Chapter 21 Lesson Goal

- After completing this lesson, the student shall be able to provide basic pre-hospital emergency care for firefighters following the policies and procedures set forth by the authority having jurisdiction (AHJ).

Specific Objectives

1. Discuss the importance of body substance isolation (BSI).
2. Describe the components of personal protective equipment.
3. Discuss diseases of concern.
4. Describe laws that relate to infection control.

(Continued)
Specific Objectives

5. Explain the importance of immunizations.
6. Describe the physiological aspects of stress.
7. Describe types of stress reactions.
8. Summarize causes of stress.

(Continued)

Specific Objectives

10. Explain various ways to deal with stress.
11. Describe scene safety considerations at hazardous materials incidents and rescue operations.

(Continued)

Specific Objectives

12. Describe actions required when responding to scenes involving violent or dangerous situations.
13. Discuss the circulatory system.
14. List the links in the chain of survival.
15. Explain actions to be taken before resuscitation.

(Continued)
Specific Objectives

16. Discuss rescue breathing.
17. Describe the steps of cardiopulmonary resuscitation (CPR).
18. Describe the CPR techniques for an infant patient.
19. Describe the CPR techniques for a child patient.

Specific Objectives

20. Describe the CPR techniques for an adult patient.
21. Discuss indications of effective CPR and when CPR may be interrupted.
22. Summarize when not to begin or to terminate CPR.

Specific Objectives

23. Summarize actions taken when clearing an airway obstruction.
24. Describe the main components of the circulatory system.
25. Differentiate between arterial, venous, and capillary bleeding.
Specific Objectives

26. Describe the steps for controlling external bleeding.
27. Discuss internal bleeding.
29. Describe the signs of shock.
30. Describe the steps for managing shock.

Pathogens

- Organisms that cause infection
- Bloodborne
- Airborne

Body Substance Isolation (BSI)

- Equipment and procedures that protect responders
- Requirements
  - Employers
  - Employee
  - Agencies
Components of Personal Protective Equipment

- Protective gloves
  - Types
  - Allergies to latex
- Handwashing
  - Alcohol-based hand cleaners

(Continued)

DISCUSSION QUESTION

When should gloves be changed?

Components of Personal Protective Equipment

- Eye protection
  - Types
- Masks
  - N-95
  - HEPA respirators
- Gowns
Diseases of Concern

- Hepatitis
  - Inflammation of liver
  - Forms
- Tuberculosis
  - Settles in lungs
  - Highly contagious
  - Spread through air

(Continued)

Diseases of Concern

- AIDS
  - Results when immune system has been attacked by HIV
  - Has no cure
  - Routes of exposure

(Continued)

Diseases of Concern

- Emerging diseases and conditions
  - West Nile virus
  - SARS
    - How it is spread
    - Protection
**Occupational Exposure to Bloodborne Pathogens**

- OSHA standard
- Mandates measures for employers of emergency responders
- Infection control is a joint responsibility between employer and employee.

(Continued)

**Occupational Exposure to Bloodborne Pathogens**

- Critical elements
  - Infection exposure control plan
  - Adequate education and training
  - Hepatitis B vaccination
  - Personal protective equipment

(Continued)

**Occupational Exposure to Bloodborne Pathogens**

- Critical elements
  - Methods of control
  - Housekeeping
  - Labeling
  - Post-exposure evaluation and follow-up
**CARE Act**

- Federal act – applies to all 50 states
- Mandates procedures for emergency responders to be notified if exposed to potentially life-threatening diseases
- Designates officer for every emergency response organization
- Two notification systems

**Tuberculosis Compliance Mandate**

- Describes selection and use of respirators
- Firefighters should recognize situations in which potential of TB exists
  - Those at greatest risk
  - Signs and symptoms

(Continued)

- N-95 or HEPA respirator should be used
  - Caring for patients suspected of having TB
  - Transporting an individual from high-risk area in a closed vehicle
  - Performing high-risk procedures
**Immunizations**

- Available for many diseases
- Availability of Hepatitis B vaccination
- No immunization for TB

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**Physiological Aspects of Stress**

- State of physical and/or psychological arousal to stimulus
- Normal part of life
- General adaptation syndrome
  - First stage – Alarm reaction
  - Second stage – Stage of resistance
  - Third stage - Exhaustion

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**Acute Stress Reaction**

- Linked to catastrophes
- Signs and symptoms
- May require immediate intervention
**Delayed Stress Reaction**

- Post-traumatic stress disorder
- Triggered by specific incident
- Signs and symptoms
- May lead to drug and alcohol abuse
- Requires intervention

**Cumulative Stress Reaction**

- Stems from sustained, recurring low-level stressors
- Develops over years
- Begins subtly and progresses
- May result in manifestations

**Causes of Stress**

- Multiple-casualty incidents
- Calls involving infants and children
- Severe injuries
- Abuse and neglect
- Death of coworker
**Stress**

- Types
  - Eustress
  - Distress
- Signs and symptoms

**Ways to Deal with Stress**

- Lifestyle changes
  - Healthful and positive dietary habits
  - Exercise
  - Time for relaxing
- Professional changes
  - Location or shift change
  - Professional help

**Scene Safety at Hazardous Materials Incidents**

- Maintain safe distance
- Use binoculars to read placards; identify using ERG
- Recognize potential problems

(Continued)
Scene Safety at Hazardous Materials Incidents

- Take initial actions
- Notify trained haz mat team
- Do not take any actions other than those for protection

Scene Safety at Rescue Operations

- Ensure appropriate assistance requested
- Do not perform tasks not trained to do
- Secure the scene and wait for specialists

Actions at Scenes Involving Violent or Dangerous Situations

- Be certain the scene is safe
- Plan
  - Wear safe clothing
  - Prepare equipment
  - Carry radio
  - Decide on safety roles

(Continued)
Actions at Scenes Involving Violent or Dangerous Situations

- Observe
  - Neighborhood
  - Scene
  - Violence
  - Crime scenes
  - Alcohol or drug use

(Continued)

Actions at Scenes Involving Violent or Dangerous Situations

- Observe
  - Weapons
  - Family members
  - Bystanders
  - Perpetrators
  - Pets

(Continued)

Actions at Scenes Involving Violent or Dangerous Situations

- React
  - Retreat
  - Radio
  - Reevaluate
Circulatory System

- Heart
  - Four chambers
- Blood vessels
- Arteries
- Veins
- Capillaries
- Blood

How the Heart Works

- Two-sided pump
- Left side – Receives oxygenated blood from lungs and pumps to body
- Right side – Receives deoxygenated blood from body and pumps into lungs
- Pulse

How the Heart Stops

- Respiratory arrest and cardiac arrest
  - Importance of immediate CPR
- Reasons
  - Heart disease
  - Stroke
  - Allergic reaction
  - Prolonged seizures
  - Serious injuries
Chain of Survival

Actions to be Taken Before Resuscitation

- Assess the patient
  - Determine unresponsiveness
  - Determine breathlessness
  - Determine pulselessness
  - Assess the ABC’s

DISCUSSION QUESTION

Where should patients be positioned?
**Actions to be Taken Before Resuscitation**

- Activate EMS
  - If assistance is available
  - If alone
- Position the patient
  - Supine
  - If injury is suspected, support neck

(Continued)

**Actions to be Taken Before Resuscitation**

- Open the airway — Head-tilt, chin-lift

(Continued)

**Actions to be Taken Before Resuscitation**

- Open the airway — Jaw-thrust

(Continued)
Actions to be Taken Before Resuscitation

- Initial ventilations and pulse check
  - Deliver two breaths
  - If unsuccessful, clear airway
  - Confirm open airway and feel for pulse
  - If no pulse, begin chest compressions with ventilations
  - If pulse but no breathing, perform rescue breathing

Rescue Breathing – Adult

- Puberty and older
- Ventilation duration – 1/second
- Ventilation rate – 10-12 breaths/min

Rescue Breathing – Child

- 1 year-puberty
- Ventilation duration – 1/second
- Ventilation rate – 12-20 breaths/min
Rescue Breathing – Infant

- Birth-1 year
- Ventilation duration – 1/second
- Ventilation rate – 12-20 breaths/min

Rescue Breathing

- Gastric distention
  - Air in the patient's stomach
  - Indicates blocked airway, improper position, large breaths
  - Problems
  - How to avoid

Steps of CPR

- Checking for circulation
  - Confirm pulselessness
  - Adult – Begin CPR
  - Infant or child with pulse slower than 60 beats/minute – Begin CPR
Steps of CPR

• Providing chest compressions
  – Place the patient supine
  – Position hands

Steps of CPR

• Providing chest compressions
  – Straighten arms and lock elbows
  – Shoulders are directly over hands
  – Deliver compressions straight down
  – Fully release pressure on patient’s sternum

How to Join CPR in Progress

• If started by non-responder
• If started by responder in EMS system
CPR Techniques

- Infant patient
  - Age
  - Compression depth
  - Compression rate
  - Each ventilation
  - Pulse check location
  - Compressions-to-ventilation ratio

CPR Techniques

- Child patient
  - Age
  - Compression depth
  - Compression rate
  - Each ventilation
  - Pulse check location
  - Compressions-to-ventilations ratio

CPR Techniques

- Adult patient
  - Age
  - Compression depth
  - Compression rate
  - Each ventilation
  - Pulse check location
  - One-rescuer CPR compressions-to-ventilations ratio
How to Know if CPR is Effective

- Have someone feel for carotid pulse
- Listen for exhalation of air
- Pupils constrict
- Skin color improves
- Heartbeat returns

(Continued)

Reasons to Interrupt CPR

- Check for pulse and breathing
- Reposition self and patient
- Move patient to stretcher
- Move patient down stairs or through narrow passage

(Continued)
Reasons to Interrupt CPR

- Move patient on or off ambulance
- Suction vomitus or airway obstruction
- Allow for defibrillation or advanced life support

When Not to Begin or to Terminate CPR

- Obvious mortal wounds
- Rigor mortis
- Obvious decomposition
- Line of lividity
- Stillbirth

Once CPR has been Started

- Must continue until:
  - Spontaneous circulation occurs
  - Spontaneous circulation and breathing occur
  - A trained rescuer can take over
  - Care of patient is transferred
  - Responder is too exhausted
  - “No CPR” order given
Airway Obstruction

- Partial
  - Have patient cough; coughing may dislodge or expel foreign object
- Complete
  - Patient will try to speak but will be unable

(Continued)

Airway Obstruction

- Abdominal thrusts
  - Procedures for conscious adult or child sitting or standing
  - Procedures for unconscious adult or child or conscious patient who cannot sit or stand

(Continued)

Airway Obstruction

- Chest thrusts
  - Used for patient in late pregnancy or if too obese for abdominal thrusts
  - Procedures for the conscious adult sitting or standing
  - Procedures for the unconscious adult
Airway Clearance Sequences

- Conscious adult
- Unconscious adult
- Conscious child
- Unconscious child
- Conscious infant
- Unconscious infant

Clearing Airway Obstructions in Child or Infant

- Place infant facedown
- Support infant’s head
- Deliver five back slaps

(Continued)

- Move infant face up
- Deliver five chest thrusts
Components of the Circulatory System

- Heart
  - Pumps blood, supplies oxygen
- Blood vessels
  - Arteries
  - Capillaries
  - Veins
- Blood

Types of Bleeding

- Direct pressure
  - Most common and effective
  - Apply pressure to wound
  - Hold pressure until bleeding is controlled
  - Create pressure dressing
  - Do not remove dressing

(Continued)
Controlling External Bleeding

- Elevation
  - Elevate injury above heart to reduce blood pressure and slow bleeding
  - Do not use if possible musculoskeletal injuries, impaled objects in extremity, or spine injury
  - Apply direct pressure and elevate injured extremity

(Continued)

Controlling External Bleeding

- Pressure points
  - Site where large artery lies close to surface and directly over a bone
  - Use after direct pressure and elevation fail

(Continued)

Controlling External Bleeding

- Pressure Points
  - Upper extremity – Pressure to point over brachial artery
  - Lower extremity – Pressure to point over femoral artery

(Continued)
Controlling External Bleeding

- Special situations
  - Head injury
    - Allow drainage to flow freely
  - Nosebleed
    - Have patient sit and lean forward
    - Apply direct pressure to flesh around nostrils

Internal Bleeding

- Bleeding that occurs inside the body
- Can be very serious
- Causes
  - Blunt trauma
  - Penetrating trauma

Signs of Internal Bleeding

- Injuries to surface of body
- Bruising, swelling, pain over organs
- Painful, swollen, deformed extremities

(Continued)
**Signs of Internal Bleeding**

- Bleeding from body orifices
- Tender, rigid, distended abdomen
- Vomiting coffee-ground-like or bright red vomitus
- Dark, tarry stools or bright red stools
- Signs and symptoms of shock

**Care for Patient with Internal Bleeding**

- Maintain ABCs and provide support
- Administer high-concentration oxygen
  - If trained to do so
  - If permitted by organization
- Control external bleeding
- Provide prompt transport

**Shock**

- Inadequate tissue perfusion
- Inability of circulatory system to supply cells with oxygen and nutrients
- Hypovolemic shock
  - Seen most by EMT-Bs
  - Internal and/or external bleeding
  - Caused by burns or crush injuries

(Continued)
**Shock**

- Cardiogenic shock
  - Suffered by heart attack patients
  - Caused by irregular heartbeat or other cardiac problems
- Neurogenic/vasodilatory shock
  - Uncontrolled dilation of blood vessels
  - Caused by sepsis or anaphylactic reaction

**Signs of Shock**

- Altered mental status
  - Caused by deprivation of oxygen
  - Anxiety
  - Restlessness
  - Combativeness
- Pale, cool, clammy skin
- Nausea and vomiting

(Continued)

**Signs of Shock**

- Vital sign changes
  - Increased pulse
  - Increased respirations
  - Drop in blood pressure
- Other signs
  - Thirst
  - Dilated pupils
  - Cyanosis
Managing Shock

- Maintain open airway and assess respiratory rate
- Assist ventilations or perform CPR
- Control external bleeding

(Continued)

Managing Shock

- Elevate legs
- Prevent loss of body heat
- Transport patient
- Speak calmly and reassuringly

Summary

- Fire fighting is a dangerous profession. Many firefighters die from sudden cardiac events while on duty.
- The most effective strategy for ensuring prompt, well-trained emergency medical care is to train all firefighters in basic pre-hospital emergency medical care.
Review Questions

1. What body substance isolation (BSI) precautions should firefighters take to protect against infection?
2. What are three communicable diseases of concern to firefighters?
3. What is the Ryan White CARE Act?

(Continued)

4. What are some causes of stress for emergency responders?
5. What are the links in the chain of survival for patients in respiratory and cardiac arrest?
6. Describe what actions are taken when assessing the patient during CPR.

(Continued)

7. What are the basic steps in performing CPR?
8. What are the major methods of controlling external bleeding?
9. What are the emergency care steps for shock?