CARDIAC

EMERGENCIES

ife-threatening cardiac emergencies often strike close to home, where we live, work and play. When you know how to recognize and respond to a cardiac emergency, the life you could save is likely to be that of

**L**

someone you know—a family member, co-worker or neighbor. Because every minute counts when a person is experiencing a cardiac emergency, the person’s survival often depends on lay responders acting quickly and giving appropriate care until EMS personnel arrive and take over.

Heart Attack

A **heart attack** occurs when blood flow to part of the heart muscle is blocked (e.g., as a result of coronary artery disease). Because the cells in the affected area of the heart muscle are not receiving the oxygen and nutrients they need, they die, causing permanent damage to the heart muscle (Figure 3-1). Seeking advanced medical care as soon as you recognize the signs and symptoms of a heart attack can minimize the damage to the heart and may save the person’s life.

When a person is having a heart attack, every minute counts.

Signs and Symptoms of a Heart Attack

Signs and symptoms of a heart attack vary from person to person, and can be different in women than they are in

men. Even people who have had a heart attack before may not experience the same signs and symptoms if they have

a second heart attack. A person who is having a heart attack may show any of the following signs and symptoms:

Blockage in

the artery

Damaged heart muscle

**Figure 3-1.** A heart attack occurs when blood flow to the heart is blocked.

* + - Chest pain, which can range from mild to unbearable. The person may complain of pressure, squeezing, tightness, aching or heaviness in

the chest. The pain or discomfort is persistent, lasting longer than 3 to 5 minutes, or going away and then coming back. It is not relieved by resting, changing position or taking medication. It may be difficult to distinguish the pain of a heart attack from the pain of indigestion, heartburn or a muscle spasm.

* + - Discomfort or pain that spreads to one or both arms, the back, the shoulder, the neck, the jaw or the upper part of the stomach
    - Dizziness or light-headedness

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* + - Trouble breathing, including noisy breathing, shortness of breath or breathing that is faster than normal
    - Nausea or vomiting
    - Pale, ashen (gray) or slightly bluish skin, especially around the face and fingers
    - Sweating
    - A feeling of anxiety or impending doom
    - Extreme fatigue (tiredness)
    - Unresponsiveness



**MEN...**

often, but not always, experience the “classic” signs and symptoms of a heart attack:

**Chest pain**, pressure, squeezing, tightness, aching or heaviness that lasts longer than 3-5 minutes or goes away and comes back

**WOMEN...**

may experience the “classic” signs

and symptoms but they are often milder and may be accompanied by more general signs and symptoms such as:

HEART ATTACK

**Radiating pain** to arm(s), shoulder or neck

**Secondary signs and symptoms** may include dizziness, loss of consciousness, sweating, nausea or shortness of breath

**Shortness of breath**

**Nausea, vomiting or diarrhea Fatigue**

**Dizziness Sweating**

**Back or jaw pain**

**Figure 3-2.** Men and women often experience heart attacks differently.

Although men often have the “classic” signs and symptoms of a heart attack, such as chest pain that radiates down one arm, women often have more subtle signs and symptoms or experience the signs and symptoms of a heart attack differently than men do (Figure 3-2). For example, in women, the “classic” signs and symptoms may be milder or accompanied by more general signs and symptoms such as shortness of breath; nausea

or vomiting; extreme fatigue; and dizziness or light-headedness. Because these signs and symptoms are so general and nonspecific, women may experience them for hours, days or even weeks leading up to the heart attack but dismiss them as nothing out of the ordinary.

The signs and symptoms of a heart attack may also be more subtle in people with certain medical conditions, such as diabetes.

#### First Aid Care for a Heart Attack

If you think that a person is having a heart attack, call 9-1-1 or the designated emergency number immediately. Trust your instincts. Many people who are having a heart attack delay seeking care because they hope they are experiencing signs and symptoms of a more minor condition that will go away with time, such as indigestion, heartburn, a muscle strain or the flu. People often worry about calling an ambulance and going to the emergency room for a “false alarm.” However, most people who die of a heart attack die within 2 hours of first experiencing signs or symptoms. Even when a heart attack is not fatal, early advanced medical care can help to minimize the damage to the heart. Always seek advanced medical care as soon as signs and symptoms of a heart attack are noted.

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

* + - * Call 9-1-1 or the designated emergency number immediately. Never try to drive a person who

is experiencing signs and symptoms of a heart attack to the hospital yourself. EMS personnel can transport the person to the hospital safely while initiating care.

* Have the person stop what he or she is doing and rest in a comfortable position to reduce 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.
  + Reassure the person. Anxiety increases the person’s discomfort.
  + If the person has a history of heart disease and takes a prescribed medication to relieve chest pain (e.g., nitroglycerin), offer to locate the medication and help the person to take it.
  + If the person is responsive, able to chew and swallow, and allowed to have aspirin, you may offer two low-dose (81-mg) aspirin tablets or one 5-grain (325-mg) regular-strength aspirin tablet (Box 3-1).
* Closely monitor the person’s condition until EMS personnel arrive and take over. Notice any changes in the person’s appearance or behavior.
* If you are trained in giving CPR and using an automated external defibrillator (AED), be prepared to give CPR and use an AED if the person becomes unresponsive.

## Cardiac Arrest

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Cardiac arrest is not the same as a heart attack. Remember, a heart attack occurs when blood flow to part of the heart muscle is blocked, causing part of the heart muscle to die. **Cardiac arrest**, on the other hand, occurs when the heart stops beating or beats too ineffectively to circulate blood to the brain and other vital organs. A network of special cells in the heart muscle conducts electrical impulses that coordinate contraction, causing the heart to beat rhythmically. In cardiac arrest, the electrical impulses become abnormal and chaotic. This causes the heart to lose the ability to beat rhythmically, or to stop beating altogether (Figure 3-3).

**Figure 3-3.** Cardiac arrest occurs when the electrical impulses that control the heartbeat become irregular and chaotic.

Box 3-1. **Aspirin for a Heart Attack**

You may be able to help a person who is showing early signs and symptoms of a heart attack

by offering the person an appropriate dose of aspirin. Aspirin can help to prevent blood clotting and is most effective when given soon after the onset of signs and symptoms of a heart attack. However, you should never delay calling 9-1-1 or the designated emergency number to find or offer aspirin.

Before offering aspirin, make sure the person is responsive, able to chew and swallow, and allowed to have aspirin. Ask the person:

* + 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 healthcare provider to avoid taking aspirin?

If the person answers “no” to each of these questions, you may offer the person two low-dose (81-mg) aspirin tablets or one

1. grain (325-mg) regular- strength aspirin tablet.

Have the person chew the aspirin completely. Chewing the aspirin speeds its absorption into the bloodstream.

Do not offer the person an aspirin-containing combination product meant to relieve multiple conditions, or another type of pain medication, such as

acetaminophen (Tylenol®),

ibuprofen (Motrin®, Advil®) or naproxen (Aleve®). These medications do not work the same way aspirin does and are not beneficial for a person who is experiencing a heart attack.

Cardiovascular disease and certain congenital heart conditions (conditions that a person is born with) can increase a person’s risk for cardiac arrest. Breathing emergencies, such as choking or drowning, can also lead to cardiac arrest because if the body’s supply of oxygen is interrupted, the heart soon stops beating. Every organ in the body needs a steady supply of oxygen in order to work properly, and the heart is no exception. Severe trauma, electric shock and drug

overdose are other potential causes of cardiac arrest. Although cardiac arrest is more common in

adults, it does occur in young people as well. The most common causes of cardiac arrest in children and infants are breathing emergencies, congenital heart disorders and trauma.

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When the heart stops beating properly, the body cannot survive for long. 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 8 to 10 minutes (Figure 3-4). Death occurs within a matter of minutes if the person does not receive immediate care.

4-6 minutes:

Brain damage can begin

8-10 minutes: Brain damage can become irreversible

60

5

55

60

50 10

10

50

50

10

40 20

40

30

30

45 15

40 20

35 30 25

**Figure 3-4.** Every minute counts in cardiac arrest.

#### Signs and Symptoms of Cardiac Arrest

When a person experiences cardiac arrest, you may see the person suddenly collapse. When you check the person, you will find that the person is not responsive and not breathing, or only gasping. (In an unresponsive person, isolated or infrequent gasping in the absence of normal breathing may be **agonal breaths**, which can occur even after the heart has stopped beating.

Agonal breaths are not breathing and are a sign of cardiac arrest.) The person has no heartbeat.

Cardiac arrest can happen suddenly and without any warning signs. When this occurs, the person is said to have experienced **sudden cardiac arrest**. People who have a history of cardiovascular disease or a congenital heart disorder are at higher risk for sudden cardiac arrest. However, sudden cardiac arrest can

happen in people who appear healthy and have no known heart disease or other risk factors for the condition. A person who experiences sudden cardiac arrest is at very high risk for dying and needs immediate care.

#### First Aid Care for Cardiac Arrest

When a person experiences cardiac arrest, quick action on the part of those who witness the arrest is crucial and gives the person the greatest chance for survival. The **Cardiac Chain of Survival** describes five actions that, when performed in rapid succession, increase the person’s likelihood of surviving cardiac arrest (Box 3-2). In the Cardiac Chain of Survival, each link of the chain depends on, and is connected to, the other links.

Four out of every five cardiac arrests in the United States occur outside of the hospital. That means responders like you are often responsible for initiating the Cardiac Chain of Survival. When you complete the first three links in the Cardiac Chain of Survival—recognizing cardiac arrest and activating the EMS system, immediately beginning CPR and using an AED as soon as possible—you give the person the best chance for surviving the incident.

For each minute that CPR and use of an AED are delayed, the person’s chance for survival is reduced by about 10 percent.

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If you think that a person is in cardiac arrest:

* + Have someone call 9-1-1 or the designated emergency number immediately.
  + Begin CPR immediately.
  + Use an AED as soon as possible.

Box 3-2. **The Cardiac Chain of Survival**

#### Adult Cardiac Chain of Survival

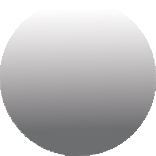
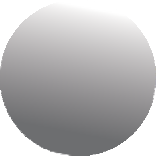
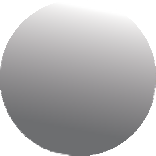
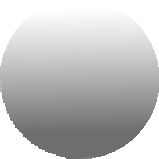
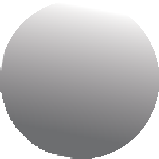
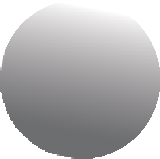
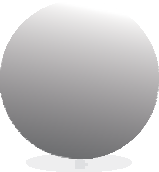
* + - **Recognition of cardiac arrest and activation of the emergency medical services (EMS) system.** The sooner someone recognizes that a person is in cardiac arrest

and calls 9-1-1 or the designated emergency number, the sooner people capable of providing advanced life support will arrive on the scene.

* + - **Early CPR.** CPR circulates oxygen-containing blood to the brain and other vital organs, helping to prevent brain damage and death.
    - **Early defibrillation.** Defibrillation (delivery of an electrical shock using an AED) may restore an effective heart rhythm, significantly increasing the person’s chances for survival.
* **Early advanced life support.** Provided by EMS personnel at the scene and en route to the hospital, early advanced life support gives the person access to emergency medical care delivered by trained professionals.
* **Integrated post–cardiac arrest care.** After the person is resuscitated, an interdisciplinary team of medical professionals works to stabilize the person’s medical condition, minimize complications, and diagnose and treat the underlying cause of the cardiac arrest to improve survival outcomes.

#### Pediatric Cardiac Chain of Survival

* + **Prevention.** Because cardiac arrest in children often occurs as the result of a preventable injury (such as trauma, drowning, choking or electrocution), the Pediatric Cardiac Chain of Survival has “prevention” as the first link.



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* + **Early CPR.** CPR circulates oxygen-containing blood to the brain and other vital organs, helping to prevent brain damage and death.
  + **Activation of the emergency medical services (EMS) system.** The sooner someone recognizes that a person is in cardiac arrest and calls 9-1-1 or the designated emergency number, the sooner people capable of providing advanced life support will arrive on the scene.
* **Early advanced life support.** Provided by EMS personnel at the scene and

en route to the hospital, early advanced life support gives the person access to

emergency medical care delivered by trained professionals.

* **Integrated post–cardiac arrest care.** After the person is resuscitated, an interdisciplinary team of medical

professionals works to stabilize the person’s medical condition, minimize complications, and diagnose and treat the underlying cause of the cardiac arrest to improve survival outcomes.

###### CPR

**CPR**, or cardiopulmonary resuscitation, is a skill that is used when a person is in cardiac arrest to keep oxygenated blood moving to the brain and other vital

organs until advanced medical help arrives (Figure 3-5). CPR involves giving sets of 30 chest compressions followed by sets of 2 rescue breaths. When you give compressions, you press down on the person’s chest. This squeezes (compresses) the heart between the breastbone (sternum) and spine, moving blood out of the heart and to the brain and other vital organs. After each compression, you must let the chest return to its normal position. This allows blood to flow back into the heart. The rescue breaths you give after each set of 30 compressions deliver a fresh supply of oxygen into the person’s lungs. When you give CPR, you help to keep oxygenated blood moving throughout the body, which can buy the person some time until advanced medical help arrives.

**Figure 3-5.** CPR keeps oxygen-containing blood circulating to the brain and other vital organs.

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Although full CPR (compressions and rescue breaths) is preferred, if you are unable or unwilling for any reason to give full CPR, you can give **compression-only CPR** instead. In compression-only CPR, you give continuous chest compressions, with no rescue breaths. After checking the scene and the person and calling 9-1-1 or the designated emergency number, give chest compressions without stopping until another trained responder or EMS personnel take over or you notice an obvious sign of life.

###### AED

While CPR can help to prevent brain damage and death by keeping oxygenated blood moving throughout the body, an AED can correct the underlying problem for some people who go into

sudden cardiac arrest. Two abnormal heart rhythms

in particular, **ventricular fibrillation (V-fib)** and

**\_\_\_\_\_\_\_**

Many lay responders worry about hurting the person (for example, by breaking the person’s ribs or breastbone) while giving CPR, but a person who is in need of CPR is clinically dead (i.e., the person has no heartbeat and is not breathing). It is very unlikely that you will injure the person while giving CPR, but even if you do, consider this: any injury you may cause is secondary when compared with the person’s current circumstances, and the injury will heal with medical care and time. Remember: The worst thing to do is nothing!

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**ventricular tachycardia (V-tach)**, can lead to sudden cardiac arrest. In V-fib, the heart muscle simply quivers (fibrillates) weakly instead of contracting strongly. In V-tach, the heart muscle contracts too fast (*tachy-* means “fast”). Both abnormal rhythms impair the heart’s ability to pump and circulate blood throughout the body and are life threatening. However, in many cases, V-fib and V-tach can be corrected by an electrical shock delivered by an AED. This shock

disrupts the heart’s electrical activity long enough to allow the heart to spontaneously develop an effective rhythm on its own. Starting CPR immediately and using an AED as soon as possible gives the person the best chance for surviving cardiac arrest (Figure 3-6).

**Figure 3-6.** Immediately beginning CPR and using an AED as soon as possible gives the person the best chance for survival.

## Giving CPR

If you check a person and find that he or she is unresponsive and not breathing or only gasping, begin CPR immediately, starting with chest compressions. Proper technique is important. Skill Sheets 3-1, 3-2 and 3-3 describe step by step how to give CPR to an adult, child and infant, respectively. Table 3-1 summarizes the key differences in giving CPR to an adult, child or infant.

#### Giving CPR to an Adult

First, make sure the person is lying face-up on a firm, flat surface. For example, if the person is on a soft surface like a sofa or bed, quickly move him or her to the floor before you begin. Kneel beside the person.

* + **Position your hands.** Place the heel of one hand in the center of the person’s chest on the person’s breastbone (sternum). If you feel the notch at the end of the breastbone, move your hand slightly toward the person’s head. Place your other hand on top of your first hand and interlace your fingers or hold them up so that your fingers are not on the person’s chest. If you have arthritis in your hands, you can grasp the wrist of the hand positioned on

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the chest with your other hand instead. 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.

* + **Give a set of 30 compressions.** Position your body so that your shoulders are directly over your hands. This will let you push on the chest using a straight up-and-down motion, which moves the most blood with each push and is also less tiring. Keeping

TABLE 3-1 Comparison of CPR Technique in Adults, Children and Infants

Adult

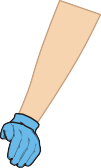
About age 12 years or older

Child

Between the ages of 1 and 12 years

###### Infant

Younger than 1 year



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|  |  |  |
| --- | --- | --- |
| Hand Position |  |  |
| Two hands in center of chest | Two hands in center of chest | Two fingers on center of chest, just below the nipple line |
| Chest Compressions |  |  |
| Compress **at least 2** inches  Rate: 100–120 compressions/min | Compress **about 2** inches  Rate: 100–120 compressions/min | Compress **about 1½** inches  Rate: 100–120 compressions/min |
| Rescue Breaths |  |  |
| Tilt head to **past-neutral position**; pinch nose shut and form seal over mouth | Tilt head to **slightly past-neutral position**; pinch nose shut and form seal over mouth | Tilt head to **neutral position**; form seal over mouth and nose |
| Sets |  |  |
| 30 chest compressions and 2 rescue breaths | 30 chest compressions and 2 rescue breaths | 30 chest compressions and 2 rescue breaths |

your arms straight, push down at least 2 inches, and then let the chest completely return to its normal position. Push hard and push fast! You want to go at a rate of 100–120 compressions per minute. As you give compressions, count out loud up to

30. Maintain a smooth, steady down-and-up rhythm and do not pause between compressions.

* + **Give a set of 2 rescue breaths.** Once you have given 30 compressions, give 2 rescue breaths. First, open the airway using the **head-tilt/chin-lift maneuver**. Place one of your hands on the person’s forehead and two fingers of your other hand on the bony part of the person’s chin. Tilt the person’s head back and lift the chin. For an adult, tilt the head to a past-neutral position (see Table 3-1). If possible, use a CPR breathing barrier when you are giving rescue breaths, but do not delay rescue breaths to find a breathing barrier or learn how to use it. Pinch the person’s nose shut. Take a normal breath, make a complete seal over the person’s mouth with your mouth, and blow into

the person’s mouth to give the first rescue breath. Take another breath, make a seal, and give the second rescue breath. Each rescue breath should last about 1 second and make the person’s chest rise. After you finish giving 2 rescue breaths, return to giving compressions as quickly as possible. The process of giving 2 rescue breaths and getting back to compressions should take less than 10 seconds. Never give more than 2 rescue breaths per set. Table 3-2 describes how to troubleshoot special situations when giving rescue breaths.

Once you begin CPR, continue giving sets of 30 chest compressions and 2 rescue breaths until:

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* + You notice an obvious sign of life, such as movement. (If the person shows an obvious sign of life, stop CPR, place the person in the recovery position and continue to monitor the person’s condition until EMS personnel take over.)
  + An AED is ready to use and no other trained responders are available to assist you with the AED.

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Counting out loud as you give compressions can help you to keep a steady, even rhythm. For compressions 1 through 12, say

“one and two and three and four and five and six and…” up to 12. When you get to 13, just say the number: “thirteen, fourteen, fifteen, sixteen…” up to 30. Push down as you say the number and come up as you say “and” (or the second syllable of the number). This will help you to keep a steady, even rhythm.

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Incorrect technique or body position can cause your arms and shoulders to tire quickly when you are giving compressions. Use the weight of your upper body to compress the chest, not your arm muscles. Avoid rocking back and forth, because rocking makes your compressions less effective and wastes your energy. Also avoid leaning on the chest, because leaning prevents the chest from returning to its normal position after each compression, limiting the amount of blood that can return to the heart.

**THE PROS KNOW.**

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When giving rescue breaths, keep the person’s head tilted back and avoid taking too large of a breath or blowing too forcefully. Failing to keep the person’s head tilted back, taking too large of a breath, or blowing

too forcefully can force air into the person’s stomach instead of into his or her lungs, which can make the person vomit and cause other complications. Remember: Keep the head tilted back, take a normal

breath and blow just enough to make the chest rise.

###### TABLE 3-2 Special Situations: Rescue Breathing

|  |  |
| --- | --- |
| Special Situation | Solution |
| **The breaths do not make the chest rise.** | Never give more than 2 rescue breaths per set. If the first rescue breath does not cause the chest to rise, retilt the head to ensure that the airway  is properly opened and ensure that the person’s nose and mouth are properly sealed before giving the second rescue breath. If the second breath does not make the chest rise, an object may be blocking the person’s airway. Give CPR with one modification: after each set of compressions and before giving rescue breaths, open the mouth, look for an object in the person’s mouth, and if you see it, remove it. |
| **The person vomits or there is fluid in the mouth.** | Roll the person onto his or her side and clear the mouth of fluid using a gloved finger or a piece of gauze. Then roll the person onto his or her back and resume giving care. |
| **You are unable to form a tight seal over the person’s mouth (e.g., due to an injury).** | Use mouth-to-nose breathing instead. With the person’s head tilted back, close the person’s mouth by pushing on the person’s chin. Make a complete seal over the person’s nose with your mouth and blow in for 1 second to make the chest rise. |

(*Continued*)

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|  |  |
| --- | --- |
| Special Situation | Solution |
| The person has a **tracheostomy** or “stoma,” a surgically created opening in the front of the neck that opens into the trachea (windpipe) to form an alternate route for breathing when the upper airway is blocked or damaged. | Use mouth-to-stoma breathing instead. Expose the person’s neck down to the breastbone and remove anything covering the stoma (e.g., a filter or stoma cover). Wipe away any secretions from the stoma. Make a complete seal over the person’s stoma or tracheostomy tube with your mouth and blow in for 1 second to make the chest rise.   * If the chest does not rise, the tracheostomy tube may be blocked. Remove the inner tube and try rescue breaths again. * If you hear or feel air escaping from the person’s mouth or nose, the person is a partial neck breather (i.e., there is still a connection between the trachea and the upper airway, and although the person breathes mainly through the stoma, he or she is also able to breathe to some extent through the mouth and nose). Seal the person’s mouth and nose with your hand or a tight-fitting mask so that air does not escape out of the mouth or nose when you give rescue breaths into the stoma. |

* + You have performed approximately 2 minutes of CPR (5 sets of 30:2) and another trained

responder is available to take over compressions. Giving chest compressions correctly is physically tiring. If more than one responder is available and trained in CPR, the responders should switch responsibility for compressions every 2 minutes, or whenever the responder giving compressions indicates that he or she is tiring. Switching responsibility for giving chest compressions frequently reduces responder fatigue, which improves the quality of chest compressions and leads to a better chance of survival for the person.

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* You have performed approximately 2 minutes of CPR (5 sets of 30:2), you are alone and caring for a child, and you need to call 9-1-1 or the designated emergency number.
* EMS personnel take over.
* You are alone and too tired to continue.
* The scene becomes unsafe.

#### Giving CPR to a Child

Giving CPR to a child is very similar to giving CPR to an adult. However, in a child, you open the airway by tilting the head to a slightly past-neutral position, rather than to a past- neutral position (see Table 3-1). Rather than compressing the chest to a depth of *at least* 2 inches as you would for an adult, you compress the chest to a depth of *about* 2 inches for a child. Also, for a small child, you may only need to give compressions with one hand, instead of two.

#### Giving CPR to an Infant

The general principles of giving CPR to an infant are the same as they are for children and adults. However, because the infant’s body is smaller, you will position your hands differently to deliver compressions. Place the pads of two fingers on the center of the infant’s chest, just below the nipple line. If you feel the notch at the end of the infant’s breastbone, move your fingers slightly toward the infant’s head. Place your other hand on the infant’s forehead. Give compressions by using the pads of your fingers to compress the chest about 1½ inches.

When you give rescue breaths, open the airway by tilting the head to a neutral position (see Table 3-1). Instead of pinching the nose shut and covering the mouth with your mouth, cover the infant’s nose and mouth with your mouth to form a seal.

## Using an AED

Different types of AEDs are available, but all are similar to operate and use visual displays, voice prompts or both to guide the responder. If your place of employment has an AED on site, know where it is located, how to operate it and how to maintain it (Box 3-3). Also take note of the location of AEDs in public places that you frequent, such as shopping centers, airports, recreation centers and sports arenas.

When a person is in cardiac arrest, use an AED as soon as possible. Skill Sheet 3-4 describes how to use an AED step by step. Environmental and person-specific considerations for safe and effective AED use are given in Box 3-4.

#### Using an AED on an Adult

To use an AED, first turn the device on. Remove or cut away clothing and undergarments to expose the person’s chest. If the person’s chest is wet, dry it using a towel or gauze pad. Dry skin helps the AED pads to stick properly. Do not use an alcohol wipe to dry the skin because alcohol is flammable.

Next, apply the AED pads. Peel the backing off the pads as directed, one at a time, to expose the adhesive. Place one pad on the upper right side of the person’s chest and the other pad on the lower left side of the person’s chest below the armpit, pressing firmly to adhere (Figure 3-7). Plug the connector cable into the AED (if necessary) and follow the device’s directions. Most AEDs will begin to analyze the heart rhythm automatically, but some may require you to push an “analyze” button to start this process. No one should touch the person while the AED is analyzing the heart rhythm because this could result in a faulty reading. Next, the AED

**Figure 3-7.** Place one AED pad on the upper right side of the chest and the other on the lower left side of the chest, below the armpit.

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will tell you to push the “shock” button if a shock is advised. Again, avoid touching the person, because anyone who is touching the person while the device is delivering a shock is at risk for receiving a shock as well. After a shock is delivered (or if the AED determines that no shock is necessary), immediately resume CPR, starting with compressions. The AED will continue to check the heart rhythm every 2 minutes. Listen for prompts from the AED and continue giving CPR and using the AED until you notice an obvious sign of life or EMS personnel arrive. If you notice an obvious sign of life, stop CPR but leave the AED turned on and the pads in place on the person’s chest, and continue to follow the AED’s prompts.

#### Using an AED on a Child or Infant

The procedure for using an AED on a child or infant is the same as the procedure for using an AED on an adult. Some AEDs come with pediatric AED pads that are smaller and designed specifically to analyze a child’s heart rhythm and deliver a lower level of energy. These pads should be used on children up to 8 years of age or weighing less than 55 pounds. Other AEDs have a key or switch that configures the AED for use on a child up to 8 years of age or weighing less than 55 pounds. If pediatric AED pads are not available or the