



**American
Red Cross**

First Aid/CPR/AED

PARTICIPANT'S MANUAL





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This participant's manual is part of the American Red Cross First Aid/CPR/AED program. By itself, it does not constitute complete and comprehensive training. Visit redcross.org to learn more about this program.

The emergency care procedures outlined in this book reflect the standard of knowledge and accepted emergency practices in the United States at the time this book was published. It is the reader's responsibility to stay informed of changes in emergency care procedures.

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Acknowledgments

This is the fourth edition of the *American Red Cross First Aid/CPR/AED Participant's Manual*. This is a revised version of the text that was previously published under the title, *First Aid/CPR/AED for Schools and the Community*.

This manual is dedicated to the thousands of employees and volunteers of the American Red Cross who contribute their time and talent to supporting and teaching life-saving skills worldwide and to the thousands of course participants and other readers who have decided to be prepared to take action when an emergency strikes.

This manual reflects the 2010 Consensus on Science for CPR and Emergency Cardiovascular Care (ECC) and the Guidelines 2010 for First Aid. These treatment recommendations and related training guidelines have been reviewed by the American Red Cross Scientific Advisory Council, a panel of nationally recognized experts in fields that include emergency medicine, occupational health, sports medicine, school and public health, emergency medical services (EMS), aquatics, emergency preparedness and disaster mobilization.

The *American Red Cross First Aid/CPR/AED Participant's Manual* was developed through the dedication of both employees and volunteers. Their commitment to excellence made this manual possible.

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About This Manual

This manual has been designed to help you acquire the knowledge and skills you will need to effectively respond to emergency situations. The following pages point out some of the manual's special features.

CHAPTER 4
Breathing Emergencies



A breathing emergency is any respiratory problem that can threaten a person's life. Breathing emergencies happen when we cannot travel freely and easily into the lungs. Respiratory distress, respiratory arrest and choking are examples of breathing emergencies. In a breathing emergency, seconds count so you must react at once. This chapter discusses how to recognize and care for breathing emergencies.

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▲ **Chapter Openers**
Each chapter concentrates on an essential component of the American Red Cross First Aid/CPR/AED course. Material is presented in a clear and concise manner, complete with color imagery.

FOCUS ON PREVENTION

POISONING

Use common sense when handling substances that could be harmful, such as chemicals and cleaners. Use them in a well-ventilated area. Wear protective clothing, such as gloves and a facemask.

Use common sense with your own medications. Read the product information and use only as directed. Ask your health care provider or pharmacist about the intended effects, side effects and possible interactions with other medications that you are taking. Never use another person's prescribed medications. What is right for one person often is wrong for another.

Always keep medications in their original containers. Make sure that the container is well marked with the original pharmacy labeling. If taking several medications, always check the label to ensure that you are taking the correct medication, and be especially aware of possible adverse drug interactions.

Over time, expired medications can become less effective and even toxic to humans if consumed. Dispose of out-of-date or unused medications properly by following the guidelines below.

Most medications should be thrown away in the household trash and not flushed down the toilet. Follow these steps to maintain safety and protect the environment from unnecessary exposure to medications.

1. Place the medication out of the original container into a sealable plastic bag.
2. Mix the medication with something that will hide the medication or make it unpalatable (e.g., coffee grounds or kitty litter).
3. Seal the plastic bag.
4. Throw the plastic bag into your household trash.
5. Remove and destroy all personal information and medication information (prescription label) from the medication container. Recycle or throw away the medication container.

Another option is to check if your state or local community has a community-based household hazardous waste collection program. You may be able to take your expired and unused medications to your pharmacy or another location for disposal.

The U.S. Food and Drug Administration (FDA) website maintains a list of some of the medications that should be flushed down the toilet. These medications are especially dangerous to humans and pets. One dose could cause death if taken by someone other than the person for whom it was prescribed. Flushing these medications avoids any chance that children or pets would ingest them accidentally.

According to the FDA, any possible risk to people and the environment from flushing these few medications is small. The FDA maintains that the risk is outweighed by the possibility of someone accidentally ingesting these medications, which could be life-threatening.

Preventing Poisoning in Children
Many substances found in or around the house are poisonous. Children younger than 3 years and infants are able to crawl and are especially likely to be poisoned because of their curious nature, and because they explore their world through touching and putting things around them (Fig. 4-6). If you see or are near young children, be warned: it only takes a moment for a small child to get into trouble.




FIGURE 4-6 Always supervise young children closely, especially in areas where common household toxicants are stored.

(Continued)

CHAPTER 4 | Sudden Illness 81

▲ **Prevention and Preparedness Boxes**
These sidebars expand on the essential prevention and preparedness information covered in the course. They appear in most chapters.

SKILL SHEET

CPR-CHILD
NO BREATHING

AFTER CHECKING THE SCENE AND THE INJURED OR ILL CHILD:

- 1 GIVE 30 CHEST COMPRESSIONS**
Push hard, push fast in the center of the chest about 2 inches deep and at least 100 compressions per minute.
TIP: The child must lie on a flat surface.



- 2 GIVE 2 RESCUE BREATHS**
Tilt the head back and lift the chin up.
Pinch the nose shut then make a complete seal over the child's mouth.
Blow for about 1 second to make the chest clearly rise.
Give rescue breaths, one after the other.
If chest does not rise with rescue breaths, retilt the head and give another rescue breath.



- 3 DO NOT STOP**
Continue cycles of CPR. Do not stop except in one of these situations:
 - You find an obvious sign of life, such as breathing.
 - An AED is ready to use.
 - Another trained responder or EMS personnel take over.
 - You are too exhausted to continue.
 - The scene becomes unsafe.**TIP:** If it says that you must be a certain age of 16, and CPR and AED are not available, get help as quickly as possible.

WHAT TO DO NEXT

- USE AN AED AS SOON AS ONE IS AVAILABLE.
- IF BREATHS DO NOT MAKE CHEST RISE AFTER RETILTING THE HEAD—Give CARE for unconscious choking.

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▲ **Skill Sheets**
At the end of certain chapters, skill sheets give step-by-step directions for performing specific skills. Photographs enhance each skill sheet. Learning specific skills that you will need to give appropriate care for victims of sudden illness or injury is an important part of this course.

Health Precautions and Guidelines During First Aid Training

The American Red Cross has trained millions of people in first aid and cardiopulmonary resuscitation (CPR) using manikins as training aids.

The Red Cross follows widely accepted guidelines for cleaning and decontaminating training manikins. **If these guidelines are adhered to, the risk of any kind of disease transmission during training is extremely low.**

To help minimize the risk of disease transmission, you should follow some basic health precautions and guidelines while participating in training. You should take precautions if you have a condition that would increase your risk or other participants' risk of exposure to infections. Request a separate training manikin if you—

- Have an acute condition, such as a cold, a sore throat, or cuts or sores on the hands or around your mouth.
- Know you are seropositive (have had a positive blood test) for hepatitis B surface antigen (HBsAg), indicating that you are currently infected with the hepatitis B virus.*
- Know you have a chronic infection indicated by long-term seropositivity (long-term positive blood tests) for the hepatitis B surface antigen (HBsAg)* or a positive blood test for anti-HIV (that is, a positive test for antibodies to HIV, the virus that causes many severe infections including AIDS).
- Have had a positive blood test for hepatitis C (HCV).
- Have a type of condition that makes you unusually likely to get an infection.

To obtain information about testing for individual health status, visit the CDC Web site at:
www.cdc.gov/ncidod/diseases/hepatitis/c/faq.htm

After a person has had an acute hepatitis B infection, he or she will no longer test positive for the surface antigen but will test positive for the hepatitis B antibody (anti-HBs). Persons who have been vaccinated for hepatitis B will also test positive for the hepatitis B antibody. A positive test for the hepatitis B antibody (antiHBs) should not be confused with a positive test for the hepatitis B surface antigen (HBsAg).

If you decide you should have your own manikin, ask your instructor if he or she can provide one for you to use. You will *not* be asked to explain why in your request. The manikin will not be used by anyone else until it has been cleaned according to the recommended end-of-class decontamination procedures. Because the number of manikins available for class use is limited, the more advance notice you give, the more likely it is that you can be provided a separate manikin.

*A person with hepatitis B infection will test positive for the hepatitis B surface antigen (HBsAg). Most persons infected with hepatitis B will get better within a period of time. However, some hepatitis B infections will become chronic and will linger for much longer. These persons will continue to test positive for HBsAg. Their decision to participate in CPR training should be guided by their physician.

Some people are sensitive to certain allergens and may have an allergic reaction. If you start experiencing skin redness, rash, hives, itching, runny nose, sneezing, itchy eyes, scratchy throat or signs of asthma, wash your hands immediately. If conditions persist or you experience a severe reaction, stop training and seek medical attention right away.

GUIDELINES

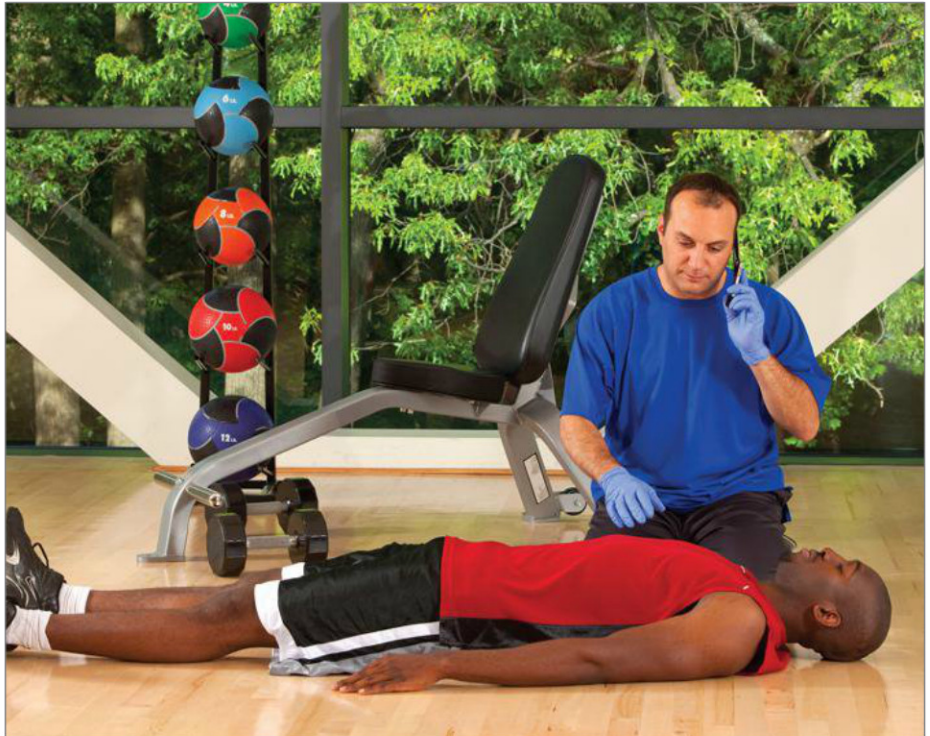
In addition to taking the precautions regarding manikins, you can further protect yourself and other participants from infection by following these guidelines:

- Wash your hands thoroughly before participating in class activities.
- Do not eat, drink, use tobacco products or chew gum during class when manikins are used.
- Clean the manikin properly before use.
- For some manikins, this means vigorously wiping the manikin's face and the inside of its mouth with a clean gauze pad soaked with either a fresh solution of liquid chlorine bleach and water ($\frac{1}{4}$ cup sodium hypochlorite per gallon of tap water) or rubbing alcohol. The surfaces should remain wet for at least 1 minute before they are wiped dry with a second piece of clean, absorbent material.
- For other manikins, it means changing the manikin's face. Your instructor will provide you with instructions for cleaning the type of manikin used in your class.
- Follow the guidelines provided by your instructor when practicing skills such as clearing a blocked airway with your finger.

PHYSICAL STRESS AND INJURY

Successful course completion requires full participation in classroom and skill sessions, as well as successful performance in skill and knowledge evaluations. Due to the nature of the skills in this course, you will be participating in strenuous activities, such as performing CPR on the floor. If you have a medical condition or disability that will prevent you from taking part in the skills practice sessions, please let your instructor know so that accommodations can be made. If you are unable to participate fully in the course, participate as much as you can or desire. Be aware that you will *not* be eligible to receive a course completion certificate unless you participate fully and meet all course objectives and prerequisites.

Before Giving Care and Checking an Injured or Ill Person



Medical emergencies can happen every day, in any setting. People are injured in situations like falls or motor-vehicle accidents, or they develop sudden illnesses, such as heart attack or stroke.

The statistics are sobering. For example, about 900,000 people in the United States die each year from some form of heart disease. More than 300,000 of these deaths are caused by sudden cardiac arrest. Heart disease is the number one cause of death in this country.

Another leading cause of death is unintentional injury. In 2008, approximately 118,000 Americans died from an unintentional injury and another 25.7 million were disabled.

Given the large number of injuries and sudden illnesses that occur in the United States each year, it is possible that you might have to deal with an emergency situation someday. If you do, you should know who and when to call, what care to give and how to give that care until emergency medical help takes over.

This chapter discusses your role in the emergency medical services (EMS) system, the purpose of Good Samaritan laws, how to gain consent from an injured or ill person and how to reduce your risk of disease transmission while giving care.

In addition, you will read about the emergency action steps, **CHECK—CALL—CARE**, which guide you on how to check and give emergency care for an injured or suddenly ill person. You also will read about the effects of incident stress and how to identify the signals of shock and minimize its effects.

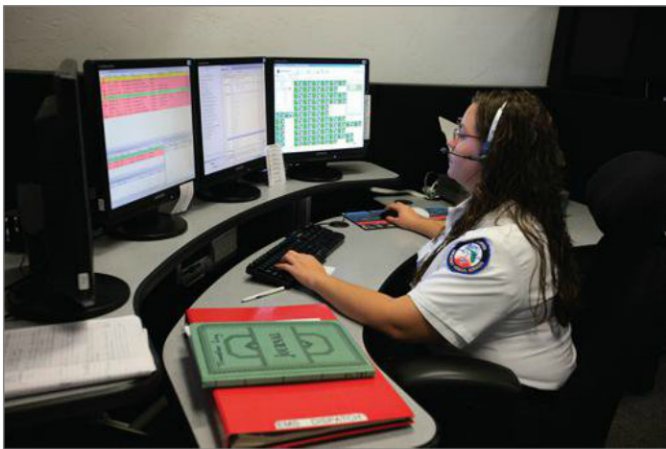


FIGURE 1-1 EMS call taker or dispatcher

YOUR ROLE IN THE EMS SYSTEM

You play a major role in making the EMS system work effectively. The EMS system is a network of community resources, including police, fire and medical personnel—and you.

The system begins when someone like you recognizes that an emergency exists and decides to take action, such as calling 9-1-1 or the local emergency number for help. The EMS dispatcher or call taker answers the call and uses the information that you give to determine what help is needed (Fig. 1-1). Emergency personnel are dispatched to the scene based on the information given. These personnel then give care at the scene and transport the injured or ill person to the hospital where emergency department staff and other professionals take over.

Early arrival of emergency personnel increases a person's chance of surviving a life-threatening emergency. Calling 9-1-1 or the local emergency number is the most important action that you can take.

Your role in the EMS system includes four basic steps:

- Step 1: Recognize that an emergency exists.
- Step 2: Decide to act.

Step 3: Activate the EMS system.

Step 4: Give care until help takes over.

Step 1: Recognize that an Emergency Exists

Emergencies can happen to anyone, anywhere. Before you can give help, however, you must be able to recognize an emergency. You may realize that an emergency has occurred only if you become aware of unusual noises, sights, odors and appearances or behaviors. Examples include the following:

- Unusual noises
 - Screaming, moaning, yelling or calls for help
 - Breaking glass, crashing metal or screeching tires
 - A change in the sound made by machinery or equipment
 - Sudden, loud noises, such as the sound of collapsing buildings or falling ladders
 - Unusual silence
- Unusual sights
 - A stopped vehicle on the roadside or a car that has run off of the road
 - Downed electrical wires
 - A person lying motionless
 - Spilled medication or empty container
 - An overturned pot in the kitchen
 - Sparks, smoke or fire (Fig. 1-2, A)
- Unusual odors
 - Odors that are stronger than usual
 - Unrecognizable odors
 - Inappropriate odors
- Unusual appearances or behaviors
 - Unconsciousness (Fig. 1-2, B)
 - Confusion, drowsiness or unusual behavior (Fig. 1-2, C)
 - Trouble breathing
 - Sudden collapse, slip or fall



A



B



C

FIGURE 1-2, A-C Unusual sights or behavior may indicate an emergency.

- Clutching the chest or throat
- A person doubled over in pain
- Slurred, confused or hesitant speech
- Sweating for no apparent reason
- Uncharacteristic skin color
- Inability to move a body part

Step 2: Decide to Act

Once you recognize that an emergency has occurred, you must decide how to help and what to do. There are many ways you can help in an emergency, but in order to help, you must act.

Overcoming Barriers to Act

Being faced with an emergency may bring out mixed feelings. While wanting to help, you also may feel hesitant or may want to back away from the situation. These feelings are personal and real.

Sometimes, even though people recognize that an emergency has occurred, they fail to act. The most common factors that keep people from responding are:

- Panic or fear of doing something wrong
- Being unsure of the person's condition and what to do
- Assuming someone else will take action
- Type of injury or illness
- Fear of catching a disease (see the Disease Transmission and Prevention section in this chapter)
- Fear of being sued (see discussion of Good Samaritan laws in this chapter)
- Being unsure of when to call 9-1-1 or the local emergency number

Panic or Fear of Doing Something Wrong

People react differently in emergencies. Some people are afraid of doing the wrong thing and making matters worse. Sometimes people simply panic. Knowing what to do in an emergency can instill confidence that can help you to avoid panic and be able to provide the right care. If you are not sure what to do, call 9-1-1 or the local emergency number and follow the instructions of the EMS dispatcher or call taker. The worst thing to do is nothing.

Being Unsure of the Person's Condition and What to Do

Because most emergencies happen in or near the home, you are more likely to find yourself giving care to a family member or a friend than to someone you do not know. However, you may be faced with an emergency

situation involving a stranger, and you might feel uneasy about helping someone whom you do not know. For example, the person may be much older or much younger than you, be of a different gender or race, have a disabling condition, be of a different status at work or be the victim of a crime.

Sometimes, people who have been injured or become suddenly ill may act strangely or be uncooperative. The injury or illness; stress; or other factors, such as the effects of drugs, alcohol or medications, may make people unpleasant or angry. Do not take this behavior personally. If you feel at all threatened by the person's behavior, leave the immediate area and call 9-1-1 or the local emergency number for help.

Assuming Someone Else Will Take Action

If several people are standing around, it might not be easy to tell if anyone is giving care. Always ask if you can help. Just because there is a crowd does not mean someone is caring for the injured or ill person. In fact, you may be the only one on the scene who knows first aid.

Although you may feel embarrassed about coming forward in front of other people, this should not stop you from offering help. Someone has to take action in an emergency, and it may have to be you.

If others already are giving care, ask if you can help. If bystanders do not appear to be helping, tell them how to help. You can ask them to call 9-1-1 or the local emergency number, meet the ambulance and direct it to your location, keep the area free of onlookers and traffic, send them for blankets or other supplies such as a first aid kit or an automated external defibrillator (AED), or help to give care.

The Type of Injury or Illness

An injury or illness sometimes may be very unpleasant. Blood, vomit, bad odors, deformed body parts, or torn or burned skin can be very upsetting. You may have to turn away for a moment and take a few deep breaths to get control of your feelings before you can give care. If you still are unable to give care, you can help in other ways, such as volunteering to call 9-1-1 or the local emergency number.

Fear of Catching a Disease

Many people worry about the possibility of being infected with a disease while giving care. Although it is possible for diseases to be transmitted in a first aid situation, it is extremely unlikely that you will catch a disease this way. (For more information on disease transmission, see the Disease Transmission section in this chapter.)

Fear of Being Sued

Sometimes people worry that they might be sued for giving care. In fact, lawsuits against people who give emergency care at a scene of an accident are highly unusual and rarely successful.

Good Samaritan Laws

The vast majority of states and the District of Columbia have Good Samaritan laws that protect people against claims of negligence when they give emergency care in good faith without accepting anything in return. Good Samaritan laws usually protect citizens who act the same way that a “reasonable and prudent person” would if that person were in the same situation. For example, a reasonable and prudent person would:

- Move a person only if the person’s life were in danger.
- Ask a conscious person for permission, also called consent, before giving care.
- Check the person for life-threatening conditions before giving further care.
- Call 9-1-1 or the local emergency number.
- Continue to give care until more highly trained personnel take over.

Good Samaritan laws were developed to encourage people to help others in emergency situations. They require the “Good Samaritan” to use common sense and a reasonable level of skill and to give only the type of emergency care for which he or she is trained. They assume each person would do his or her best to save a life or prevent further injury.

Non-professionals who respond to emergencies, also called “lay responders,” rarely are sued for helping in an emergency. Good Samaritan laws protect the responder from financial responsibility. In cases in which a lay responder’s actions were deliberately negligent or reckless or when the responder abandoned the person after starting care, the courts have ruled Good Samaritan laws do not protect the responder.

For more information about your state’s Good Samaritan laws, contact a legal professional or check with your local library.

Being Unsure When to Call 9-1-1

People sometimes are afraid to call 9-1-1 or the local emergency number because they are not sure that the situation is a real emergency and do not want to waste the time of the EMS personnel.

Your decision to act in an emergency should be guided by your own values and by your knowledge of the risks that may be present. However, even if you

decide not to give care, you should at least call 9-1-1 or the local emergency number to get emergency medical help to the scene.

Step 3: Activate the EMS System

Activating the EMS system by calling 9-1-1 or the local emergency number is the most important step you can take in an emergency. Remember, some facilities, such as hotels, office and university buildings, and some stores, require you to dial a 9 or some other number to get an outside line before you dial 9-1-1.

Also, a few areas still are without access to a 9-1-1 system and use a local emergency number instead. Becoming familiar with your local system is important because the rapid arrival of emergency medical help greatly increases a person’s chance of surviving a life-threatening emergency.

When your call is answered, an emergency call taker (or dispatcher) will ask for your phone number, address, location of the emergency and questions to determine whether you need police, fire or medical assistance.

You should not hang up before the call taker does so. Once EMS personnel are on the way, the call taker may stay on the line and continue to talk with you. Many call takers also are trained to give first aid instructions so they can assist you with life-saving techniques until EMS personnel take over.

Step 4: Give Care Until Help Takes Over

This manual and the American Red Cross First Aid/CPR/AED courses provide you with the confidence, knowledge and skills you need to give care to a person in an emergency medical situation.

In general, you should give the appropriate care to an ill or injured person until:

- You see an obvious sign of life, such as breathing.
- Another trained responder or EMS personnel take over.
- You are too exhausted to continue.
- The scene becomes unsafe.

If you are prepared for unforeseen emergencies, you can help to ensure that care begins as soon as possible for yourself, your family and your fellow citizens. If you are trained in first aid, you can give help that can save a life in the first few minutes of an emergency. First aid can be the difference between life and death. Often, it makes the difference between complete recovery and permanent disability. By knowing what to do and acting on that knowledge, you can make a difference.

Getting Permission to Give Care

People have a basic right to decide what can and cannot be done to their bodies. They have the legal right to accept or refuse emergency care. Therefore, before giving care to an injured or ill person, you must obtain the person's permission.

To get permission from a conscious person, you must first tell the person who you are, how much training you have (such as training in first aid, CPR and/or AED), what you think is wrong and what you plan to do. You also must ask if you may give care. When a conscious person who understands your questions and what you plan to do gives you permission to give care, this is called *expressed consent*. Do not touch or give care to a conscious person who refuses it. If the person refuses care or withdraws consent at any time, step back and call for more advanced medical personnel.

Sometimes, adults may not be able to give expressed consent. This includes people who are unconscious or unable to respond, confused, mentally impaired, seriously injured or seriously ill. In these cases, the law assumes that if the person could respond, he or she would agree to care. This is called *implied consent*.

If the conscious person is a child or an infant, permission to give care must be obtained from a parent or guardian when one is available. If the condition is life threatening, permission—or consent—is implied if a parent or guardian is not present. If the parent or guardian is present but does not give consent, do not give care. Instead, call 9-1-1 or the local emergency number.

DISEASE TRANSMISSION AND PREVENTION

Infectious diseases—those that can spread from one person to another—develop when germs invade the body and cause illness.

How Disease Spreads

The most common germs are bacteria and viruses. Bacteria can live outside of the body and do not depend on other organisms for life. The number of bacteria that infect humans is small, but some cause serious infections. These can be treated with medications called *antibiotics*.

Viruses depend on other organisms to live. Once in the body, it is hard to stop their progression. Few medications can fight viruses. The body's immune system is its number one protection against infection.

Bacteria and viruses spread from one person to another through direct or indirect contact. *Direct contact* occurs when germs from the person's blood or other body fluids pass directly into your body through breaks or cuts in your skin or through the lining of your mouth, nose or eyes.

Some diseases, such as the common cold, are transmitted by droplets in the air we breathe. They can be passed on through *indirect contact* with shared objects like spoons, doorknobs and pencils that have been exposed to the droplets. Fortunately, exposure to these germs usually is not adequate for diseases to be transmitted.

Animals, including humans and insects, also can spread some diseases through bites. Contracting a disease from a bite is rare in any situation and uncommon when giving first aid care.

Some diseases are spread more easily than others. Some of these, like the flu, can create discomfort but often are temporary and usually not serious for healthy adults.

Other germs can be more serious, such as the Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Human Immunodeficiency Virus (HIV), which causes Acquired Immune Deficiency Syndrome (AIDS) (see HIV and AIDS box in this chapter). Although serious, they are not easily transmitted and are not spread by casual contact, such as shaking hands. The primary way to transmit HBV, HCV or HIV during first aid care is through blood-to-blood contact.

Preventing Disease Transmission

By following some basic guidelines, you can greatly decrease your risk of getting or transmitting an infectious disease while giving care or cleaning up a blood spill.

While Giving Care

To prevent disease transmission when giving care, follow what are known as *standard precautions*:

- Avoid contact with blood and other body fluids or objects that may be soiled with blood and other body fluids.
- Use protective CPR breathing barriers.
- Use barriers, such as disposable gloves, between the person's blood or body fluids and yourself.
- Before putting on personal protective equipment (PPE), such as disposable gloves, cover any of your own cuts, scrapes or sores with a bandage.
- Do not eat, drink or touch your mouth, nose or eyes when giving care or before you wash your hands after care has been given.

BE PREPARED FOR AN INJURY OR ILLNESS!

Important Information

- Keep medical information about you and your family in a handy place, such as on the refrigerator door or in your car's glove compartment. Keep medical and insurance records up to date.
- Wear a medical ID tag, bracelet or necklace if you have a potentially serious medical condition, such as epilepsy, diabetes, heart disease or allergies.
- Make sure your house or apartment number is easy to read. Numerals are easier to read than spelled-out numbers.

Emergency Telephone Numbers

- Keep all emergency telephone numbers in a handy place, such as by the telephone or in the first aid kit. Include home and work numbers of family members and friends. Be sure to keep both lists current.
- If your wireless phone came pre-programmed with the auto-dial 9-1-1 feature turned on, turn off the feature.
- Do not program your phone to automatically dial 9-1-1 when one button, such as the "9" key is pressed. Unintentional 9-1-1 calls, which often occur with auto-dial keys, cause problems for emergency call centers.
- Lock your keypad when you're not using your wireless phone. This action prevents automatic calls to 9-1-1.
- Most communities are served by an emergency 9-1-1 telephone number. If your community does not operate on a 9-1-1 system, look up the numbers for the police, fire department and EMS personnel. Emergency numbers usually are listed in the front of the telephone book. Know the number for the National Poison Control Center Hotline, 1-800-222-1222, and post it on or near your telephones. Teach everyone in your home how and when to use these numbers.
- Many 9-1-1 calls in the United States are not emergencies. For this reason, some cities have

started using 3-1-1 (or similar) as a number for people to call for non-emergency situations. Find out if your area uses this number. Remember, your local emergency number is for just that—emergencies! So, please use good judgment.

First Aid Kit

- Keep a first aid kit in your home, car, workplace and recreation area. A well-stocked first aid kit is a handy thing to have. Carry a first aid kit with you or know where you can find one. Find out the location of first aid kits where you work or for any place where you spend a lot of time. First aid kits come in many shapes and sizes. You can purchase one from redcross.org or the local American Red Cross chapter. Your local drug store may sell them. You also may make your own. Some kits are designed for specific activities, such as hiking, camping or boating. Whether you buy a first aid kit or put one together, make sure it has all of the items you may need. Include any personal items such as medications and emergency phone numbers or other items suggested by your health care provider. Check the kit regularly. Make sure that flashlight batteries work. Check expiration dates and replace any used or out-of-date contents.
- The Red Cross recommends that all first aid kits for a family of four include the following:
 - 2 absorbent compress dressings (5 x 9 inches)
 - 25 adhesive bandages (assorted sizes)



(Continued)

FOCUS ON PREPAREDNESS *(Continued)*

- 1 adhesive cloth tape (10 yards x 1 inch)
- 5 antibiotic ointment packets (approximately 1 gram each)
- 5 antiseptic wipe packets
- 2 packets of chewable aspirin (81 mg each)
- 1 blanket (space blanket)
- 1 CPR breathing barrier (with one-way valve)
- 1 instant cold compress
- 2 pairs of non-latex gloves (size: large)
- 2 hydrocortisone ointment packets (approximately 1 gram each)
- Scissors
- 1 roller bandage (3 inches wide)
- 1 roller bandage (4 inches wide)
- 5 sterile gauze pads (3 x 3 inches)
- 5 sterile gauze pads (4 x 4 inches)
- Oral thermometer (nonmercury/nonglass)
- 2 triangular bandages
- Tweezers
- First aid instruction booklet

For items to include in a workplace first aid kit, see the latest ANSI/ISEA-Z308-1 standard for minimum requirements.

Be Prepared

- Learn and practice CPR and first aid skills.
- Learn how to use an AED for victims of sudden cardiac arrest.

- Avoid handling any of your personal items, such as pens or combs, while giving care or before you wash your hands.
- Do not touch objects that may be soiled with blood or other body fluids.
- Be prepared by having a first aid kit handy and stocked with PPE, such as disposable gloves, CPR breathing barriers, eye protection and other supplies.
- Wash your hands thoroughly with soap and warm running water when you have finished giving care, even if you wore disposable gloves. Alcohol-based hand sanitizers allow you to clean your hands when soap and water are not readily available and your hands are not visibly soiled. (Keep alcohol-based hand sanitizers out of reach of children.)
- Tell EMS personnel at the scene or your health care provider if you have come into contact with an injured or ill person's body fluids.
- If an exposure occurs in a workplace setting, follow your company's exposure control plan for reporting incidents and follow-up (post-exposure) evaluation.
- Use disposable gloves and other PPE when cleaning spills.
- Wipe up the spill with paper towels or other absorbent material.
 - If the spill is mixed with sharp objects, such as broken glass or needles, do not pick these up with your hands. Use tongs, a broom and dustpan or two pieces of cardboard to scoop up the sharp objects.
- After the area has been wiped up, flood the area with an appropriate disinfectant, such as a solution of approximately 1½ cups of liquid chlorine bleach

While Cleaning Up Blood Spills

To prevent disease transmission while cleaning up a blood spill:

- Clean up the spill immediately or as soon as possible after the spill occurs (Fig. 1-3).



FIGURE 1-3 *Cleaning up a blood spill*

HIV AND AIDS

AIDS is a condition caused by HIV. When HIV infects the body, it damages the body's immune system and impairs its ability to fight other infections. The virus can grow quietly for months or even years. People infected with HIV might not feel or look sick. Eventually, the weakened immune system allows certain types of infections to develop. This condition is known as AIDS. People with AIDS eventually develop life-threatening infections, which can cause them to die. Because currently there is no vaccine against HIV, prevention still is the best tool.

The two most likely ways for HIV to be transmitted during care would be through:

- **Unprotected direct contact with infected blood.** *This type of transmission could happen if infected blood or body fluids from one person enter another person's body at a correct entry site. For example, a responder could contract HIV if the infected person's blood splashes in the responder's eye or if the responder directly touches the infected person's body fluids.*
- **Unprotected indirect contact with infected blood.** *This type of transmission could happen if a person touches an object that contains the blood or other body fluids of an infected person, and that infected blood or other body fluid enters the body through a correct entry site. For example, HIV could be transmitted if*

a responder picks up a blood-soaked bandage with a bare hand and the infected blood enters the responder's hand through a cut in the skin.

The virus cannot enter through the skin unless there is a cut or break in the skin. Even then, the possibility of infection is very low unless there is direct contact for a lengthy period of time. Saliva is not known to transmit HIV.

The likelihood of HIV transmission during a first aid situation is very low. Always give care in ways that protect you and the person from disease transmission. For more information on preventing HIV transmission, see the Preventing Disease Transmission section in this chapter.

If you think you have put yourself at risk for an infectious disease, get tested. Tests are readily available and will tell whether your body is producing antibodies in response to the virus. If you are not sure whether you should be tested, call your health care provider, the public health department, an AIDS service organization or the AIDS hotline listed in the next paragraph.

If you have any questions about AIDS, call the Centers for Disease Control and Prevention (CDC), 24 hours a day, for information in English and Spanish at 1-800-232-4636. (TTY service is available at 1-888-232-6348.) You also can visit www.aids.gov or call your local or state health department.

to 1 gallon of fresh water (1 part bleach per 9 parts water), and allow it to stand for at least 10 minutes.

- Dispose of the contaminated material used to clean up the spill in a labeled biohazard container.
- Contact your worksite safety representative or your local health department regarding the proper disposal of potentially infectious material. For more information on preventing disease transmission, visit the federal Occupational Safety and Health administration: <http://www.osha.gov/SLTC/bloodbornepathogens/index.html>.

TAKING ACTION: EMERGENCY ACTION STEPS

In any emergency situation, follow the emergency action steps:

1. **CHECK** the scene and the person.
2. **CALL** 9-1-1 or the local emergency number.
3. **CARE** for the person.

CHECK

Before you can help an injured or ill person, make sure that the scene is safe for you and any bystanders (Fig. 1-4). Look the scene over and try to answer these questions:



FIGURE 1-4 Check the scene for anything that may threaten the safety of you, the injured persons and bystanders.

- Is it safe?
- Is immediate danger involved?
- What happened?
- How many people are involved?
- Is anyone else available to help?
- What is wrong?

Is It Safe?

Check for anything unsafe, such as spilled chemicals, traffic, fire, escaping steam, downed electrical lines, smoke or extreme weather. Avoid going into confined areas with no ventilation or fresh air, places where there might be poisonous gas, collapsed structures, or places where natural gas, propane or other substances could explode. Such areas should be entered by responders who have special training and equipment, such as respirators and self-contained breathing apparatus.

If these or other dangers threaten, stay at a safe distance and call 9-1-1 or the local emergency number immediately. If the scene still is unsafe after you call, do not enter. Dead or injured heroes are no help to anyone! Leave dangerous situations to professionals like

firefighters and police. Once they make the scene safe, you can offer to help.

Is Immediate Danger Involved?

Do not move a seriously injured person unless there is an immediate danger, such as fire, flood or poisonous gas; you have to reach another person who may have a more serious injury or illness; or you need to move the injured person to give proper care and you are able to do so without putting yourself in danger from the fire, flood or poisonous gas. If you must move the person, do it as quickly and carefully as possible. If there is no danger, tell the person not to move. Tell any bystanders not to move the person.

What Happened?

Look for clues to what caused the emergency and how the person might be injured. Nearby objects, such as a fallen ladder, broken glass or a spilled bottle of medicine, may give you information. Your check of the scene may be the only way to tell what happened.

If the injured or ill person is a child, keep in mind that he or she may have

been moved by well-meaning adults. Be sure to ask about this when you are checking out what happened. If you find that a child has been moved, ask the adult where the child was and how he or she was found.

How Many People Are Involved?

Look carefully for more than one person. You might not spot everyone at first. If one person is bleeding or screaming, you might not notice an unconscious person. It also is easy to overlook a small child or an infant. In an emergency with more than one injured or ill person, you may need to prioritize care (in other words, decide who needs help first).

Is Anyone Else Available to Help?

You already have learned that the presence of bystanders does not mean that a person is receiving help. You may have to ask them to help. Bystanders may be able to tell you what happened or make the call for help while you provide care. If a family member, friend or co-worker is present, he or she may know if the person is ill or has a medical condition.

The injured or ill person may be too upset to answer your questions. Anyone who awakens after having been

unconscious also may be frightened. Bystanders can help to comfort the person and others at the scene. A child may be especially frightened. Parents or guardians who are present may be able to calm a frightened child. They also can tell you if a child has a medical condition.

What Is Wrong?

When you reach the person, try to find out what is wrong. Look for signals that may indicate a life-threatening emergency. First, check to see if the injured or ill person is conscious (Fig. 1-5). Sometimes this is obvious. The person may be able to speak to you. He or she may be moaning, crying, making some other noise or moving around. If the person is conscious, reassure him or her and try to find out what happened.

If the person is lying on the ground, silent and not moving, he or she may be unconscious. If you are not sure whether someone is unconscious, tap him or her on the shoulder and ask if he or she is OK. Use the person's name if you know it. Speak loudly. If you are not sure whether an infant is unconscious, check by tapping the infant's shoulders and shouting or flicking the bottom of the infant's foot to see if the infant responds.

Unconsciousness is a life-threatening emergency. If the person does not respond to you in any way, assume that he or she is unconscious. Make sure that someone calls 9-1-1 or the local emergency number right away.

For purposes of first aid, an adult is defined as someone about age 12 (adolescent) or older; someone between the ages of 1 and 12 is considered to be a child; and an infant is someone younger than 1 year. When using an AED, a child is considered to be someone between the ages of 1 and 8 years or weighing less than 55 pounds.

Look for other signals of life-threatening injuries including trouble breathing, the absence of breathing or breathing that is not normal, and/or severe bleeding.



FIGURE 1-5 When you reach the person, first check to see if he or she is conscious.

While you are checking the person, use your senses of sight, smell and hearing. They will help you to notice anything abnormal. For example, you may notice an unusual smell that could be caused by a poison. You may see a bruise or a twisted arm or leg. You may hear the person say something that explains how he or she was injured.

Checking Children and the Elderly

Keep in mind that it is often helpful to take a slightly different approach when you check and care for children, infants and elderly people in an emergency situation. For more information on checking and caring for children, infants, the elderly and others with special needs, see Chapter 9.

Identifying Life-Threatening Conditions

At times you may be unsure if advanced medical personnel are needed. Your first aid training will help you to make this decision. The most important step you can take when giving care to a person who is unconscious or has some other life-threatening condition is to call for emergency medical help. With a life-threatening condition, the survival of a person often depends on both emergency medical help and the care you can give. You will have to use your best judgment—based on the situation, your assessment of the injured or ill person, information gained from this course and other training you may have received—to make the decision to call. When in doubt, and you think a life-threatening condition is present, make the call.

CALL

Calling 9-1-1 or the local emergency number for help often is the most important action you can take to help an injured or ill person (Fig. 1-6). It will send emergency medical help on its way as fast as possible. Make the call quickly and return to the person. If possible, ask someone else to make the call.

As a general rule, call 9-1-1 or the local emergency number if the person has any of the following conditions:

- Unconsciousness or an altered level of consciousness (LOC), such as drowsiness or confusion
- Breathing problems (trouble breathing or no breathing)
- Chest pain, discomfort or pressure lasting more than a few minutes that goes away and comes back or that radiates to the shoulder, arm, neck, jaw, stomach or back
- Persistent abdominal pain or pressure
- Severe external bleeding (bleeding that spurts or gushes steadily from a wound)
- Vomiting blood or passing blood
- Severe (critical) burns
- Suspected poisoning



FIGURE 1-6 Calling 9-1-1 or your local emergency number is important because getting emergency help fast greatly increases a person's chances of survival.

- Seizures
- Stroke (sudden weakness on one side of the face/ facial droop, sudden weakness on one side of the body, sudden slurred speech or trouble getting words out or a sudden, severe headache)
- Suspected or obvious injuries to the head, neck or spine
- Painful, swollen, deformed areas (suspected broken bone) or an open fracture

Also call 9-1-1 or the local emergency number immediately for any of these situations:

- Fire or explosion
- Downed electrical wires
- Swiftly moving or rapidly rising water
- Presence of poisonous gas
- Serious motor-vehicle collisions
- Injured or ill persons who cannot be moved easily

Deciding to Call First or Care First

If you are ALONE:

- **Call First** (call 9-1-1 or the local emergency number before giving care) for:
 - Any adult or child about 12 years of age or older who is unconscious.
 - A child or an infant who you witnessed suddenly collapse.
 - An unconscious child or infant known to have heart problems.
- **Care First** (give 2 minutes of care, then call 9-1-1 or the local emergency number) for:
 - An unconscious child (younger than about 12 years of age) who you did not see collapse.
 - Any drowning victim.

Call First situations are likely to be cardiac emergencies, where time is a critical factor. In Care First situations, the conditions often are related to breathing emergencies.

CARE

Once you have checked the scene and the person and have made a decision about calling 9-1-1 or the local emergency number, you may need to give care until EMS personnel take over. After making the 9-1-1 call, immediately go back to the injured or ill person. Check the person for life-threatening conditions and give the necessary care (see Checking a Conscious and Unconscious Person section in this chapter). To do so, follow these general guidelines:

- Do no further harm.
- Monitor the person's breathing and consciousness.
- Help the person rest in the most comfortable position.
- Keep the person from getting chilled or overheated.
- Reassure the person.
- Give any specific care as needed.

Transporting the Person Yourself

In some cases, you may decide to take the injured or ill person to a medical facility yourself instead of waiting for EMS personnel. *NEVER* transport a person:

- When the trip may aggravate the injury or illness or cause additional injury.
- When the person has or may develop a life-threatening condition.
- If you are unsure of the nature of the injury or illness.

If you decide it is safe to transport the person, ask someone to come with you to keep the person comfortable. Also, be sure you know the quickest route to the nearest medical facility capable of handling emergency care. Pay close attention to the injured or ill person and watch for any changes in his or her condition.

Discourage an injured or ill person from driving him- or herself to the hospital. An injury may restrict movement, or the person may become groggy or faint. A sudden onset of pain may be distracting. Any of these conditions can make driving dangerous for the person, passengers, other drivers and pedestrians.

Moving an Injured or Ill Person

One of the most dangerous threats to a seriously injured or ill person is unnecessary movement. Moving an injured person can cause additional injury and pain and may complicate his or her recovery. Generally, you should not move an injured or ill person while giving care. However, it would be appropriate in the following three situations:

1. When you are faced with immediate danger, such as fire, lack of oxygen, risk of explosion or a collapsing structure.
2. When you have to get to another person who may have a more serious problem. In this case, you may have to move a person with minor injuries to reach someone needing immediate care.

3. When it is necessary to give proper care. For example, if someone needed CPR, he or she might have to be moved from a bed because CPR needs to be performed on a firm, flat surface. If the surface or space is not adequate to give care, the person should be moved.

Techniques for Moving an Injured or Ill Person

Once you decide to move an injured or ill person, you must quickly decide how to do so. Carefully consider your safety and the safety of the person. Move an injured or ill person only when it is safe for you to do so and there is an immediate life threat. Base your decision on the dangers you are facing, the size and condition of the person, your abilities and physical condition, and whether you have any help.

To improve your chances of successfully moving an injured or ill person without injuring yourself or the person:

- Use your legs, not your back, when you bend.
- Bend at the knees and hips and avoid twisting your body.
- Walk forward when possible, taking small steps and looking where you are going.
- Avoid twisting or bending anyone with a possible head, neck or spinal injury.
- Do not move a person who is too large to move comfortably.

You can move a person to safety in many different ways, but no single way is best for every situation. The objective is to move the person without injuring yourself or causing further injury to the person. The following common types of emergency moves can all be done by one or two people and with minimal to no equipment.

Types of Non-Emergency Moves

Walking Assist

The most basic emergency move is the walking assist. Either one or two responders can use this method with a conscious person. To perform a walking assist, place the injured or ill person's arm across your shoulders and hold it in place with one hand. Support the person with your other hand around the person's waist (Fig. 1-7, A). In this way, your body acts as a crutch, supporting the person's weight while you both walk. A second responder, if present, can support the person in the same way on the other side (Fig. 1-7, B). Do not use this assist if you suspect that the person has a head, neck or spinal injury.

Two-Person Seat Carry

The two-person seat carry requires a second responder. This carry can be used for any person who is conscious and not seriously injured. Put one arm behind the person's thighs and the other across the person's back. Interlock your arms with those of a second responder behind the person's legs and across his or her back. Lift the person in the "seat" formed by the responders' arms (Fig. 1-8). Responders should coordinate their movement so they walk together. Do not use this assist if you suspect that the person has a head, neck or spinal injury.

Types of Emergency Moves

Pack-Strap Carry

The pack-strap carry can be used with conscious and unconscious persons. Using it with an unconscious person requires a second responder to help position the injured or ill person on your back. To perform the

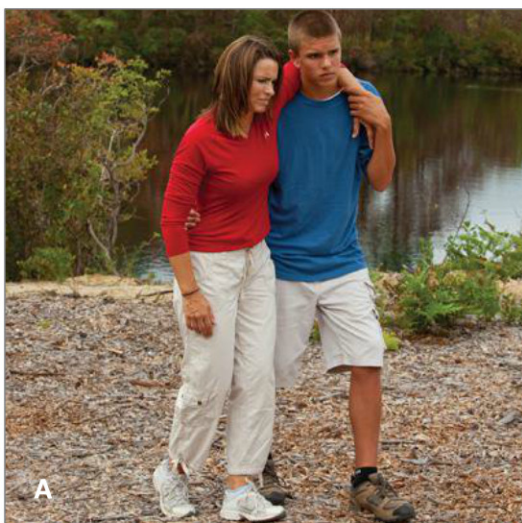


FIGURE 1-7, A-B A, In a walking assist, your body acts as a crutch, supporting the person's weight while you both walk. B, Two responders may be needed for the walking assist.



FIGURE 1-8 *The two-person seat carry*



FIGURE 1-9 *The pack-strap carry*

pack-strap carry, have the person stand or have a second responder support the person. Position yourself with your back to the person, back straight, knees bent, so that your shoulders fit into the person's armpits.

Cross the person's arms in front of you and grasp the person's wrists. Lean forward slightly and pull the person up and onto your back. Stand up and walk to safety (Fig. 1-9). Depending on the size of the person, you may be able to hold both of his or her wrists with one hand, leaving your other hand free to help maintain balance, open doors and remove obstructions. Do not use this assist if you suspect that the person has a head, neck or spinal injury.

Clothes Drag

The clothes drag can be used to move a conscious or unconscious person with a suspected head, neck or spinal injury. This move helps keep the person's head,

neck and back stabilized. Grasp the person's clothing behind the neck, gathering enough to secure a firm grip. Using the clothing, pull the person (headfirst) to safety (Fig. 1-10).

During this move, the person's head is cradled by clothing and the responder's arms. Be aware that this move is exhausting and may cause back strain for the responder, even when done properly.

Blanket Drag

The blanket drag can be used to move a person in an emergency situation when equipment is limited. Keep the person between you and the blanket. Gather half of the blanket and place it against the person's side. Roll the person as a unit toward you. Reach over and place the blanket so that it is positioned under the person, then roll the person onto the blanket. Gather the blanket at the head and move the person (Fig. 1-11).

Ankle Drag

Use the ankle drag (also known as the foot drag) to move a person who is too large to carry or move in any other way. Firmly grasp the person's ankles and move backward. The person's arms should be crossed on his



FIGURE 1-10 *The clothes drag*



FIGURE 1-11 *The blanket drag*



FIGURE 1-12 *The ankle drag*

or her chest. Pull the person in a straight line, being careful not to bump the person's head (Fig. 1-12).

Reaching a Person in the Water

Do not enter the water unless you are specifically trained to perform in-water rescues. Get help from a trained responder, such as a lifeguard, to get the person out of the water as quickly and safely as possible. You can help a person in trouble in the water from a safe position by using *reaching assists*, *throwing assists* or *wading assists*.

When possible, start by talking to the person. Let the person know that help is coming. If noise is a problem or if the person is too far away to hear you, use nonverbal communication. Direct the person what to do, such as grasping a line, ring buoy or other object that floats. Ask the person to move toward you, which may be done by using the back float with slight leg movements or small strokes. Some people can reach safety by themselves with the calm and encouraging assistance of someone calling to them.

- **Reaching Assists.** Firmly brace yourself on a pool deck, pier or shoreline and reach out to the person with any object that will extend your reach, such as a pole, oar or paddle, tree branch, shirt, belt or towel. If no equipment is available, you can still perform a reaching assist by lying down and extending your arm or leg for the person to grab.
- **Throwing Assists.** An effective way to rescue someone beyond your reach is to throw a floating object out to the person with a line attached. Once the person grasps the object, pull the individual to safety. Throwing equipment includes heaving lines, ring buoys, throw bags or any floating object available, such as a picnic jug, small cooler, buoyant cushion, kickboard or extra life jacket.

- **Wading Assists.** If the water is safe and shallow enough (not over your chest), you can wade in to reach the person. If there is a current or the bottom is soft or unknown, making it dangerous to wade, do *not* go in the water. If possible, wear a life jacket and take something with you to extend your reach, such as a ring buoy, buoyant cushion, kickboard, life jacket, tree branch, pole, air mattress, plastic cooler, picnic jug, paddle or water exercise belt.

CHECKING A CONSCIOUS PERSON

If you determine that an injured or ill person is conscious and has no immediate life-threatening conditions, you can begin to check for other conditions that may need care. Checking a conscious person with no immediate life-threatening conditions involves two basic steps:

- Interview the person and bystanders.
- Check the person from head to toe.

Conducting Interviews

Ask the person and bystanders simple questions to learn more about what happened. Keep these interviews brief (Fig. 1-13). Remember to first identify yourself and to get the person's consent to give care. Begin by asking the person's name. This will make him or her feel more comfortable. Gather additional information by asking the person the following questions:

- What happened?
- Do you feel pain or discomfort anywhere?
- Do you have any allergies?
- Do you have any medical conditions or are you taking any medication?



FIGURE 1-13 *Ask simple questions and keep interviews brief.*

If the person feels pain, ask him or her to describe it and to tell you where it is located. Descriptions often include terms such as burning, crushing, throbbing, aching or sharp pain. Ask when the pain started and what the person was doing when it began. Ask the person to rate his or her pain on a scale of 1 to 10 (1 being mild and 10 being severe).

Sometimes an injured or ill person will not be able to give you the information that you need. The person may not speak your language. In some cases, the person may not be able to speak because of a medical condition. Known as a *laryngectomy*, a person whose larynx (voice box) was surgically removed breathes through a permanent opening, or *stoma*, in the neck and may not be able to speak. Remember to question family members, friends or bystanders as well. They may be able to give you helpful information or help you to communicate with the person. You will learn more about communicating with people with special needs in Chapter 9.

Children or infants may be frightened. They may be fully aware of you but still unable to answer your questions. In some cases, they may be crying too hard and be unable to stop. Approach slowly and gently, and give the child or infant some time to get used to you. Use the child's name, if you know it. Get down to or below the child's eye level.

Write down the information you learn during the interviews or, preferably, have someone else write it down for you. Be sure to give the information to EMS personnel when they arrive. It may help them to determine the type of medical care that the person should receive.

Checking from Head to Toe

Next you will need to thoroughly check the injured or ill person so that you do not overlook any problems. Visually check from head to toe. When checking a conscious person:



FIGURE 1-14 Feel the forehead with the back of your hand to determine its temperature.

- Do not move any areas where there is pain or discomfort, or if you suspect a head, neck or spinal injury.
- Check the person's head by examining the scalp, face, ears, mouth and nose.
- Look for cuts, bruises, bumps or depressions. Think of how the body usually looks. If you are unsure if a body part or limb looks injured, check it against the opposite limb or the other side of the body.
- Watch for changes in consciousness. Notice if the person is drowsy, confused or is not alert.
- Look for changes in the person's breathing. A healthy person breathes easily, quietly, regularly and without discomfort or pain. Young children and infants generally breathe faster than adults. Breathing that is not normal includes noisy breathing, such as gasping for air; rasping, gurgling or whistling sounds; breathing that is unusually fast or slow; and breathing that is painful.
- Notice how the skin looks and feels. Skin can provide clues that a person is injured or ill. Feel the person's forehead with the back of your hand to determine if the skin feels unusually damp, dry, cool or hot (Fig. 1-14). Note if it is red, pale or ashen.
- Look over the body. Ask again about any areas that hurt. Ask the person to move each part of the body that does not hurt. Ask the person to gently move his or her head from side to side. Check the shoulders by asking the person to shrug them. Check the chest and abdomen by asking the person to take a deep breath. Ask the person to move his or her fingers, hands and arms; and then the toes, legs and hips in the same way. Watch the person's face and listen for signals of discomfort or pain as you check for injuries.
- Look for a medical identification (ID) tag, bracelet or necklace (Fig. 1-15) on the person's wrist, neck or ankle. A tag will provide medical information about the person, explain how to care for certain conditions



FIGURE 1-15 Medical ID tags and bracelets can provide important information about an injured or ill person. Courtesy of the Canadian Red Cross.

and list whom to call for help. For example, a person with diabetes may have some form of medical ID tag, bracelet or necklace identifying this condition.

If a child or an infant becomes extremely upset, conduct a toe-to-head check of the child or infant. This will be less emotionally threatening. Parents or guardians who are present may be able to calm a frightened child. In fact, it often is helpful to check a young child while he or she is seated in his or her parent's or guardian's lap. Parents also can tell you if a child has a medical condition.

When you have finished checking, determine if the person can move his or her body without any pain. If the person can move without pain and there are no other signals of injury, have him or her attempt to rest in a sitting position or other comfortable position (Fig. 1-16). When the person feels ready, help him or her to stand up. Determine what additional care is needed and whether to call 9-1-1 or the local emergency number.

SHOCK

When the body is healthy, three conditions are needed to keep the right amount of blood flowing:

- The heart must be working well.
- An adequate amount of oxygen-rich blood must be circulating in the body.
- The blood vessels must be intact and able to adjust blood flow.

Shock is a condition in which the circulatory system fails to deliver enough oxygen-rich blood to the body's tissues and vital organs. The body's organs, such as the brain, heart and lungs, do not function properly without this blood supply. This triggers a series of responses that produce specific signals known as shock. These responses are the body's attempt to maintain adequate blood flow.



FIGURE 1-16 If there are no signals of obvious injuries, help the person into a comfortable position.

When someone is injured or becomes suddenly ill, these normal body functions may be interrupted. In cases of minor injury or illness, this interruption is brief because the body is able to compensate quickly. With more severe injuries or illnesses, however, the body may be unable to adjust. When the body is unable to meet its demand for oxygen because blood fails to circulate adequately, shock occurs.

What to Look For

The signals that indicate a person may be going into shock include:

- Restlessness or irritability.
- Altered level of consciousness.
- Nausea or vomiting.
- Pale, ashen or grayish, cool, moist skin.
- Rapid breathing and pulse.
- Excessive thirst.

Be aware that the early signals of shock may not be present in young children and infants. However, because children are smaller than adults, they have less blood volume and are more susceptible to shock.

When to Call 9-1-1

In cases where the person is going into shock, call 9-1-1 or the local emergency number immediately. Shock cannot be managed effectively by first aid alone. A person suffering from shock requires emergency medical care as soon as possible.

What to Do Until Help Arrives

Caring for shock involves the following simple steps:

- Have the person lie down. This often is the most comfortable position. Helping the person rest in a more comfortable position may lessen any pain. Helping the person to rest comfortably is important because pain can intensify the body's stress and speed up the progression of shock.
- Control any external bleeding.
- Since you may not be sure of the person's condition, leave him or her lying flat.
- Help the person maintain normal body temperature (Fig. 1-17). If the person is cool, try to cover him or her to avoid chilling.
- Do not give the person anything to eat or drink, even though he or she is likely to be thirsty. The person's condition may be severe enough to require surgery, in which case it is better if the stomach is empty.
- Reassure the person.



FIGURE 1-17 Help the person going into shock to lie down and keep him or her from getting chilled or overheated.

- Continue to monitor the person's breathing and for any changes in the person's condition. Do not wait for signals of shock to develop before caring for the underlying injury or illness.

CHECKING AN UNCONSCIOUS PERSON

If you think someone is unconscious, tap him or her on the shoulder and ask if he or she is OK. Use the person's name if you know it. Speak loudly. If you are not sure whether an infant is unconscious, check by tapping the infant's shoulder and shouting or by flicking the bottom of the infant's foot to see if the infant responds (Fig. 1-18).

If the person does not respond, call 9-1-1 or the local emergency number and check for other life-threatening conditions.

Always check to see if an unconscious person:

- Has an open airway and is breathing normally.
- Is bleeding severely.

Consciousness, effective (normal) breathing and circulation and skin characteristics sometimes are referred to as *signs of life*.

Airway

Once you or someone else has called 9-1-1 or the local emergency number, check to see if the person has an open airway and is breathing. An open airway allows air to enter the lungs for the person to breathe. If the airway is blocked, the person cannot breathe. A blocked airway is a life-threatening condition.



FIGURE 1-18 If you are not sure whether an infant is unconscious, check by tapping the infant's shoulder or flicking the bottom of the infant's foot.

- When someone is unconscious and lying on his or her back, the tongue may fall to the back of the throat and block the airway. To open an unconscious person's airway, push down on his or her forehead while pulling up on the bony part of the chin with two or three fingers of your other hand (Fig. 1-19). This procedure, known as the *head-tilt/chin-lift technique*, moves the tongue away from the back of the throat, allowing air to enter the lungs.
 - For a child: Place one hand on the forehead and tilt the head slightly past a *neutral position*



FIGURE 1-19 Open an unconscious person's airway using the head-tilt/chin-lift technique.

(the head and chin are neither flexed downward toward the chest nor extended backward).

- For an infant: Place one hand on the forehead and tilt the head to a neutral position while pulling up on the bony part of the chin with two or three fingers of your other hand.
- If you suspect that a person has a head, neck or spinal injury, carefully tilt the head and lift the chin just enough to open the airway.

Check the person's neck to see if he or she breathes through an opening. A person whose larynx was removed may breathe partially or entirely through a stoma instead of through the mouth (Fig. 1-20). The person may breathe partially or entirely through this opening instead of through the mouth and nose. It is important to recognize this difference in the way a person breathes. This will help you give proper care.

Breathing

After opening the airway, quickly check an unconscious person for breathing. Position yourself so that you can *look* to see if the person's chest clearly rises and falls, *listen* for escaping air and *feel* for it against the side of your face. Do this for no more than 10 seconds (Fig. 1-21). If the person needs CPR, chest compressions must not be delayed.

Normal breathing is regular, quiet and effortless. A person does not appear to be working hard or struggling when breathing normally. This means that the person is not making noise when breathing, breaths are not fast (although it should be noted that normal breathing rates in children and infants are faster than normal breathing rates in adults) and breathing does not cause discomfort or pain. In an unconscious adult you may detect an irregular, gasping or shallow breath. This is known as an *agonal breath*. Do not confuse this with normal breathing. Care for the person as if

there is no breathing at all. Agonal breaths do not occur frequently in children.

If the person is breathing normally, his or her heart is beating and is circulating blood containing oxygen. In this case, maintain an open airway by using the head-tilt/chin-lift technique as you continue to look for other life-threatening conditions.

If an adult is not breathing normally, this person most likely needs immediate CPR.

If a child or an infant is not breathing, give 2 rescue breaths. Tilt the head back and lift chin up. Pinch the nose shut then make a complete seal over the child's mouth and blow in for about 1 second to make the chest clearly rise (Fig. 1-22, A). For an infant, seal your mouth over the infant's mouth and nose (Fig. 1-22, B). Give rescue breaths one after the other.

If you witness the sudden collapse of a child, assume a cardiac emergency. Do not give 2 rescue breaths. CPR needs to be started immediately, just as with an adult.

Sometimes you may need to remove food, liquid or other objects that are blocking the person's airway. This may prevent the chest from rising when you attempt rescue breaths. You will learn how to recognize an obstructed airway and give care to the person in Chapter 4.

Circulation

It is important to recognize breathing emergencies in children and infants and to act before the heart stops beating. Adults' hearts frequently stop beating because of disease. Children's and infants' hearts, however, are usually healthy. When a child's or an infant's heart stops, it usually is the result of a breathing emergency.

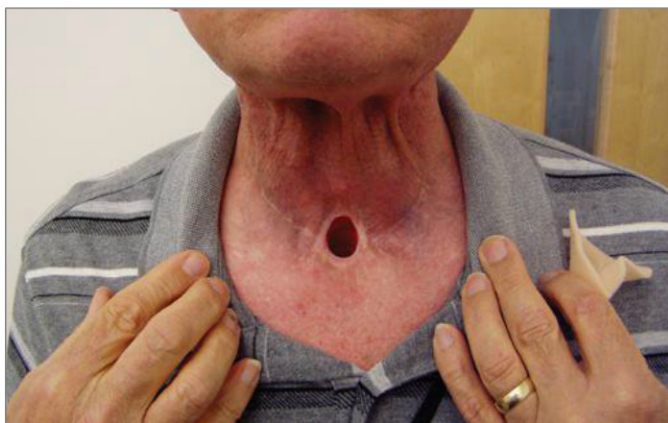


FIGURE 1-20 A stoma is an opening in the neck that allows a person to breathe after certain surgeries on the airway. Courtesy of the International Association of Laryngectomees.



FIGURE 1-21 Check for breathing for no more than 10 seconds.



FIGURE 1-22, A–B A, Give a child 2 rescue breaths with each breath lasting about 1 second. B, For an infant, cover the mouth and nose.

If an adult is not breathing or is not breathing normally and if the emergency is not the result of non-fatal drowning or other respiratory cause such as a drug overdose, assume that the problem is a cardiac emergency.

Quickly look for severe bleeding by looking over the person’s body from head to toe for signals such as blood-soaked clothing or blood spurting out of a wound (Fig. 1-23). Bleeding usually looks worse than it is. A small amount of blood on a slick surface or mixed with water usually looks like a large volume of blood. It is not always easy to recognize severe bleeding.

What to Do Next

- If an unconscious person is breathing normally, keep the person lying face-up and maintain an open airway with the head-tilt/chin-lift technique. If the person vomits, fluids block the airway, or if you must leave the person to get help, place him or her into a modified high arm in endangered spine (H.A.IN.E.S.) recovery position. (Placing an Unconscious Person in a Recovery Position is discussed in this chapter.)
- If an unconscious adult has irregular, gasping or shallow breaths (agonal breathing) or is not breathing at all, begin CPR. You will learn how to perform CPR in Chapter 2.



FIGURE 1-23 Check for severe bleeding by quickly looking over the person from head to toe.

- If an unconscious child or infant is not breathing, after giving 2 rescue breaths, perform CPR (see Chapter 2).
- If the person is bleeding severely, control the bleeding by applying direct pressure (see Chapter 7).

Using CPR Breathing Barriers

You might not feel comfortable with giving rescue breaths, especially to someone whom you do not know. Disease transmission is an understandable worry, even though the chance of getting a disease from giving rescue breaths is extremely small.

CPR breathing barriers, such as face shields and resuscitation masks, create a barrier between your mouth and nose and those of the injured or ill person (Fig. 1-24). This barrier can help to protect you from contact with blood and other body fluids, such as saliva, as you give rescue breaths. These devices also protect you from breathing the air that the person exhales. Some devices are small enough to fit in your pocket or in the glove compartment of your car. You also can keep one in your first aid kit. If a face shield is used, switch to a resuscitation mask, if available, or when one becomes available. However, you should *not delay* rescue breaths while searching



FIGURE 1-24 CPR breathing barriers, such as face shields and resuscitation masks, create a barrier between your mouth and nose and the injured or ill person’s mouth.

for a CPR breathing barrier or by trying to learn how to use one.

Pediatric CPR breathing barriers are available and should be used to care for children and infants. Always use the appropriate equipment for the size of the injured or ill person.

Special Situations

When giving rescue breaths while performing CPR, you may encounter certain special situations. These include air in the stomach; vomiting; mouth-to-nose breathing; mouth-to-stoma breathing; persons with suspected head, neck or spinal injuries; and drowning victims.

- **Air in the Stomach:** When you are giving rescue breaths, be careful to avoid forcing air into the person's stomach instead of the lungs. This may happen if you breathe too long, breathe too hard or do not open the airway far enough.
 - To avoid forcing air into the person's stomach, keep the person's head tilted back. Take a normal breath and blow into the person's mouth, blowing just enough to make the chest clearly rise. Each rescue breath should last about 1 second for an adult, a child or an infant. Pause between breaths long enough for the air in the person to come out and for you to take another breath.
 - Air in the stomach can make the person vomit and cause complications. When an unconscious person vomits, the contents of the stomach can get into the lungs and block breathing. Air in the stomach also makes it harder for the diaphragm—the large muscle that controls breathing—to move. This makes it harder for the lungs to fill with air.

- **Vomiting.** Even when you are giving rescue breaths properly, the person may vomit.
 - If this happens, roll the person onto one side and wipe the mouth clean (Fig. 1-25). If possible, use a protective barrier, such as disposable gloves, gauze or even a handkerchief when cleaning out the mouth.
 - Then roll the person on his or her back again and continue giving care as necessary.
- **Mouth-to-Nose Breathing.** If you are unable to make a tight enough seal over the person's mouth, you can blow into the nose (Fig. 1-26).
 - With the head tilted back, close the mouth by pushing on the chin.
 - Seal your mouth around the person's nose and breathe into the nose.
 - If possible, open the person's mouth between rescue breaths to let the air out.
- **Mouth-to-Stoma Breathing.** Check the person's neck to see if he or she breathes through a stoma.
 - If you discover that the person needing rescue breaths has a stoma, expose his or her entire neck down to the breastbone. Remove anything covering the stoma that blocks the person's airway. Also, wipe away any secretions or blockages.
 - Keep the airway in a neutral position; do not allow the chin or head to flex forward toward the chest or extend backward as you look, listen and feel for normal breathing with your ear over the stoma. To give rescue breaths, make an airtight seal with your lips around the stoma or tracheostomy tube and blow in for about 1 second to make the chest clearly rise.



FIGURE 1-25 If the person vomits, roll him or her onto one side and wipe the mouth clean.



FIGURE 1-26 If you are unable to make a tight enough seal over the person's mouth, you can blow into the nose.

- Give rescue breaths into the stoma at the same rate you would breathe into the mouth when performing CPR. Your rescue breaths are successful if you see the chest rise and fall and you hear and feel air escape from the stoma.
- If the chest does not rise and fall, the person's tracheostomy tube may be blocked. If this happens, remove the inner tube and give rescue breaths again.
- If you hear or feel air escaping from the person's mouth or nose, the person is a partial neck breather. In order to give rescue breaths to a partial neck breather, the responder must seal the person's mouth and nose with either his or her hand or a tight-fitting face mask so that air does not escape out of the mouth or nose when you give rescue breaths into the stoma or tracheostomy tube.
- You might feel uncomfortable with the thought of giving mouth-to-stoma rescue breaths. An alternative method is to use a barrier device (see Using CPR Breathing Barriers section in this chapter). For a neck breather or partial neck breather, a round pediatric mask may provide a better seal around a stoma or tracheostomy tube neck plate (Fig. 1-27).
- **Head, Neck and Spinal Injuries.** Be especially careful with a person who may have a head, neck or spinal injury. These kinds of injuries can result from a fall from a height greater than the person's height, an automobile collision or a diving mishap. If you suspect such an injury, try not to move the person's head, neck and back. If a child is strapped into a car seat, do not remove him or her from it. To give rescue breaths to a person whom you suspect has a head, neck or spinal injury:
 - Minimize movement of the head and neck when opening the airway.



FIGURE 1-27 To give rescue breaths into a stoma, make an airtight seal with your lips around the stoma or use a round pediatric resuscitation mask and blow in to make chest clearly rise.

- Carefully tilt the head and lift the chin just enough to open the airway.
- **Drowning Victims.** For an adult, give 2 rescue breaths as you would for a child or an infant once you determine there is no breathing. If alone, you should give 2 minutes of care before calling 9-1-1 (Care First) for an unconscious person who has been submerged. Do not enter the water unless you are specifically trained to perform in-water rescues. Get help from a trained responder, such as a lifeguard, to get the person out of the water as quickly and safely as possible. If the person is not breathing, you will have to give proper care.

Placing an Unconscious Person in a Recovery Position

In some cases, the person may be unconscious but breathing normally. Generally, that person should not be moved from a face-up position, especially if there is a suspected spinal injury. However, there are a few situations when you should move a person into a recovery position whether or not a spinal injury is suspected. Examples include situations where you are alone and have to leave the person (e.g., to call for help), or you cannot maintain an open and clear airway because of fluids or vomit. Fig. 1-28, A–B shows how to place a person, whether or not a spinal injury is suspected, in a modified H.A.IN.E.S. recovery position. Placing a person in this position will help to keep the airway open and clear.

To place an adult or a child in a modified H.A.IN.E.S. recovery position:

- Kneel at the person's side.
- Reach across the body and lift the arm farthest from you up next to the head with the person's palm facing up.
- Take the person's arm closest to you and place it next to his or her side.
- Grasp the leg farthest from you and bend it up.
- Using your hand that is closest to the person's head, cup the base of the skull in the palm of your hand and carefully slide your forearm under the person's shoulder closest to you. Do not lift or push the head or neck.
- Place your other hand under the arm and hip closest to you.
- Using a smooth motion, roll the person away from you by lifting with your hand and forearm. Make sure the person's head remains in contact with the extended arm and be sure to support the head and neck with your hand.
- Stop all movement when the person is on his or her side.



FIGURE 1-28, A–B A, Placing a person in a modified H.A.I.N.E.S. recovery position. B, Placing a person in a modified H.A.I.N.E.S. if you must leave to call 9-1-1.

- Bend the knee closest to you and place it on top of the other knee so that both knees are in a bent position.
- Make sure the arm on top is in line with the upper body.
 - If you must leave the person to get help, place the hand of the upper arm palm side down with the fingers under the head at the armpit of the extended lower arm.

An infant can be placed in a recovery position as would be done for an older child. You can also hold an infant in a recovery position (Fig. 1-29) by:

- Carefully positioning the infant face-down along your forearm.



FIGURE 1-29 An infant recovery position

- Supporting the infant's head and neck with your other hand while keeping the infant's mouth and nose clear.
- Keeping the head and neck slightly lower than the chest.

INCIDENT STRESS

After responding to an emergency involving a serious injury, illness or death, it is not unusual to experience acute stress. Sometimes, people who have given first aid or performed CPR in these situations feel that they are unable to cope with the stress. This feeling is known as *incident stress*. If not appropriately managed, this acute stress may lead to a serious condition called post-traumatic stress disorder.

Signals of Incident Stress Reactions

Some effects may appear right away whereas others may take longer to develop. Signals of incident stress include:

- Anxiousness and inability to sleep.
- Nightmares.
- Restlessness and other problems.
- Confusion.
- Lower attention span.
- Poor concentration.
- Denial.
- Guilt.
- Depression.
- Anger.
- Nausea.
- Change in interactions with others.
- Increased or decreased eating.

- Uncharacteristic, excessive humor or silence.
- Unusual behavior.
- Difficulty performing one's job.

Guidelines for Coping with Incident Stress

Incident stress may require professional help to prevent post-traumatic stress from developing. Other things that you may do to help reduce stress include using relaxation techniques, eating a balanced diet, avoiding alcohol and drugs, getting enough rest and participating in some type of physical exercise or activity.

PUTTING IT ALL TOGETHER

Given the large number of injuries and sudden illnesses that occur in the United States each year, it is likely that you might have to deal with an emergency situation someday.

Remember that you have a vital role to play in the EMS system. This includes following the emergency action steps of **CHECK—CALL—CARE**, which will help you to react quickly and calmly in any emergency situation. Emergencies happen every day. Be prepared, respond immediately and make a difference.

REMOVING GLOVES

AFTER GIVING CARE AND MAKING SURE TO NEVER TOUCH THE BARE SKIN WITH THE OUTSIDE OF EITHER GLOVE:

1 PINCH GLOVE

Pinch the palm side of one glove near the wrist. Carefully pull the glove off so that it is inside out.



2 SLIP TWO FINGERS UNDER GLOVE

Hold the glove in the palm of the remaining gloved hand. Slip two fingers under the glove at the wrist of the remaining gloved hand.



3 PULL GLOVE OFF

Pull the glove until it comes off, inside out, so that the first glove ends up inside the glove just removed.



4 DISPOSE OF GLOVES AND WASH HANDS

After removing the gloves:

- Dispose of gloves in the appropriate biohazard container.
- Wash hands thoroughly with soap and warm running water, if available.
- Otherwise, use an alcohol-based hand sanitizer to clean the hands if they are not visibly soiled.

CHECKING AN INJURED OR ILL ADULT APPEARS TO BE UNCONSCIOUS

TIP: Use disposable gloves and other PPE.

AFTER CHECKING THE SCENE FOR SAFETY, CHECK THE PERSON.

1 CHECK FOR RESPONSIVENESS

Tap the shoulder and shout, “Are you okay?”



2 CALL 9-1-1

If no response, **CALL 9-1-1** or the local emergency number.

- If an unconscious person is face-down, roll him or her face-up keeping the head, neck and back in a straight line.

If the person responds, obtain consent and **CALL 9-1-1** or the local emergency number for any life-threatening conditions.

CHECK the person from head to toe and ask questions to find out what happened.

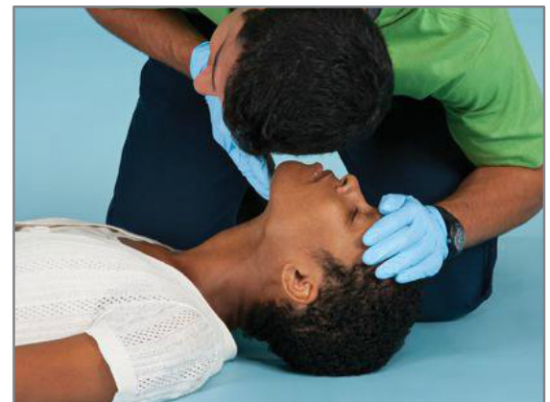
3 OPEN THE AIRWAY

Tilt head, lift chin.

4 CHECK FOR BREATHING

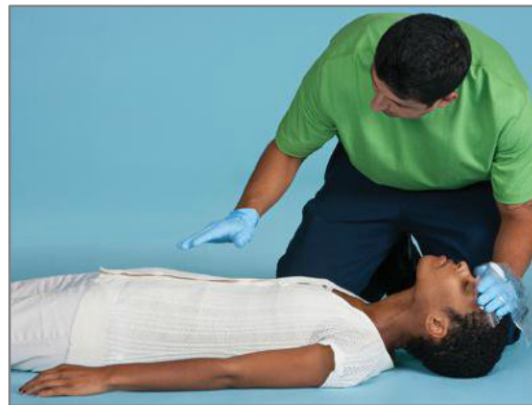
CHECK for no more than **10** seconds.

- Occasional gasps are not breathing.



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5 QUICKLY SCAN FOR SEVERE BLEEDING



WHAT TO DO NEXT

- IF THERE IS NO BREATHING—Perform CPR or use an AED (if AED is immediately available).
- IF BREATHING—Maintain an open airway and monitor breathing and for any changes in condition.

CHECKING AN INJURED OR ILL CHILD OR INFANT APPEARS TO BE UNCONSCIOUS

TIP: Use disposable gloves and other PPE. Get consent from a parent or guardian, if present.

AFTER CHECKING THE SCENE FOR SAFETY, CHECK THE CHILD OR INFANT.

1 CHECK FOR RESPONSIVENESS

Tap the shoulder and shout, "Are you okay?"
For an infant, you may flick the bottom of the foot.



2 CALL 9-1-1

If no response, **CALL 9-1-1** or the local emergency number.

- If an unconscious infant is face-down, roll him or her face-up supporting the head, neck and back in a straight line.

If **ALONE**, give about **2** minutes of **CARE**, then **CALL 9-1-1**.

If the child or infant responds, **CALL 9-1-1** or the local emergency number for any life-threatening conditions and obtain consent to give **CARE**.

CHECK the child from head to toe and ask questions to find out what happened.

3 OPEN THE AIRWAY

Tilt head back slightly, lift chin.

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4 CHECK FOR BREATHING

CHECK for no more than **10** seconds.

- Occasional gasps are not breathing.
- Infants have periodic breathing, so changes in breathing pattern are normal for infants.



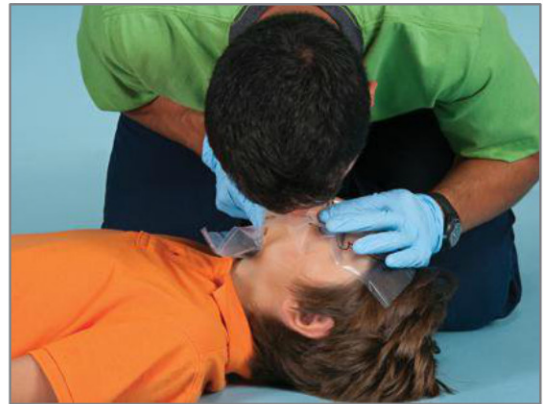
5 GIVE 2 RESCUE BREATHS

If no breathing, give **2** rescue breaths.

- Tilt the head back and lift the chin up.
- **Child:** pinch the nose shut, then make a complete seal over child's mouth.
- **Infant:** Make complete seal over infant's mouth and nose.
- Blow in for about 1 second to make the chest clearly rise.
- Give rescue breaths, one after the other.

TIPS:

- *If you witnessed the child or infant suddenly collapse, skip rescue breaths and start CPR.*
- *If the chest does not rise with rescue breaths, retilt the head and give another rescue breath.*



6 QUICKLY SCAN FOR SEVERE BLEEDING

WHAT TO DO NEXT

- IF THE CHEST DOES NOT RISE AFTER RETILTING THE HEAD—Give **CARE** for unconscious choking.
- IF THERE IS NO BREATHING—Perform CPR or use an AED (if AED is immediately available).
- IF BREATHING—Maintain an open airway. Monitor breathing and for any changes in condition.

Cardiac Emergencies and CPR



Cardiac emergencies are life threatening. Heart attack and cardiac arrest are major causes of illness and death in the United States. Every day in U.S. homes, parks and workplaces someone will have a heart attack or go into cardiac arrest. Recognizing the signals of a heart attack and cardiac arrest, calling 9-1-1 or the local emergency number and giving immediate care in a cardiac emergency saves lives. Performing CPR and using an automated external defibrillator (AED) immediately after a person goes into cardiac arrest can greatly increase his or her chance of survival.

In this chapter you will find out what signals to look for if you suspect a person is having a heart attack or has gone into cardiac arrest. This chapter also discusses how to care for a person having a heart attack and how to perform CPR for a person in cardiac arrest. In addition, this chapter covers the important links in the Cardiac Chain of Survival.

Although cardiac emergencies occur more commonly in adults, they also occur in infants and children. This chapter discusses the causes of cardiac arrest and how to provide care for all age groups.

BACKGROUND

The heart is a fascinating organ. It beats more than 3 billion times in an average lifetime. The heart is about the size of a fist and lies between the lungs in the middle of the chest. It pumps blood throughout the body. The ribs, breastbone and spine protect it from injury. The heart is separated into right and left halves (Fig. 2-1).

Blood that contains little or no oxygen enters the right side of the heart and is pumped to the lungs. The blood picks up oxygen in the lungs when you breathe. The oxygen-rich blood then goes to the left side of the heart and is pumped from the heart's blood vessels, called the *arteries*, to all other parts of the body. The heart and your body's vital organs need this constant supply of oxygen-rich blood.

Cardiovascular disease is an abnormal condition that affects the heart and blood vessels. An estimated 80 million Americans suffer from some form of the disease. It remains the number one killer in the United States and is a major cause of disability. The most common conditions caused by cardiovascular disease include *coronary heart disease*, also known as *coronary artery disease*, and stroke, also called a *brain attack*.

Coronary heart disease occurs when the arteries that supply blood to the heart muscle harden and narrow. This process is called *atherosclerosis*. The damage occurs gradually, as cholesterol and fatty deposits called *plaque* build up on the inner artery walls (Fig. 2-2). As this

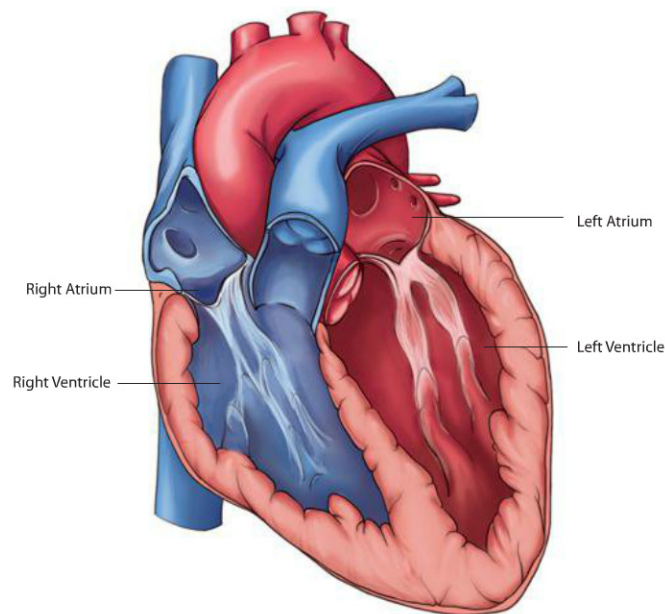


FIGURE 2-1 The heart is separated into right and left halves. Blood that contains little or no oxygen enters the right side of the heart and is pumped to the lungs. The blood picks up oxygen in the lungs when you breathe. The oxygen-rich blood then goes to the left side of the heart and is pumped to all parts of the body.

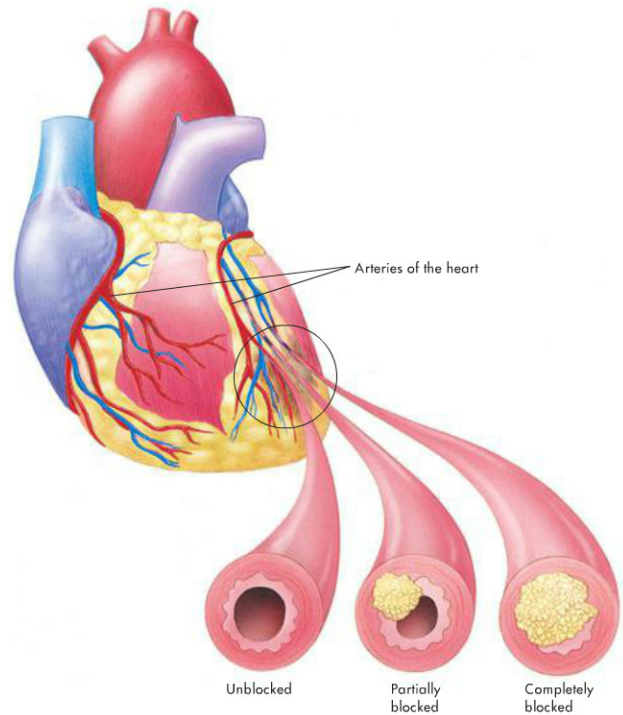


FIGURE 2-2 Build-up of fatty materials on the inner walls of the arteries reduces blood flow to the heart muscle and may cause a heart attack.

build-up worsens, the arteries become narrower. This reduces the amount of blood that can flow through them and prevents the heart from getting the blood and oxygen it needs. If the heart does not get blood containing oxygen, it will not work properly. Coronary heart disease accounts for about half of the greater than 800,000 adults who die each year from cardiovascular disease.

When the heart is working normally, it beats evenly and easily, with a steady rhythm. When damage to the heart causes it to stop working effectively, a person can experience a heart attack or other damage to the heart muscle. A heart attack can cause the heart to beat in an irregular way. This may prevent blood from circulating effectively.

When the heart does not work properly, normal breathing can be disrupted or stopped. A heart attack also can cause the heart to stop beating entirely. This condition is called *cardiac arrest*. The number one cause of heart attack and cardiac arrest in adults is coronary heart disease. Other significant causes of cardiac arrest are non-heart related (e.g., poisoning or drowning).

HEART ATTACK

When blood flow to the heart muscle is reduced, people experience chest pain. This reduced blood flow usually is caused by coronary heart disease. When the blood and oxygen supply to the heart is reduced, a heart attack may result.

What to Look For

A heart attack can be indicated by common signals. Even people who have had a heart attack may not recognize the signals, because each heart attack may not show the same signals. You should be able to recognize the following signals of a heart attack so that you can give prompt and proper care:

- **Chest pain, discomfort or pressure.** The most common signal is persistent pain, discomfort or pressure in the chest that lasts longer than 3 to 5 minutes or goes away and comes back. Unfortunately, it is not always easy to distinguish heart attack pain from the pain of indigestion, muscle spasms or other conditions. This often causes people to delay getting medical care. Brief, stabbing pain or pain that gets worse when you bend or breathe deeply usually is not caused by a heart problem.
 - The pain associated with a heart attack can range from discomfort to an unbearable crushing sensation in the chest.
 - The person may describe it as pressure, squeezing, tightness, aching or heaviness in the chest.
 - Many heart attacks start slowly as mild pain or discomfort.
 - Often the person feels pain or discomfort in the center of the chest (Fig. 2-3).
 - The pain or discomfort becomes constant. It usually is not relieved by resting, changing position or taking medicine.
 - Some individuals may show no signals at all.
- **Discomfort in other areas of the upper body in addition to the chest.** Discomfort, pain or pressure may also be felt in or spread to the shoulder, arm, neck, jaw, stomach or back.
- **Trouble breathing.** Another signal of a heart attack is trouble breathing. The person may be breathing faster than normal because the body tries to get the much-needed oxygen to the heart. The person may have noisy breathing or shortness of breath.
- **Other signals.** The person's skin may be pale or ashen (gray), especially around the face. Some people suffering from a heart attack may be damp with sweat or may sweat heavily, feel dizzy, become nauseous or vomit. They may become fatigued, lightheaded or lose consciousness. These signals are caused by the stress put on the body when the heart does not work as it should. Some individuals may show no signals at all.
- **Differences in signals between men and women.** Both men and women experience the most common signal for a heart attack: chest pain or discomfort. However, it is important to note that women are somewhat more likely to experience some of the other warning signals, particularly shortness of breath, nausea or vomiting, back or jaw pain and unexplained fatigue or malaise. When they do experience chest pain, women may have a greater tendency to have atypical chest pain: sudden, sharp but short-lived pain outside of the breastbone.



FIGURE 2-3 Heart attack pain or pressure is often felt in the center of the chest. It may spread to the shoulder, arm, neck or jaw.

When to Call 9-1-1

Remember, the key signal of a heart attack is persistent chest pain or discomfort that lasts more than 3 to 5 minutes or goes away and comes back. If you suspect the person is having a heart attack based on his or her signals, call 9-1-1 or the local emergency number immediately. A person having a heart attack probably will deny that any signal is serious. Do not let this influence you. If you think the person might be having a heart attack, act quickly.

What to Do Until Help Arrives

It is important to recognize the signals of a heart attack and to act on those signals. Any heart attack might lead to cardiac arrest, but prompt action may prevent further damage to the heart. A person suffering from a heart attack, and whose heart is still beating, has a far better chance of living than does a person whose heart has stopped. Most people who die of a heart attack die within 2 hours of the first signal. Many could have been saved if people on the scene or the person having the heart attack had been aware of the signals and acted promptly.

Many people who have heart attacks delay seeking care. Nearly half of all heart attack victims wait for 2 hours or more before going to the hospital. Often they do not realize they are having a heart attack. They may say the signals are just muscle soreness, indigestion or heartburn.

CORONARY HEART DISEASE

Recognizing a heart attack and getting the necessary care at once may prevent a person from going into cardiac arrest. However, preventing a heart attack in the first place is even more effective. There is no substitute for prevention.

Heart attacks usually result from disease of the heart and blood vessels. Although a heart attack may seem to strike suddenly, many people's lifestyles are gradually putting their hearts in danger. Because coronary heart disease develops slowly, some individuals may not be aware of it for many years. Fortunately, it is possible to slow the progression of the disease by making lifestyle changes.

Many things increase a person's chances of developing coronary heart disease. These are called risk factors. Some of them cannot be changed. For instance, although more women than men die each year from coronary heart disease in the United States, heart disease generally affects men at younger ages than it does women.

Besides gender, ethnicity also plays an important role in determining the risk for heart disease. African Americans and Native Americans have higher rates of heart disease than do other U.S. populations. A family history of heart disease also increases your risk.

Reducing Risk Factors

There are some risk factors that can be reduced. Cigarette smoking, a poor diet, uncontrolled high blood cholesterol or high blood pressure, being overweight and lack of regular exercise all increase your risk of heart disease. When you combine one risk factor, like smoking, with others, such as high blood pressure and lack of exercise, your risk of heart attack is much greater.

By taking steps to control your risk factors, you can improve your chances for living a long and healthy life. Remember, it is never too late.

The best way to deal with a heart attack or cardiac arrest is to prevent it. Begin to reduce your risk of heart disease today.

Early treatment with certain medications—including aspirin—can help minimize damage to the heart after a heart attack. To be most effective, these medications need to be given within 1 hour of the start of heart attack signals.

If you suspect that someone might be having a heart attack, you should:

- Call 9-1-1 or the local emergency number immediately.
- Have the person stop what he or she is doing and rest comfortably (Fig. 2-4). This will ease the heart's need for oxygen. Many people experiencing a heart attack find it easier to breathe while sitting.
- Loosen any tight or uncomfortable clothing.
- Closely watch the person until advanced medical personnel take over. Notice any changes in the person's appearance or behavior. Monitor the person's condition.
- Be prepared to perform CPR and use an AED, if available, if the person loses consciousness and stops breathing.
- Ask the person if he or she has a history of heart disease. Some people with heart disease take

prescribed medication for chest pain. You can help by getting the medication for the person and assisting him or her with taking the prescribed medication.

- Offer aspirin, if medically appropriate and local protocols allow, and if the patient can swallow and has no known contraindications (see the following section). Be sure that the person has not been



FIGURE 2-4 *Comforting the person helps to reduce anxiety and eases some of the discomfort.*

told by his or her health care provider to avoid taking aspirin.

- Be calm and reassuring. Comforting the person helps to reduce anxiety and eases some of the discomfort.
- Talk to bystanders and if possible the person to get more information.
- Do not try to drive the person to the hospital yourself. He or she could quickly get worse on the way.

Giving Aspirin to Lessen Heart Attack Damage

You may be able to help a conscious person who is showing early signals of a heart attack by offering him or her an appropriate dose of aspirin when the signals first begin. However, you should never delay calling 9-1-1 or the local emergency number to do this. Always call for help as soon as you recognize the signals of a heart attack. Then help the person to be comfortable before you give the aspirin.

If the person is able to take medicine by mouth, ask:

- Are you allergic to aspirin?
- Do you have a stomach ulcer or stomach disease?
- Are you taking any blood thinners, such as warfarin (Coumadin™)?
- Have you ever been told by a doctor to avoid taking aspirin?

If the person answers **no** to *all* of these questions, you may offer him or her two chewable (81 mg each) baby aspirins, or one 5-grain (325 mg) adult aspirin tablet with a small amount of water. Do not use coated aspirin products or products meant for multiple uses such as for cold, fever and headache. You also may offer these doses of aspirin if the person regains consciousness while you are giving care and is able to take the aspirin by mouth.

Be sure that you offer only aspirin and not Tylenol®, acetaminophen or *nonsteroidal anti-inflammatory drugs* (NSAIDs), such as ibuprofen, Motrin®, Advil®, naproxen and Aleve®.

CARDIAC ARREST

Cardiac arrest occurs when the heart stops beating or beats too ineffectively to circulate blood to the brain and other vital organs. The beats, or contractions, of the heart become ineffective if they are weak, irregular or uncoordinated, because at that point the blood no longer flows through the arteries to the rest of the body.

When the heart stops beating properly, the body cannot survive. Breathing will soon stop, and the body's organs will no longer receive the oxygen they need to function. Without oxygen, brain damage can begin in about

4 to 6 minutes, and the damage can become irreversible after about 10 minutes.

A person in cardiac arrest is unconscious, not breathing and has no heartbeat. The heart has either stopped beating or is beating weakly and irregularly so that a pulse cannot be detected.

Cardiovascular disease is the primary cause of cardiac arrest in adults. Cardiac arrest also results from drowning, choking, drug abuse, severe injury, brain damage and electrocution.

Causes of cardiac arrest in children and infants include airway and breathing problems, traumatic injury, a hard blow to the chest, congenital heart disease and sudden infant death syndrome (SIDS).

Cardiac arrest can happen suddenly, without any of the warning signs usually seen in a heart attack. This is known as *sudden cardiac arrest* or *sudden cardiac death* and accounts for more than 300,000 deaths annually in the United States. Sudden cardiac arrest is caused by abnormal, chaotic electrical activity of the heart (known as *arrhythmias*). The most common life-threatening abnormal arrhythmia is *ventricular fibrillation* (V-fib).

Cardiac Chain of Survival

CPR alone may not be enough to help someone survive cardiac arrest. Advanced medical care is needed as soon as possible. A person in cardiac arrest will have the greatest chance of survival if you follow the four links in the Cardiac Chain of Survival:

1. **Early recognition and early access to the emergency medical services (EMS) system.** The sooner someone calls 9-1-1 or the local emergency number, the sooner EMS personnel will take over.
2. **Early CPR.** CPR helps supply blood containing oxygen to the brain and other vital organs. This helps to keep the person alive until an AED is used or advanced medical care is provided.
3. **Early defibrillation.** An electrical shock, called *defibrillation*, may help to restore an effective heart rhythm.
4. **Early advanced medical care.** EMS personnel provide more advanced medical care and transport the person to a hospital.

For each minute that CPR and defibrillation are delayed, the chance for survival is reduced by about 10 percent.

In the Cardiac Chain of Survival, each link of the chain depends on, and is connected to, the other links. Taking quick action by calling 9-1-1 or the local emergency number, starting CPR immediately and using an AED, if one is available, makes it more likely that a person in cardiac arrest will survive. Remember, you are the

first link in the Cardiac Chain of Survival. By acting quickly, you can make a positive difference for someone experiencing a cardiac emergency.

What to Look For

The main signals of cardiac arrest in an adult, a child and an infant are unconsciousness and no breathing.

The presence of these signals means that no blood and oxygen are reaching the person's brain and other vital organs.

When to Call 9-1-1

Call 9-1-1 or the local emergency number *immediately* if you suspect that a person is in cardiac arrest or you witness someone suddenly collapse.

What to Do Until Help Arrives

Perform CPR until an AED is available and ready to use or advanced medical personnel take over.

Early CPR and Defibrillation

A person in cardiac arrest needs immediate CPR and defibrillation. The cells of the brain and other important organs continue to live for a short time—until all of the oxygen in the blood is used.

CPR is a combination of chest compressions and rescue breaths. When the heart is not beating, chest compressions are needed to circulate blood containing oxygen. Given together, rescue breaths and chest compressions help to take over for the heart and lungs. CPR increases the chances of survival for a person in cardiac arrest.

In many cases, however, CPR alone cannot correct the underlying heart problem: defibrillation delivered

by an AED is needed. This shock disrupts the heart's electrical activity long enough to allow the heart to spontaneously develop an effective rhythm on its own. Without *early* CPR and *early* defibrillation, the chances of survival are greatly reduced. (Using an AED is discussed in detail in Chapter 3.)

CPR for Adults

To determine if an unconscious adult needs CPR, follow the emergency action steps (**CHECK—CALL—CARE**) that you learned in Chapter 1.

- **CHECK** the scene and the injured or ill person.
- **CALL** 9-1-1 or the local emergency number.
- **CHECK** for breathing for no more than 10 seconds.
- Quickly **CHECK** for severe bleeding.
- If the person is not breathing, give **CARE** by beginning CPR.

For chest compressions to be the most effective, the person should be on his or her back on a firm, flat surface. If the person is on a soft surface like a sofa or bed, quickly move him or her to a firm, flat surface before you begin.

To perform CPR on an adult:

- Position your body correctly by kneeling beside the person's upper chest, placing your hands in the correct position, and keeping your arms and elbows as straight as possible so that your shoulders are directly over your hands (Fig. 2-5). Your body position is important when giving chest compressions. Compressing the person's chest straight down will help you reach the necessary depth. Using the correct body position also will be less tiring for you.
- Locate the correct hand position by placing the heel of one hand on the person's sternum (breastbone) at the center of his or her chest (Fig. 2-6). Place



FIGURE 2-5 Position yourself so that your shoulders are directly over your hands.



FIGURE 2-6 Locate the correct hand position by placing the heel of one hand on the person's sternum (breastbone) in the center of the person's chest.

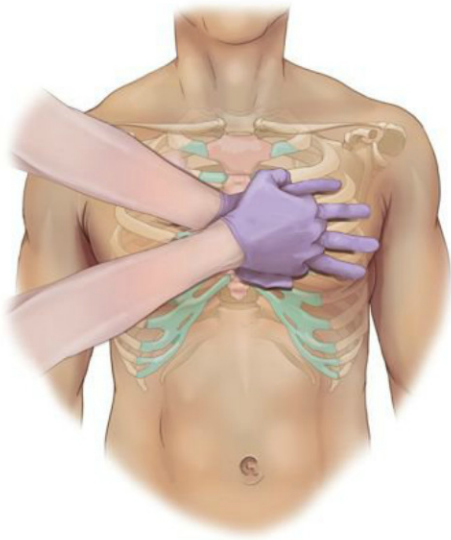


FIGURE 2-7 Place your other hand directly on top of the first hand. Try to keep your fingers off of the chest by interlacing them or holding them upward.

your other hand directly on top of the first hand and try to keep your fingers off of the chest by interlacing them or holding them upward (Fig. 2-7). If you feel the notch at the end of the sternum, move your hands slightly toward the person's head. If you have arthritis in your hands, you can give compressions by grasping the wrist of the hand positioned on the chest with your other hand (Fig. 2-8). The person's clothing should not interfere with finding the proper hand position or your ability to give effective compressions. If it does, loosen or remove enough clothing to allow deep compressions in the center of the person's chest.

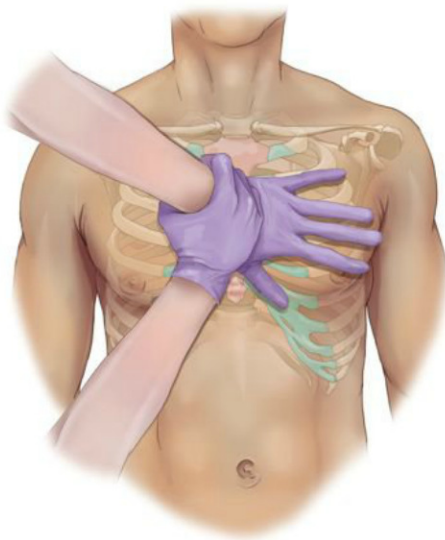


FIGURE 2-8 If you have arthritis in your hands, you can give compressions by grasping the wrist of the hand positioned on the chest with your other hand.

- Give 30 chest compressions. Push hard, push fast at a rate of at least 100 compressions per minute. Note that the term “100 compressions per minute” refers to the *speed of compressions*, not the *number of compressions* given in a minute. As you give compressions, count out loud, “One and two and three and four and five and six and...” up to 30. Push down as you say the number and come up as you say “and.” This will help you to keep a steady, even rhythm.
- Give compressions by pushing the sternum down at least 2 inches (Fig. 2-9, A). The downward and upward movement should be smooth, not jerky. Push straight down with the weight of your upper body, not with your arm muscles. This way, the weight of your upper body will create the force needed to compress the chest. Do not rock back and forth. Rocking results in less-effective compressions and wastes much-needed energy. If your arms and shoulders tire quickly, you are not using the correct body position.
- After each compression, release the pressure on the chest without removing your hands or changing hand position (Fig. 2-9, B). Allow the chest to return to its normal position before starting the next compression. Maintain a steady down-and-up rhythm and do not pause between compressions. Spend half of the time pushing down and half of the time coming up. When you press down, the walls of the heart squeeze together, forcing the blood to empty out of the heart. When you come up, you should release all pressure on the chest, but do not take hands off the chest. This allows the heart's chambers to fill with blood between compressions.

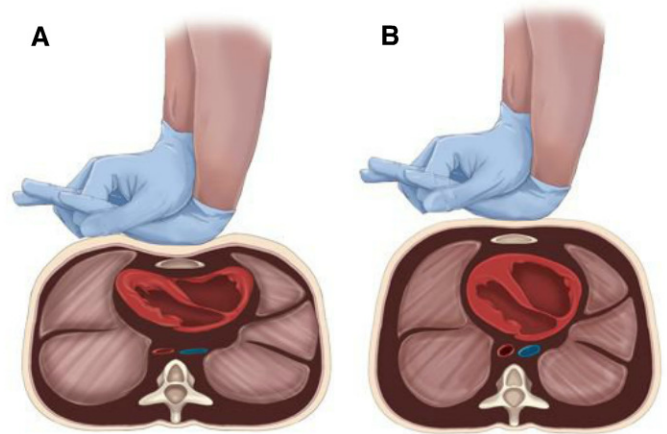


FIGURE 2-9, A-B To give chest compressions: **A**, Push straight down with the weight of your body. **B**, Release, allowing the chest to return to its normal position.

- Once you have given 30 compressions, open the airway using the head-tilt/chin-lift technique and give 2 rescue breaths. Each rescue breath should last about 1 second and make the chest clearly rise.
 - Open the airway and give rescue breaths, one after the other.
 - Tilt the head back and lift the chin up.
 - Pinch the nose shut then make a complete seal over the person's mouth.
 - Blow in for about 1 second to make the chest clearly rise.
- Continue cycles of chest compressions and rescue breaths. Each cycle of chest compressions and rescue breaths should take about 24 seconds. Minimize the interruption of chest compressions.

If Two Responders Are Available

If two responders trained in CPR are at the scene, both should identify themselves as being trained. One should call 9-1-1 or the local emergency number for help while the other performs CPR. If the first responder is tired and needs help:

- The first responder should tell the second responder to take over.
- The second responder should immediately take over CPR, beginning with chest compressions.

When to Stop CPR

Once you begin CPR, do not stop except in one of these situations:

- You notice an obvious sign of life, such as breathing.
- An AED is available and ready to use.
- Another trained responder or EMS personnel take over (Fig. 2-10).



FIGURE 2-10 Perform CPR until an AED becomes available and is ready to use or EMS personnel take over. Courtesy of Terry Georgia.



FIGURE 2-11 Monitor breathing until help arrives.

- You are too exhausted to continue.
- The scene becomes unsafe.

If at any time you notice that the person is breathing, stop CPR. Keep his or her airway open and continue to monitor the person's breathing and for any changes in the person's condition until EMS personnel take over (Fig. 2-11).

Cardiac Emergencies in Children and Infants

It is rare for a child or an infant to initially suffer a cardiac emergency. Usually, a child or an infant has a respiratory emergency first and then a cardiac emergency develops.

Causes of cardiac arrest in children and infants include:

- Airway and breathing problems.
- Traumatic injury or an accident (e.g., motor-vehicle collision, drowning, electrocution or poisoning).
- A hard blow to the chest.
- Congenital heart disease.
- Sudden infant death syndrome (SIDS).

If you recognize that a child or an infant is not breathing, begin CPR.

CPR for Children and Infants

Follow the emergency action steps (**CHECK—CALL—CARE**) to determine if you will need to perform CPR for a child or an infant. The principles of CPR (compressing the chest and giving rescue breaths) are the same for children and infants as for adults. However, the CPR techniques are slightly different since children's and infants' bodies are smaller.

ADVANCE DIRECTIVES

Your 85-year-old grandfather is living with your family. He has a terminal illness and is frequently in the hospital.

One afternoon, you go to his room to give him lunch. As you start to talk to him, you realize that he is unconscious. You check for breathing. He is not breathing. What should you do?

No one but you can answer that question. No one can advise you. No one can predict the outcome of your decision. You alone must decide whether or not to give your grandfather CPR.

Endless questions race through your mind. Can I face the fact I am losing someone I love? Should I always try to perform CPR? What would his life be like after resuscitation? What would my grandfather want? Your mind tells you to perform CPR, yet your heart says no.

It is important to realize that it is okay to withhold CPR when a terminally ill person is dying. Nature takes its course, and in some cases people feel they have lived full lives and are prepared for death.

Advance Directives

Fortunately, this type of heart-wrenching, last-second decision sometimes can be avoided if loved ones talk to each other in advance about their preferences regarding lifesaving treatments.

Instructions that describe a person's wishes about medical treatment are called advance directives. These instructions make known a person's intentions while he or she is still capable of doing so and are used when the person can no longer make his or her own health-care decisions.

As provided by the Federal Patient Self-Determination Act, adults who are admitted to a hospital or a health-care facility or who receive assistance from certain organizations that receive funds from Medicare and Medicaid have the right to make fundamental choices about their own care. They must be told about their right to make decisions about the level of life support that would be provided in an emergency situation. They are supposed to be offered the opportunity to make these choices at the time of admission.

Conversations with relatives, friends or health care providers while the person is still capable of making decisions are the most common form of advance directives. However, because conversations may not be recalled accurately or may not have taken into account the illness or emergency now facing the person, the courts consider written directives to be more reliable.

Two examples of written advance directives are living wills and durable powers of attorney for health care. The types of health-care decisions covered by these documents vary by state. Talking with a legal professional can help to determine which advance directive options are available in your state and what they cover.

If a person establishes a living will, directions for health care would be in place before he or she became unable to communicate his or her wishes. Instructions that can be included in this document vary from state to state. A living will generally allows a person to refuse only medical care that "merely prolongs the process of dying," such as resuscitating a person with a terminal illness.

If a person has established a durable power of attorney for health care, the document would authorize someone else to make medical decisions for that person in any situation in which the person could no longer make them for him- or herself. This authorized person is called a health care surrogate or proxy. This surrogate, with the information given by the person's health care provider, may consent to or refuse medical treatment on the person's behalf.

Do Not Resuscitate or Do Not Attempt Resuscitation

A doctor could formalize the person's preferences by writing Do Not Resuscitate (DNR) or Do Not Attempt Resuscitation (DNAR) orders in his or her medical records. Such orders would state that if the person's heart or breathing stops, he or she should not be resuscitated. DNR/DNAR orders may be covered in a living will or in the durable power of attorney for health care.

(Continued)

FOCUS ON PREPAREDNESS *(Continued)*

Appointing someone to act as a health care surrogate, along with writing down your instructions, is the best way to formalize your wishes about medical care. Some of these documents can be obtained through a personal physician, attorney or various state and health care organizations. A lawyer is not always needed to execute advance directives. However, if you have any questions concerning advance directives, it is wise to obtain legal advice.

Talk in Advance

Copies of advance directives should be provided to all personal physicians, family members and the person chosen as the health care surrogate. Tell them which documents have been prepared and where the original and other copies are located.

Discuss the document with all parties so that they understand the intent of all requests. Keep these documents updated.

Keep in mind that advance directives are not limited to elderly people or people with terminal illnesses. Advance directives should be considered by anyone who has decided on the care he or she would like to have provided. An unexpected injury or illness could create a need for decisions at any time.

Knowing about living wills, durable powers of attorney for health care and DNR/DNAR orders can help you prepare for difficult decisions. For more information about your rights and the options available to you in your state, contact a legal professional.

CPR for a Child

If during the unconscious check you find that the child is not breathing, place the child face-up on a firm, flat surface. Begin CPR by following these steps:

- Locate the proper hand position on the middle of the breastbone as you would for an adult (Fig. 2-12, A). If you feel the notch at the end of the sternum, move your hands slightly toward the child's head.
- Position your body as you would for an adult, kneeling next to the child's upper chest, positioning

your shoulders over your hands and keeping your arms and elbows as straight as possible.

- Give 30 chest compressions. Push hard, push fast to a depth of about 2 inches and at a rate of at least 100 compressions per minute. Lift up, allowing the chest to fully return to its normal position, but keep contact with the chest.
- After giving 30 chest compressions, open the airway and give 2 rescue breaths (Fig. 2-12, B). Each rescue breath should last about 1 second and make the chest clearly rise. Use the head-tilt/chin-lift technique to ensure that the child's airway is open.

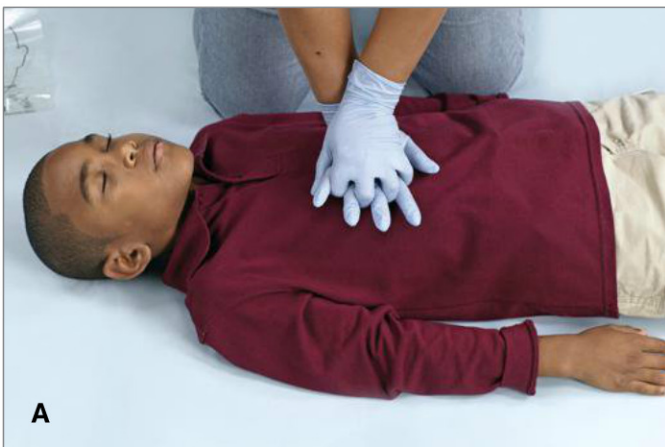


FIGURE 2-12, A–B To perform CPR on a child: **A**, Locate the proper hand position in the center of the child's chest by placing 2 hands on the center of the child's chest. **B**, After giving 30 chest compressions, open the airway and give 2 rescue breaths.

Continue cycles of 30 chest compressions and 2 rescue breaths. Do not stop CPR except in one of these situations:

- You find an obvious sign of life, such as breathing.
- An AED is ready to use.
- Another trained responder or EMS personnel take over.
- You are too exhausted to continue.
- The scene becomes unsafe.

If at any time you notice the child begin to breathe, stop CPR, keep the airway open and monitor breathing and for any changes in the child's condition until EMS personnel take over.

CPR for an Infant

If during your check you find that the infant is not breathing, begin CPR by following these steps:

- Find the correct location for compressions. Keep one hand on the infant's forehead to maintain an open airway. Use the pads of two or three fingers of your other hand to give chest compressions on the center of the chest, just below the nipple line (toward the infant's feet). If you feel the notch at the end of the infant's sternum, move your fingers slightly toward the infant's head.
- Give 30 chest compressions using the pads of these fingers to compress the chest. Compress the chest about 1½ inches. Push hard, push fast (Fig. 2-13, A). Your compressions should be smooth, not jerky. Keep a steady rhythm. Do not pause between each compression.

When your fingers are coming up, release pressure on the infant's chest completely but do not let your fingers lose contact with the chest. Compress at a rate of at least 100 compressions per minute.

- After giving 30 chest compressions, give 2 rescue breaths, covering the infant's mouth and nose with your mouth (Fig. 2-13, B). Each rescue breath should last about 1 second and make the chest clearly rise.

Continue cycles of 30 chest compressions and 2 rescue breaths. Do not stop CPR except in one of these situations:

- You find an obvious sign of life, such as breathing.
- An AED is ready to use.
- Another trained responder or EMS personnel take over.
- You are too exhausted to continue.
- The scene becomes unsafe.

If at any time you notice the infant begin to breathe, stop CPR, keep the airway open and monitor breathing and for any changes in the infant's condition until EMS personnel take over.

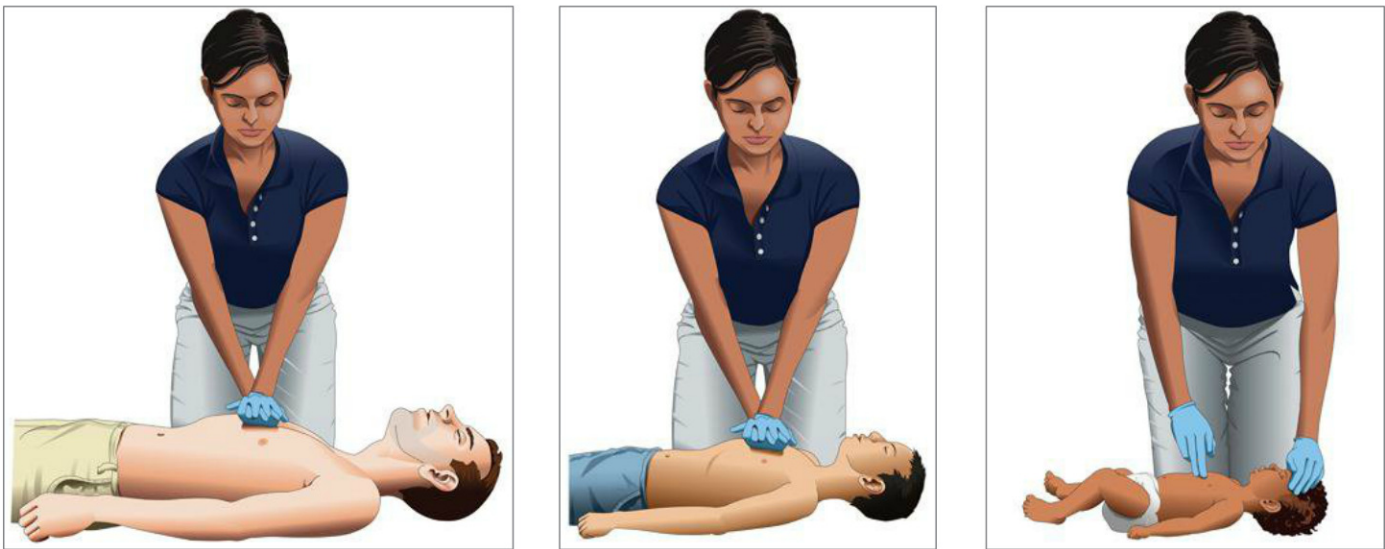
Continuous Chest Compressions (Hands-Only CPR)

If you are unable or unwilling for any reason to perform full CPR (with rescue breaths), give continuous chest compressions after calling 9-1-1 or the local emergency number. Continue giving chest compressions until EMS personnel take over or you notice an obvious sign of life, such as breathing.



FIGURE 2-13, A–B To perform CPR on an infant: **A**, Place the pads of two or three fingers in the center of the infant's chest and compress the chest about 1½ inches. **B**, Give 2 rescue breaths, covering the infant's mouth and nose with your mouth.

TABLE 2-1 CPR SKILL COMPARISON



Skill Components	Adult	Child	Infant
HAND POSITION	Two hands in center of chest (on lower half of sternum)	Two hands in center of chest (on lower half of sternum)	Two or three fingers in center of chest (on lower half of sternum, just below nipple line)
CHEST COMPRESSIONS RESCUE BREATHS	At least 2 inches Until the chest clearly rises (about 1 second per breath)	About 2 inches Until the chest clearly rises (about 1 second per breath)	About 1½ inches Until the chest clearly rises (about 1 second per breath)
CYCLE	30 chest compressions and 2 rescue breaths	30 chest compressions and 2 rescue breaths	30 chest compressions and 2 rescue breaths
RATE	30 chest compressions in about 18 seconds (at least 100 compressions per minute)	30 chest compressions in about 18 seconds (at least 100 compressions per minute)	30 chest compressions in about 18 seconds (at least 100 compressions per minute)

PUTTING IT ALL TOGETHER

Cardiac emergencies are life threatening. Every day someone will have a heart attack or go into cardiac arrest. These cardiac emergencies usually happen in the home. If you know the signals of a heart attack and cardiac arrest, you will be able to respond

immediately. Call 9-1-1 or the local emergency number and give care until help takes over. If the person is in cardiac arrest, perform CPR. Use an AED if one is available. These steps will increase the chances of survival for the person having a cardiac emergency.

CPR-ADULT

NO BREATHING

AFTER CHECKING THE SCENE AND THE INJURED OR ILL PERSON:

1 GIVE 30 CHEST COMPRESSIONS

Push hard, push fast in the center of the chest at least **2** inches deep and at least **100** compressions per minute.

TIP: *The person must be on a firm, flat surface.*



2 GIVE 2 RESCUE BREATHS

- Tilt the head back and lift the chin up.
- Pinch the nose shut then make a complete seal over the person's mouth.
- Blow in for about **1** second to make the chest clearly rise.
- Give rescue breaths, one after the other.
- If chest does not rise with rescue breaths, retilt the head and give another rescue breath.



3 DO NOT STOP

Continue cycles of CPR. Do not stop except in one of these situations:

- You find an obvious sign of life, such as breathing.
- An AED is ready to use.
- Another trained responder or EMS personnel take over.
- You are too exhausted to continue.
- The scene becomes unsafe.

TIP: *If at any time you notice an obvious sign of life, stop CPR and monitor breathing and for any changes in condition.*

WHAT TO DO NEXT

- USE AN AED AS SOON AS ONE IS AVAILABLE.
- IF BREATHS DO NOT MAKE CHEST RISE AFTER RETILTING THE HEAD—Give CARE for unconscious choking.

CPR-CHILD

NO BREATHING

AFTER CHECKING THE SCENE AND THE INJURED OR ILL CHILD:

1 GIVE 30 CHEST COMPRESSIONS

Push hard, push fast in the center of the chest about **2 inches** deep and at least **100** compressions per minute.

TIP: *The child must be on a firm, flat surface.*



2 GIVE 2 RESCUE BREATHS

- Tilt the head back and lift the chin up.
- Pinch the nose shut then make a complete seal over the child's mouth.
- Blow in for about **1** second to make the chest clearly rise.
- Give rescue breaths, one after the other.
- If chest does not rise with rescue breaths, retilt the head and give another rescue breath.



3 DO NOT STOP

Continue cycles of CPR. Do not stop except in one of these situations:

- You find an obvious sign of life, such as breathing.
- An AED is ready to use.
- Another trained responder or EMS personnel take over.
- You are too exhausted to continue.
- The scene becomes unsafe.

TIP: *If at any time you notice an obvious sign of life, stop CPR and monitor breathing and for any changes in condition.*

WHAT TO DO NEXT

- **USE AN AED AS SOON AS ONE IS AVAILABLE.**
- **IF BREATHS DO NOT MAKE CHEST RISE AFTER RETILTING THE HEAD—Give CARE for unconscious choking.**

CPR–INFANT

NO BREATHING

AFTER CHECKING THE SCENE AND THE INJURED OR ILL INFANT:

1 GIVE 30 CHEST COMPRESSIONS

Push hard, push fast in the center of the chest about **1½ inches deep** and at least **100 compressions per minute**.

TIP: *The infant must be on a firm, flat surface.*



2 GIVE 2 RESCUE BREATHS

- Tilt the head back and lift the chin up.
- Make a complete seal over the infant's mouth and nose.
- Blow in for about **1 second** to make the chest clearly rise.
- Give rescue breaths, one after the other.
- If chest does not rise with rescue breaths, retilt the head and give another rescue breath.



3 DO NOT STOP

Continue cycles of CPR. Do not stop except in one of these situations:

- You find an obvious sign of life, such as breathing.
- An AED is ready to use.
- Another trained responder or EMS personnel take over.
- You are too exhausted to continue.
- The scene becomes unsafe.

TIP: *If at any time you notice an obvious sign of life, stop CPR and monitor breathing and for any changes in condition.*

WHAT TO DO NEXT

- **USE AN AED AS SOON AS ONE IS AVAILABLE.**
- **IF BREATHS DO NOT MAKE CHEST RISE AFTER RETILTING THE HEAD—Give CARE for unconscious choking.**

AED



Sudden cardiac arrest occurs when the heart suddenly stops beating normally because of abnormal electrical activity of the heart. Every year in the United States more than 300,000 people die of sudden cardiac arrest. Sudden cardiac arrest can happen to anyone, anytime without warning but usually occurs in adults. Most cardiac arrests happen in the home. Therefore, knowing how to activate the emergency medical services (EMS) system, perform CPR and use an automated external defibrillator (AED) could help you save a life—most likely someone you love.

This chapter further discusses the third link in the Cardiac Chain of Survival: early defibrillation, including what it is and how it works in the case of life-threatening abnormal electrical activity of the heart. You also will read about the steps to follow when using an AED. This knowledge will give you the confidence to give care to anyone who experiences sudden cardiac arrest.

WHEN THE HEART SUDDENLY FAILS

The heart's electrical system sends out signals that tell the heart to pump blood. These signals travel through the upper chambers of the heart, called the *atria*, to the lower chambers, called the *ventricles*.

When the heart is normal and healthy, these electrical signals cause the ventricles to squeeze together, or contract. These contractions force blood out of the heart. The blood then circulates throughout the body. When the ventricles relax between contractions, blood flows back into the heart. The pause that you notice between heart beats when taking a person's pulse are the pauses between contractions.

If the heart is damaged by disease or injury, its electrical system can be disrupted. This can cause an abnormal heart rhythm that can stop the blood from circulating. The most common abnormal heart rhythm that causes sudden cardiac arrest occurs when the ventricles simply quiver, or *fibrillate*, without any organized rhythm. This condition is called *ventricular fibrillation (V-fib)*. In V-fib, the electrical impulses fire at random, creating chaos and preventing the heart from pumping and circulating blood. The person may suddenly collapse unconscious, and stop breathing.

Another abnormal rhythm found during sudden cardiac arrest is *ventricular tachycardia*, or V-tach. With V-tach, the electrical system tells the ventricles to contract too quickly. As a result, the heart cannot pump blood properly. As with V-fib, during V-tach the person may collapse, become unconscious and stop breathing.

In many cases, V-fib and V-tach can be corrected by an electrical shock delivered by an AED. AEDs are portable electronic devices that analyze the heart's rhythm and deliver an electrical shock, known as *defibrillation*, which helps the heart to re-establish an effective rhythm (Fig. 3-1). For each minute that CPR and defibrillation are delayed, the person's chance for survival is reduced by about 10 percent. However, by learning how to perform CPR and use an AED, you can make a difference before EMS personnel take over.

USING AN AED

When a cardiac arrest in an adult occurs, call 9-1-1 or local emergency number and begin CPR immediately. Also, use an AED as soon as it is available and ready to use (Fig. 3-2). If CPR is in progress, do not interrupt until the AED is turned on and the defibrillation pads are applied. Always follow *local protocols*, which are



FIGURE 3-1 There are several types of AEDs.

guidelines provided by the facility's medical director or EMS system, when using an AED. Be thoroughly familiar with the manufacturer's operating instructions. Also, be familiar with maintenance guidelines for the device that you will be using.

AED PRECAUTIONS

When operating an AED, follow these general precautions:

- Do *not* use alcohol to wipe the person's chest dry. Alcohol is flammable.
- Do *not* use an AED and/or pads designed for adults on a child younger than 8 years or weighing less than 55 pounds unless pediatric AED pads specific to the device are not available.
- Do *not* use pediatric AED pads on an adult or on a child older than 8 years, or on a person weighing more than 55 pounds. AEDs equipped with pediatric AED pads deliver lower levels of energy that are considered appropriate only for children.



FIGURE 3-2 Defibrillation may help the heart to re-establish an effective heart rhythm.

and infants up to 8 years old or weighing less than 55 pounds.

- Do *not* touch the person while the AED is analyzing. Touching or moving the person may affect analysis.
- Before shocking a person with an AED, make sure that *no one* is touching or is in contact with the person or any resuscitation equipment.
- Do *not* touch the person while the device is defibrillating. You or someone else could be shocked.
- Do *not* defibrillate someone when around flammable or combustible materials, such as gasoline or free-flowing oxygen.
- Do *not* use an AED in a moving vehicle. Movement may affect the analysis.
- Do *not* use an AED on a person who is in contact with water. Move the person and AED away from puddles of water or swimming pools or out of the rain before defibrillating.
- Do *not* use an AED on a person wearing a nitroglycerin patch or other medical patch on the chest. With a gloved hand, remove any patches from the chest before attaching the device.
- Do *not* use a mobile phone or radio within 6 feet of the AED. Radiofrequency interference (RFI) and electromagnetic interference (EMI), as well as infrared interference, generated by radio signals can disrupt analysis.

HOW TO USE AN AED—ADULTS

Different types of AEDs are available, but all are similar to operate and have some common features, such as electrode (AED or defibrillation) pads, voice prompts, visual displays and/or lighted buttons to guide the responder through the steps of the AED

operation. Most AEDs can be operated by following these simple steps:

- Turn on the AED.
- Expose the person's chest and wipe the bare chest dry with a small towel or gauze pads. This ensures that the AED pads will stick to the chest properly.
- Apply the AED pads to the person's *bare, dry* chest. (Make sure to peel the backing off each pad, one at a time, to expose the adhesive surface of the pad before applying it to the person's bare chest.) Place one pad on the upper right chest and the other pad on the left side of the chest (Fig. 3-3, A).
- Plug the connector into the AED, if necessary.
- Let the AED analyze the heart rhythm (or push the button marked "analyze," if indicated and prompted by the AED). Advise all responders and bystanders to "stand clear" (Fig. 3-3, B). No one should touch the person while the AED is analyzing because this could result in faulty readings.
- If the AED advises that a shock is needed:
 - Make sure that no one, including you, is touching the person.
 - Say, "EVERYONE, STAND CLEAR."
 - Deliver the shock by pushing the "shock" button, if necessary. (Some models can deliver the shock automatically while others have a "shock" button that must be manually pushed to deliver the shock.)
- After delivering the shock, or if no shock is advised:
 - Perform about 2 minutes (or 5 cycles) of CPR.
 - Continue to follow the prompts of the AED.

If at any time you notice an obvious sign of life, such as breathing, stop performing CPR and monitor the person's breathing and any changes in the person's condition.



FIGURE 3-3, A–B To use an AED on an adult: Turn on the AED. **A**, Apply the pads to the person's bare, dry chest. Place one pad on the upper right chest and the other pad on the left side of the chest. **B**, Advise everyone to "stand clear" while the AED analyzes the heart rhythm. Deliver a shock by pushing the shock button if indicated and prompted by the AED.

HOW TO USE AN AED— CHILDREN AND INFANTS

While the incidence of cardiac arrest is relatively low compared with adults, sudden cardiac arrest resulting from V-fib does happen to young children and infants. However, most cases of cardiac arrest in children and infants are not sudden and may be caused by:

- Airway and breathing problems.
- Traumatic injuries or accidents (e.g., motor-vehicle collision, drowning, electrocution or poisoning).
- A hard blow to the chest.
- Congenital heart disease.
- Sudden infant death syndrome (SIDS).

Use an AED as soon as it is available, ready to use and is safe to do so. However, as you learned in the Cardiac Chain of Survival, in a cardiac emergency, you should always call 9-1-1 or the local emergency number *first*.

AEDs equipped with pediatric AED pads can deliver lower levels of energy considered appropriate for children and infants up to 8 years of age or weighing less than 55 pounds. Use pediatric AED pads and/or equipment if available. If pediatric-specific equipment is not available, use an AED designed for adults on children and infants. Always follow local protocols (i.e., guidelines provided by the facility’s medical director or EMS) and the manufacturer’s instructions. Follow the same general steps and precautions that you would when using an AED on an adult in cardiac arrest.

- Turn on the AED.
- Expose the child’s or infant’s chest and wipe it dry.
- Apply the pediatric pads to the child’s or infant’s bare, dry chest. Place one pad on the child’s upper right

chest and the other pad on the left side of the chest. Make sure that the pads are not touching. If the pads risk touching each other, such as with a small child or an infant, place one pad in the middle of the child’s or infant’s chest and the other pad on the child’s or infant’s back, between the shoulder blades (Fig. 3-4, A–B).

- Plug the connector into the AED, if necessary.
- Let the AED analyze the heart rhythm (or push the button marked “analyze,” if indicated and prompted by the AED). Advise all responders and bystanders to “Stand clear.” No one should touch the child or infant while the AED is analyzing because this could result in faulty reading.
- If the AED advises that a shock is needed:
 - Make sure that no one, including you, is touching the child or infant.
 - Say, “EVERYONE, STAND CLEAR.”
 - Deliver the shock by pushing the “shock” button, if necessary.
- After delivering the shock, or if no shock is advised:
 - Perform about 2 minutes (or 5 cycles) of CPR.
 - Continue to follow the prompts of the AED.

If at any time you notice an obvious sign of life, such as breathing, stop performing CPR and monitor breathing and for any changes in the child’s or infant’s condition.

SPECIAL AED SITUATIONS

Some situations require you to pay special attention when using an AED. These include using AEDs around water and on people with implantable devices, transdermal patches, hypothermia, trauma and jewelry or body piercings. Or, you may need to determine what

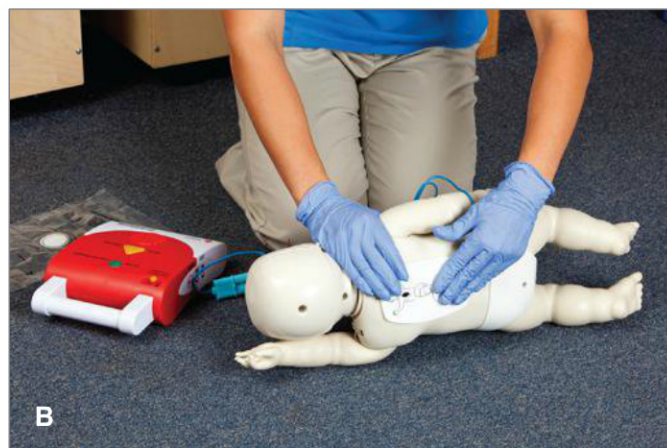


FIGURE 3-4, A–B **A**, Place one pediatric pad on the upper right chest and the other pad on the left side of the chest. **B**, If the pads risk touching each other, place one on the chest and the other on the back of the child or infant.

to do if local protocols or the AED's instructions differ from those you have learned. Familiarize yourself with these situations as much as possible so that you know how to respond appropriately, should the situation arise. Always use common sense when using an AED and follow the manufacturer's recommendations.

AEDs Around Water

If the person is in water, remove him or her from the water before defibrillation. A shock delivered in water could harm responders or bystanders. Once you have removed the person from the water, be sure there are no puddles of water around you, the person or the AED. Remove wet clothing to place the pads properly, if necessary. Dry the person's chest and attach the AED pads.

If it is raining, take steps to make sure that the person is as dry as possible and sheltered from the rain. Ensure that the person's chest is wiped dry. Do not delay defibrillation when taking steps to create a dry environment. AEDs are safe when all precautions and manufacturer's operating instructions are followed, even in rain and snow. Avoid getting the AED or defibrillation pads wet.

Pacemakers and Implantable Cardioverter-Defibrillators

Some people whose hearts are weak, beat too slowly, skip beats or beat in a rhythm that is too fast may have had a *pacemaker* implanted. These small, implantable devices are usually located in the area below the person's left collar bone, although they can be placed elsewhere. Typically they feel like a small lump under the skin. Other people may have an *implantable cardioverter-defibrillator* (ICD), a miniature version of an AED. ICDs automatically recognize and restore abnormal heart rhythms. Sometimes a person's heart beats irregularly, even if the person has a pacemaker or ICD.

If the implanted device is visible or you know that the person has one, do *not* place the defibrillation pads directly over the device (Fig. 3-5). This may interfere with the delivery of the shock. Adjust pad placement if necessary and continue to follow the AED instructions. If you are not sure whether the person has an implanted device, use the AED if needed. It will not harm the person or responder.

The responder should be aware that it is possible to receive a mild shock if an implantable ICD delivers a shock to the person during CPR. However, this risk of injury to responders is minimal, and the amount of electrical energy involved is low. Follow any special precautions associated with ICDs but do not delay in performing CPR and using an AED.

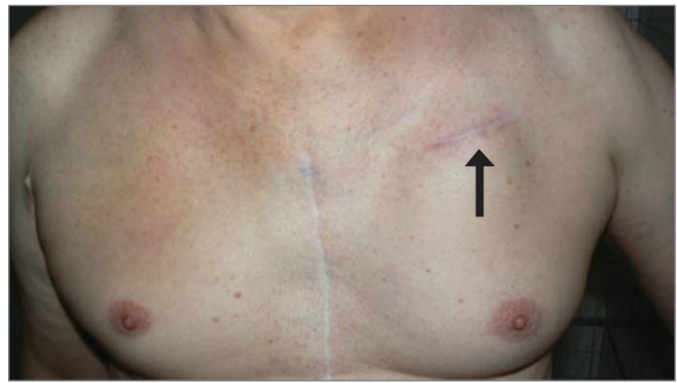


FIGURE 3-5 Look for an ICD before defibrillation. Courtesy of Ted Crites.

Transdermal Medication Patches

Some people have a patch on their skin that automatically delivers medication through the skin, called a *transdermal medication patch*. A common medication patch is the nitroglycerin patch, which is used by people with a history of cardiac problems. Because a responder can absorb medication through the skin, remove patches with a gloved hand before defibrillation. Nicotine patches used to stop smoking look similar to nitroglycerin patches. Do not waste time trying to identify patches. Instead remove any patch that you see on the person's chest with a gloved hand. *Never* place AED electrode pads directly on top of medication patches.

Hypothermia

Hypothermia is a life-threatening condition in which the entire body cools because its ability to keep warm fails. Some people who have experienced hypothermia have been resuscitated successfully, even after prolonged exposure to the cold. If the person is not breathing, begin CPR until an AED becomes readily available. Follow local protocols as to whether you should use an AED in this situation.

If the person is wet, remove wet clothing and dry his or her chest. Attach the AED pads. If a shock is indicated, deliver it, following the instructions of the AED. If the person still is not breathing, continue CPR and protect the person from further heat loss. Follow local protocols as to whether additional shocks should be delivered. Do not withhold CPR or defibrillation to re-warm the person. Be careful not to unnecessarily shake a person who has experienced hypothermia as this could result in V-fib.

Trauma

If a person is in cardiac arrest as a result of traumatic injuries, you still can use an AED. Administer defibrillation according to local protocols.

Chest Hair

Some men have excessive chest hair that may interfere with AED pad-to-skin contact, although it's a rare occurrence. Since time is critical in a cardiac arrest situation and chest hair rarely interferes with pad adhesion, attach the pads and analyze the heart's rhythm as soon as possible. Press firmly on the pads to attach them to the person's chest.

If you get a "check pads" or similar message from the AED, remove the pads and replace them with new ones. The pad adhesive may pull out some of the chest hair, which may solve the problem. If you continue to get the "check pads" message, remove the pads, shave the person's chest where the pads should be placed, and attach new pads to the person's chest. (There should be spare defibrillation pads and a safety razor included in the AED kit.) Be careful not to cut the person while shaving the chest, as cuts and scrapes can interfere with rhythm analysis.

Metal Surfaces

It is safe to deliver a shock to a person in cardiac arrest when he or she is lying on a metal surface, such as bleachers, as long as appropriate safety precautions are taken. Specifically, care should be taken that defibrillation electrode pads do not contact the conductive (metal) surface and that no one is touching the person when the shock button is pressed.

Jewelry and Body Piercings

You *do not* need to remove jewelry and body piercings when using an AED. Leaving them on the person will do no harm. Taking time to remove them will delay giving the first shock. Therefore, *do not* delay the use of an AED to remove jewelry or body piercings. However, *do not* place the AED pads directly over metallic jewelry or body piercings. Adjust AED pad placement if necessary.

OTHER AED PROTOCOLS

Other AED protocols, such as delivering three shocks and then performing CPR, are neither wrong nor harmful to the person. However, improved methods, based on scientific evidence, make it easier to coordinate performing CPR and using the AED. Follow the instructions of the AED device you are using.

AED MAINTENANCE

For defibrillators to perform properly, they must be maintained like any other machine. AEDs require minimal maintenance. They have a variety of self-

testing features. However, it is important to be familiar with any visual or audible warning prompts on the AED that warn of malfunction or a low battery. Read the operator's manual thoroughly and check with the manufacturer to obtain all necessary information regarding maintenance.

In most cases, if the machine detects any malfunction, contact the manufacturer. You may need to return the device to the manufacturer for service. Although AEDs require minimal maintenance, it is important to remember the following:

- Follow the manufacturer's specific recommendations and your facility's schedule for periodic equipment checks, including checking the batteries and defibrillation pads.
- Make sure that the batteries have enough energy for one complete rescue. (A fully charged backup battery should be readily available.)
- Make sure that the correct defibrillation pads are in the package and are properly sealed.
- Check any expiration dates on defibrillation pads and batteries and replace as needed.
- After use, make sure that all accessories are replaced and that the machine is in proper working order.
- If at any time the machine fails to work properly or warning indicators are recognized, stop using it and contact the manufacturer immediately. If the AED stops working during an emergency continue performing CPR until EMS personnel take over.

PUTTING IT ALL TOGETHER

Sudden cardiac arrest is a life-threatening emergency that happens when the heart suddenly stops beating or circulating blood because of abnormal electrical activity of the heart. You must act quickly to help. For a person to survive cardiac arrest, responders must recognize the cardiac emergency, call 9-1-1 immediately, perform CPR and use an AED as soon as one becomes available. These actions will keep blood containing oxygen flowing throughout the body, stop the abnormal heart rhythm and ensure that advanced medical care arrives as quickly as possible. The sooner the EMS system is activated, CPR is started and a defibrillation shock from an AED is delivered, the greater are the chances for survival. By following the four links of the Cardiac Chain of Survival you can help save a life.

AED—ADULT OR CHILD OLDER THAN 8 YEARS OR WEIGHING MORE THAN 55 POUNDS

NO BREATHING

TIP: Do not use pediatric AED pads or equipment on an adult or on a child older than 8 years or weighing more than 55 pounds.

AFTER CHECKING THE SCENE AND THE INJURED OR ILL PERSON:

1 TURN ON AED

Follow the voice and/or visual prompts.

2 WIPE BARE CHEST DRY

TIP: Remove any medication patches with a gloved hand.

3 ATTACH PADS



4 PLUG IN CONNECTOR, IF NECESSARY



5 STAND CLEAR

Make sure no one, including you, is touching the person.

- Say, “EVERYONE STAND CLEAR.”



6 ANALYZE HEART RHYTHM

Push the “analyze” button, if necessary. Let the AED analyze the heart rhythm.

7 DELIVER SHOCK

IF A SHOCK IS ADVISED:

- Make sure no one, including you, is touching the person.
- Say, “EVERYONE STAND CLEAR.”
- Push the “shock” button, if necessary.



8 PERFORM CPR

After delivering the shock, or if no shock is advised:

- Perform about **2** minutes (or **5** cycles) of CPR.
- Continue to follow the prompts of the AED.

TIPS:

- *If at any time you notice an obvious sign of life, stop CPR and monitor breathing and for any changes in condition.*
- *If two trained responders are present, one should perform CPR while the second responder operates the AED.*

AED-CHILD AND INFANT YOUNGER THAN 8 YEARS OR WEIGHING LESS THAN 55 POUNDS NO BREATHING

TIP: When available, use pediatric settings or pads when caring for children and infants. If pediatric equipment is not available, rescuers may use AEDs configured for adults.

AFTER CHECKING THE SCENE AND THE INJURED OR ILL CHILD OR INFANT:

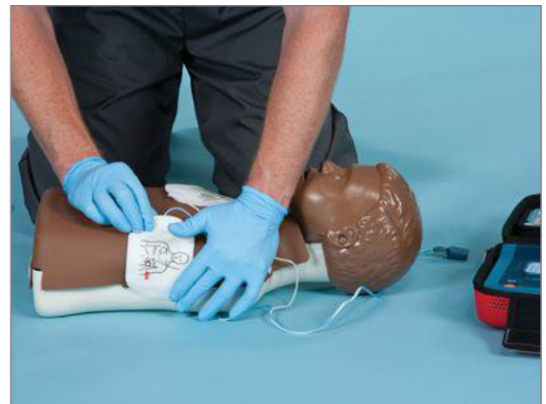
1 TURN ON AED

Follow the voice and/or visual prompts.

2 WIPE BARE CHEST DRY

3 ATTACH PADS

If the pads risk touching each other, use the front-to-back pad placement.



4 PLUG IN CONNECTOR, IF NECESSARY



5 STAND CLEAR

Make sure no one, including you, is touching the child or infant.

- Say, “EVERYONE STAND CLEAR.”



6 ANALYZE HEART RHYTHM

Push the “analyze” button, if necessary. Let the AED analyze the heart rhythm.

7 DELIVER SHOCK

IF A SHOCK IS ADVISED:

- Make sure no one, including you, is touching the child or infant.
- Say, “EVERYONE STAND CLEAR.”
- Push the “shock” button.



8 PERFORM CPR

After delivering the shock, or if no shock is advised:

- Perform about **2** minutes (or **5** cycles) of CPR.
- Continue to follow the prompts of the AED.

TIPS:

- *If at any time you notice an obvious sign of life, stop CPR and monitor breathing and for any changes in condition.*
- *If two trained responders are present, one should perform CPR while the second responder operates the AED.*

Breathing Emergencies



A *breathing emergency* is any respiratory problem that can threaten a person's life. Breathing emergencies happen when air cannot travel freely and easily into the lungs. Respiratory distress, respiratory arrest and choking are examples of breathing emergencies. In a breathing emergency, seconds count so you must react at once. This chapter discusses how to recognize and care for breathing emergencies.

BACKGROUND

The human body needs a constant supply of oxygen to survive. When you breathe through your mouth and nose, air travels down your throat, through your windpipe and into your lungs. This pathway from the mouth and nose to the lungs is called the *airway*.

As you might imagine, the airway, mouth and nose are smaller in children and infants than they are in adults (Fig. 4-1, A–B). As a result, they can be blocked more easily by small objects, blood, fluids or swelling.

In a breathing emergency, air must reach the lungs. For any person, regardless of age, it is important to keep the airway open when giving care.

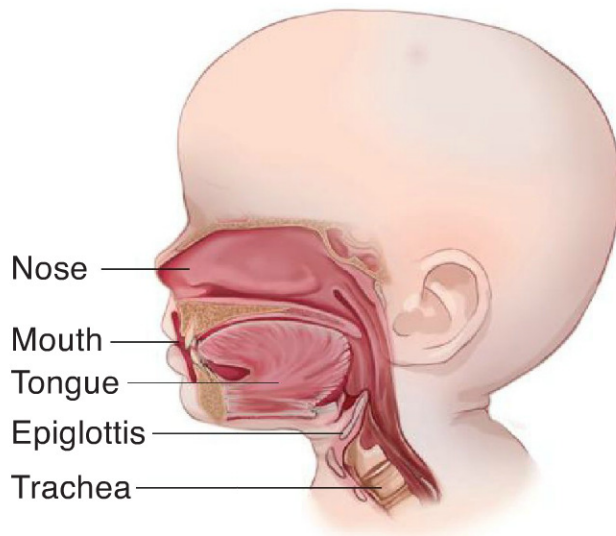


FIGURE 4-1, A A child's airway

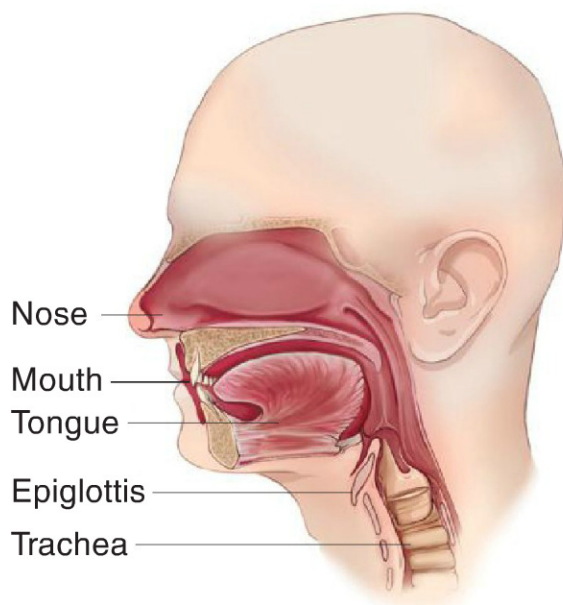


FIGURE 4-1, B An adult's airway

Once air reaches the lungs, oxygen in the air is transferred to the blood. The heart pumps the blood throughout the body. The blood flows through the blood vessels, delivering oxygen to the brain, heart and all other parts of the body.

In some breathing emergencies the oxygen supply to the body is greatly reduced, whereas in others the oxygen supply is cut off entirely. As a result, the heart soon stops beating and blood no longer moves through the body. Without oxygen, brain cells can begin to die within 4 to 6 minutes (Fig. 4-2). Unless the brain receives oxygen within minutes, permanent brain damage or death will result.

It is important to recognize breathing emergencies in children and infants and act before the heart stops beating. Frequently, an adult's heart stops working (known as *cardiac arrest*) because of heart disease. However, children and infants usually have healthy hearts. When the heart stops in a child or infant, it usually is the result of a breathing emergency.

No matter what the age of the person, trouble breathing can be the first signal of a more serious emergency, such as a heart problem. Recognizing the signals of breathing problems and giving care often are the keys to preventing these problems from becoming more serious emergencies.

If the injured or ill person is conscious, he or she may be able to indicate what is wrong by speaking or gesturing to you and may be able to answer questions. However, if you are unable to communicate with a

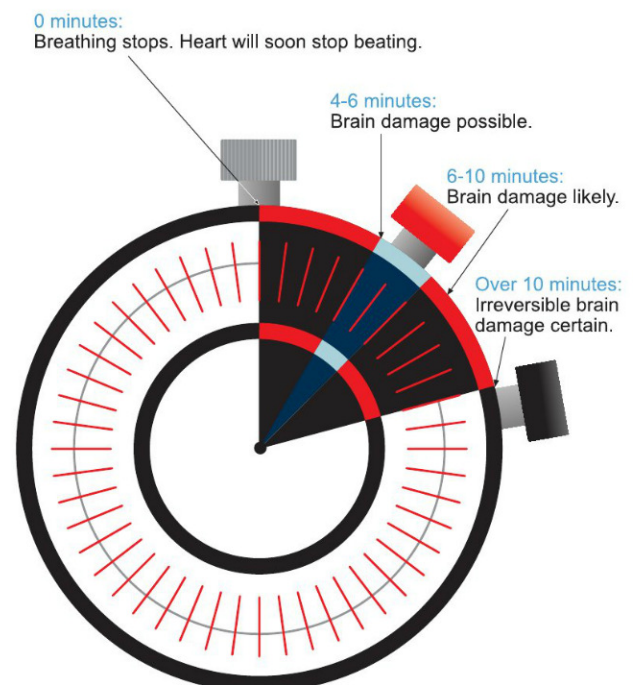


FIGURE 4-2 Time is critical in breathing emergencies.

person, it can be difficult to determine what is wrong. Therefore, it is important to recognize the signals of breathing emergencies, know when to call 9-1-1 or the local emergency number and know what to do until help arrives and takes over.

RESPIRATORY DISTRESS AND RESPIRATORY ARREST

Respiratory distress and respiratory arrest are types of breathing emergencies. *Respiratory distress* is a condition in which breathing becomes difficult. It is the most common breathing emergency. Respiratory distress can lead to *respiratory arrest*, which occurs when breathing has stopped.

Normal breathing is regular, quiet and effortless. A person does not appear to be working hard or struggling when breathing normally. This means that the person is not making noise when breathing, breaths are not fast and breathing does not cause discomfort or pain. However, it should be noted that normal breathing rates in children and infants are faster than normal breathing rates in adults. Infants have periodic breathing, so changes in breathing patterns are normal for infants.

You usually can identify a breathing problem by watching and listening to the person's breathing and by asking the person how he or she feels.

Causes of Respiratory Distress and Respiratory Arrest

Respiratory distress and respiratory arrest can be caused by:

- Choking (a partially or completely obstructed airway).
- Illness.
- Chronic conditions (long-lasting or frequently recurring), such as asthma.
- Electrocution.
- Irregular heartbeat.
- Heart attack.
- Injury to the head or brain stem, chest, lungs or abdomen.
- Allergic reactions.
- Drug overdose (especially alcohol, narcotic painkillers, barbiturates, anesthetics and other depressants).
- Poisoning.
- Emotional distress.
- Drowning.

Asthma

Asthma is the inflammation of the air passages that results in a temporary narrowing of the airways that carry oxygen to the lungs. An asthma attack happens

when a trigger, such as exercise, cold air, allergens or other irritants, causes the airway to swell and narrow. This makes breathing difficult.

The Centers for Disease Control and Prevention (CDC) estimate that in 2005, nearly 22.2 million Americans were affected by asthma. Asthma is more common in children and young adults than in older adults, but its frequency and severity is increasing in all age groups in the United States. Asthma is the third-ranking cause of hospitalization among those younger than 15 years.

You often can tell when a person is having an asthma attack by the hoarse whistling sound that he or she makes while exhaling. This sound, known as *wheezing*, occurs because air becomes trapped in the lungs. Trouble breathing, shortness of breath, tightness in the chest and coughing after exercise are other signals of an asthma attack. Usually, people diagnosed with asthma prevent and control their attacks with medication. These medications reduce swelling and mucus production in the airways. They also relax the muscle bands that tighten around the airways, making breathing easier. For more information on asthma, see Chapter 10.

Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) is a long-term lung disease encompassing both chronic bronchitis and emphysema. COPD causes a person to have trouble breathing because of damage to the lungs. In a person with COPD, the airways become partly blocked and the air sacs in the lungs lose their ability to fill with air. This makes it hard to breathe in and out. There is no cure for COPD, and it worsens over time.

The most common cause of COPD is cigarette smoking, but breathing in other types of lung irritants, pollution, dust or chemicals over a long period also can cause COPD. It usually is diagnosed when a person is middle aged or older. It is the fourth-ranking cause of death in the United States and a major cause of illness.

Common signals of COPD include:

- Coughing up a large volume of mucus.
- Tendency to tire easily.
- Loss of appetite.
- Bent posture with shoulders raised and lips pursed to make breathing easier.
- A fast pulse.
- Round, barrel-shaped chest.
- Confusion (caused by lack of oxygen to the brain).

Emphysema

Emphysema is a type of COPD. *Emphysema* is a disease that involves damage to the air sacs in the lungs. It is a chronic (long-lasting or frequently recurring) disease that worsens over time. The most common signal of emphysema is shortness of breath. Exhaling is extremely difficult. In advanced cases, the affected person may feel restless, confused and weak, and even may go into respiratory or cardiac arrest.

Bronchitis

Bronchitis is an inflammation of the main air passages to the lungs. It can be acute (short-lasting) or chronic. Chronic bronchitis is a type of COPD. To be diagnosed with chronic bronchitis, a person must have a cough with mucus on most days of the month for at least 3 months.

Acute bronchitis is *not* a type of COPD; it develops after a person has had a viral respiratory infection. It first affects the nose, sinuses and throat and then spreads to the lungs. Those most at risk for acute bronchitis include children, infants, the elderly, people with heart or lung disease and smokers.

Signals of both types of bronchitis include:

- Chest discomfort.
- Cough that produces mucus.
- Fatigue.
- Fever (usually low).
- Shortness of breath that worsens with activity.
- Wheezing.

Additional signals of chronic bronchitis include:

- Ankle, feet and leg swelling.
- Blue lips.
- Frequent respiratory infections, such as colds or the flu.

Hyperventilation

Hyperventilation occurs when a person's breathing is faster and more shallow than normal. When this happens, the body does not take in enough oxygen to meet its demands. People who are hyperventilating feel as if they cannot get enough air. Often they are afraid and anxious or seem confused. They may say that they feel dizzy or that their fingers and toes feel numb and tingly.

Hyperventilation often results from fear or anxiety and usually occurs in people who are tense and nervous. However, it also can be caused by head injuries, severe bleeding or illnesses, such as high fever, heart failure, lung disease and diabetic

emergencies. Asthma and exercise also can trigger hyperventilation.

Hyperventilation is the body's way of compensating when there is a lack of enough oxygen. The result is a decrease in carbon dioxide, which alters the acidity of the blood.

Allergic Reactions

An *allergic reaction* is the response of the immune system to a foreign substance that enters the body. Common allergens include bee or insect venom, antibiotics, pollen, animal dander, sulfa and some foods such as nuts, peanuts, shellfish, strawberries and coconut oils.

Allergic reactions can cause breathing problems. At first the reaction may appear to be just a rash and a feeling of tightness in the chest and throat, but this condition can become life threatening. The person's face, neck and tongue may swell, closing the airway.

A severe allergic reaction can cause a condition called *anaphylaxis*, also known as *anaphylactic shock*. During anaphylaxis, air passages swell and restrict a person's breathing. Anaphylaxis can be brought on when a person with an allergy comes into contact with allergens via insect stings, food, certain medications or other substances. Signals of anaphylaxis include a rash, tightness in the chest and throat, and swelling of the face, neck and tongue. The person also may feel dizzy or confused. Anaphylaxis is a life-threatening emergency.

Some people know that they are allergic to certain substances or to insect stings. They may have learned to avoid these things and may carry medication to reverse the allergic reaction. People who have severe allergic reactions may wear a medical identification (ID) tag, bracelet or necklace.

Croup

Croup is a harsh, repetitive cough that most commonly affects children younger than 5 years. The airway constricts, limiting the passage of air, which causes the child to produce an unusual-sounding cough that can range from a high-pitched wheeze to a barking cough. Croup mostly occurs during the evening and nighttime.

Most children with croup can be cared for at home using mist treatment or cool air. However, in some cases, a child with croup can progress quickly from respiratory distress to respiratory arrest.

Epiglottitis

Epiglottitis is a far less common infection than croup that causes severe swelling of the epiglottis. The epiglottis is a piece of cartilage at the back of the tongue.

When it swells, it can block the windpipe and lead to severe breathing problems. Epiglottitis usually is caused by infection with *Haemophilus influenzae* bacteria.

The signals of epiglottitis may be similar to croup, but it is a more serious illness and can result in death if the airway is blocked completely.

In the past, epiglottitis was a common illness in children between 2 and 6 years of age. However, epiglottitis in children has dropped dramatically in the United States since the 1980s when children began routinely receiving the H. influenzae type B (Hib) vaccine.

For children and adults, epiglottitis begins with a high fever and sore throat. A person with epiglottitis may need to sit up and lean forward, perhaps with the chin thrust out in order to breathe. Other signals include drooling, difficulty swallowing, voice changes, chills, shaking and fever.

Seek medical care immediately for a person who may have epiglottitis. This condition is a medical emergency.

What to Look For

Although breathing problems have many causes, you do not need to know the exact cause of a breathing emergency to care for it. You do need to be able to recognize when a person is having trouble breathing or is not breathing at all. Signals of breathing emergencies include:

- Trouble breathing or no breathing.
- Slow or rapid breathing.
- Unusually deep or shallow breathing.
- Gasping for breath.
- Wheezing, gurgling or making high-pitched noises.
- Unusually moist or cool skin.
- Flushed, pale, ashen or bluish skin.
- Shortness of breath.
- Dizziness or light-headedness.
- Pain in the chest or tingling in the hands, feet or lips.
- Apprehensive or fearful feelings.

When to Call 9-1-1

If a person is not breathing or if breathing is too fast, too slow, noisy or painful, call 9-1-1 or the local emergency number immediately.

What to Do Until Help Arrives

If an adult, child or infant is having *trouble breathing*:

- Help the person rest in a comfortable position. Usually, sitting is more comfortable than lying down because breathing is easier in that position (Fig. 4-3).



FIGURE 4-3 A person who is having trouble breathing may breathe more easily in a sitting position.

- If the person is conscious, check for other conditions.
- Remember that a person having breathing problems may find it hard to talk. If the person cannot talk, ask him or her to nod or to shake his or her head to answer yes-or-no questions. Try to reassure the person to reduce anxiety. This may make breathing easier.
- If bystanders are present and the person with trouble breathing is having difficulty answering your questions, ask them what they know about the person's condition.
- If the person is hyperventilating and you are sure whether it is caused by emotion, such as excitement or fear, tell the person to relax and breathe slowly. A person who is hyperventilating from emotion may resume normal breathing if he or she is reassured and calmed down. If the person's breathing still does not slow down, the person could have a serious problem.

If an adult is unconscious and *not* breathing, the cause is most likely a cardiac emergency. Immediately begin CPR starting with chest compressions.

If an adult is not breathing because of a respiratory cause, such as drowning, or drug overdose, give 2 rescue breaths after checking for breathing and before quickly scanning for severe bleeding and beginning CPR.

Remember, a nonbreathing person's greatest need is for oxygen. If breathing stops or is restricted long enough, a person will become unconscious, the heart will stop beating and body systems will quickly fail.

If a child or an infant is unconscious and *not* breathing, give 2 rescue breaths after checking for breathing and before quickly scanning for severe bleeding and beginning CPR.

CHOKING

Choking is a common breathing emergency. It occurs when the person's airway is partially or completely blocked. If a conscious person is choking, his or her airway has been blocked by a foreign object, such as a piece of food or a small toy; by swelling in the mouth or throat; or by fluids, such as vomit or blood. With a partially blocked airway, the person usually can breathe with some trouble. A person with a partially blocked airway may be able to get enough air in and out of the lungs to cough or to make wheezing sounds. The person also may get enough air to speak. A person whose airway is completely blocked cannot cough, speak, cry or breathe at all.

Causes of Choking in Adults

Causes of choking in an adult include:

- Trying to swallow large pieces of poorly chewed food.
- Drinking alcohol before or during meals. (Alcohol dulls the nerves that aid swallowing.)
- Wearing dentures. (Dentures make it difficult to sense whether food is fully chewed before it is swallowed.)
- Eating while talking excitedly or laughing, or eating too fast.
- Walking, playing or running with food or objects in the mouth.

Causes of Choking in Children and Infants

Choking is a common cause of injury and death in children younger than 5 years. Because young children put nearly everything in their mouths, small, nonfood items, such as safety pins, small parts from toys and coins, often cause choking. However, food is responsible for most of the choking incidents in children.

The American Academy of Pediatrics (AAP) recommends that young children not be given hard, smooth foods such as raw vegetables. These foods must be chewed with a grinding motion, which is a skill that children do not master until 4 years of age; therefore, children may attempt to swallow these foods whole. For this same reason, the AAP recommends not giving children peanuts until they are 7 years of age or older.

The AAP also recommends that young children not be given round, firm foods such as hot dogs and carrot sticks unless they are chopped into small pieces no larger than ½ inch. Since choking remains a significant danger to children younger than 5 years, the AAP further recommends keeping the following foods, and other items meant to be chewed or swallowed, away from young children:

- Hard, gooey or sticky candy
- Grapes
- Popcorn

FOCUS ON PREVENTION

CHOKING IN CHILDREN AND INFANTS

- *Supervise mealtimes for young children and infants.*
- *Do not let children eat while playing or running.*
- *Teach children to chew and swallow food before talking or laughing.*
- *Do not give chewing gum to young children.*
- *Do not give young children smooth, hard food such as peanuts and raw vegetables.*
- *Do not give young children round, firm foods such as hot dogs and carrot sticks unless chopped into pieces ½ inch or smaller.*
- *Do not allow small children to play with un-inflated balloons. (The U.S. Consumer*

Product Safety Commission recommends keeping these away from children younger than 8 years of age.)

- *Keep small objects such as safety pins, small parts from toys and coins away from small children.*
- *Make sure that toys are too large to be swallowed.*
- *Make sure that toys have no small parts that could be pulled off.*

If you are unsure whether an object is safe for young children, test it by trying to pass it through a toilet paper roll. If it fits through the 1¼-inch diameter roll, it is not safe for young children.

- Chewing gum
- Vitamins

Although food items cause most of the choking injuries in children, toys and household items also can be hazardous. Balloons, when broken or un-inflated, can choke or suffocate young children who try to swallow them. According to the Consumer Product Safety Commission (CPSC), more children have suffocated on non-inflated balloons and pieces of broken balloons than any other type of toy. Other nonfood items that can cause choking include:

- Baby powder.
- Objects from the trash, such as eggshells and pop-tops from beverage cans.
- Safety pins.
- Coins.
- Marbles.
- Pen and marker caps.
- Small button-type batteries.

What to Look For

Signals of choking include:

- Coughing, either forcefully or weakly.
- Clutching the throat with one or both hands (Fig. 4-4).
- Inability to cough, speak, cry or breathe.
- Making high-pitched noises while inhaling or noisy breathing.
- Panic.
- Bluish skin color.
- Losing consciousness if blockage is not removed.

When to Call 9-1-1

If the person continues to cough without coughing up the object, have someone call 9-1-1 or the local emergency number. A partially blocked airway can quickly become completely blocked.



FIGURE 4-4 Clutching the throat with one or both hands is universally recognized as a signal for choking.

A person whose airway is completely blocked cannot cough, speak, cry or breathe. Sometimes the person may cough weakly or make high-pitched noises. This tells you that the person is not getting enough air to stay alive. Act at once! If a bystander is available, have him or her call 9-1-1 or the local emergency number while you begin to give care.

What to Do Until Help Arrives

Caring for a Conscious Choking Adult or Child

If the choking person is coughing forcefully, let him or her try to cough up the object. A person who is getting enough air to cough or speak is getting enough air to breathe. Stay with the person and encourage him or her to continue coughing.

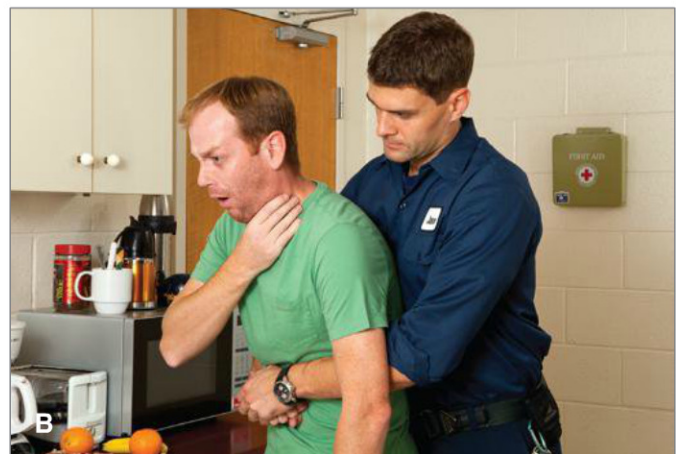


FIGURE 4-5, A-B If a conscious adult has a completely blocked airway: **A**, Give back blows. **B**, Then give abdominal thrusts.



FIGURE 4-5, C–D If a conscious child has a completely blocked airway: **C**, Give back blows. **D**, Then give abdominal thrusts, as you would for an adult.

A conscious adult or child who has a completely blocked airway needs immediate care. Using more than one technique often is necessary to dislodge an object and clear a person’s airway. A combination of 5 back blows followed by 5 abdominal thrusts provides an effective way to clear the airway obstruction (Fig. 4-5, A–D).

To give back blows, position yourself slightly behind the person. Provide support by placing one arm diagonally across the chest and bend the person forward at the waist until the upper airway is at least parallel to the ground. Firmly strike the person between the shoulder blades with the heel of your other hand.

To give abdominal thrusts to a conscious choking adult or child:

- Stand or kneel behind the person and wrap your arms around his or her waist.
- Locate the navel with one or two fingers of one hand. Make a fist with the other hand and place the thumb side against the middle of the person’s abdomen, just above the navel and well below the lower tip of the breastbone.
- Grab your fist with your other hand and give quick, upward thrusts into the abdomen.

Each back blow and abdominal thrust should be a separate and distinct attempt to dislodge the obstruction. Continue sets of 5 back blows and 5 abdominal thrusts until the object is dislodged; the person can cough forcefully, speak or breathe; or the person becomes unconscious. For a conscious child, use less force when

giving back blows and abdominal thrusts. Using too much force may cause internal injuries.

A person who has choked and has been given back blows, abdominal thrusts and/or chest thrusts to clear the airway requires a medical evaluation. Internal injuries and damage to the airway may not be evident immediately.

Special Situations in Caring for the Conscious Choking Adult or Child

Special situations include:

- **A large or pregnant person.** If a conscious choking person is too large for you to reach around, is obviously pregnant or is known to be pregnant, give chest thrusts instead (Fig. 4-6). Chest thrusts



FIGURE 4-6 Give chest thrusts to a choking person who is obviously pregnant or known to be pregnant or is too large for you to reach around.

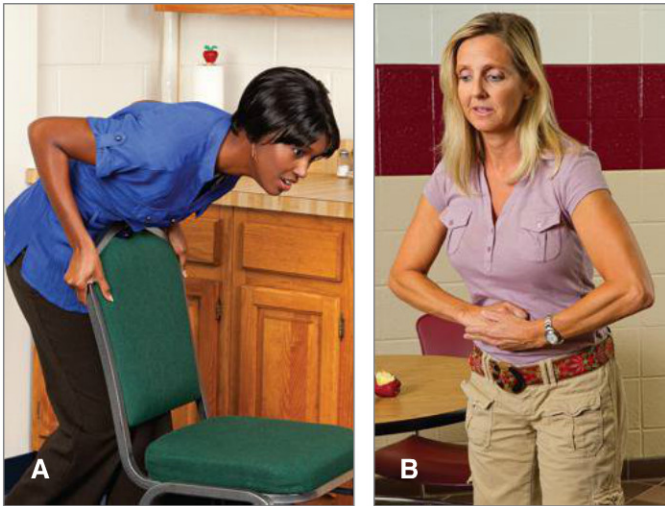


FIGURE 4-7, A-B If you are alone and choking; **A**, Bend over and press your abdomen against any firm object, such as the back of a chair. **B**, Or, give yourself abdominal thrusts by using your hands, just as you would do to another person.



FIGURE 4-8 For a choking person in a wheelchair, give abdominal thrusts.

for a conscious adult are like abdominal thrusts, except for the placement of your hands. For chest thrusts, place your fist against the center of the person's breastbone. Then grab your fist with your other hand and give quick thrusts into the chest.

- **Being alone and choking.** If you are alone and choking, bend over and press your abdomen against any firm object, such as the back of a chair, a railing or the kitchen sink (Fig. 4-7, A). Do not bend over anything with a sharp edge or corner that might hurt you, and be careful when leaning on a rail that is elevated. Alternatively, give yourself abdominal thrusts, using your hands, just as if you were administering the abdominal thrusts to another person (Fig. 4-7, B).
- **A person in a wheelchair.** For a choking person in a wheelchair, give abdominal thrusts (Fig. 4-8).

Caring for a Conscious Choking Infant

If you determine that a conscious infant cannot cough, cry or breathe, you will need to give a combination of 5 back blows followed by 5 chest thrusts.

To give back blows:

- Position the infant face-up on your forearm.
 - Place one hand and forearm on the child's back, cradling the back of the head, and one hand and forearm on the front of the infant. Use your thumb and fingers to hold the infant's jaw while sandwiching the infant between your forearms.
 - Turn the infant over so that he or she is face-down along your forearm (Fig. 4-9, A).
- Lower your arm onto your thigh so that the infant's head is lower than his or her chest. Then give 5 firm

back blows with the heel of your hand between the shoulder blades (Fig. 4-9, B). Each back blow should be a separate and distinct attempt to dislodge the object.

- Maintain support of the infant's head and neck by firmly holding the jaw between your thumb and forefinger.



FIGURE 4-9, A-B **A**, To give back blows, position the infant so that he or she is face-down along your forearm. **B**, Give 5 firm back blows with the heel of your hand while supporting the arm that is holding the infant on your thigh.

To give chest thrusts:

- Place the infant in a face-up position.
 - Place one hand and forearm on the child's back, cradling the back of the head, while keeping your other hand and forearm on the front of the infant. Use your thumb and fingers to hold the infant's jaw while sandwiching the infant between your forearms (Fig. 4-10, A).
 - Turn the infant onto his or her back.
- Lower your arm that is supporting the infant's back onto your opposite thigh. The infant's head should be lower than his or her chest, which will assist in dislodging the object.
- Place the pads of two or three fingers in the center of the infant's chest just below the nipple line (toward the infant's feet).
- Use the pads of these fingers to compress the breastbone. Compress the breastbone 5 times about 1½ inches and then let the breastbone return to its normal position. Keep your fingers in contact with the infant's breastbone (Fig. 4-10, B).



FIGURE 4-10, A–B A, To give chest thrusts, sandwich the infant between your forearms. Continue to support the infant's head. B, Turn the infant onto his or her back keeping the infant's head lower than the chest. Give 5 chest thrusts.

Continue giving sets of 5 back blows and 5 chest thrusts until the object is forced out; the infant begins to cough forcefully, cry or breathe on his or her own; or the infant becomes unconscious.

You can give back blows and chest thrusts effectively whether you stand, kneel or sit, as long as the infant is supported on your thigh and the infant's head is lower than the chest. If the infant is large or your hands are too small to adequately support it, you may prefer to sit.

Use less force when giving back blows and chest thrusts to an infant than for a child or an adult. Using too much force may cause internal injuries.

Caring for a Conscious Choking Adult or Child Who Becomes Unconscious

If a conscious choking adult or child becomes unconscious, carefully lower the person to the ground, open the mouth and look for an object. If an object is seen, remove it with your finger. If no object is seen, open the person's airway by tilting the head and try to give 2 rescue breaths. If the chest does not clearly rise, begin the modified CPR technique used for an unconscious choking person, which is described next.

Caring for an Unconscious Choking Adult or Child

If you determine that an adult or a child is unconscious, not breathing and the chest does not rise with rescue breaths, retilt the head and try another rescue breath. If the chest still does not rise, assume that the airway is blocked.

To care for an unconscious choking adult or child, perform a modified CPR technique:

- Locate the correct hand position for chest compressions. Use the same technique that is used for CPR.
- Give chest compressions. Compress an adult's chest 30 times to a depth of at least 2 inches (Fig. 4-11, A). Compress a child's chest 30 times to a depth of about 2 inches. Compress at a rate of at least 100 chest compressions per minute; the 30 chest compressions should take about 18 seconds to complete.
- Look for a foreign object (Fig. 4-11, B). Open the person's mouth. (Remove the CPR breathing barrier if you are using one.) If you see an object, remove it with a finger (Fig. 4-11, C).

- Give 2 rescue breaths (Fig. 4-11, D). If the chest does not clearly rise, repeat cycles of chest compressions, foreign object check/removal and 2 rescue breaths. Do not stop except in one of these situations:

- The object is removed and the chest clearly rises with rescue breaths.
- The person starts to breathe on his or her own.
- Another trained responder or EMS personnel take over.
- You are too exhausted to continue.
- The scene becomes unsafe.

If the breaths make the chest clearly rise, quickly check for breathing. Care for the conditions you find.

Caring for a Conscious Choking Infant Who Becomes Unconscious

If a conscious choking infant becomes unconscious, carefully lower the infant to the ground, open the mouth and look for an object. If an object is seen, remove it with your little finger. If no object is seen, open the infant's airway by rettiling the head and try to give 2 rescue breaths. If the chest does not clearly rise, begin a modified CPR technique used for an unconscious choking infant, which is described next.

Caring for an Unconscious Choking Infant

If you determine that an infant is unconscious, not breathing and the chest does not rise with rescue breaths, rettil the head and try another rescue breath. If the chest still does not rise, assume that the airway is blocked.

To care for an unconscious choking infant:

- Locate the correct hand and finger position for chest compressions. Use the same technique that is used for CPR.
- Give 30 chest compressions at a rate of at least 100 chest compressions per minute (Fig. 4-12, A). Each compression should be about 1½ inches deep.

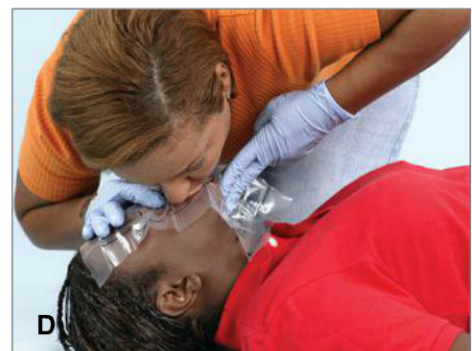
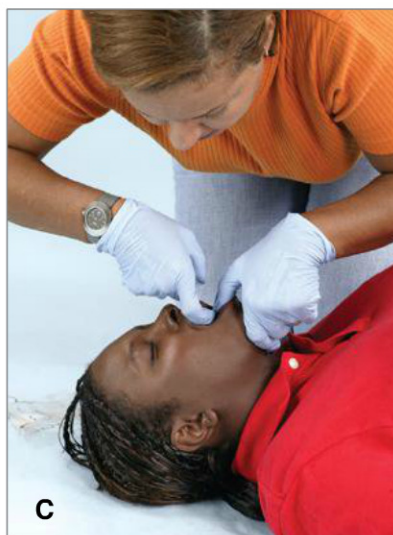
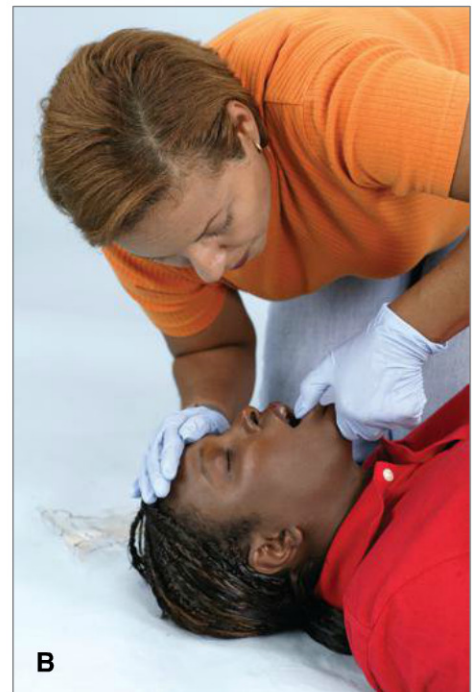


FIGURE 4-11, A-D For an unconscious choking adult or child: **A**, Give 30 chest compressions. **B**, Look for an object. **C**, If you see one, remove it with a finger. **D**, Give 2 rescue breaths.

- Look for a foreign object (Fig. 4-12, B). If the object is seen, remove it with your little finger (Fig. 4-12, C).
- Give 2 rescue breaths (Fig. 4-12, D). If the breaths do not make the chest clearly rise, repeat cycles of chest compressions, foreign object check/removal and rescue breaths. Do not stop except in one of these situations:
 - The object is removed and the chest clearly rises with rescue breaths.
 - The infant starts to breathe on his or her own.
 - Another trained responder or EMS personnel take over.
 - You are too exhausted to continue.
 - The scene becomes unsafe.

If the breaths make the chest clearly rise, quickly check for breathing. Care for the conditions you find.



FIGURE 4-12, A-D For an unconscious choking infant: **A**, Give 30 chest compressions. **B**, Look for an object. **C**, If you see one, remove it with a smaller finger. **D**, Give 2 rescue breaths.

PUTTING IT ALL TOGETHER

In a breathing emergency, seconds count so it is important to act at once. Breathing emergencies include respiratory distress, respiratory arrest and choking. Look for signals that indicate a person is having trouble breathing, is not

breathing or is choking. When you recognize that an adult, a child or an infant is having trouble breathing, is not breathing or is choking, call 9-1-1 or the local emergency number immediately. Then give care for the condition until help arrives and takes over. You could save a life.

CONSCIOUS CHOKING—ADULT

CANNOT COUGH, SPEAK OR BREATHE

AFTER CHECKING THE SCENE AND THE INJURED OR ILL PERSON, HAVE SOMEONE CALL 9-1-1 AND GET CONSENT.

1 GIVE 5 BACK BLOWS

Bend the person forward at the waist and give **5** back blows between the shoulder blades with the heel of one hand.



2 GIVE 5 ABDOMINAL THRUSTS

- Place a fist with the thumb side against the middle of the person's abdomen, just above the navel.
- Cover your fist with your other hand.
- Give **5** quick, upward abdominal thrusts.



3 CONTINUE CARE

Continue sets of **5** back blows and **5** abdominal thrusts until the:

- Object is forced out.
- Person can cough forcefully or breathe.
- Person becomes unconscious.



WHAT TO DO NEXT

- IF PERSON BECOMES UNCONSCIOUS—CALL 9-1-1, if not already done.
- Carefully lower the person to the ground and give **CARE** for an unconscious choking adult, beginning with looking for an object.

CONSCIOUS CHOKING—CHILD

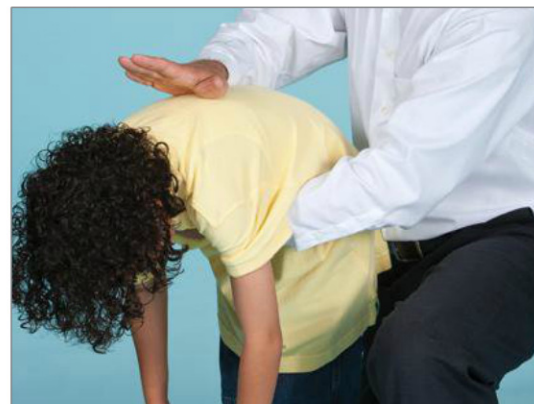
CANNOT COUGH, SPEAK OR BREATHE

TIP: Stand or kneel behind the child, depending on his or her size.

AFTER CHECKING THE SCENE AND THE INJURED OR ILL CHILD, HAVE SOMEONE CALL 9-1-1 AND GET CONSENT FROM THE PARENT OR GUARDIAN, IF PRESENT.

1 GIVE 5 BACK BLOWS

Bend the child forward at the waist and give **5** back blows between the shoulder blades with the heel of one hand.



2 GIVE 5 ABDOMINAL THRUSTS

- Place a fist with the thumb side against the middle of the child's abdomen, just above the navel.
- Cover your fist with your other hand.
- Give **5** quick, upward abdominal thrusts.



3 CONTINUE CARE

Continue sets of **5** back blows and **5** abdominal thrusts until the:

- Object is forced out.
- Child can cough forcefully or breathe.
- Child becomes unconscious.



WHAT TO DO NEXT

- IF CHILD BECOMES UNCONSCIOUS—CALL 9-1-1, if not already done.
- Carefully lower the child to the ground and give **CARE** for an unconscious choking child, beginning with looking for an object.

CONSCIOUS CHOKING—INFANT CANNOT COUGH, CRY OR BREATHE

AFTER CHECKING THE SCENE AND THE INJURED OR ILL INFANT, HAVE SOMEONE CALL 9-1-1 AND GET CONSENT FROM PARENT OR GUARDIAN, IF PRESENT.

1 GIVE 5 BACK BLOWS

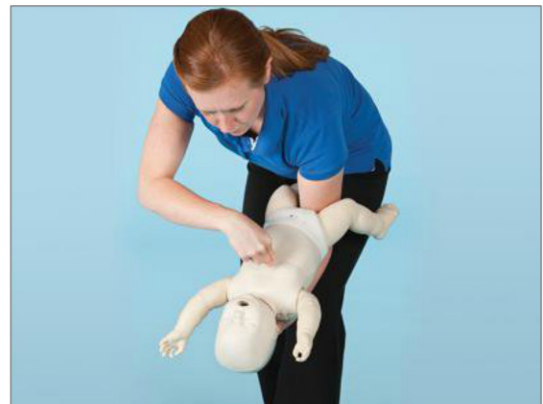
Give firm back blows with the heel of one hand between the infant's shoulder blades.



2 GIVE 5 CHEST THRUSTS

Place two or three fingers in the center of the infant's chest just below the nipple line and compress the breastbone about 1½ inches.

TIP: Support the head and neck securely when giving back blows and chest thrusts. Keep the head lower than the chest.



3 CONTINUE CARE

Continue sets of **5** back blows and **5** chest thrusts until the:

- Object is forced out.
- Infant can cough forcefully, cry or breathe.
- Infant becomes unconscious.

WHAT TO DO NEXT

- IF INFANT BECOMES UNCONSCIOUS—CALL 9-1-1, if not already done.
- Carefully lower the infant onto a firm, flat surface, and give **CARE** for an unconscious choking infant, beginning with looking for an object.

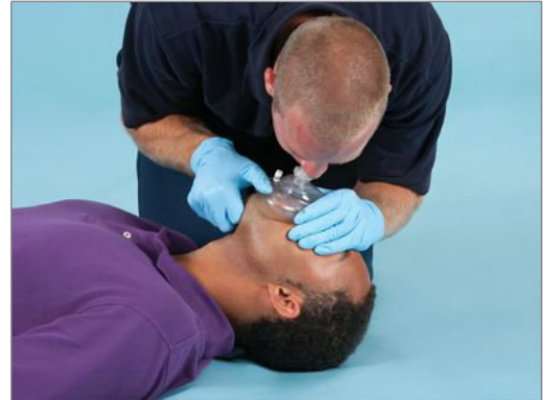
UNCONSCIOUS CHOKING—ADULT

CHEST DOES NOT RISE WITH RESCUE BREATHS

IF AT ANY TIME THE CHEST DOES NOT RISE:

1 GIVE ANOTHER RESCUE BREATH

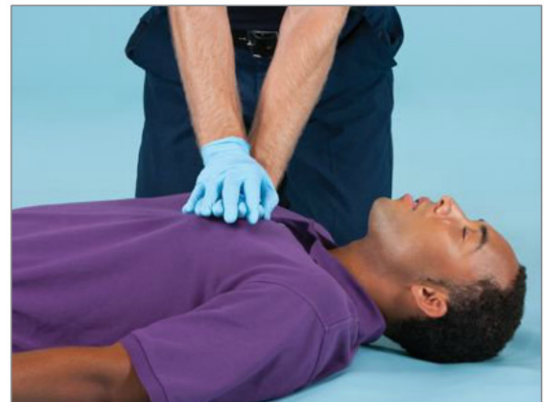
Retilt the head and give another rescue breath.



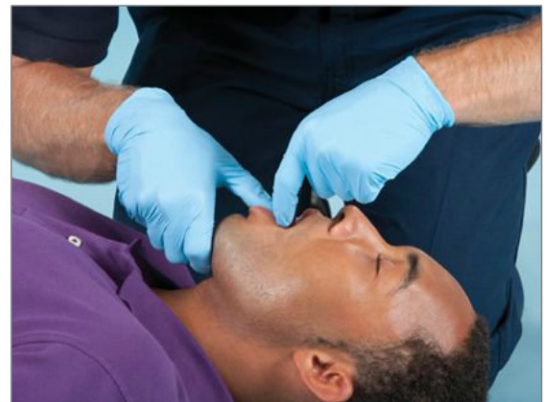
2 GIVE 30 CHEST COMPRESSIONS

If the chest still does not rise, give **30** chest compressions.

TIP: The person must be on firm, flat surface. Remove the CPR breathing barrier when giving chest compressions.



3 LOOK FOR AND REMOVE OBJECT IF SEEN



4 GIVE 2 RESCUE BREATHS

WHAT TO DO NEXT

- IF BREATHS DO NOT MAKE THE CHEST RISE—Repeat steps **2** through **4**.
- IF CHEST CLEARLY RISES—CHECK for breathing. Give **CARE** based on the conditions found.

UNCONSCIOUS CHOKING—CHILD AND INFANT

CHEST DOES NOT RISE WITH RESCUE BREATHS

IF AT ANY TIME THE CHEST DOES NOT RISE:

1 GIVE ANOTHER RESCUE BREATH

Retilt the head and give another rescue breath.



2 GIVE CHEST COMPRESSIONS

If the chest still does not rise, give **30** chest compressions.

TIP: The child or infant must be on firm, flat surface. Remove the CPR breathing barrier when giving chest compressions.



3 LOOK FOR AND REMOVE OBJECT IF SEEN



4 GIVE 2 RESCUE BREATHS

WHAT TO DO NEXT

- IF BREATHS DO NOT MAKE THE CHEST RISE—Repeat steps **2** through **4**.
- IF CHEST CLEARLY RISES—CHECK for breathing. Give **CARE** based on the conditions found.

Sudden Illness



If a person suddenly becomes ill, it is important to respond quickly and effectively. When illness happens suddenly it can be hard to determine what is wrong and what you should do to help.

In this chapter you will read about the signals of sudden illnesses including fainting, seizures, stroke, diabetic emergencies, allergic reactions, poisoning and substance abuse. This chapter also discusses how to care for specific sudden illnesses, even if you do not know the exact cause.

SUDDEN ILLNESS

It usually is obvious when someone is injured and needs care. The person may be able to tell you what happened and what hurts. Checking the person also gives you clues about what might be wrong. However, when someone becomes suddenly ill, it is not as easy to tell what is physically wrong. At times, there are no signals to give clues about what is happening. At other times, the signals only confirm that something is wrong, without being clear as to what is wrong. In either case, the signals of a sudden illness often are confusing. You may find it difficult to determine if the person's condition is an emergency and whether to call 9-1-1 or the local emergency number.

What to Look For

When a person becomes suddenly ill, he or she usually looks and feels sick. Common signals include:

- Changes in level of consciousness, such as feeling lightheaded, dizzy, drowsy or confused, or becoming unconscious.
- Breathing problems (i.e., trouble breathing or no breathing).
- Signals of a possible heart attack, including persistent chest pain, discomfort or pressure lasting more than a few minutes that goes away and comes back or that spreads to the shoulder, arm, neck, jaw, stomach or back.
- Signals of a stroke, including sudden weakness on one side of the face (facial droop); sudden weakness, often on one side of the body; sudden slurred speech or trouble forming words; or a sudden, severe headache.
- Loss of vision or blurred vision.
- Signals of shock, including rapid breathing, changes in skin appearance and cool, pale or ashen (grayish) skin.
- Sweating.
- Persistent abdominal pain or pressure.
- Nausea or vomiting.
- Diarrhea.
- Seizures.

Look around the area for clues that might tell you what is wrong with the person. This may help you to find out what the person was doing when the illness started. For example, if someone working in a hot environment suddenly becomes ill, it would make sense to conclude that the illness resulted from the heat. If someone suddenly feels ill or acts strangely and is attempting to take medication, the medication may be a clue as to what is wrong. For example, the person may need the medication for a heart condition and is trying to take it to avoid a medical emergency.

When to Call 9-1-1

Call 9-1-1 or the local emergency for any of the following conditions:

- Unconsciousness or altered level of consciousness
- Breathing problems
- No breathing
- Chest pain, discomfort or pressure lasting more than 3 to 5 minutes that goes away and comes back or that radiates to the shoulder, arm, jaw, neck, stomach or back
- Persistent abdominal pain or pressure
- Severe external bleeding (bleeding that spurts or gushes steadily from a wound)
- Vomiting blood or passing blood
- Severe (critical) burns
- Suspected poisoning
- Seizures
- Stroke
- Suspected or obvious injuries to the head, neck or spine
- Painful, swollen, deformed areas (indicates possible broken bone) or an open fracture

With some sudden illnesses, you might not be sure whether to call 9-1-1 or the local emergency number for help. Sometimes the signals come and go. Remember, if you cannot sort out the problem quickly and easily or if you have any doubts about the severity of the illness, make the call for help.

What to Do Until Help Arrives

Although you may not know the exact cause of the sudden illness, you should still give care. Initially you will care for the signals and not for any specific condition. In the few cases in which you know that the person has a medical condition, such as diabetes, epilepsy or heart disease, the care you give may be slightly different. This care may involve helping the person take medication for his or her specific illness.

Care for sudden illnesses by following the same general guidelines as you would for any emergency.

- Do no further harm.
- Check the scene for safety, and then check the person.
- First care for life-threatening conditions such as unconsciousness; trouble breathing; no breathing; severe bleeding; severe chest pain; or signals of a stroke, such as weakness, numbness or trouble with speech.
- Help the person to rest comfortably.
- Keep the person from getting chilled or overheated.
- Reassure the person because he or she may be anxious or frightened.
- Watch for changes in consciousness and breathing.

- If the person is conscious, ask if he or she has any medical conditions or is taking any medication.
- Do not give the person anything to eat or drink unless he or she is fully conscious, is able to swallow and does not show any signals of a stroke.
- If the person vomits and is unconscious and lying down, position the person on his or her side so that you can clear the mouth.
- If you know the person is having a severe allergic reaction or a diabetic emergency, assist the person with his or her prescribed medication, if asked.

SPECIFIC SUDDEN ILLNESSES

Some sudden illnesses may be linked with chronic conditions. These conditions include degenerative diseases, such as heart and lung diseases. There may be a hormone imbalance, such as in diabetes. The person could have epilepsy, a condition that causes seizures. An allergy can cause a sudden and sometimes dangerous reaction to certain substances. When checking a person, look for a medical identification (ID) tag, bracelet, necklace or anklet indicating that the person has a chronic condition or allergy.

Having to deal with a sudden illness can be frightening, especially when you do not know what is wrong. Do not hesitate to give care. Remember, you do not have to know the cause to help. Signals for sudden illnesses are similar to other conditions and the care probably involves skills that you already know.

Fainting

One common signal of sudden illness is a loss of consciousness, such as when a person faints. Fainting is a temporary loss of consciousness. When someone suddenly loses consciousness and then reawakens, he or she may simply have fainted.

Fainting occurs when there is an insufficient supply of blood to the brain for a short period of time. This condition results from a widening of the blood vessels in the body. This causes blood to drain away from the brain to the rest of the body.

Fainting usually is not harmful. The person usually recovers quickly with no lasting effects. However, what appears to be a simple case of fainting actually may be a signal of a more serious condition.

What to Look For

A person who is about to faint often becomes pale, begins to sweat and then loses consciousness and collapses. A person who feels weak or dizzy may prevent

a fainting spell by lying down or sitting with his or her head level with the knees.

When to Call 9-1-1

Call 9-1-1 or the local emergency number when in doubt about the condition of a person who has fainted. It is always appropriate to seek medical care for fainting.

What to Do Until Help Arrives

Lower the person to the ground or other flat surface and position him or her on his or her back, lying flat. Loosen any tight clothing, such as a tie or collar (Fig. 5-1). Check that the person is breathing. Do not give the person anything to eat or drink. If the person vomits, roll him or her onto one side.

Seizures

When the normal functions of the brain are disrupted by injury, disease, fever, infection, metabolic disturbances or conditions causing a decreased oxygen level, a *seizure* may occur. The seizure is a result of abnormal electrical activity in the brain and causes temporary, involuntary changes in body movement, function, sensation, awareness or behavior.

Epilepsy

Epilepsy is a chronic seizure condition. Almost 3 million Americans have some form of epilepsy. The seizures that occur with epilepsy usually can be controlled with medication. Still, some people with epilepsy who take seizure medication occasionally have seizures. Others who go a long time without a seizure may think that the condition has gone away and stop taking their medication, thus putting themselves at risk for another seizure.



FIGURE 5-1 To care for a person who has fainted, place the person on his or her back lying flat and loosen any restrictive clothing, such as a tie or collar.

Febrile Seizures

Young children and infants may be at risk for *febrile seizures*, which are seizures brought on by a rapid increase in body temperature. They are most common in children younger than 5 years.

Febrile seizures often are caused by infections of the ear, throat or digestive system and are most likely to occur when a child or an infant experiences a rapid rise in temperature. A child or an infant experiencing a febrile seizure may experience some or all of the signals listed below.

What to Look For

Signals of seizures include:

- A blank stare.
- A period of distorted sensation during which the person is unable to respond.
- Uncontrolled muscular contractions, called *convulsions*, which last several minutes.

A person with epilepsy may experience something called an *aura* before the seizure occurs. An aura is an unusual sensation or feeling, such as a visual hallucination; strange sound, taste or smell; or an urgent need to get to safety. If the person recognizes the aura, he or she may have time to tell bystanders and sit down before the seizure occurs.

Febrile seizures may have some or all of the following signals:

- Sudden rise in body temperature
- Change in consciousness
- Rhythmic jerking of the head and limbs
- Loss of bladder or bowel control
- Confusion
- Drowsiness
- Crying out
- Becoming rigid
- Holding breath
- Upward rolling of the eyes

Although it may be frightening to see someone unexpectedly having a seizure, you should remember that most seizures last only for a few minutes and the person usually recovers without problems.

When to Call 9-1-1

Call 9-1-1 or the local emergency number if:

- The seizure lasts more than 5 minutes.
- The person has multiple seizures with no signs of slowing down.
- The person appears to be injured or fails to regain consciousness after the seizure.

- The cause of the seizure is unknown.
- The person is pregnant.
- The person has diabetes.
- The person is a young child or an infant and experienced a febrile seizure brought on by a high fever.
- The seizure takes place in water.
- The person is elderly and could have suffered a stroke.
- This is the person's first seizure.

If the person is known to have occasional seizures, you *may not* have to call 9-1-1 or the local emergency number. He or she usually will recover from a seizure in a few minutes.

What to Do Until Help Arrives

Although it may be frightening to watch, you can easily help to care for a person having a seizure. Remember that he or she cannot control the seizure. Do not try to stop the seizure. General principles of managing a seizure are to prevent injury, protect the person's airway and make sure that the airway is open after the seizure has ended.

Do not hold or restrain the person. Do not put anything in the person's mouth or between the teeth. People having seizures rarely bite their tongues or cheeks with enough force to cause significant bleeding; however, some blood may be present.

Make sure that the environment is as safe as possible to prevent injury to the person who is having a seizure. Remove any nearby furniture or other objects that may injure the person.

Give care to a person who has had a seizure the same way you would for an unconscious person. When the seizure is over, make sure that the person's airway is open. Usually, the person will begin to breathe normally. If there is fluid in the person's mouth, such as saliva, blood or vomit, roll him or her on one side so that the fluid drains from the mouth. If the child or infant has a febrile seizure, it is important to immediately cool the body by giving a sponge bath with lukewarm water.

The person may be drowsy and disoriented or unresponsive for a period of time. Check to see if he or she was injured during the seizure. Be comforting and reassuring. If the seizure occurred in public, the person may be embarrassed and self-conscious. Ask bystanders not to crowd around the person. He or she may be tired and want to rest. Stay on the scene with the person until he or she is fully conscious and aware of the surroundings.

For more information on epilepsy, visit the Epilepsy Foundation at epilepsyfoundation.org.

Stroke

Stroke is the third-leading killer and a leading cause of long-term disability in the United States. Nearly 800,000 Americans will have a stroke this year.

A *stroke*, also called a *brain attack*, is caused when blood flow to a part of the brain is cut off or when there is bleeding into the brain. Strokes can cause permanent brain damage, but sometimes the damage can be stopped or reversed.

A stroke usually is caused by a blockage in the arteries that supply blood to the brain. Once the blood flow is cut off, that part of the brain starts to “suffocate” and die unless the blood flow can be restored. Blockages can be caused by blood clots that travel from other parts of the body, like the heart, or they can be caused by slow damage to the arteries over time from diseases such as high blood pressure and diabetes.

In a small percentage of strokes there is bleeding into the brain. This bleeding can be from a broken blood vessel or from a bulging aneurysm that has broken open. There is no way to tell the type of stroke until the person gets to an emergency room and undergoes a thorough medical evaluation.

A *mini-stroke* is when a person has the signals of a stroke, which then completely go away. Most mini-strokes get better within a few minutes, although they can last several hours. Although the signals of a mini-stroke disappear quickly, the person is not out of danger at that point. In fact, someone who has a mini-stroke is at very high risk of having a full stroke within the next 2 days.

Risk Factors

The *risk factors* for stroke, meaning things that make a stroke more likely, are similar to those for heart disease. Some risk factors are beyond one’s control, such as age, gender and family history of stroke or cardiovascular disease. Other risk factors can be controlled through diet, changes in lifestyle or medication. With a history of high blood pressure, previous stroke or mini-stroke, diabetes or heart disease one’s chances of a stroke increases.

High Blood Pressure

Uncontrolled high blood pressure is the number one risk factor for stroke. If you have high blood pressure, you are approximately seven times more likely to have a stroke compared with someone who does not have high blood pressure.

High blood pressure puts added pressure on arteries and makes them stiffer. The excess pressure also damages organs, including the brain, heart and kidneys. Even mildly elevated blood pressure can increase one’s risk of a stroke.

High blood pressure is the most important of the controllable risk factors. Have your blood pressure checked regularly and if it is high, follow the advice of your health care provider about how to lower it. Often, high blood pressure can be controlled by losing weight, changing diet, exercising routinely and managing stress. If those measures are not sufficient, your health care provider may prescribe medication.

Diabetes

Diabetes is a major risk factor for stroke. If you have been diagnosed with diabetes, follow the advice of your health care provider about how to control it. If uncontrolled, the resulting elevated blood sugar levels can damage blood vessels throughout the body.

Cigarette Smoking

Cigarette smoking is another major risk factor of stroke. Smoking is linked to heart disease and cancer, as well as to stroke. Smoking increases blood pressure, damages blood vessels and makes blood more likely to clot. If you smoke and would like to quit, many techniques and support systems are available to help, including seeking help from your health care provider and local health department.

The benefits of quitting smoking begin as soon as you stop, and some of the damage from smoking actually may be reversible. Approximately 10 years after a person has stopped smoking, his or her risk of stroke is about the same as the risk for a person who has never smoked. Even if you do not smoke, be aware that inhaling smoke from smokers can harm your health. Avoid long-term exposure to cigarette smoke and protect children from this danger as well.

Diet

Diets that are high in saturated fats and cholesterol can increase your risk of stroke by causing fatty materials to build up on the walls of your blood vessels. Foods high in cholesterol include egg yolks and organ meats, such as liver and kidneys. Saturated fats are found in beef, lamb, veal, pork, ham, whole milk and whole-milk products. Limiting your intake of these foods can help to prevent stroke.

Preventing Stroke

You can help prevent stroke if you:

- Control your blood pressure.
- Quit smoking.
- Eat a healthy diet.
- Exercise regularly. Regular exercise reduces your chances of stroke by strengthening the heart and improving blood circulation. Exercise also helps in weight control.

- Maintain a healthy weight. Being overweight increases the chance of developing high blood pressure, heart disease and fat deposits lining the arteries.
- Control diabetes.

What to Look For

As with other sudden illnesses, looking or feeling ill, or behaving in a strange way, are common, general signals of a stroke or mini-stroke. Other specific signals of stroke have a *sudden onset*, including:

- Weakness or numbness of the face, arm or leg. This usually happens on only one side of the body.
- Facial droop or drooling.
- Trouble with speech. The person may have trouble talking, getting words out or being understood when speaking and may have trouble understanding.
- Loss of vision or disturbed (blurred or dimmed) vision in one or both eyes. The pupils may be of unequal size.
- Sudden severe headache. The person will not know what caused the headache and may describe it as “the worst headache ever.”
- Dizziness, confusion, agitation, loss of consciousness or other severe altered mental status.
- Loss of balance or coordination, trouble walking or ringing in the ears.
- Incontinence.

Think FAST for a Stroke

For a stroke, think **FAST**, which stands for the following:

- **Face:** Weakness, numbness or drooping on one side of the face. Ask the person to smile. Does one side of the face droop (Fig. 5-2, A)?

- **Arm:** Weakness or numbness in one arm. Ask the person to raise both arms. Does one arm drift downward (Fig. 5-2, B)?
- **Speech:** Slurred speech or difficulty speaking. Ask the person to repeat a simple sentence (e.g., Ask the person to say something like, “The sky is blue.”) Are the words slurred? Can the person repeat the sentence correctly?
- **Time:** Try to determine when the signals began. If the person shows any signals of stroke, time is critical. Call 9-1-1 or the local emergency number right away.

The FAST mnemonic is based on the Cincinnati Pre-Hospital Stroke Scale. This scale originally was developed for EMS personnel in 1997. The scale was designed to help EMS personnel to identify strokes in the field. The FAST method for public awareness has been in use in the community in Cincinnati, Ohio, since 1999. Researchers at the University of North Carolina validated it in 2003 as an appropriate tool for helping lay persons to recognize and respond quickly to the signals of stroke.

By paying attention to the signals of stroke and reporting them to your health care provider, you can prevent damage before it occurs. Experiencing a mini-stroke is the clearest warning that a stroke may occur. Do not ignore its stroke-like signals, even if they disappear completely within minutes or hours.

When to Call 9-1-1

Call 9-1-1 or the local emergency number immediately if you encounter someone who is having or has had a stroke, if you see signals of a stroke or if the person had a mini-stroke (even if the signals have gone away). Note the time of onset of signals and report it to the call taker or EMS personnel when they arrive.

In the past, a stroke usually caused permanent brain damage. Today, new medications and medical

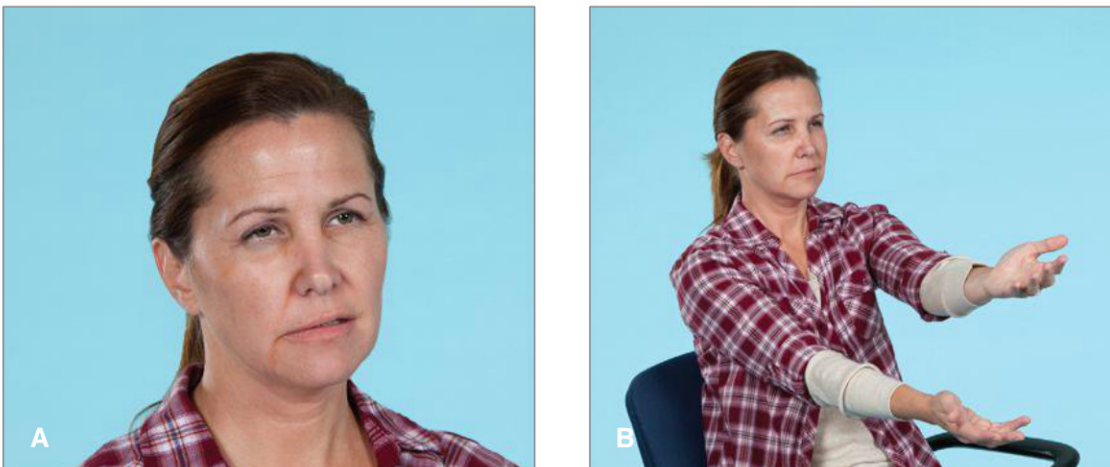


FIGURE 5-2, A–B Signals of stroke include **A**, facial drooping, and **B**, weakness on one side of the body.

procedures can limit or reduce the damage caused by stroke. Many of these new treatments must be given quickly to be the most helpful. It is important for the person to get the best care as quickly as possible.

What to Do Until Help Arrives

Note the time that the signals started. If the person is unconscious, make sure that he or she has an open airway and care for life-threatening conditions. If fluid or vomit is in the person's mouth, position him or her on one side to allow fluids to drain out of the mouth. Remove any material from the mouth with a finger if the person is unconscious. Stay with the person and monitor breathing and for any changes in the person's condition.

If the person is conscious, check for non-life-threatening conditions. A stroke can make the person fearful and anxious. Often, he or she does not understand what has happened. Offer comfort and reassurance. Have the person rest in a comfortable position. Do not give him or her anything to eat or drink.

Diabetic Emergencies

A total of 23.6 million people in the United States (7.8% of the population) have diabetes. Among this group, more than 5 million people are unaware that they have the disease. Diabetes was the seventh-leading cause of death listed on U.S. death certificates in 2006. Altogether, diabetes contributed to 233,619 deaths in 2005. Diabetes is likely to be underreported as a cause of death. Overall, the risk for death among people with diabetes is about twice that of people without diabetes.

The American Diabetes Association defines *diabetes* as the inability of the body to change sugar (glucose) from food into energy. This process is regulated by *insulin*, a hormone produced in the pancreas. Diabetes can lead to other medical conditions such as blindness, nerve disease, kidney disease, heart disease and stroke.

The cells in your body need *glucose* (sugar) as a source of energy. The cells receive this energy during digestion or from stored forms of sugar. The sugar is absorbed into the bloodstream with the help of insulin. Insulin is produced in the pancreas. For the body to properly function, there has to be a balance of insulin and sugar. People who have diabetes may become suddenly ill because there is too much or too little sugar in their blood.

There are two major types of diabetes: Type I and Type II diabetes.

Type I diabetes, formerly called juvenile diabetes, affects about 1 million Americans. This type of diabetes, which usually begins in childhood, occurs when the body produces little or no insulin. People with Type I diabetes must inject insulin into their bodies daily and are therefore considered to be insulin-dependent. Type I diabetes is a chronic disease that currently has no cure.

The exact cause of Type I diabetes is not known. Warning signals include:

- Frequent urination.
- Increased hunger and thirst.
- Unexpected weight loss.
- Irritability.
- Weakness and fatigue.

Type II diabetes is the most common type, affecting about 90 to 95 percent of people with diabetes. This condition usually occurs in adults but also can occur in children. With Type II diabetes, the body makes insulin but not enough to meet the body's needs or the body becomes resistant to the insulin produced. Since Type II diabetes is a progressive disease, people with this type of diabetes eventually may need to use insulin.

People from certain racial and ethnic backgrounds are known to be at greater risk for diabetes. Type II diabetes is more common among African-Americans, Latinos, Asians, certain Native Americans and Pacific Islanders. Although genetics and other factors increase risk for diabetes, being overweight or obese also is a risk factor for developing the disease in adults and children.

People with Type II diabetes often do not experience any warning signals. Possible warning signals of Type II diabetes include:

- Any signals of Type I diabetes.
- Frequent infections, especially involving the skin, gums and bladder.
- Blurred vision.
- Numbness in the legs, feet and fingers.
- Cuts or bruises that are slow to heal.
- Itching.

People with diabetes should monitor their exercise and diet. Self-monitoring for blood sugar levels is a valuable tool. Insulin-dependent diabetics also must monitor their use of insulin. If the person with diabetes does not control these factors, he or she can have a diabetic emergency.



FIGURE 5-3 Hypoglycemia and hyperglycemia are diabetic emergencies that result from an imbalance between sugar and insulin within the body.

A diabetic emergency is caused by an imbalance between sugar and insulin in the body (Fig. 5-3). A diabetic emergency can happen when there is:

- Too much sugar in the blood (*hyperglycemia*): Among other causes, the person may not have taken enough insulin or the person is reacting adversely to a large meal or a meal that is high in carbohydrates.
- Too little sugar in the blood (*hypoglycemia*): The person may have taken too much insulin, eaten too little food, or overexerted him- or herself. Extremely low blood sugar levels can quickly become life threatening.

What to Look For

Signals of a diabetic emergency include:

- Changes in the level of consciousness.
- Changes in mood.
- Rapid breathing and pulse.
- Feeling and looking ill.
- Dizziness and headache.
- Confusion.

When to Call 9-1-1

Always call 9-1-1 or the local emergency number if:

- The person is unconscious or about to lose consciousness. In this situation, do not give the person anything by mouth. After calling 9-1-1 or the local emergency number, care for the person in the same way you would care for an unconscious person. This includes making sure the person's airway is clear of vomit, checking for breathing and giving care until advanced medical personnel take over.
- The person is conscious but unable to swallow. (In this case, *do not* put anything, liquid or solid, into the person's mouth.)
- The person does not feel better within about 5 minutes after taking some form of sugar.

- You cannot find any form of sugar immediately. Do not spend time looking for it.

What to Do Until Help Arrives

You may know the person is a diabetic or the person may tell you he or she is a diabetic. Often diabetics know what is wrong and will ask for something with sugar in it. They may carry some form of sugar with them in case they need it.

If the diabetic person is conscious and able to swallow, and advises you that he or she needs sugar, give sugar in the form of several glucose tablets or glucose paste, a 12-ounce serving of fruit juice, milk, nondiet soft drink or table sugar dissolved in a glass of water (Fig. 5-4). Most fruit juices and nondiet soft drinks have enough sugar to be effective. If the problem is too much sugar, this amount of sugar will not cause further harm. Diabetics also may carry glucagon, which they can self-administer to counter hypoglycemia. People who take insulin to control diabetes may have injectable medication with them to care for hyperglycemia.

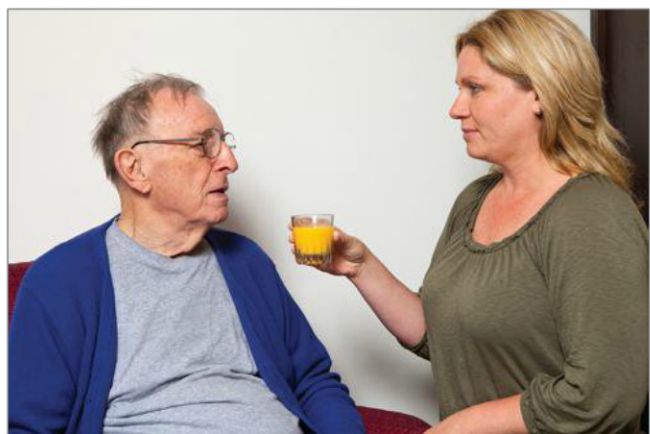


FIGURE 5-4 If the person having a diabetic emergency is conscious and able to swallow, give him or her sugar, preferably glucose tablets or in liquid form.

For more information about diabetes, contact the American Diabetes Association at 1-800-DIABETES, go to diabetes.org or visit the National Diabetes Education Program website at ndep.nih.gov. For specific information about Type I diabetes, contact the Juvenile Diabetes Foundation at 1-800-533-CURE or at jdrf.org.

Allergic Reactions

Allergic reactions are caused by over activity of the immune system against specific *antigens* (foreign substances). People with allergies are especially sensitive to these antigens. When their immune systems overreact to the antigens it is called an *allergic reaction*.

Antigens that often cause allergic reactions in at-risk people include the following:

- Bee or insect venom
- Antibiotics
- Pollen
- Animal dander
- Latex
- Sulfa drugs
- Certain foods (e.g., tree nuts, peanuts, shellfish and dairy products)

People who know that they are severely allergic to certain substances or bee stings may wear a medical ID tag, necklace or bracelet.

What to Look For

Allergic reactions can range from mild to severe. An example of a mild reaction is an itchy skin rash from touching poison ivy. Severe allergic reactions can cause a life-threatening condition called *anaphylaxis* (also called *anaphylactic shock*). Anaphylaxis usually occurs suddenly. It happens within seconds or minutes after contact with the substance. The skin or area of the body that comes in contact with the substance usually swells and turns red. Other signals include the following:

- Hives
- Itching
- Rash
- Weakness
- Nausea
- Stomach cramps
- Vomiting
- Dizziness
- Trouble breathing (including coughing and wheezing)

Trouble breathing can progress to a blocked airway as the lips, tongue, throat and *larynx* (voice box) swell.

Low blood pressure and shock may accompany these reactions. Death from anaphylaxis may

happen quickly because the person's breathing is restricted severely.

When to Call 9-1-1

Call 9-1-1 or the local emergency number if the person:

- Has trouble breathing.
- Complains of the throat tightening.
- Explains that he or she is subject to severe allergic reactions.
- Is unconscious.

What to Do Until Help Arrives

If you suspect anaphylaxis and have called 9-1-1 or the local emergency number, follow these guidelines for giving care:

1. Monitor the person's breathing and for any changes in the person's condition.
2. Give care for life-threatening emergencies.
3. Check a conscious person to determine:
 - The substance (antigen) involved.
 - The route of exposure to the antigen.
 - The effects of the exposure.
4. Assist the person with using an epinephrine auto-injector, if available and state or local regulations allow.
5. Assist the person with taking an antihistamine, if available.
6. Document any changes in the person's condition over time.

For more information on anaphylaxis, see Chapter 11.

POISONING

A poison is any substance that causes injury, illness or death if it enters the body. In 2008, Poison Control Centers (PCCs) received more than 2.4 million calls having to do with people who had come into contact with a poison. Over 93 percent of these poisonings took place in the home. Fifty percent (1.2 million) involved children younger than 6 years. Poisoning deaths in children younger than 6 years represented about 2 percent of the total deaths from poisoning. The 20- to 59-year-old age group represented about 76 percent of all deaths from poisoning.

In recent years there has been a decrease in child poisonings. This is due partly to child-resistant packaging for medications. This packaging makes it harder for children to get into these substances. The decrease also is a result of preventive actions by parents and others who care for children. At the same time, there has been an increase in adult poisoning deaths. This increase is linked to an increase in both suicides and drug-related poisonings.

Types of Poisoning

A person can be poisoned by swallowing poison, breathing it, absorbing it through the skin and by having it injected into the body.

Swallowed Poisons

Poisons that can be swallowed include foods, such as certain mushrooms and shellfish; an overdose of drugs, such as sleeping pills, tranquilizers and alcohol; medications, such as a high quantity of aspirin; household items, such as cleaning products and pesticides; and certain plants. Many substances that are not poisonous in small amounts are poisonous in larger amounts. Combining certain substances can result in poisoning, although if taken by themselves they might not cause harm.

Inhaled Poisons

A person can be poisoned by breathing in (inhaling) toxic fumes. Examples of poisons that can be inhaled include:

- Gases, such as:
 - Carbon monoxide from an engine or car exhaust.
 - Carbon dioxide from wells and sewers.
 - Chlorine, found in many swimming pools.
- Fumes from:
 - Household products, such as glues and paints.
- Drugs, such as crack cocaine.

Absorbed Poisons

Poisons that can be absorbed through the skin come from many sources including plants, such as poison ivy, poison oak and poison sumac, and fertilizers and pesticides.

Injected Poisons

Injected poisons enter the body through the bites or stings of insects, spiders, ticks, some marine life, snakes and other animals or through drugs or medications injected with a hypodermic needle.

What to Look For

How will you know if someone who is ill has been poisoned? Look for clues about what has happened. Try to get information from the person or from bystanders. As you check the scene, be aware of unusual odors, flames, smoke, open or spilled containers, an open medicine cabinet or an overturned or a damaged plant. Also, notice if the person is showing any of the following signals of poisoning:

- Nausea and vomiting
- Diarrhea
- Chest or abdominal pain
- Trouble breathing
- Sweating
- Changes in consciousness

- Seizures
- Headache
- Dizziness
- Weakness
- Irregular pupil size
- Burning or tearing eyes
- Abnormal skin color
- Burns around the lips, tongue or on the skin

You also may suspect a poisoning based on information from or about the person. If you suspect someone has swallowed a poison, try to find out:

- The type of poison.
- The quantity taken.
- When it was taken.
- How much the person weighs.

This information can help you and others to give the most appropriate care.

When to Call 9-1-1

For life-threatening conditions (such as if a person is unconscious or is not breathing or if a change in the level of consciousness occurs), CALL 9-1-1 or local emergency number. If the person is conscious and alert, CALL the National Poison Control Center (PCC) hotline at 1-800-222-1222 and follow the advice given.

What to Do Until Help Arrives

After you have checked the scene and determined that there has been a poisoning, follow these general care guidelines:

- Remove the person from the source of poison if the scene is dangerous. Do this only if you are able to without endangering yourself.
- Check the person's level of consciousness and breathing.
- Care for any life-threatening conditions.
- If the person is conscious, ask questions to get more information.
- Look for any containers and take them with you to the telephone.
- Call the National Poison Control Center Hotline at 1-800 222-1222.
- Follow the directions of the Poison Control Center.

If the person becomes violent or threatening, move to safety and wait for help to arrive. Do not give the person anything to eat or drink unless medical professionals tell you to do so. If you do not know what the poison was and the person vomits, save some of the vomit. The hospital may analyze it to identify the poison.

POISONING

Use common sense when handling substances that could be harmful, such as chemicals and cleaners. Use them in a well-ventilated area. Wear protective clothing, such as gloves and a facemask.

Use common sense with your own medications. Read the product information and use only as directed. Ask your health care provider or pharmacist about the intended effects, side effects and possible interactions with other medications that you are taking. Never use another person's prescribed medications. What is right for one person often is wrong for another.

Always keep medications in their original containers. Make sure that this container is well marked with the original pharmacy labeling. If taking several medications, always check the label to ensure that you are taking the correct medication, and be especially aware of possible adverse drug interactions.

Over time, expired medications can become less effective and even toxic to humans if consumed. Dispose of out-of-date or unused medications properly by following the guidelines below.

Most medications should be thrown away in the household trash and not flushed down the toilet. Follow these steps to maintain safety and protect the environment from unnecessary exposure to medications:

- 1. Pour the medication out of its original container into a sealable plastic bag.*
- 2. Mix the medication with something that will hide the medication or make it unpleasant (e.g., coffee grounds or kitty litter).*
- 3. Seal the plastic bag.*
- 4. Throw the plastic bag into your household trash.*
- 5. Remove and destroy all personal information and medication information (prescription label) from the medication container. Recycle or throw away the medication container.*

Another option is to check if your state or local community has a community-based household

hazardous waste collection program. You may be able to take your expired and unused medications to your pharmacy or another location for disposal.

The U.S. Food and Drug Administration (FDA) website maintains a list of some of the medications that should be flushed down the toilet. These medications are especially dangerous to humans and pets. One dose could cause death if taken by someone other than the person for whom it was prescribed. Flushing these medications avoids any chance that children or pets would ingest them accidentally.

According to the FDA, any possible risk to people and the environment from flushing these few medications is small. The FDA maintains that the risk is outweighed by the possibility of someone accidentally ingesting these medications, which could be life threatening.

Preventing Poisoning in Children

Many substances found in or around the house are poisonous. Children younger than 3 years and infants that are able to crawl are especially likely to be poisoned because of their curious nature, and because they explore their world through touching and tasting things around them (Fig. 5-5). If you care for or are near young children, be warned: it only takes a moment for a small child to get into trouble.



FIGURE 5-5 Always supervise young children closely, especially in areas where common, but poisonous, household items are stored.

(Continued)

FOCUS ON PREVENTION *(Continued)*

Most child poisonings take place when a parent or guardian is watching a child.

Follow these guidelines to guard against poisoning emergencies in children:

- *Always supervise children closely, especially in areas where poisons are commonly stored, such as kitchens, bathrooms and garages.*
- *Keep children out of your work area when you are using potentially harmful substances.*
- *Consider all household or drugstore products to be potentially harmful.*
- *Read all labels of products you use in your home. Look for these words on bottles and packages: "Caution," "Warning," "Poison," "Danger" or "Keep Out of Reach of Children."*
- *Be careful when using and storing household products with fruit shown on the labels. Children may think that they are okay to drink.*
- *Remove all medications and medical supplies from bags, purses, pockets, shelves, unlocked cabinets and drawers.*
- *Keep all medications, medical supplies and household products locked away, well out of the reach of children and away from food and drinks.*
- *Install special child safety locks to keep children from opening cabinets.*
- *Use childproof safety caps on all medications, chemicals and cleaning products.*
- *Never call medicine "candy" to get a child to take it, even if it has a pleasant candy flavor.*
- *Keep products in their original containers with the original labels in place.*
- *Use poison symbols to identify dangerous substances and teach children the meaning of the symbols.*
- *Dispose of outdated or unused medications and household products as recommended (see above for appropriate disposal of medications).*

FOCUS ON PREPAREDNESS

POISON CONTROL CENTERS

There are 60 regional PCCs across the United States. These centers are dedicated to helping people deal with poisons. Medical professionals staff PCCs. These professionals give free, 24-hour advice to callers. PCC staff have access to information about most poisonous substances. They also can tell you what to do if a poisoning happened or is suspected.

If you think a person has been poisoned and the person is conscious, call the National Poison Control Center hotline at 1-800-222-1222 first. When you call this number, your call is automatically routed to your regional PCC based on the area code from which you called. The regional PCC staff

then will tell you what care to give. They also will tell you whether you should call 9-1-1 or the local emergency number.

In 2008, PCCs answered over 2.4 million calls about poisonings. In over 70 percent of the cases, the caller was able to get the help needed without having to call 9-1-1 or the local emergency number, or go to the hospital or health care provider. PCCs help reduce the workload of the EMS personnel and safely reduce the number of emergency room visits.

Be prepared: Keep the telephone number of the National Poison Control Center hotline posted by every telephone in your home or office!