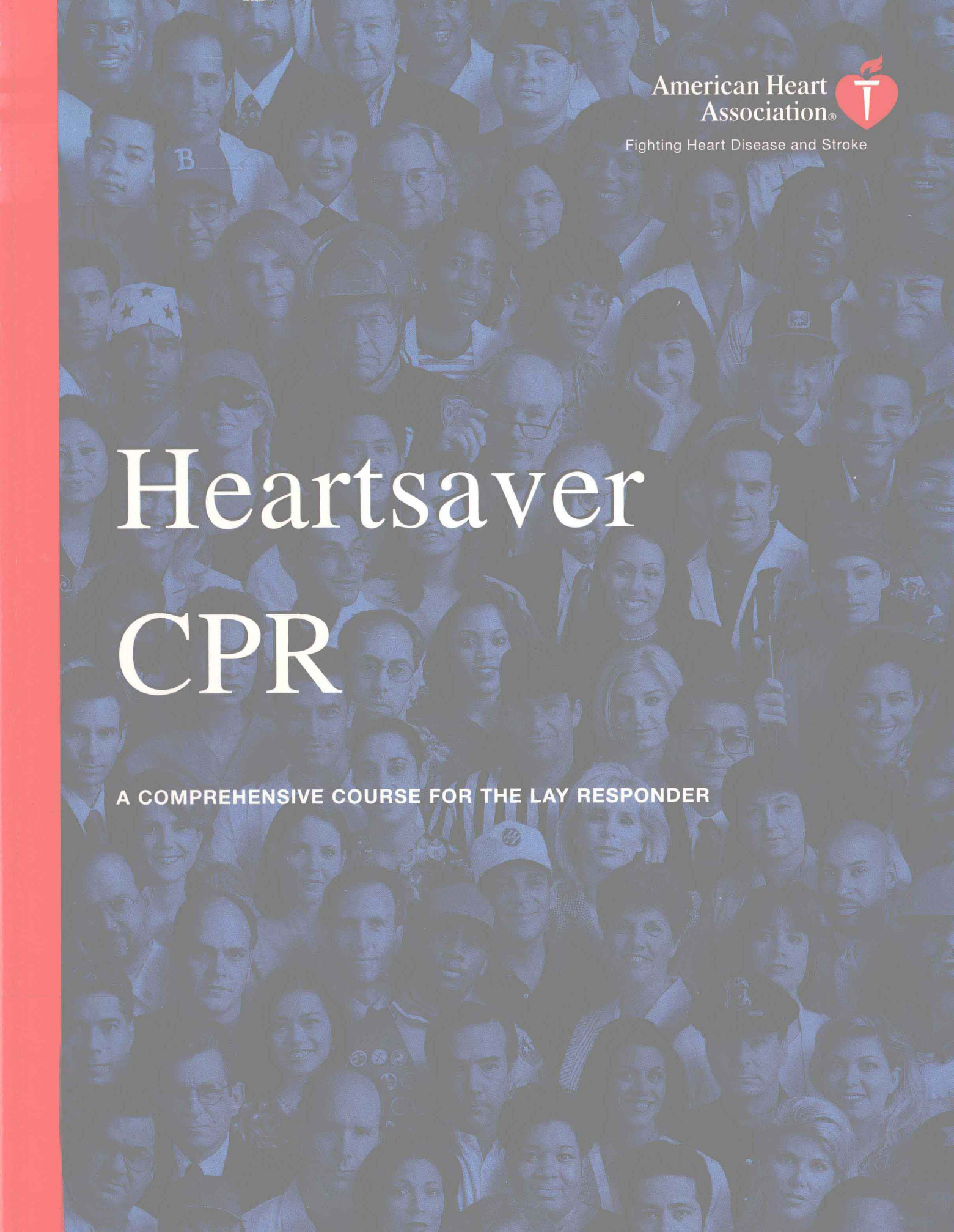

American Heart Association®

Fighting Heart Disease and Stroke

Heartsaver CPR

A COMPREHENSIVE COURSE FOR THE LAY RESPONDER

Heartsaver CPR

A COMPREHENSIVE COURSE FOR THE LAY RESPONDER

Adult, Infant, and Child

Cardiopulmonary Resuscitation

and First Aid for Choking

ISBN 0-87493-317-X

Preface

Heartsaver CPR
A Comprehensive Course for the Lay Responder

If you want to know what to do in an emergency, the American Heart Association (AHA) Heartsaver CPR courses can help you. With the knowledge and skills you learn in these courses, you can save the life of a loved one, a friend, a coworker, or a citizen in your community.

These new courses are for the lay rescuer who needs a credential (a card) documenting successful completion of a CPR course. Such credentials are often required in the workplace. This course will prepare you to respond to emergencies in the workplace as part of an emergency response system. You can then serve as a lay responder.

These courses will teach you how to recognize and treat life-threatening emergencies, including cardiac arrest and choking. You also will learn to recognize the warning signs of heart attack and stroke in adults and signs of breathing difficulty in children. By recognizing these signs and phoning 911 (or other emergency response number in your area), you may save a life.

This manual may be used to teach any 1 of 3 Heartsaver CPR courses for lay rescuers:

Course 1: Adult CPR teaches warning signs of heart attack and stroke, CPR, and relief of choking for adult victims. Course 1 uses only Module 1.

Course 2: Infant and Child CPR teaches prevention of injuries and cardiac arrest, CPR, and relief of choking for infants (birth to 1 year of age) and children (1 to 8 years of age). Course 2 uses only Module 2.

Course 3: CPR for All Ages teaches CPR and relief of choking for adult, infant, and child victims. This course uses both Module 1 and Module 2.

This manual is divided into 2 modules:

This student manual contains several features designed to help you learn CPR, including *learning objectives, review questions,* and *skills review* sheets. These components will help make learning easier. At the start of each chapter, read the learning objectives carefully. This will help you focus on the essential information in each chapter. When you finish reading the chapter, answer the review questions. If you cannot answer a question or if you choose the wrong answer, review the parts of the chapter related to that question.

This manual also contains colored boxes that highlight important and useful information. The **red boxes** contain **Critical Concepts,** information that is *essential* for mastering the knowledge and skills taught in this course. Critical signs and symptoms included in these red boxes or elsewhere in the text are called **red flags.** The **blue boxes** contain **Foundation Facts,** which explain or justify actions and recommendations and provide important supportive information. The **black boxes** are **FYI...,** information that may be of interest to some course participants but is *not* required to fulfill the core learning objectives.

The skills performance sheets ("Performance Criteria") in the appendixes of Modules 1 and 2 list the skills you will practice in class. To obtain a *Course Completion Card* at the end of this course, you must complete a written examination satisfactorily and demonstrate each skill listed on the skills performance sheet to your instructor. Review each skill, pay attention to the details, and practice carefully. This manual will be a valuable resource for you before, during, and after your training. It is easy to forget some CPR skills, so practice the skills and reread this manual after you complete the course.

The appendixes also contain case scenarios to help you apply your knowledge of CPR to real-life situations. The appendixes include answers to frequently asked questions about CPR, special situations in CPR, self-test questions, and a glossary of terms. This information is provided to help you learn faster and integrate your knowledge after reading the manual. Take advantage of this information to prepare yourself for the course and acquire the skills to save a life.

For more information about interventions to reduce the risk of injury and updated recommendations on the steps of CPR, visit the AHA website at *www.americanheart.org*. This site contains links to other sites with useful information.

We wish you success as you learn CPR. When you complete the course, you will be better prepared to recognize the warning signs of emergencies in adults, to prevent many causes of cardiac arrest in infants and children, and to respond to future emergencies by using the skills of CPR.

Module 1 *Adult CPR*

Module 1 *Adult CPR*

Module 1

Chapter 1 *Early Action Saves Lives*

The Chain of Survival and Warning Signs of Heart Attack and Stroke

Module 1

Chapter 1 Early Action Saves Lives

The Chain of Survival and Warning Signs of Heart Attack and Stroke

Case Scenario, Option 1

You are walking on a beach, and you see a family enjoying a picnic near the water. An elderly man, a middle-aged man, and 2 children are sitting on a blanket eating lunch. As you walk by, you overhear some of the conversation, allowing you to identify a grandfather, a father, a 3-year-old son, and a 10-month-old son. You speak briefly to them and then continue walking. Suddenly you hear someone shout from the direction you have come, "Help! I think he needs CPR! I don't know what to do! Somebody help me!" As you run toward the shout, you realize it came from the area of the family picnic. You wonder who needs CPR. Is it the grandfather, the father, the 3-year-old child, or the infant?

Who in the family is the most likely victim of cardiopulmonary arrest? What actions should you be prepared to take for that victim?

By the end of this module you will be able to identify the most likely causes of sudden cardiac arrest in adults and how to recognize the signs of heart attack and stroke.

Case Scenario, Option 1, continued

You run to the scene of the picnic. The family is gathered around the father, who is clearly in distress. He is pale and sweaty and complains of nausea. He says he has terrible chest discomfort that he describes as a tightness or pressure. He says that the chest discomfort feels like it is moving to his neck, jaw, and left arm. He tells you that the discomfort has lasted for 10 minutes. You offer to call an ambulance, but he says, "No, I think it's just indigestion from the barbecue," and he asks you to get him an antacid tablet.

What problem is this man likely to be experiencing? Why is it important to take action? What action should you take?

Case Scenario, Option 2

You return to the scene of the picnic. The family is gathered around the grandfather. He looks ill, and one side of his face droops as he tries to speak. His right arm hangs uselessly by his side, and he is unable to walk. You ask him if he is OK, and he replies with very slurred words that his head hurts and "something's wrong."

What problem is this man likely to be experiencing? Why is it important to take action? What action should you take?

Learning Objectives

After reading this chapter you should be able to

1. Name the links in the AHA adult Chain of Survival and discuss the role *you* play in the Chain of Survival.
2. List the warning signs of these 4 major adult emergencies:
   a. Heart attack
   b. Cardiac arrest
   c. Stroke
   d. Choking (foreign-body airway obstruction) in the responsive adult

Cardiovascular Disease and How YOU Can Help

Cardiovascular disease is the single greatest cause of death in the United States. Every year more than 480,000 adult Americans die of a **heart attack** or related complications. About half of these deaths (some 225,000) result from **sudden cardiac arrest**. Sudden cardiac arrest can complicate a heart attack. If it does, it is most likely to occur during the *first hour* after the onset of symptoms of a heart attack, typically before the victim arrives at the hospital. Sudden cardiac arrest will result in death unless emergency treatment is provided immediately.

The victim of an emergency such as a heart attack, cardiac arrest, stroke, or choking may be saved if people at the scene start the **Chain of Survival**. In this chapter you will learn the critical actions that make up the 4 links in the AHA adult Chain of Survival. You will learn how to recognize the symptoms of these 4 emergencies. You will learn when to phone 911 (or other emergency response number in your area), when and how to perform CPR, and when and how to attempt to relieve choking in adults.

AHA Chain of Survival

The AHA Chain of Survival symbol **(see Figure 1)** depicts the critical actions required to treat life-threatening emergencies, including heart attack, cardiac arrest, stroke, and choking.

Once you recognize an emergency, you should *immediately*

- **Phone 911** (or other emergency response number) to activate the emergency medical services (EMS) system
- **Begin CPR**

The next 2 links will be provided by rescuers with additional training:

- **Early defibrillation** by trained rescuers or EMS personnel
- **Advanced care** by EMS and hospital personnel

You must know when to activate the Chain of Survival. You must recognize when an emergency exists. When you recognize the emergency, the first 2 links—**phone 911** (or other emergency response number) and **begin CPR**—are in your hands. *You* perform the actions or links that increase a victim's chance of survival. Skilled rescuers and emergency professionals will respond to the 911 emergency call. They will be trained and equipped to provide defibrillation and advanced care to further increase the victim's chance of survival.

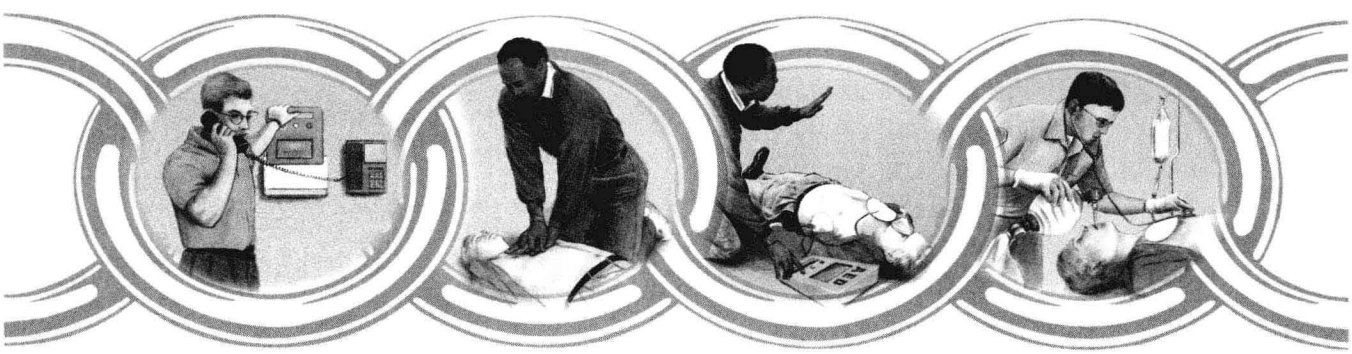

FIGURE 1. ***The AHA Adult Chain of Survival.*** The 4 links or sets of actions in the chain are **(1)** phone 911, **(2)** CPR, **(3)** early defibrillation, and **(4)** advanced care.

To save people with heart attack, cardiac arrest, or stroke, *each set of actions or link in the Chain of Survival must be performed as soon as possible.* If any link in the chain is weak, delayed, or missing, the chance of survival is lessened. The 4 links in the Chain of Survival are discussed below.

First Link: Phone 911

The first set of actions in the treatment of any emergency is recognizing that an emergency exists and phoning 911 or other emergency response number in your area. You must recognize the warning signs of a heart attack, cardiac arrest, stroke, or choking. *Anyone* who is *unresponsive* should receive emergency care. Heart attack, cardiac arrest, stroke, and choking can cause the victim to become unresponsive. Although many conditions, not just cardiac arrest, can cause the victim to have no response, *all* victims who suddenly become unresponsive will benefit from activation of the Chain of Survival.

Lay responders often serve as part of an emergency response system in the workplace. If the emergency response system includes an emergency number other than 911, use that number as instructed. The operator who answers this emergency response number should determine your location and the nature of the emergency, phone the local EMS system, and send other trained rescuers who are on-site to help you until EMS personnel arrive. If you are part of a workplace emergency response team, whenever this manual indicates that you should phone 911, you should phone the emergency response number at your workplace.

If your workplace participates in a public access defibrillation (PAD) program, trained rescuers will be on-site to perform CPR and provide early defibrillation with an automated external defibrillator (AED). If your workplace is in a PAD program, when you or another rescuer phones

FYI...

Emergency Medical Dispatch Assistance and Enhanced 911

In many areas of the United States emergency medical dispatchers (EMDs) are taught how to help callers give emergency care. The instructions are simple, and they will help you help the victim until EMS personnel arrive.

The EMD can coach you through the basic steps of CPR. If you can bring the phone to the victim's side, follow the EMD's instructions. If other rescuers are at the scene and the EMD provides instructions, stay on the phone and do the following:

- Repeat the dispatcher's instructions loudly to the other rescuers and confirm that they are following each step.
- If the victim vomits or other complications occur, tell the dispatcher. Rescuers are not expected to perform perfectly in such a crisis.
- Be sure that rescuers follow each instruction, even if it takes extra seconds.
- Ensure the safety of the rescuers at all times.
- When EMS personnel arrive at the victim's side, the dispatcher will hang up after confirming their arrival.
- You hang up last or if instructed to do so by the dispatcher.

Find out if your community has *enhanced* 911. In enhanced 911 systems a computer automatically confirms the caller's address. This allows the dispatcher to locate the caller even if the caller is unable to speak or the connection is broken. If your community does not have an enhanced 911 system, you should become a vocal advocate for such services. Enhanced 911 can save precious seconds, minutes, and lives.

the emergency response number, get the AED (usually located near the phone). Place the AED at the victim's side so that it will be available when other trained rescuers arrive.

Other rescuers are often nearby. If you find a person who is unresponsive, shout for help to bring other rescuers to help you. When you or another rescuer calls 911 (or other emergency response number), the dispatcher will ask questions and relay the information you provide to the response team. You should reply with short, specific answers, giving only the requested information. The dispatcher will probably ask:

- **"What is your emergency?"** You might answer: *"My husband had sudden chest pain and has now collapsed."*
- **"What's happening now?"** *"My friend is giving CPR."*
- **"Where is the victim located?"** *"We're at the Evergreen Apartments, 1234 Fifth Avenue Northeast, on the second floor in the back of the building."*
- **"What number are you calling from?"** *"555-1313."* At this point the dispatcher may give you directions such as **"Stay on the line until I tell you to hang up. Rescuers are being sent to your location. Please send someone to meet them and direct them to the scene."**

Second Link: CPR

CPR is a set of actions that the rescuer performs in sequence to *assess and support* airway, breathing, and circulation if needed. CPR is performed in steps **(see Figure 2)** so that the rescuer provides only the support the victim needs.

CPR is the critical link that buys time between the first link (phone 911) and the third link (early defibrillation). CPR allows oxygen to flow to the brain and heart until defibrillation or other advanced care can restore normal heart action. *Victims of out-of-hospital cardiac arrest who receive CPR by bystanders are more than twice as likely to survive as victims who do not receive such support.* The earlier you give CPR to a person in cardiac or respiratory arrest, the greater the victim's chance of survival.

Third Link: Early Defibrillation

Many adult victims of sudden cardiac arrest have **ventricular fibrillation (VF)**. VF is an abnormal, chaotic heart rhythm that prevents the heart from pumping blood.

The only treatment for VF is defibrillation. **Defibrillation** is a shock that stops VF and allows a normal heart rhythm to resume. When VF is present, prompt defibrillation will increase the victim's chance of survival. With each minute that defibrillation is delayed during cardiac arrest

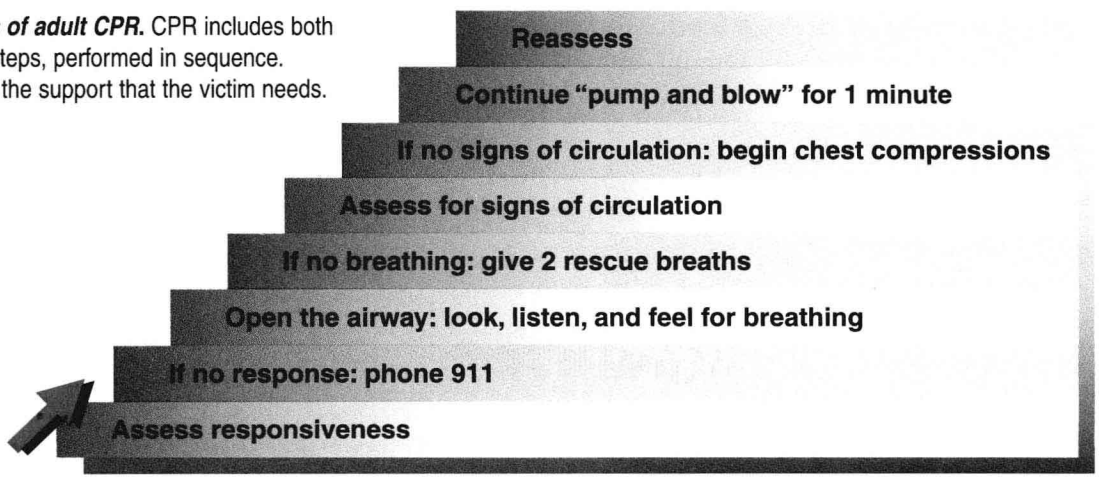

FIGURE 2. ***The steps of adult CPR.*** CPR includes both assessment and support steps, performed in sequence. The rescuer provides only the support that the victim needs.

FYI...

Automated External Defibrillators and Public Access Defibrillation Program

Automated external defibrillators (AEDs) are computerized defibrillators that may be safely operated by lay rescuers who have received a few hours of training. AEDs are extremely accurate and relatively inexpensive, and they can reduce the time to defibrillation if they are used before EMS personnel arrive. The AED is attached to the victim with 2 adhesive pads. The AED analyzes the electrical activity of the victim's heart and then determines if a shock is needed. The rescuer presses a SHOCK button to deliver the shock when prompted by the AED.

Public access defibrillation (PAD) is a public health initiative developed by the AHA. PAD programs are designed to increase the number of AEDs available in a community and the number of rescuers trained to provide CPR and use the defibrillators. In communities with PAD programs AEDs can be used by firefighters, police officers, airline personnel, and trained lay rescuers before EMS personnel arrive. When AEDs are used before the arrival of EMS personnel, they reduce the time to defibrillation and increase survival from out-of-hospital cardiac arrest.

You can be trained to provide CPR and operate an AED by taking the AHA Heartsaver AED Course. ***Contact your local AHA for more details.***

caused by VF, the victim's chance of survival is reduced by 7% to 10%. If defibrillation is provided within the first 5 minutes of a VF cardiac arrest, the victim's chance of survival is about 50%. After 10 to 12 minutes of cardiac arrest there is very little chance of a successful rescue *unless CPR has been provided.* CPR prolongs the time that defibrillation can be effective, increasing the "window of opportunity" for resuscitation. To increase the victim's chance of survival, you must provide CPR until the defibrillator arrives.

In many locations throughout the United States, early community defibrillation programs, or *public access defibrillation* (PAD) programs, have been established. In PAD programs trained lay rescuers are equipped with AEDs. As noted above, if you provide CPR in a location served by a PAD program (for example, some golf courses or shopping malls), you (or the person who phones 911) should get the AED and place it at the victim's side. When a rescuer trained in the use of AEDs arrives, early defibrillation can be performed without further delay.

Fourth Link: Advanced Care

The fourth link in the Chain of Survival is advanced care. Highly trained EMS personnel called *emergency medical technicians* (EMTs) provide CPR and defibrillation. Paramedics also provide CPR and defibrillation as well as more advanced care, such as use of cardiac drugs and breathing tubes. These advanced actions help the heart in VF to respond to defibrillation or maintain a normal rhythm after successful defibrillation. Advanced care is also provided in the hospital.

How to Recognize Life-Threatening Emergencies

- **Heart Attack**
- **Cardiac Arrest**
- **Stroke**
- **Choking**

How to Recognize a Heart Attack

Recall the case scenario of the father at the picnic on the beach who suddenly developed chest pain. He is pale, sweaty, and nauseated and complains of tightness in his chest that has lasted 10 minutes and has moved to his neck, jaw, and left arm. Are his symptoms consistent with the signs of a heart attack?

A heart attack means some heart muscle has suddenly started to die. The muscle is dying because one of the blood vessels of the heart (a coronary artery) has become blocked. New drugs called ***clotbusters*** can unblock the arteries of the heart if they are given within a few hours of the onset of signs of a heart attack. *Acute myocardial infarction* is the medical term for heart attack.

A person who is having a heart attack is usually awake and can talk to you but feels severe pain. The most critical time for treatment of a heart attack with clotbusters is within the first 90 minutes after symptoms begin. If you suspect someone is having a heart attack, activate the EMS system *immediately* (phone 911). These minutes count! Know the symptoms!

The most important and most common symptom of a heart attack is chest pain or pressure in the center of the chest, behind the breastbone (sternum). The pain may travel to the neck or jaw or down the left arm. It usually lasts more than 3 to 5 minutes. **Chest pain** is a ***red flag.*** The flag says ***Warning! Think heart attack.***

Ask these questions:

- ***"What* is the pain like?"** People describe the pain of a heart attack in many ways: pressure, fullness, squeezing, or heaviness.
- ***"Where* is the pain located?"** People usually feel the pain right behind the breastbone, deep in the center of the chest **(see Figure 3)**. After a few moments the pain may spread to the shoulder, neck, or lower jaw or down the arm. The pain may be on the left side, right side, or both sides but is often on the left side. Sometimes the pain or discomfort may even be felt in the back, between the shoulder blades.

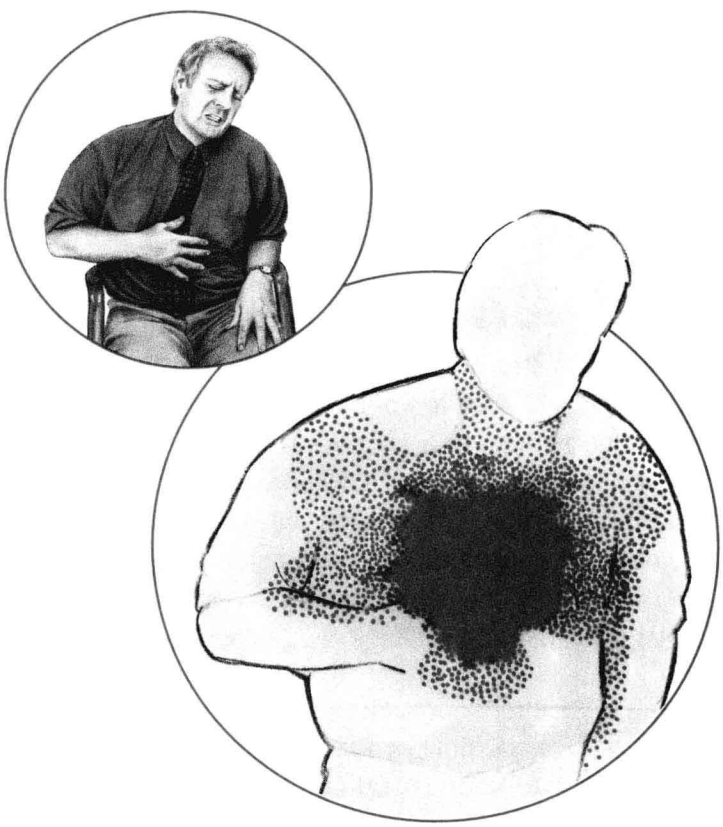

FIGURE 3. Typical locations of pain caused by a heart attack.

- ***"How long* have you had the pain?"** The discomfort of a heart attack usually lasts more than a few minutes. Sharp, stabbing, knifelike pain that lasts only a second and then disappears is usually not the pain of a heart attack. But chest pain caused by a heart attack sometimes "stutters." This means the pain may stop completely and then return a short time later.

Not all warning symptoms occur in every heart attack. People who are having a heart attack may have vague signs. They may say they feel lightheaded, faint, short of breath, or nauseated, or they may describe their chest discomfort as an ache, heartburn, or indigestion. These vague signs of a heart attack are more common in women, people with diabetes, and the elderly.

Many people will not admit that they might be having a heart attack. People react with a variety of statements or excuses. They may say "I'm too healthy," or "I don't want to bother the doctor," or "I don't want to frighten my wife," or "I'll feel ridiculous if it isn't a heart attack," or "I hate red lights and sirens." When a person with symptoms of a heart attack tries to downplay what he or she is feeling, **you** must take responsibility and act at once. Tell the victim to sit quietly. Phone 911 or send someone to phone 911 and get the AED (if one is available). Be prepared to perform CPR.

Critical Concepts

Warning Signs and Symptoms of a Heart Attack

Not *all* warning symptoms (red flags) occur in *every* heart attack. People who are having a heart attack may complain of vague signs or symptoms. If *any* symptoms occur, don't wait. Get help immediately. Phone 911 or other emergency response number. Delay can be deadly.

Red flags of a heart attack include

- *Lightheadedness* or "feeling dizzy" during the pain
- *Fainting* or loss of responsiveness
- *Sweating*, breaking out in a "cold sweat all over" but without fever
- *Nausea*, usually without vomiting
- *Shortness of breath*, especially worrisome if the victim is short of breath during pain, while lying still or resting, or when moving only a little

Critical Concepts

Remember the critical actions you should take if you are alone and find someone who is unresponsive:

- Phone 911 (or other emergency response number) and get the AED if available.
- Begin CPR.

You must phone 911 immediately for 2 reasons. First, EMS personnel can rapidly transport the victim to the hospital and provide medical care during transport. EMS personnel are prepared to treat potential complications of a heart attack, particularly abnormal heart rhythms and cardiac arrest. Second, EMS personnel can alert the hospital about the arrival of a patient with a potential heart attack. The hospital will then be better prepared to administer drugs such as clot-busters that may dissolve the clot and reduce or eliminate damage to the heart. These new drugs are effective only if they are given within the first few hours after the onset of symptoms of a heart attack. For these reasons, it is extremely important to phone 911.

After you phone 911, have the person rest quietly and calmly. Help the person into a position that is comfortable and that allows the easiest breathing.

How to Recognize a Cardiac Arrest

Recall the scenario used throughout this chapter. The father at the picnic complains of chest pain, which he says is caused by indigestion. He suddenly slumps over on the blanket and does not respond to voice or touch.

What should you do?

When an artery of the heart is blocked during a heart attack, the heart muscle is deprived of oxygen, and the heart may stop pumping blood. The heart muscle may quiver in the abnormal heart rhythm called ventricular fibrillation. This produces **cardiac arrest**—blood flow stops. Without blood flow to the brain, the person becomes unresponsive, collapses, stops breathing normally, and has no signs of circulation. The only treatment for VF is defibrillation with a defibrillator. If CPR is provided until the defibrillator arrives, defibrillation is more likely to be successful.

VF can develop as a complication of a heart attack, even in men or women who have no chest pain. In fact, VF and sudden cardiac arrest may be the *only* sign of a heart attack in some victims.

Sudden loss of responsiveness is a red flag. Act immediately! The victim may be in *cardiac arrest*. The **victim of cardiac arrest** will have **3 red flag signs:**

1. **No response:** Victims of cardiac arrest do not respond when you speak to them or touch them. If you are alone with someone who suddenly becomes unresponsive, immediately phone 911 or other emergency response number. If a second rescuer is present, send that rescuer to phone 911 (or other emergency response number) and get the AED if one is available while you begin CPR.
2. **No normal breathing:** Once you discover that the victim is unresponsive and 911 has been called, begin CPR. Open the airway and look, listen, and feel for breathing. The person in cardiac arrest does not take a normal breath when you check for breathing. You should then give the victim 2 rescue breaths.
3. **No signs of circulation:** After you provide 2 rescue breaths to the victim, check for signs of circulation. Look for a response from the victim to the initial breaths, such as normal breathing, coughing, or movement. If the heart is beating and delivering oxygen to the brain and body, the victim should react in some way after you deliver the 2 rescue breaths. Check for signs of circulation for no more than 10 seconds. If no signs of circulation are present, begin chest compressions. The steps of CPR are summarized in Chapter 2 of this module.

FYI...

Respiratory Arrest

Respiratory arrest is present when the victim is not breathing at all or is breathing so slowly, shallowly, or irregularly that oxygenation of the blood cannot occur. The term *respiratory arrest* is used for victims who are not breathing effectively but who still have signs of circulation. You can determine that respiratory arrest has occurred only when you go through the steps of CPR. A victim in respiratory arrest will be unresponsive. Open the airway and look, listen, and feel for breathing. You will see no breathing or only occasional or very shallow breathing effort. Give 2 breaths, watching the chest to see if it rises with each breath. The victim in respiratory arrest will show signs of circulation (breathing, coughing, or movement in response to the rescue breaths), confirming that the victim has spontaneous blood flow (circulation) and cardiac arrest is *not* present. However, the victim does not show normal, effective breathing, so respiratory arrest *is* present.