

DIVERSIFIED HEALTH OCCUPATIONS

Seventh Edition

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Diversified Health Occupations, Seventh Edition

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CHAPTER 13

Promotion of Safety



Chapter Objectives

After completing this chapter, you should be able to:

- ◆ Define *body mechanics*
- ◆ Use correct body mechanics while performing procedures in the laboratory or clinical area
- ◆ Observe all safety standards established by OSHA, especially the Occupational Exposure to Hazardous Chemicals Standard and the Bloodborne Pathogen Standard
- ◆ Follow safety regulations stated while performing in the laboratory area
- ◆ Observe all regulations for patient safety while performing procedures on a student partner in the laboratory or clinical area, or on a patient in any area
- ◆ List the four main classes of fire extinguishers
- ◆ Relate each class of fire extinguisher to the specific fire(s) for which it is used
- ◆ Simulate the operation of a fire extinguisher by following the directions on the extinguisher and specific measures for observing fire safety
- ◆ Locate and describe the operation of the nearest fire alarm
- ◆ Describe in detail the evacuation plan for the laboratory area according to established school policy
- ◆ Define, pronounce, and spell all key terms

Observe Standard Precautions



Instructor's Check—Call Instructor at This Point



Safety—Proceed with Caution



OBRA Requirement—Based on Federal Law



Math Skill



Legal Responsibility



Science Skill



Career Information



Communications Skill



Technology



KEY TERMS

base of support
Bloodborne Pathogen
Standard
body mechanics
ergonomics
fire extinguishers

Material Safety Data Sheet
(MSDS)
Occupational Exposure to
Hazardous Chemicals
Standard

Occupational Safety and
Health Administration
(OSHA)
safety standards

13:1 INFORMATION



Using Body Mechanics

To prevent injury to yourself and others while working in the health field, it is important that you observe good body mechanics.

Body mechanics refers to the way in which the body moves and maintains balance while making the most efficient use of all its parts. Basic rules for body mechanics are provided as guidelines to prevent strain and help maintain muscle strength.

There are four main reasons for using good body mechanics:

- ◆ Muscles work best when used correctly.
- ◆ Correct use of muscles makes lifting, pulling, and pushing easier.
- ◆ Correct application of body mechanics prevents unnecessary fatigue and strain, and saves energy.
- ◆ Correct application of body mechanics prevents injury to self and others.

Eight basic rules of good body mechanics include:

- ◆ Maintain a broad **base of support** by keeping the feet 8–10 inches apart, placing one foot slightly forward, balancing weight on both feet, and pointing the toes in the direction of movement (figure 13-1).
- ◆ Bend from the hips and knees to get close to an object, and keep your back straight (figure 13-2). Do not bend at the waist.
- ◆ Use the strongest muscles to do the job. The larger and stronger muscles are located in the shoulders, upper arms, hips, and thighs. Back muscles are weak.



FIGURE 13-1 Maintain a broad base of support by keeping the feet 8–10 inches apart.

- ◆ Use the weight of your body to help push or pull an object. Whenever possible, push, slide, or pull rather than lift.
- ◆ Carry heavy objects close to the body. Also, stand close to any object or person being moved.
- ◆ Avoid twisting your body as you work. Turn with your feet and entire body when you change direction of movement.
- ◆ Avoid bending for long periods.



FIGURE 13-2 Bend from the hips and knees to get close to an object.

- ◆ If a patient or object is too heavy for you to lift alone, always get help. Mechanical lifts, transfer (gait) belts, wheelchairs, and other similar types of equipment are also available to help lift and move patients.

Some health care facilities now require health care workers to wear back supports while lifting or moving patients (figure 13-3). The supports are supposed to help prevent back injuries, but their use is controversial. Back supports may provide a false sense of security as an individual tries to lift heavier loads. It is important to remember that a back brace does not increase strength. Back sup-



FIGURE 13-3 Some health care facilities now require workers to wear back supports while lifting or moving patients.

ports may also cause sweating, skin irritation, and increased abdominal pressure. They do remind the wearer to use good body mechanics. If a back support is used, it should be the correct size to provide the maximum benefit. When the worker is performing strenuous tasks, the support should fit snugly. At other times, it should be loosened to decrease abdominal pressure.

STUDENT: Go to the workbook and complete the assignment sheet for 13:1, *Using Body Mechanics*. Then return and continue with the procedure.

PROCEDURE 13:1

Using Body Mechanics

Equipment and Supplies

Heavy book, bedside stand, bed with wheel locks

Procedure

1. Assemble equipment.
2. Compare using a narrow base of support to using a broad base of support. Stand on your toes, with your feet close

PROCEDURE 13:1

together. Next, stand on your toes with your feet farther apart. Then, stand with your feet flat on the floor but close together. Finally, stand with your feet flat on the floor but approximately 8–10 inches apart and with one foot slightly forward. Balance your weight on both feet. You should feel the best support in the final position because the broad base supports your body weight.

3. Place the book on the floor. Bend from the hips and knees (not the waist) and keep your back straight to pick up the book. Return to the standing position.
4. Place the book between your thumb and fingers, but not touching the palm of your hand, and hold your hand straight out in front of your body. Slowly move your hand toward your body, stopping several times to feel the weight of the book in different positions. Finally, hold the book with your entire hand and bring your hand close to your body. The final position should be the most comfortable.

NOTE: This illustrates the need to carry heavy objects close to your body and to use the strongest muscles to do the job.

5. Stand at either end of the bed. Release the wheel locks on the bed. Position your feet to provide a broad base of sup-

port. Get close to the bed. Use the weight of your body to push the bed forward.

6. Place the book on the bed. Pick up the book and place it on the bedside stand. Avoid twisting your body. Turn with your feet to place the book on the stand.

NOTE: Remember that holding the book close to your body allows you to use the strongest muscles.

7. Practice the rules of body mechanics by setting up situations similar to those listed in the previous steps. Continue until the movements feel natural to you.
8. Replace all equipment used.

Practice

Use the evaluation sheet for 13:1, *Using Body Mechanics*, to practice this procedure. When you believe you have mastered this skill, sign the sheet and give it to your instructor for further action.



Final Checkpoint Using the criteria listed on the evaluation sheet, your instructor will grade your performance.

13:2 INFORMATION



Preventing Accidents and Injuries

The **Occupational Safety and Health Administration (OSHA)**, a division of the Department of Labor, establishes and enforces **safety standards** for the workplace. Two main standards affect health care workers:

- ◆ The Occupational Exposure to Hazardous Chemicals Standard

- ◆ The Bloodborne Pathogen Standard

CHEMICAL HAZARDS

The **Occupational Exposure to Hazardous Chemicals Standard** requires that employers inform employees of all chemicals and hazards in the workplace. In addition, all manufacturers must provide **Material Safety Data Sheets (MSDSs)** with any hazardous products they sell (figure 13-4). The MSDSs must provide the following information:



The Clorox Company
1221 Broadway
Oakland, CA 94612
Tel. (510) 271-7000

Material Safety Data Sheet

I Product: CLOROX REGULAR-BLEACH										
Description: CLEAR, LIGHT YELLOW LIQUID WITH A CHARACTERISTIC CHLORINE ODOR										
Other Designations	Distributor									
Clorox Bleach EPA Reg. No. 5813-50	Clorox Sales Company 1221 Broadway Oakland, CA 94612									
Emergency Telephone Nos.										
For Medical Emergencies call: (800) 446-1014 For Transportation Emergencies Chemtrec (800) 424-9300										
II Health Hazard Data	III Hazardous Ingredients									
<p>DANGER: CORROSIVE. May cause severe irritation or damage to eyes and skin. Vapor or mist may irritate. Harmful if swallowed. Keep out of reach of children.</p> <p>Some clinical reports suggest a low potential for sensitization upon exaggerated exposure to sodium hypochlorite if skin damage (e.g., irritation) occurs during exposure. Under normal consumer use conditions the likelihood of any adverse health effects are low.</p> <p>Medical conditions that may be aggravated by exposure to high concentrations of vapor or mist: heart conditions or chronic respiratory problems such as asthma, emphysema, chronic bronchitis or obstructive lung disease.</p> <p>FIRST AID: <u>Eye Contact:</u> Hold eye open and rinse with water for 15-20 minutes. Remove contact lenses, after first 5 minutes. Continue rinsing eye. Call a physician. <u>Skin Contact:</u> Wash skin with water for 15-20 minutes. If irritation develops, call a physician. <u>Ingestion:</u> Do not induce vomiting. Drink a glassful of water. If irritation develops, call a physician. Do not give anything by mouth to an unconscious person. <u>Inhalation:</u> Remove to fresh air. If breathing is affected, call a physician.</p>	<table border="1"> <thead> <tr> <th>Ingredient</th> <th>Concentration</th> <th>Exposure Limit</th> </tr> </thead> <tbody> <tr> <td>Sodium hypochlorite CAS# 7681-52-9</td> <td>6.15%</td> <td>Not established</td> </tr> <tr> <td>Sodium hydroxide CAS# 1310-73-2</td> <td><1%</td> <td>2 mg/m^{3,1} 2 mg/m^{3,2}</td> </tr> </tbody> </table> <p>¹ ACGIH Threshold Limit Value (TLV) - Ceiling ² OSHA Permissible Exposure Limit (PEL) – Time Weighted Average (TWA)</p> <p>None of the ingredients in this product are on the IARC, NTP or OSHA carcinogen lists.</p>	Ingredient	Concentration	Exposure Limit	Sodium hypochlorite CAS# 7681-52-9	6.15%	Not established	Sodium hydroxide CAS# 1310-73-2	<1%	2 mg/m ^{3,1} 2 mg/m ^{3,2}
Ingredient	Concentration	Exposure Limit								
Sodium hypochlorite CAS# 7681-52-9	6.15%	Not established								
Sodium hydroxide CAS# 1310-73-2	<1%	2 mg/m ^{3,1} 2 mg/m ^{3,2}								
IV Special Protection and Precautions	V Transportation and Regulatory Data									
<p>No special protection or precautions have been identified for using this product under directed consumer use conditions. The following recommendations are given for production facilities and for other conditions and situations where there is increased potential for accidental, large-scale or prolonged exposure.</p> <p><u>Hygienic Practices:</u> Avoid contact with eyes, skin and clothing. Wash hands after direct contact. Do not wear product-contaminated clothing for prolonged periods.</p> <p><u>Engineering Controls:</u> Use general ventilation to minimize exposure to vapor or mist.</p> <p><u>Personal Protective Equipment:</u> Wear safety glasses. Use rubber or nitrile gloves if in contact liquid, especially for prolonged periods.</p> <p>KEEP OUT OF REACH OF CHILDREN</p>	<p><u>DOT/IMDG/IATA</u> - Not restricted.</p> <p><u>EPA - SARA TITLE III/CERCLA:</u> Bottled product is not reportable under Sections 311/312 and contains no chemicals reportable under Section 313. This product does contain chemicals (sodium hydroxide <0.2% and sodium hypochlorite <7.35%) that are regulated under Section 304/CERCLA.</p> <p><u>TSCA/DSL STATUS:</u> All components of this product are on the U.S. TSCA Inventory and Canadian DSL.</p>									
VI Spill Procedures/Waste Disposal	VII Reactivity Data									
<p><u>Spill Procedures:</u> Control spill. Containerize liquid and use absorbents on residual liquid; dispose appropriately. Wash area and let dry. For spills of multiple products, responders should evaluate the MSDS's of the products for incompatibility with sodium hypochlorite. Breathing protection should be worn in enclosed, and/or poorly ventilated areas until hazard assessment is complete.</p> <p><u>Waste Disposal:</u> Dispose of in accordance with all applicable federal, state, and local regulations.</p>	<p>Stable under normal use and storage conditions. Strong oxidizing agent. Reacts with other household chemicals such as toilet bowl cleaners, rust removers, vinegar, acids or ammonia containing products to produce hazardous gases, such as chlorine and other chlorinated species. Prolonged contact with metal may cause pitting or discoloration.</p>									
VIII Fire and Explosion Data	IX Physical Data									
<p><u>Flash Point:</u> None</p> <p><u>Special Firefighting Procedures:</u> None</p> <p><u>Unusual Fire/Explosion Hazards:</u> None. Not flammable or explosive. Product does not ignite when exposed to open flame.</p>	<p>Boiling point.....:F/100°C approx. 212 Specific Gravity (H₂O=1)°F~ 1.1 at 70 Solubility in Water complete pH ~11.4</p>									

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FIGURE 13-4 Read the Material Safety Data Sheet (MSDS) before using any chemical product. (Courtesy of the Clorox Company, Oakland, CA)

- ◆ Product identification information about the chemical
- ◆ Protection or precautions that should be used while handling the chemical (for example, wearing protective equipment or using only in a well-ventilated area)
- ◆ Instructions for the safe use of the chemical
- ◆ Procedures for handling spills, cleanup, and disposal of the product
- ◆ Emergency first-aid procedures to use if injury occurs

The Occupational Exposure to Hazardous Chemicals Standard also mandates that all employers train employees on the proper procedures or policies to follow with regard to:


- ◆ Identifying the types and locations of all chemicals or hazards
- ◆ Locating and using the MSDS manual containing all of the safety data sheets
- ◆ Reading and interpreting chemical labels and hazard signs
- ◆ Using personal protective equipment (PPE) such as masks, gowns, gloves, and goggles
- ◆ Locating cleaning equipment and following correct methods for managing spills and/or disposal of chemicals
- ◆ Reporting accidents or exposures and documenting any incidents that occur

BLOODBORNE PATHOGEN STANDARD

The **Bloodborne Pathogen Standard** has mandates to protect health care providers from diseases caused by exposure to body fluids. Examples of body fluids include blood and blood components, urine, stool, semen, vaginal secretions, cerebrospinal fluid, saliva, mucus, and other similar fluids. Three diseases that can be contracted by exposure to body fluids include hepatitis B, caused by the hepatitis B virus, hepatitis C, caused by the hepatitis C virus, and acquired immune deficiency syndrome (AIDS), caused by the human immunodeficiency virus. The mandates of this standard are discussed in detail in Chapter 14:4.

ENVIRONMENTAL SAFETY

Ergonomics is an applied science used to promote the safety and well-being of a person by adapting the environment and using techniques to prevent injuries. Ergonomics includes the correct placement of furniture and equipment, training in required muscle movements, efforts to avoid repetitive motions, and an awareness of the environment to prevent injuries. The prevention of accidents and injury centers around people and the immediate environment. The health worker must be conscious of personal and patient/resident safety at all times. In addition, every health care worker must be alert to unsafe situations and report them immediately. Examples include burned-out lightbulbs, frayed electrical cords, scalding water in a sink or bath area, missing floor tiles or torn carpet, and other similar hazards.

 In addition, every health care worker must accept the responsibility for using good judgment in all situations, asking questions when in doubt, and following approved policies and procedures to create a safe environment. Always remember that a health care worker has a legal responsibility to protect the patient from harm and injury.

Equipment and Solutions Safety

Basic rules that must be followed when working with equipment and solutions include:

- ◆ Do *not* operate or use any equipment until you have been instructed on how to use it.
- ◆ Read and follow the operating instructions for all major pieces of equipment. If you do not understand the instructions, ask for assistance.
- ◆ Do *not* operate any equipment if your instructor/immediate supervisor is not in the room.
- ◆ Report any damaged or malfunctioning equipment immediately. Make no attempt to use it. Some facilities use a lockout tag system for damaged electrical or mechanical equipment. A locking device is placed on the equipment to prevent the equipment from being used (figure 13-5).



FIGURE 13-5 Some facilities use a lockout tag system for damaged equipment to prevent anyone from using the equipment.

- ◆ Do not use frayed or damaged electrical cords. Do not use a plug if the third prong for grounding has been broken off. Never use excessive force to insert a plug into an outlet.
- ◆ Never handle any electrical equipment with wet hands or around water.
- ◆ Store all equipment in its proper place. Unused equipment should not be left in a patient's room, a hallway, or a doorway.
- ◆ When handling any equipment, observe all safety precautions that have been taught.
- ◆ Read MSDSs before using any hazardous chemical solutions.
- ◆ Never use solutions from bottles that are not labeled.
- ◆ Read the labels of solution bottles at least three times during use to be sure you have the correct solution (figure 13-6).
- ◆ Do *not* mix any solutions together unless instructed to do so by your instructor/imme-



FIGURE 13-6 Read the label on a solution bottle at least three times to be sure you have the correct solution.

- diate supervisor or you can verify that they are compatible.
- ◆ Some solutions can be injurious or poisonous. Avoid contact with your eyes and skin. Avoid inhaling any fumes displaced by a solution. Use only as directed.
- ◆ Store all chemical solutions in a locked cabinet or closet following the manufacturer's recommendations. For example, some solutions must be kept at room temperature, while others must be stored in a cool area.
- ◆ Dispose of chemical solutions according to the instructions provided on the MSDS for the solution.
- ◆ If you break any equipment or spill any solutions, immediately report the incident to your instructor/immediate supervisor. You will be told how to dispose of the equipment or how to remove the spilled solution (figure 13-7).

Patient/Resident Safety

Basic rules that must be followed to protect a patient or resident include:

- ◆ Do *not* perform any procedure on patients unless you have been instructed to do so.



FIGURE 13-7 Follow proper procedure to clean up spilled solutions.

Make sure you have the proper authorization. Follow instructions carefully. Ask questions if you do not understand. Use correct or approved methods while performing any procedure. Avoid shortcuts or incorrect techniques.

- ◆ Provide privacy for all patients. Knock on the door before entering any room (figure 13-8A). Speak to the patient and identify yourself. Ask for permission to enter before going behind

closed privacy curtains. Close the door and/or draw curtains for privacy before beginning a procedure on the patient (figure 13-8B).

- ◆ Always identify your patient. Be absolutely positive that you have the correct patient. Check the identification wristband, if present. Ask the patient to state his or her name. Repeat the patient's name at least twice. Check the name on the patient's bed and on the patient's record.
- ◆ Always explain the procedure so the patient knows what you are going to do (figure 13-8C). Answer any questions and make sure you have the patient's consent before performing any procedure. Never perform a procedure if a patient refuses to allow you to do so.
- ◆ Observe the patient closely during any procedure. If you notice any change, immediately report this. Be alert to the patient's condition at all times.
- ◆ Frequently check the patient area, waiting room, office rooms, bed areas, or home environment for safety hazards. Report all unsafe situations immediately to the proper person or correct the safety hazard.
- ◆ Before leaving a patient/resident in a bed, observe all safety checkpoints. Make sure the patient is in a comfortable position. Check the bed to be sure that the side rails are elevated, if indicated; the bed is at the lowest level to the floor; and the wheels on the bed are locked to prevent movement of the bed. Place the call



FIGURE 13-8A Always knock on the door or speak before entering a patient's room.



FIGURE 13-8B Close the door and draw curtains for privacy before beginning a procedure.



FIGURE 13-8C Explain the procedure and answer any questions to make sure you have the patient's consent.

signal (a bell can be used in a home situation) (figure 13-9A) and other supplies such as the telephone, television remote control, fresh water, and tissues within easy reach of the patient/resident (figure 13-9B). Open the privacy curtains if they were closed. Leave the area neat and clean, and make sure no safety hazards are present.

Personal Safety

Basic rules that must be followed to protect yourself and others include:

- ◆ Remember, it is your responsibility to protect yourself and others from injury.
 - ◆ Use correct body mechanics while performing any procedure.
 - ◆ Wear the required uniform.
 - ◆ Walk—do *not* run—in the laboratory area or clinical area, in hallways, and especially on stairs. Keep to the right and watch carefully at intersections to avoid collisions. Use handrails on stairways.
 - ◆ Promptly report any personal injury or accident, no matter how minor, to your instructor/immediate supervisor.
 - ◆ If you see an unsafe situation or a violation of a safety practice, report it to your instructor/immediate supervisor promptly.
 - ◆ Keep all areas clean and neat with all equipment and supplies in their proper locations at all times.
- ◆ Wash your hands frequently. Hands should always be washed before and after any procedure, and any time they become contaminated during a procedure (figure 13-10).
 - ◆ Keep your hands away from your face, eyes, mouth, and hair.
 - ◆ Dry your hands thoroughly before handling any electrical equipment.
 - ◆ Wear safety glasses when instructed to do so and in situations that might result in possible eye injury.
 - ◆ While working with your partner in patient simulations, observe all safety precautions taught in caring for a patient. Review the role each of you will have before you begin practicing a procedure so each person knows his or her responsibilities. Avoid horseplay and practical jokes; they cause accidents.
 - ◆ If any solutions come in contact with your skin or eyes, immediately flush the area with cool water. Inform your instructor/immediate supervisor.
 - ◆ If a particle gets in your eye, inform your instructor/immediate supervisor. Do *not* try to remove the particle or rub your eye.

STUDENT: Go to the workbook and complete the assignment sheet for 13:2, *Preventing Accidents and Injuries*. Then return and continue with the procedure.



FIGURE 13-9A Lower the bed and place the call signal within easy reach of the patient before leaving a patient.



FIGURE 13-9B Make sure other supplies and equipment are conveniently placed within the patient's reach.



FIGURE 13-10 Wash your hands before and after any procedure, and any time they become contaminated during a procedure.

PROCEDURE 13:2

Preventing Accidents and Injuries

Equipment and Supplies

Information section on Preventing Accidents and Injuries, several bottles of solutions, laboratory area with equipment

Procedure

1. Assemble equipment.
2. Review the safety standards in the information section for Preventing Accidents and Injuries. Note standards that are not clear and ask your instructor for an explanation.
3. Examine several bottles of solutions. Read the labels carefully. Read the safety or danger warnings on the bottles. Read MSDSs provided with hazardous chemicals.
4. Practice reading the label three times to be sure you have the correct solution. Read the label before taking the bottle off the shelf, before pouring from the bottle, and after you have poured from the bottle.
5. Look at major pieces of equipment in the laboratory. Read the operating instructions for the equipment. Do *not* operate the equipment until you are taught how to do it correctly.
6. Role-play the following situations by using another student as a patient.
 - Show ways to provide privacy for the patient.
 - Identify the patient.
 - Explain a procedure to the patient.
 - Check various patient areas in the laboratory. Note any safety hazards that may be present. Discuss how you can correct the problems. Report your findings to your instructor.
7. Observe the patient during a procedure. List points you should observe to note a change in the patient's condition.
7. Discuss the following situations with another student and decide how you would handle them:
 - You see an unsafe situation or a violation of a safety practice
 - You see a wet area on the laboratory counter
 - You get a small cut on your hand while using a glass slide
 - A solution splashes on your arm
 - A particle gets in your eye
 - A piece of equipment is not working correctly
 - A bottle of solution does not have a label
 - You break a glass thermometer.
8. Observe and practice all of the safety regulations as you work in the laboratory.
9. Study the regulations in preparation for the safety examination. You must pass the safety examination.
10. Replace all equipment used.

Practice

Use the evaluation sheet for 13:2, *Preventing Accidents and Injuries*, to practice this procedure. When you believe you have mastered this skill, sign the sheet and give it to your instructor for further action.



Final Checkpoint Using the criteria listed on the evaluation sheet, your instructor will grade your performance.

13:3 INFORMATION



Observing Fire Safety

This information section provides you with basic facts about fires, how they start, and how to prevent them. This information is important for fire safety in the laboratory and work environment.

Fires need three things in order to start (figure 13-11):

- ◆ *Oxygen*: present in the air
- ◆ *Fuel*: any material that will burn
- ◆ *Heat*: sparks, matches, flames

The major cause of fires is carelessness with smoking and with matches. Other causes include misuse of electricity (overloaded circuits, frayed electrical wires, and/or improperly grounded plugs), defects in heating systems, spontaneous ignition, improper rubbish disposal, and arson.

FIRE EXTINGUISHERS

Fire extinguishers are classified and labeled according to the kind of fire they extinguish. The main classes are:

- ◆ *Class A*: used on fires involving combustibles such as paper, cloth, plastic, and wood
- ◆ *Class B*: used on flammable or combustible liquids such as gasoline, oil, paint, grease, and cooking fat fires

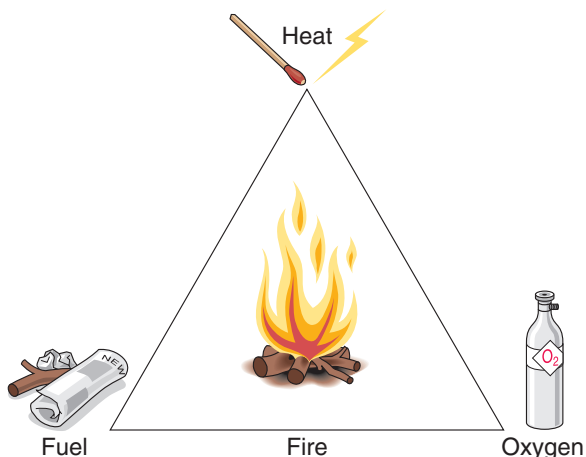


FIGURE 13-11 The fire triangle shows the three things needed to start a fire.

- ◆ *Class C*: used on electrical fires such as fuse boxes, appliances, wiring, and electrical outlets; the C stands for nonconductive; if possible, the electricity should be turned off before using an extinguisher on an electrical fire
- ◆ *Class D*: used on burning or combustible metals; often specific for the type of metal being used and are not used on any other types of fires

Many different types of fire extinguishers are available. The main types include:

- ◆ *Water*: contains pressurized water and should only be used on Class A fires
- ◆ *Carbon dioxide*: contains carbon dioxide gas that provides a smothering action on the fire by forming a cloud of cool ice or snow that displaces the air and oxygen; does leave a powdery, snowlike residue that irritates the skin and eyes and can be dangerous if inhaled; most effective on Class B or C fires
- ◆ *Dry chemical*: contains a chemical that acts to smother a fire; type BC extinguishers contain potassium bicarbonate or sodium bicarbonate, which leaves a mildly corrosive residue that must be cleaned up as soon as possible; type ABC extinguishers contain monoammonium phosphate, a yellow powder that leaves a sticky residue that can damage electrical appliances such as computers; both residues can irritate the skin and eyes; used on Class A, B, or C fires
- ◆ *Halon*: contains a gas that interferes with the chemical reaction that occurs when fuels burn; used on electrical equipment because it does not leave a residue and will not damage appliances such as computers; most effective on Class C fires

Most fire extinguishers are labeled with a diagram and/or a letter showing the type of fire for which they are effective (figure 13-12). Many extinguishers are used on different types of fires and will be labeled with more than one diagram and/or letter. In addition, some extinguishers put all of the diagrams on the label; however, a diagonal red line is drawn through any diagram that depicts a fire for which the extinguisher should not be used. For example, if a diagonal red line is drawn through the diagram for electrical fires, it means the extinguisher should *not* be used on any electrical fire. Health care workers must

CLASSES OF FIRE EXTINGUISHERS



CLASS A

Used for fires of ordinary combustibles such as wood, paper, cloth, and plastics



CLASS B

Used for fires of flammable liquids and gases such as paint, gasoline, oil, grease, and cooking fats



CLASS C

Used for electrical fires such as fuse boxes, wiring, electrical outlets, and appliances; if possible, turn off the electricity before using an extinguisher on this type of fire



CLASS D

Used on burning or combustible metals such as magnesium, titanium, and sodium; specific for the type of metal; not used on other types of fires

FIGURE 13-12 Fire extinguishers contain diagrams and/or letters to show the type of fire on which they should be used.

become familiar with the types and locations of fire extinguishers in their place of employment before a fire occurs so they are prepared to act when faced with this type of situation.

In case of fire, the main rule is to remain calm. If your personal safety is endangered, evacuate the area according to the stated method and sound the alarm. If the fire is small, confined to one area, and your safety is not endangered, determine what type of fire it is and use the proper extinguisher.

FIRE EMERGENCY PLAN

While working in a health care facility, know and follow the fire emergency plan established by the facility (figure 13-13). The plan usually states that all patients and personnel in immediate danger should be moved from the area. The alarm should be activated as quickly as possible. All doors and windows should be closed, if possible, to prevent drafts, which cause fire to spread more rapidly.

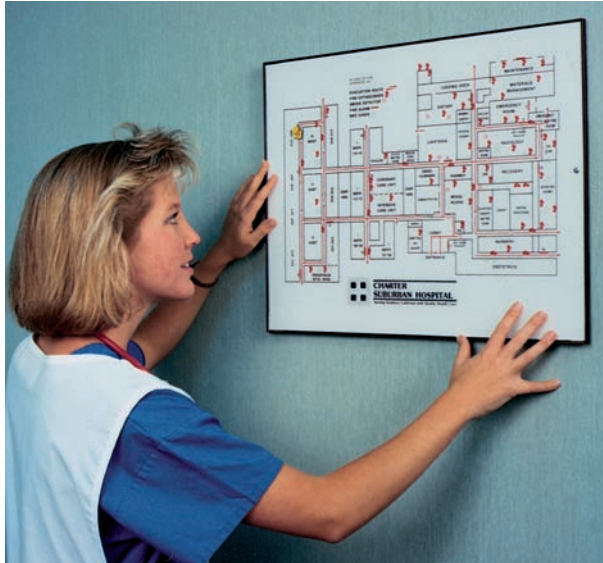


FIGURE 13-13 All personnel must be familiar with the fire emergency plan established by the facility in which they work.

Electrical equipment and oxygen should be shut off. Elevators should never be used during a fire. The acronym *RACE* is frequently used to remember the important steps. *RACE* stands for:

- ◆ *R* = Rescue anyone in immediate danger. Move patients to a safe area. If the patient can walk, escort him or her to a safe area. At times it may be necessary to move a patient in a bed or use the bed sheets as lift sheets to carry a patient to a safe area.
- ◆ *A* = Activate the alarm. Sound the alarm and give the location and type of fire.
- ◆ *C* = Contain the fire. Close windows and doors to prevent drafts. Shut off electrical equipment and oxygen if your safety is not endangered.
- ◆ *E* = Extinguish the fire or evacuate the area. If the fire is small and contained, and you are not in danger, locate the correct fire extinguisher to extinguish the fire. If the fire is large or spreading rapidly, or you or a patient/resident is in danger, evacuate the area.

By following the fire emergency plan, knowing the location of fire extinguishers and exit doors, and remaining calm, the health care worker can help prevent loss of life or serious injury during a fire.

⚠ Preventing fires is everyone's job. Constantly be alert to causes of fires, and correct all sit-

uations that can lead to fires. Some rules for preventing fires are:

- ◆ Obey all "No Smoking" signs. Most health care facilities are now "smoke-free" environments and do not permit smoking anywhere on the premises.
- ◆ Extinguish matches, cigarettes, and any other flammable items completely. Do not empty ashtrays into trash cans or plastic bags that can burn. Always empty ashtrays into separate metal cans or containers partially filled with sand or water.
- ◆ Dispose of all waste materials in proper containers.
- ◆ Before using electrical equipment, check for damaged cords or improper grounding. Avoid overloading electrical outlets.
- ◆ Store flammable materials such as kerosene or gasoline in proper containers and in a safe area. If you spill a flammable liquid, wipe it up immediately.
- ◆ Do not allow clutter to accumulate in rooms, closets, doorways, or traffic areas. Make sure no equipment or supplies block any fire exits.
- ◆ When oxygen is in use, observe special precautions. Post a "No Smoking—Oxygen in Use" sign. Remove all smoking materials, candles, lighters, and matches from the room. Avoid the use of electrically operated equipment whenever possible. Do not use flammable liquids such as alcohol, nail polish, and oils. Avoid static electricity by using cotton blankets, sheets, and gowns.

DISASTER PLANS

⚖ In addition to fires, other types of disasters may occur. Examples include tornadoes, hurricanes, earthquakes, floods, and bomb threats. In any type of disaster, stay calm, follow the policy of the health care facility, and provide for the safety of yourself and the patient. It is important to note that health care workers are legally responsible for familiarizing themselves with disaster policies so appropriate action can be taken when a disaster strikes.

STUDENT: Go to the workbook and complete the assignment sheet for 13:3, *Observing Fire Safety*. Then return and continue with the procedure.

PROCEDURE 13:3


Observing Fire Safety

Equipment and Supplies

Fire alarm box, fire extinguishers

Procedure

1. Read the information section on Observing Fire Safety.
2. Learn the four classes of fire extinguishers and know for which kind of fire each type is used.
3. Locate the nearest fire alarm box. Read the instructions on how to operate the alarm. Be sure you could set off the alarm in case of a fire.
4. Locate any fire extinguishers in the laboratory area. Look for extinguishers in both the room and surrounding building. Identify each extinguisher and the kind of fire for which it is meant to be used.
5. Learn how to operate a fire extinguisher. Read the manufacturer's operating instructions carefully. Work with a practice extinguisher or do a mock demonstration.

 **CAUTION:** Do *not* discharge a real extinguisher in the laboratory.

- a. Check the extinguisher type to be sure it is the proper one to use for the mock fire (figure 13-14A).
- b. Locate the lock or pin at the top handle. Release the lock following the manufacturer's instructions (figure 13-14B).

NOTE: During a mock demonstration, only pretend to release the lock.

- c. Grasp the handle to hold the extinguisher firmly in an upright position.
- d. Stand approximately 6–10 feet from the near edge of the fire.
- e. Aim the nozzle at the fire (figure 13-14C).
- f. Discharge the extinguisher. Use a side-to-side motion. Spray toward the near edge of the fire at the bottom of the fire.



FIGURE 13-14A Check the extinguisher type to make sure it is the correct one to use.



FIGURE 13-14B Release the pin.

PROCEDURE 13:3



FIGURE 13-14C Aim the nozzle at the near edge of the fire, and push the handle to discharge the extinguisher.

CAUTION: Do not spray into the center or top of the fire, because this will cause the fire to spread in an outward direction.

- g. Continue with the same side-to-side motion until the fire is extinguished.

NOTE: The word *PASS* can help you remember the correct steps:

P = Pull the pin.

A = Aim the extinguisher at the near edge and bottom of the fire.

S = Squeeze the handle to discharge the extinguisher.

S = Sweep the extinguisher from side to side at the base of the fire.

- h. At all times, stay a safe distance from the fire to avoid personal injury.

CAUTION: Avoid contact with residues from chemical extinguishers.

- i. After an extinguisher has been used, it must be recharged or replaced. Another usable extinguisher must be put in position when the extinguisher is removed.

6. Check the policy in your area for evacuating the laboratory area during a fire. Practice the method and know the locations of all exits.

NOTE: Remember to remain calm and avoid panic.

7. Replace all equipment used.

Practice

Use the evaluation sheet for 13:3, Observing Fire Safety, to practice this procedure. When you believe you have mastered this skill, sign the sheet and give it to your instructor for further action.

Practice

Study the safety regulations throughout Chapter 13 in preparation for the safety examination.

Final Checkpoint Using the criteria listed on the evaluation sheet, your instructor will grade your performance.

Final Checkpoint Take the safety examination and obtain a passing grade to demonstrate your knowledge of safety.

TODAY'S RESEARCH: TOMORROW'S HEALTH CARE

Draino for blood vessels?

Cardiovascular (heart and blood vessel) disease is the leading cause of death in the United States. Fatty plaques, caused mainly by an accumulation of LDL (low-density lipoprotein, or “bad” cholesterol), block the flow of blood in arterial walls, triggering a heart attack or stroke. HDL (high-density lipoprotein, or “good” cholesterol) helps protect the body from cardiovascular disease. HDL carries fats to the liver for disposal, helps prevent clots, and decreases inflammation in the blood vessels. For years, researchers have tried to find ways to increase the level of HDL while decreasing the level of LDL in the blood.

Scientists may have found the key to solve this problem in a small village in Italy. They discovered that residents of this village seemed to be immune to heart disease. Research showed that these individuals have a mutant gene that produces a powerful version of HDL. Scientists have produced a synthetic version of this HDL called *apo A-1 Milano*. When it was injected into a small group of volunteer heart patients, plaque in blood vessels was reduced by 4 percent and no new plaque buildup occurred. Scientists called it a miracle “blood vessel Draino.” However, apo A-1 Milano is expensive to produce because it is a protein. It also must be injected into the body by an intravenous infusion, making it even more costly and inconvenient. Research is now directed toward gene therapy where the codes for the apo A-1 Milano protein are transferred into the body so the body can produce its own powerful version of HDL.

Scientists are also evaluating other methods to increase levels of HDL. They have discovered an enzyme called *cholesteryl ester transfer protein* that appears to reduce HDL levels and increase the levels of harmful LDL. Research is being conducted on new drugs that will block this enzyme. Who knows which approach will be most successful, but scientists will find the answer.

CHAPTER 13 SUMMARY

Safety is the responsibility of every health care worker. It is essential that established safety standards be observed by everyone. This protects the worker, the employer, and the patient.

One important aspect of safety is the correct use of body mechanics. Body mechanics refer to the way the body moves and maintains balance while making the most efficient use of all of its parts. Practicing basic principles of good body mechanics prevents strain and maintains muscle strength. In addition, correct body mechanics make lifting, pulling, and pushing easier.

Knowing and following basic safety standards is also important. In this unit, basic standards are listed in regard to the use of equipment and solutions, patient safety, and personal safety. It is important for everyone to learn and follow the established standards at all times.

An awareness of the causes and prevention of fires is essential. Every health care worker should be familiar with the types and use of fire extinguishers. In addition, every facility has a fire emergency plan. By following the fire emergency plan, knowing the location of fire extinguishers and exit doors, and remaining calm, the health care worker can help prevent loss of life or serious injury during a fire and/or a disaster.

INTERNET SEARCHES

Use the suggested search engines in Chapter 12:4 of this textbook to search the Internet for additional information on the following topics:

1. *Federal regulations*: obtain more information on federal safety regulations by searching sites of the Occupational Safety and Health Administration (OSHA), Occupational Exposure to

Hazardous Chemicals Standard, Bloodborne Pathogen Standard, and Material Safety Data Sheets (MSDSs)

2. *Ergonomics*: search for additional information on ergonomics and environmental safety
3. *Diseases*: obtain information on the causative agents and methods of transmission for hepatitis B and C and acquired immune deficiency syndrome (AIDS)
4. *Fire safety*: search for information on fire prevention and fire safety
5. *Fire extinguishers*: search for various manufacturers of fire extinguishers and obtain information on the types of extinguishers, their main uses, precautions for handling, and safety rules that must be observed while using extinguishers
6. *Disasters*: obtain information on safety procedures that must be followed for tornadoes, floods, hurricanes, earthquakes, bomb threats, or explosions

REVIEW QUESTIONS

1. Define *body mechanics* and list four (4) reasons why it is important to use good body mechanics.
2. You are using an electrical microhematocrit centrifuge to spin blood. You see smoke coming from the back of the machine. What should you do?
3. List four (4) safety precautions that must be followed while using solutions.
4. Identify three (3) things that must be done before performing any procedure on a patient.
5. State five (5) checkpoints that must be observed before leaving a patient/resident in bed.
6. List five (5) rules that must be followed while oxygen is in use.
7. What does the acronym *RACE* stand for?
8. Create a chart showing the four (4) main types of fire extinguishers and the type of fire for which each is effective.
9. What does the acronym *PASS* stand for?