious patient from the floor between the front seat and firewall. Procedures are:

Support head.

Apply cervical collar.

Slide rope sling across patient's chest and under arms—pad as appropriate; tighten ring slide or buckle.

Slide patient out of vehicle onto long backboard—pad board as appropriate.

Strap patient securely to long board.

Removing an unconscious patient from the floor of the back seat. Procedures are:

Support head.

Apply cervical collar.

Slide short backboard behind patient—pad board as appropriate.

Attach straps to patient's forehead, chin and thighs.

Lift patient onto front seat—lift the patient, **not** the board.

Rotate patient's torso and legs.

Slide patient onto long backboard—pad board as appropriate.

Loosen thigh straps of short board and strap patient securely to long board.

Removing an unconscious patient from beneath an upright car. Procedures are:

Support head.

Apply cervical collar.

Slide rope sling across patient's chest and under arms—pad as appropriate; tighten rope sling or buckle.

Slide patient from beneath vehicle onto long backboard—pad board as appropriate.

Strap patient securely to long board.

In order to permit students to practice in a field setting skills learned in other course lessons, it is suggested that patients in this session have other simulated injuries, as follows:

The patient has a closed fracture of the right femur.

The patient has a fractured right knee and multiple lacerations of the scalp. The scalp is bleeding profusely.

The patient is draped over the steering wheel. Blood is oozing from his neck.

The patient has an open fracture of the right humerus and a closed fracture of the right ulna. He is losing blood rapidly.

The patient has an avulsed left eye and a depressed fracture in the front part of the skull.

The patient has two broken ankles.

The patient has a dislocated hip.

The patient has a flail chest.

The patient has a severe gash extending from his left eye to his left ear, and a deep 7-inch gash in his upper left arm. Blood is spurting from the arm.

The patient is breathing with great difficulty. A sucking sound is heard each time he breathes.

Study Suggestions

Working with another classmate and using a classmate or friend as a "patient," the student should practice packaging patients with spine and/or other injuries and removing them from vehicles.

Lesson Reference

Procedures for splinting spine-injured patients were based on information contained in the following reference:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapter 47.

Lesson 20

Practice, Test and Evaluation— Medical Emergencies, Emergency Childbirth, Environmental Emergencies, Lifting and Moving

This lesson provides for interim evaluation of student knowledge and skills. Each student completes a written examination designed to evaluate attainment of knowledge objectives specified for Lessons 14 through 19. Each student practices the skills taught in these lessons until he feels prepared to be evaluated on each skill. He then performs each skill for an instructor and is evaluated on his performance.

Lesson 21

Operations—Driving and Maintaining an Emergency Vehicle, Records and Reports, Communications, and Procedures at Emergency Departments

Introduction

The lesson provides the student with some knowledge of and familiarity with the operational aspects of the EMT's job in the area in which he will be working. It covers laws regulating operation of emergency vehicles, factors contributing to safe driving, maintaining a safe and ready vehicle, EMT records and reports, communication systems, procedures at emergency departments. Specific lesson contents will vary depending on the area in which services are provided. The lesson also includes a review of results of the written and practical examinations administered in the previous lesson.

Lesson Objectives

Upon the completion of the lesson and any required assignments, the student should be able to:

Describe laws relating to operation of an emergency vehicle.

Identify factors contributing to safe driving.

Describe typical causes of unsafe speeds and accidents.

Identify vehicle systems and equipment requiring daily inspection and those requiring inspection after each run.

Identify reasons that records are maintained and typical information recorded by EMT's in the area.

Describe uses of communication systems and typical systems and procedures used in the area.

Describe typical EMT responsibilities and procedures at emergency departments in the area.

Overview of Lesson Contents

Driving an Emergency Vehicle

The EMT needs to be completely knowledgeable about the laws, regulations or ordinances in the area relative to the operation of an emergency vehicle, including as appropriate:

Vehicle parking or standing regulations.

Procedures at red lights, stop signs and other intersections.

Regulations regarding speed limits.

Exemptions from following direction-of-movement regulations or specified turns.

Standard emergency or disaster routes.

Use of audible signals, e.g., sirens.

Use of visual signals, e.g., lights.

Many factors contribute to safe driving. The safe driver:

Is alert to changing weather and driving conditions.

Follows specified routes for routine runs but has alternate routes for contingencies.

Uses extreme left-hand lane on multilane highway.

Drives defensively.

Uses care in exercising the right-of-way privilege.

Exercises care in use of siren.

Maintains safe following distances.

Pauses at intersections.

Requests other emergency assistance (e.g., police) as needed.

Maintaining a Safe and Ready Vehicle

The vehicle requires routine maintenance, daily inspection, and inspections after each run. The EMT should be completely knowledgeable about the systems, equipment and materials involved in each inspection.

Records and Reports

Information must be obtained and records maintained to:

Provide for continuity of care.

Furnish source of information for evaluating quality of care.

Provide data for analysis of causes, types and degree of illness and injury requiring emergency care.

Furnish legal evidence.

Provide administrative records.

Record forms vary. The EMT should be completely familiar with the procedures for completing each form for which he is responsible.

Communications

Communications systems vary among communities and students will need to learn specific procedures followed in the area in which they provide services.

Procedures at Emergency Departments

Responsibilities and procedures at hospital emergency departments may include, among others:

Advance notification of arrival.

Identification of high priority patients.

Compliance with hospital regulations.

Rendering of reports as required.

Retrieval of equipment and supplies.

Rendering of assistance as needed and prompt departure.

Study Suggestions

1. You have loaded your ambulance with two victims of an automobile accident. One has a fractured pelvis and is in severe shock. The other is unconscious and is breathing with great difficulty. You are the driver of the ambulance. Describe all procedures you would follow until your patients are deposited at the hospital. Include communications, driving and procedures at the emergency department.

2. If an ambulance is available, practice making a daily inspection of vehicle systems and equipment.

3. Complete one copy of each report required of EMT's in your area for a simulated case. Be prepared to describe what each completed report means.

Lesson Reference

The lesson contents were based on information contained in the following reference:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Chapters 48, 49 and 50.

Lesson 22

Responding to an Ambulance Call: A Review of Factors Affecting Ambulance Run Efficiency and Patient Assessment

Introduction

It is very important that the EMT plan his emergency run in an efficient manner in order to bring expert emergency care quickly to the patient. The rescuer must know how to check all vital signs and the implications of variations in signs for patient diagnosis and care. Performance of a thorough patient examination can reveal injuries that require care before the patient is moved. Providing the care can minimize damage to the patient and shorten recovery time. A knowledge of high priority patients and triage procedures will enable patients most in need to be transported most expeditiously to the emergency medical facility.

This lesson provides an overview of factors to consider in planning an ambulance run, examining and performing triage at the emergency scene, and delivery of the patient to the emergency medical facility. It also includes a review of the vital signs and provides additional practice in performing patient examinations.

Lesson Objectives

Upon completion of the lesson and any required assignments, the student should be able to:

Identify information that can aid the EMT in planning an emergency ambulance run.

Define and describe the implications of variations in each vital sign.

Identify highest, second, and lowest priority patients for triage purposes.

Perform a patient examination for illnesses/injuries.

Describe patients suffering from various illnesses/injuries.

Identify EMT responsibilities at the scene, enroute to the hospital and at the hospital.

Overview of Lesson Contents

Planning for an Emergency Ambulance Run

Preplanning can save time and result in a more efficient service. The EMT should make use of all information and knowledge available to him to minimize the time required to serve the patient as well as to maximize the care provided. Enroute to the scene, the EMT can make use of such information as:

The nature of the illness or injury

The emergency scene—roadway, building, etc.

Travel routes to the scene.

Other emergency services responding.

Communications required and available enroute.

At the scene, the EMT should quickly size up the situation including assessing what has happened and who is there to help.

Patient Examination

Once at the scene, patient examination must be performed. It is performed in two stages:

Checking for and controlling life-threatening problems.

Checking for and stabilizing injuries/illnesses not threatening to life.

Procedures for performing these surveys have been outlined in previous lessons. The EMT should always check for medical identification symbols.

The EMT should be alert to the fact that information from the emergency scene can assist in making a diagnosis, for example:

Extreme ambient temperature

Crushed steering wheel

Seat belt in place

Damaged dashboard

Liquor bottles or drugs

The rescuer can also gain valuable information from witnesses.

Triage

Triage means sorting multiple casualties into priorities for emergency care or for transportation to definitive care. Priorities are usually given in three levels as follows:

Highest priority

Airway and breathing difficulties

Cardiac arrest

Uncontrolled or suspected severe bleeding

Severe head injuries

Severe medical problems—poisonings, diabetic complications, cardiacs

Open chest or abdominal wounds

Shock

Second priority

Burns

Major or multiple fractures

Back injuries with or without spinal cord damage

Lowest priority

Fractures or other injuries of a minor nature

Obviously mortal wounds where death appears reasonably certain

Obvious dead

Other Responsibilities at the Scene

While examining patients and performing emergency care, the EMT must control the scene as appropriate and plan for patient transportation, including:

Planning patient loading, e.g., some patients may be loaded while care is being administered to others.

Obtaining assistance as necessary in loading vehicle.

Loading patients carefully to minimize aggravation of existing illnesses/injuries.

Determining best route for leaving the scene.

Determining to which hospital patients should be taken.

Delivery of Patient to the Hospital

Procedures involved in the trip to the hospital include:

Constantly observe and care for patient.

Drive carefully to assure safety of patient and to minimize aggravation of illnesses/injuries.

Inform hospital that patient is being brought in.

Communicate changes in vital signs to hospital and obtain information on care of patient as appropriate.

At the hospital, procedures include:

Unload patient carefully.

Communicate verbally all information to hospital emergency department personnel.

Assist hospital emergency department personnel as necessary.

Complete records.

Have emergency department personnel sign for patient and his personal belongings as appropriate.

Exchange equipment and supplies with hospital as appropriate.

Return to in-service condition.

Review of Vital Signs

Students are asked to describe each sign, deviations from the normal and implications of these deviations. The student is advised that *all* signs are used together with other information (what the patient says, what bystanders say, what the rescuer observes from the scene) in evaluating the nature of given illness/injury. Examples are:

Pulse

Rapid, strong: fright, apprehension, heat stroke

Rapid, weak: shock, bleeding, diabetic coma, heat exhaustion

Slow, strong: stroke, skull fracture

None: cardiac arrest, death

Respirations

Shallow: shock, bleeding, heat exhaustion, insulin shock

Deep, gasping, labored: airway obstruction, chest injury, diabetic coma, heart disease

None: respiratory arrest due to any number of illnesses/injuries

Bright, frothy blood coughed up: lung damage possibly due to fractured ribs or penetrating objects

Skin temperature

Cool, moist: shock, bleeding, heat exhaustion

Cool, dry: exposure to cold

Hot, dry: heat stroke, high fever

Face color

Red: high blood pressure, carbon monoxide poisoning, heat stroke, diabetic coma

Pale/white/ashen: shock, bleeding heat exhaustion, insulin shock

Blue: heart failure, airway obstruction, some poisonings

Pupils of the eyes

Dilated: shock, bleeding, heat stroke, cardiac arrets

Constricted: opiate addiction

Unequal: head injury, stroke

State of consciousness

Confusion: most any illness/injury, fright, apprehension, alcohol, drugs

Coma: stroke, head injury, severe poisoning, diabetic coma

Inability to move upon command—an indicator of paralysis

One side of body: stroke, head injury

Arms and legs: damage to spinal cord in neck

Legs: damage to spinal cord below neck

Reaction to physical stimulation—an indicator of paralysis

No sensation in arms and/or legs: damage to spinal cord as indicated above

Numbness in arms and/or legs: damage to spinal cord as indicated above

Note: No sensation of indication of pain when there is an obvious injury can also be due to hysteria, violent shock, or excessive alcohol or drug use.

Blood pressure—a marked drop is an indication of shock

Patient Description and Assessment

Various illnesses/injuries covered in this emergency care course are identified by the instructor. Students are asked to describe the "patient"—including general appearance, vital signs and general condition.

Working on simulated victims, students practice patient examinations and assessing the nature of the patient's illness/injury. Students are expected to describe their actions, implications of their findings and appropriate emergency care procedures.

Study Suggestions

1. Practice performing patient examinations for life-threatening and other illnesses/injuries. Use a classmate or friend as a "patient." Provide a verbal commentary of what you are doing and what you find. Provide all appropriate emergency care. Be prepared to describe your "patient's" condition.

2. Which of the following patient conditions would you consider to be of the **highest** priority for triage purposes: cardiac arrest, open fracture of the femur, insulin shock, open fracture of the tibia, severe burns of the face and neck? Be prepared to explain your answer.

3. Be prepared to identify each vital sign, its normal condition, deviations from the normal and what these deviations mean.

4. There is a train wreck at the local railroad station. The time is 5:30 PM and the day is Wednesday, December 10. You are responding to a call for assistance. Identify all information that you would use to assist you in making your ambulance run. Would you communicate enroute? If so, with whom and for what purpose?

Lesson Reference

The medical content of the lesson was based on the following reference:

American Academy of Orthopaedic Surgeons. **Emergency care and transportation of the sick and injured.** (Second Edition) Chicago, Illinois, 1977. Entire text, especially Chapter 4.

Lesson 23

Situational Review

This lesson provides the students an opportunity to apply selected knowledge and skills learned in the course by group discussion of situational examples. Suggested situations and questions to be posed are given below. The questions do not necessarily have clear-cut answers; rather, they are designed to stimulate class discussion. The student should review each situation and be prepared to provide answers to the questions posed.

Situation 1

An ambulance is the first emergency vehicle to arrive at the scene of a two-car collision. Both cars are upright. A quick survey of life-threatening problems has revealed the following patients:

Car 1: The driver is unconscious and seated in the front seat fastened in his seat belt. The head of the passenger in the front seat has been thrown through the windshield. He is bleeding profusely about the face, is unconscious and his respirations are shallow.

Car 2: The driver is seated in the front seat. He is sweating and appears to be short of breath. He complains of pain in his chest and left arm. The passenger has been thrown from the car. He is lying on the road moaning that he cannot move his legs. He appears to feel no sensation in his legs.

Questions:

What might be wrong with each patient?

Which two patients (there are two EMT's) should be treated first and why?

What care should be given to each patient?

Which two patients should be transported first and why?

Would it be necessary to alert the hospital and why?

Would the trip to the hospital be made with utmost speed and why?

Situation 2

An unconscious person is found on a city street. His skin is pale and moist and his pulse is rapid. He is having convulsions.

Questions:

What might be wrong with the patient?

What should be searched for?

What care should be given to the patient?

Situation 3

There has been a brawl at the local tavern. One patient is lying on the floor with a knife in his chest. He is bleeding profusely and coughing up frothy blood. Patient No. 2 is unconscious, his respirations shallow, his pulse weak, and blood is dripping from his ears and nose. Patient No. 3 has an angulated compound fracture of the tibia and is bleeding profusely at the fracture site.

Questions:

What is most likely wrong with patient No. 1?

What is most likely wrong with patient No. 2?

Which two patients should be cared for first and why?

Should help be enlisted in caring for the patients?

What care should be provided for each patient?

Which two patients should be transported first and why?

Would it be necessary to alert the hospital and why?

Should the trip to the hospital be made with utmost speed and why?

Situation 4

A man has barricaded himself in the bathroom. There have been sounds of water running. When you arrive at the man's apartment, the police have just succeeded in opening the bathroom door. They tell you they have heard no sounds for five minutes. You find the patient face down in the bathtub. He is not breathing, has no pulse and his pupils are dilated and fixed.

Questions:

What care should be provided for the patient?

You have performed cardiopulmonary resuscitation on the patient for 10 minutes without reviving him. Should you cease your efforts and why?

What information should you obtain and to whom shoud you give it?

Situation 5

You are returning from the hospital and a violent thunderstorm erupts. You come across a car on which some electric wires have fallen. The driver is opening the front door of the car.

Question:

What should be done and why?

Situation 6

You have taped up a sucking chest wound and are transporting the patient to the hospital. You notice that the patient's respirations are worsening.

Questions:

What would you suspect is wrong with the patient?

What would you do?

Situation 7

You arrive at a private home and find a woman ranting that her husband plans to kill her and she is going to throw acid at him. You try to calm her from a distance and to keep her husband at a distance. However, he approaches her and she throws the acid in his face.

Questions:

What would you suspect is wrong with the wife?

How would you care for the husband and wife?

What would you do about transporting the two patients?

What information should you be sure to obtain and to whom should you give it?

Situation 8

You have been called to a building where there is no known elevator. There is a patient on the third floor having a severe asthmatic attack.

Questions:

When you leave the ambulance, what equipment should you take with you and why?

When you see the patient, you administer oxygen and his respirations worsen. What would you suspect is wrong, and why?

How would you carry this person?

How would you care for him enroute?

Situation 9

You have been called to take a pregnant woman to the hospital to have a baby.

Questions:

When you leave the ambulance, what equipment should you take with you and why?

You find the woman crowning when you arrive. What should you do to assist her in the delivery?

How should you care for the baby?

Situation 10

An unconscious patient has severe third-degree burns of the head, face and neck. His respirations are irregular and his pulse is weak.

Question:

How would you care for the patient?

Situation 11

You are following a car that veers suddenly onto the shoulder of a limited-access highway, up an embankment, turns over hard on its left wheels and rolls over onto its roof. You can see two people inside dangling in their seat belts and shoulder harnesses.

Questions:

What should be done first and why?

You have assured that the vehicle is shored up and stable. You find the door on the driver's side unlocked, and you open it to gain access to the victims. What should you do next and why?

You find each occupant unconscious. Each is breathing and has no obvious open wounds. How would you remove them from their belts and harnesses?

From the information presented, what might have happened to the driver? How would you check?

Situation 12

The left window of the vehicle is smashed and the driver has a large piece of glass penetrating his left cheek and is bleeding profusely from the left cheek and forehead. He is unconscious and fastened in his seat belt.

Questions:

How would you care for the patient?

What other injuries might you suspect the patient to have and how would you check for them?

Situation 13

A car has been traveling slowly when it suddenly veers off the road, grazes a tree and comes to rest against another tree. The driver is barely conscious. He does not speak and appears to have no feeling on one side of his body.

Questions:

What is most likely wrong with the driver?

How would you care for him?

Situation 14

The driver is unconscious. He is fastened in his seat belt. There is dark red blood oozing from his mouth. The passenger in the front seat has an open fracture of the left tibia and is bleeding profusely at the fracture site.

Questions:

What is most likely wrong with the driver?

Which patient would you care for first and why?

How would you care for each patient?

While you are working on these patients, you hear a moan and discover a child on the floor of the back seat. You have to remove one patient from the vehicle to gain access to the child. Which patient would you move? How would you move him?

The child is barely conscious and has a closed angulated fracture of the shaft of the humerus. How would you care for him?

Situation 15

A car slows down suddenly and comes to a stop at the side of the road. The window is open on the driver's side. The driver's face appears grotesquely swollen and he is barely breathing.

Questions:

What would you suspect might have happened?

What would you do for the patient?

Situation 16

Much smoke is coming from a structural fire. On entering the doorway, you notice the universal radiation symbol and see a man lying on the floor 20 feet away.

Questions:

What environmental hazards are likely?

What safety precautions should be taken?

What modifications should be made in usual patient care and transportation?

Lesson 24

Final Written Test

This lesson provides for final evaluation of student knowledge. Each student completes a written examination designed to evaluate attainment of knowledge objectives specified for the course.

Lesson 25

Final Practical Evaluation of Skills

This lesson provides for final evaluation of student skills. Each student performs each skill (or a representative sampling of skills) for an instructor and is evaluated on his performance.

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