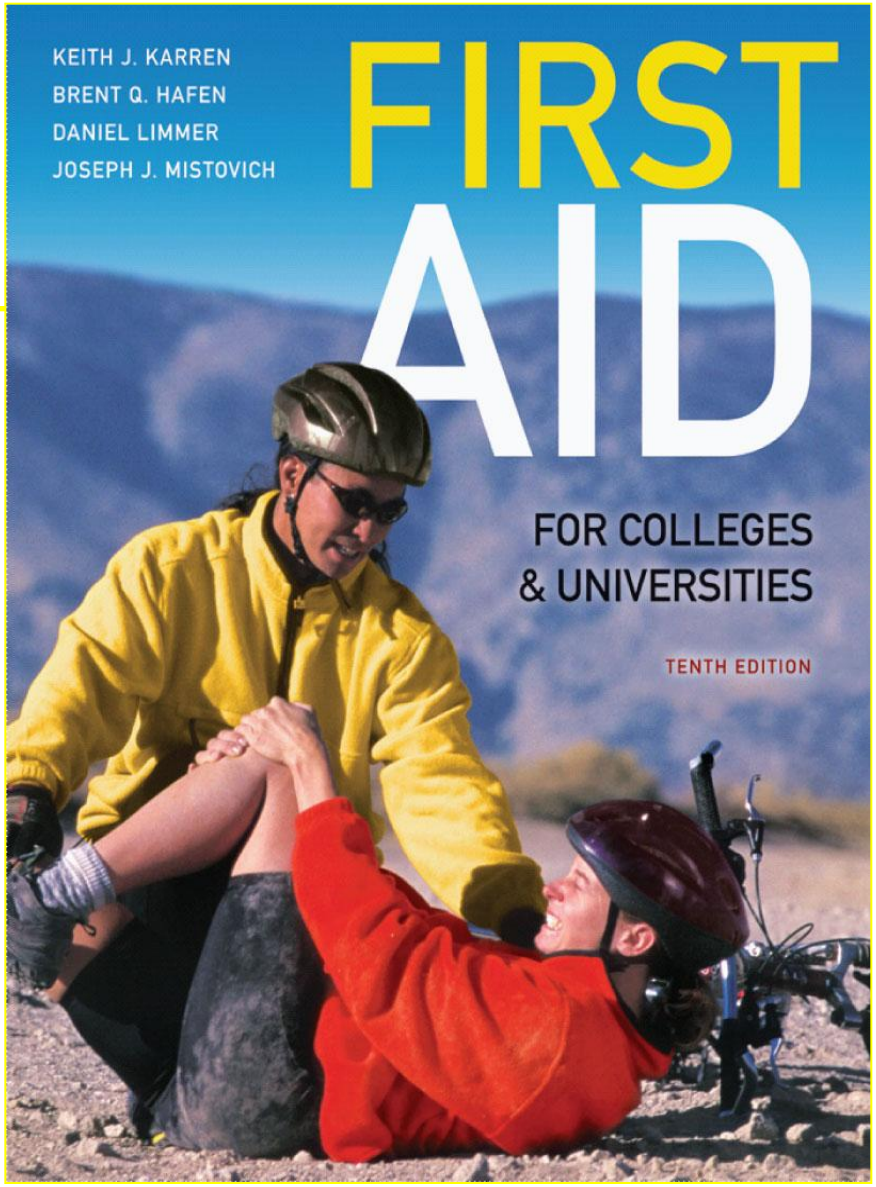
Chapter 5



Basic Life Support: Cardiopulmonary Resuscitation (CPR)

Slide Presentation prepared by
Randall Benner, M.Ed., NREMT-P

Learning Objectives

- Identify the signs and symptoms of cardiac arrest.
- List the sequence of basic life support (BLS).
- Describe how to assess a victim for breathlessness.
- Describe how to assess a victim for pulselessness.

Learning Objectives

- Demonstrate proper hand placement for chest compressions.
- Describe how to deliver effective chest compressions.
- Explain the procedures for performing one-rescuer CPR.
- Know when to terminate CPR.

Learning Objectives

- Explain the procedures for performing two-rescuer CPR.
- Explain how to adapt CPR techniques to infants and children.
- Discuss the most common mistakes made when performing CPR.
- Know when to withhold CPR.

Cardiac arrest

- Cardiac arrest is a condition in which the heart has stopped beating.
- Causes:

- the heart muscle not getting the blood–and therefore the oxygen and nutrients–it needs,
- a sudden and serious heart rhythm abnormality.

Cardiopulmonary Resuscitation (CPR)

- a term used to describe the first aid procedures necessary to sustain life in an emergency situation.
- You should perform CPR when a victim is in cardiac arrest (heart stops beating).
- Cardiac arrest symptoms can include
  - Chest pain; heaviness or tightness that radiates to the neck, shoulders, jaw, or arms
  - Nausea and/or vomiting
  - Cool, pale, moist skin
  - Weak or irregular pulse
  - Breathing difficulty
  - Light headedness

The characteristics of the victim with cardiac arrest

- unresponsive
- either without breathing activity or with extremely abnormal breathing.
- Absent carotid pulse

Cardiopulmonary Resuscitation (CPR)

- oxygenating and circulating blood until defibrillation and advanced cardiac life support can be provided.
- Consists of three important skills
  - Providing artificial circulation via chest compressions
  - Opening and maintaining the airway
  - Providing artificial ventilation through rescue breathing
- Defibrillation is the application of electricity to the chest of victim whose heart has stopped.

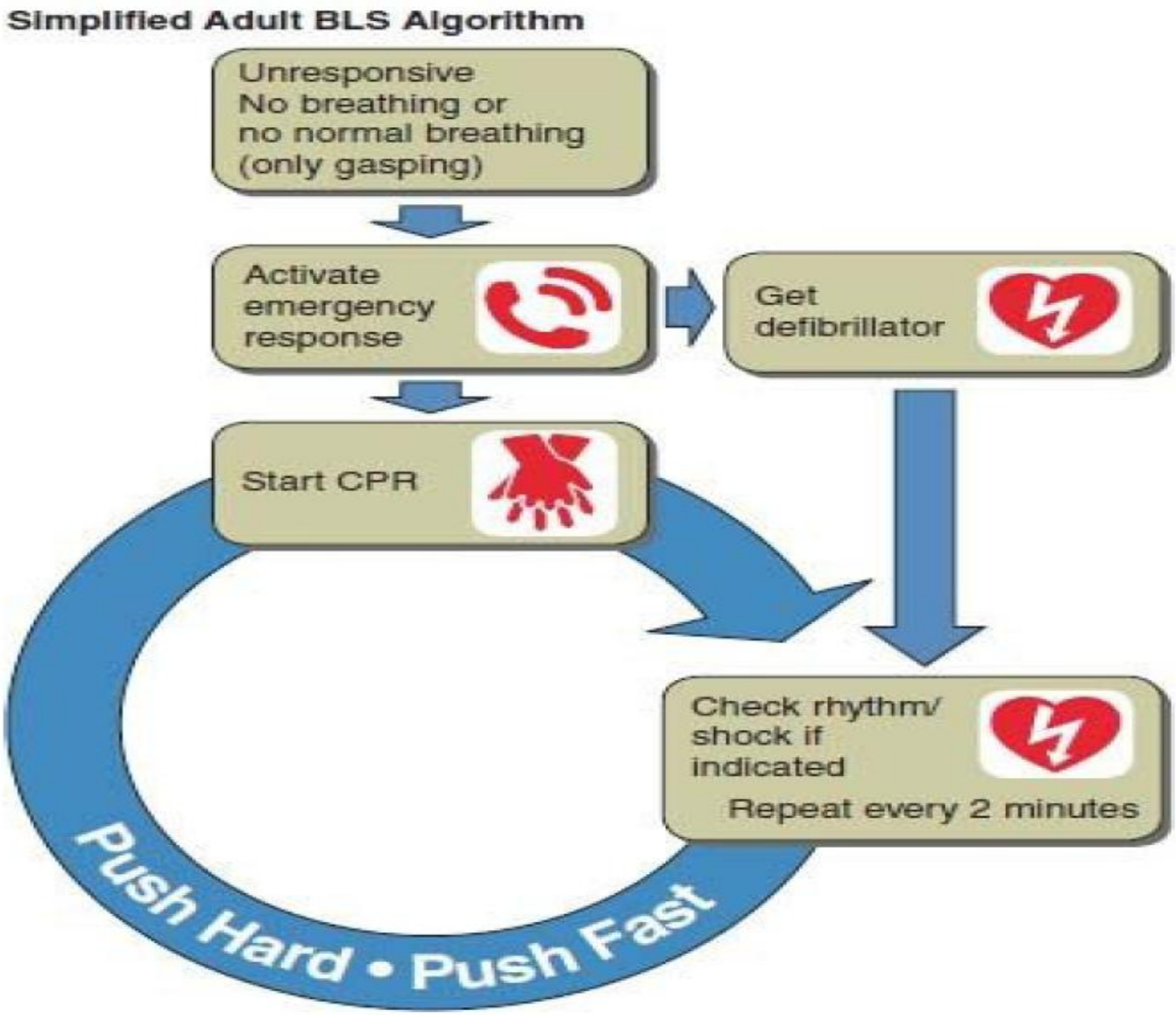
- The keys to survival of a cardiac arrest victim are:

- Immediate recognition of cardiac arrest with early summoning of EMS
- Early CPR with emphasis on quality chest compressions
- Rapid defibrillation
- Effective advanced life support care
- Integrated post—cardiac arrest care

Defibrillation

- When the heart stops, normal efficient heartbeats are replaced by electrical impulses that are chaotic, disorganized,
- result in tremors within the heart.
- These tremors are ineffective at creating any kind of cardiac output, so the pulse ceases.
- Defibrillation, by literally shocking the heart, can eliminate the disorganized electrical activity and promote the resumption of a normally contracting and beating heart.

Basic Life Support (BLS) Sequence



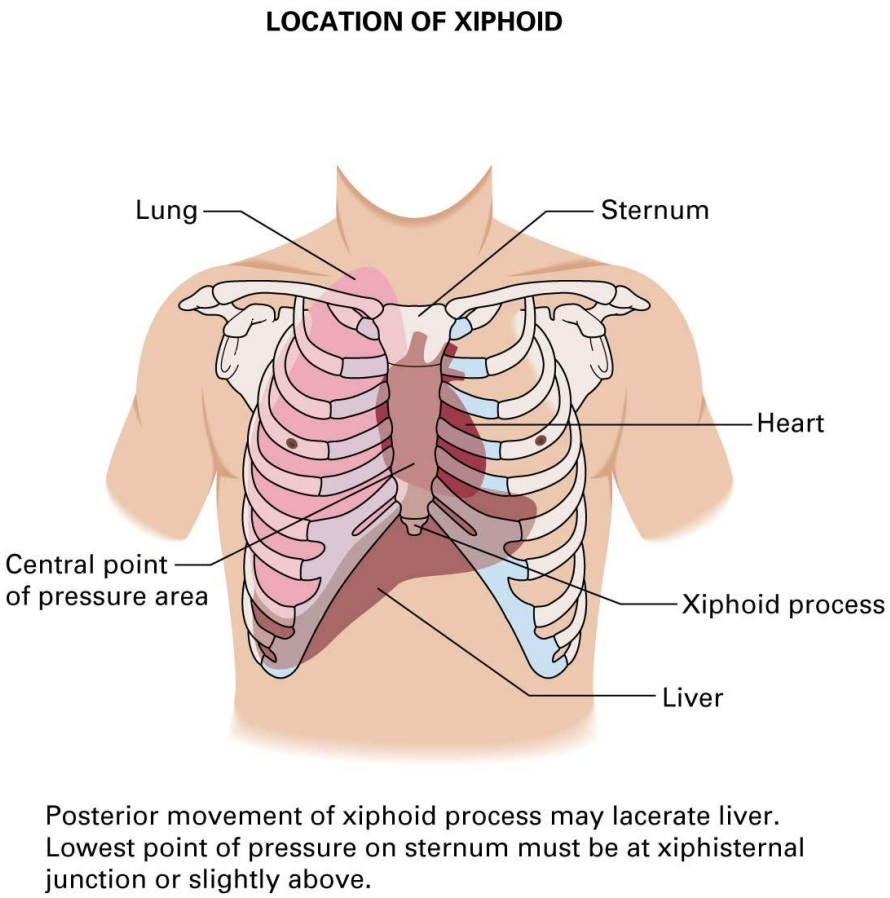
Basic Life Support (BLS) Sequence

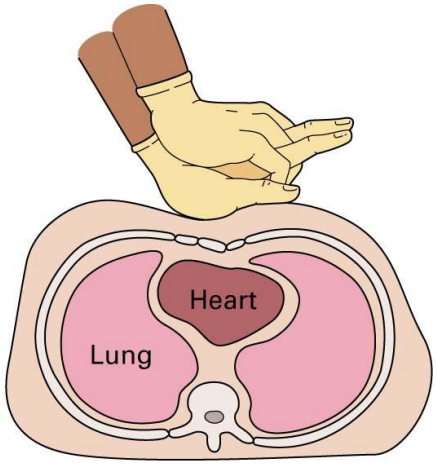
- The major steps in the BLS sequence are
  - Determine responsiveness and breathing.
  - Activate the EMS system and retrieve AED (automated external defibrillator) if needed.
  - Perform two minutes of CPR.
  - Utilize the AED if available and appropriate.
  - Resume chest compressions for another two minutes after AED use.

Chest Compressions

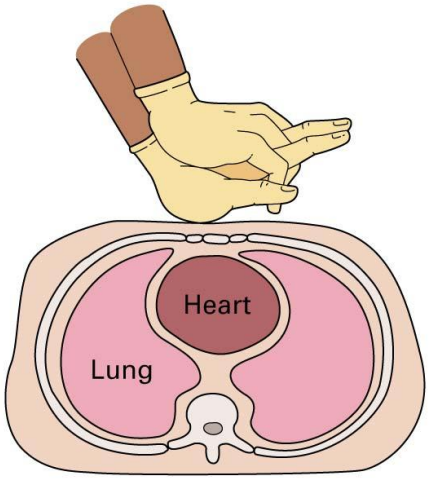
- If a victim's heart is not beating, deliver chest compressions to keep them alive.
- Chest compressions work on two principles
  - Increase chest cavity pressure, causing the heart to pump
  - Provide direct compression to the heart itself

Chest Compressions: Hand Positions





COMPRESSION



RELEASE

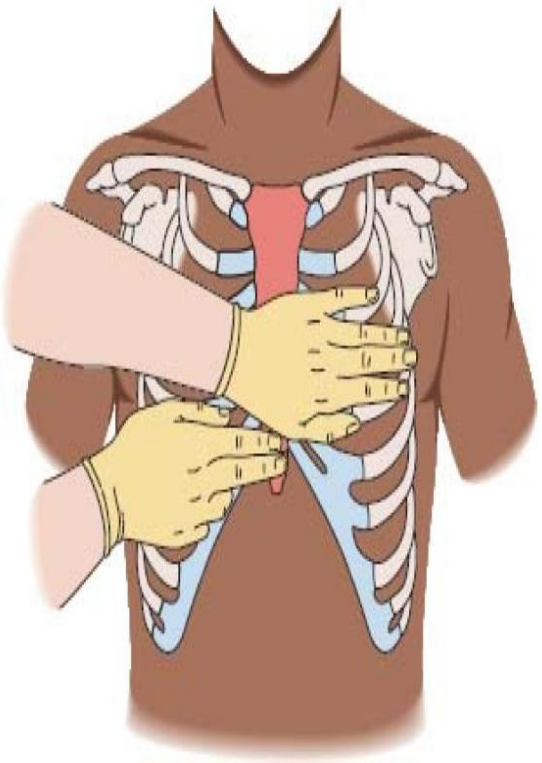


FIGURE 5.15 Place two fingers over the xiphoid process, and use this as a guide to properly place the heel of the other hand over the sternum.

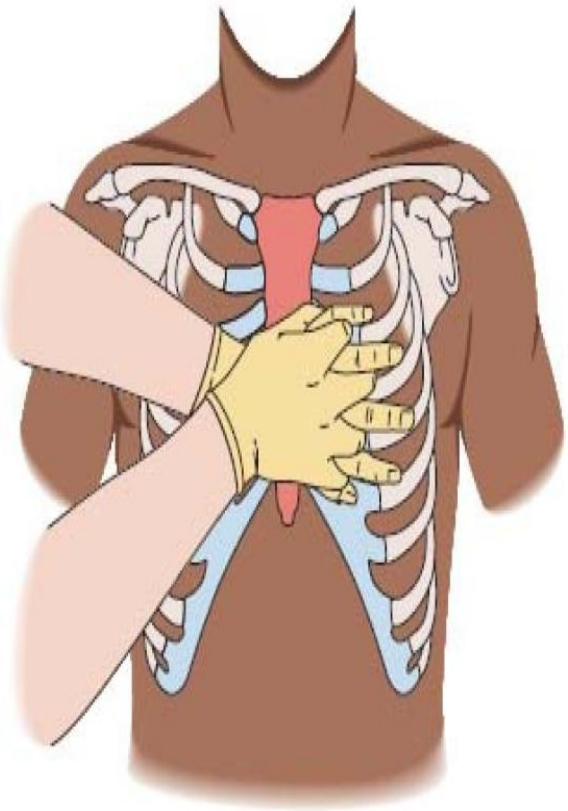


FIGURE 5.16 Interlace fingers, position your shoulders directly over your hands, and push downward on the sternum at least 2 inches deep.

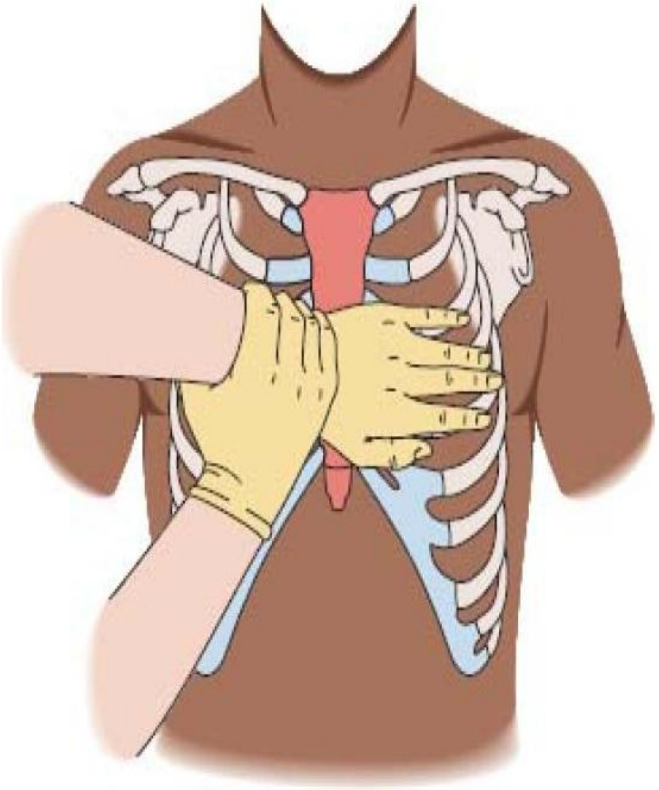


FIGURE 5.17 Alternative hand placement for CPR.

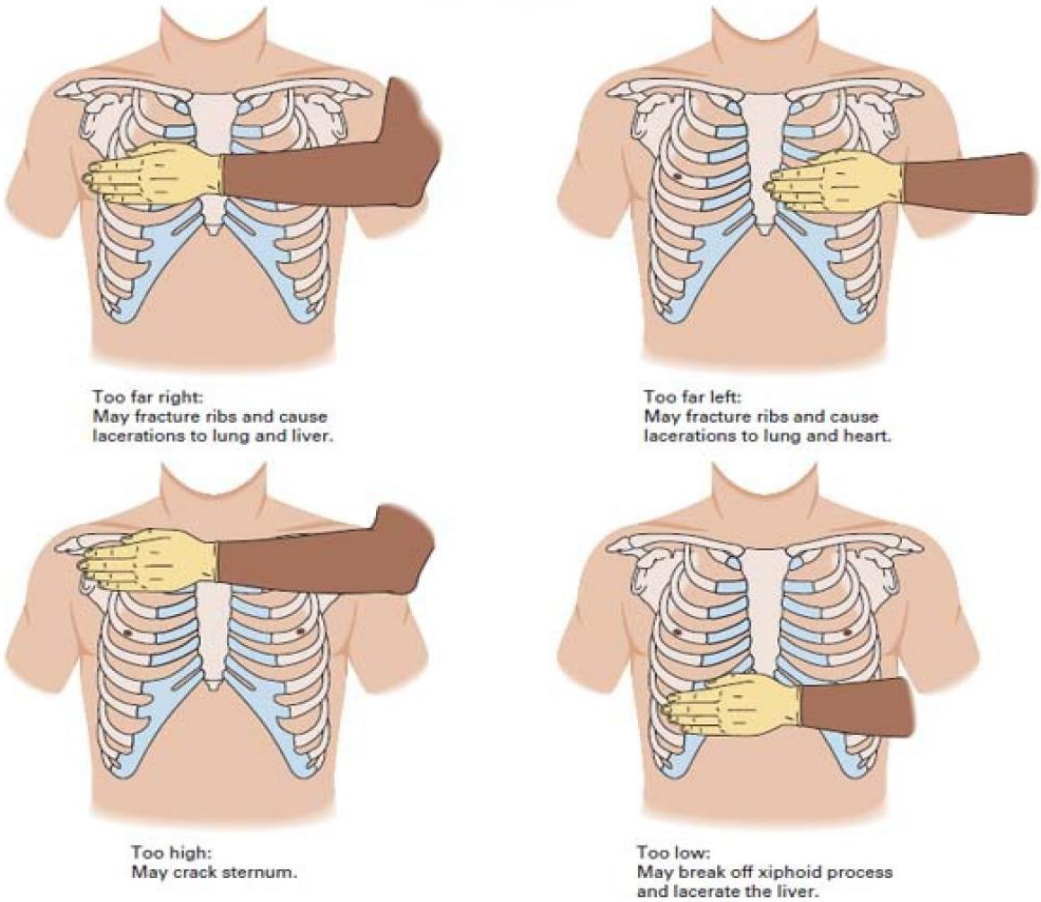
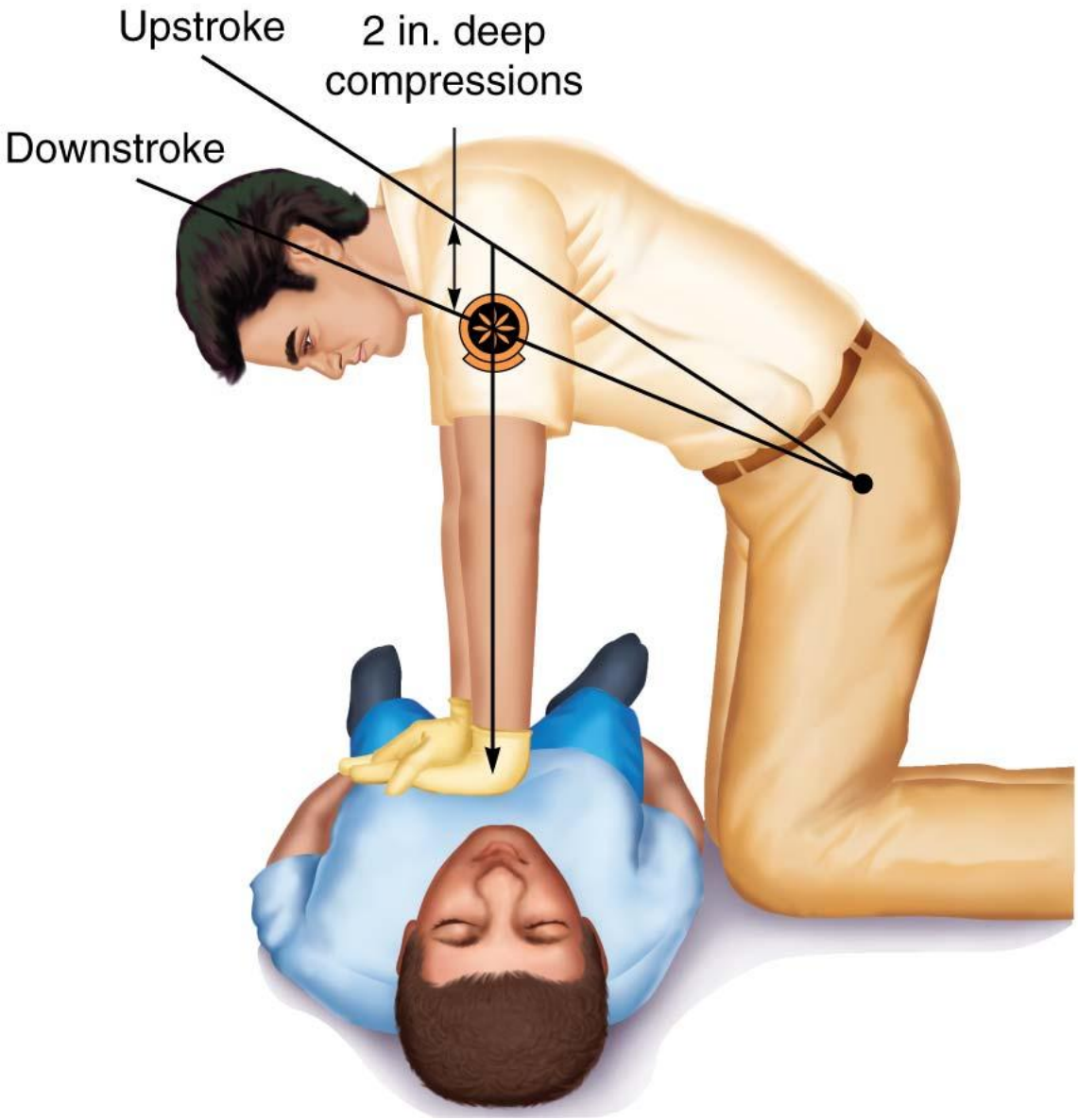


FIGURE 5.14 Improper positioning of the hands during CPR can damage the rib cage and underlying organs.

CPR Guidelines

- 2010 Chest Compression Guidelines for Adults
  - Compressions should be fast and deep
  - Rate of at least 100 per minute
  - Depth should be at least 2 inches

CPR Chest Compressions for Adults



To perform CPR, follow these steps:

1. Position your hands properly on the victim’s chest.

2. Deliver two minutes of constant chest compressions

3. After delivering two minutes of CPR:

- check for circulation and apply AED

4. Position your hands on the victim’s chest again, and deliver another two minutes of compressions

- 5. Repeat this cycle,

Terminating CPR

- Perform compressions until victim is breathing and has a pulse, or until
  - Breathing/heart rate resume spontaneously
  - Another trained professional assumes BLS
  - A physician instructs you to stop
  - Victim is taken to a medical facility
  - You are exhausted and unable to continue
  - Conditions make it unsafe to continue
  - Victim is declared dead by a physician

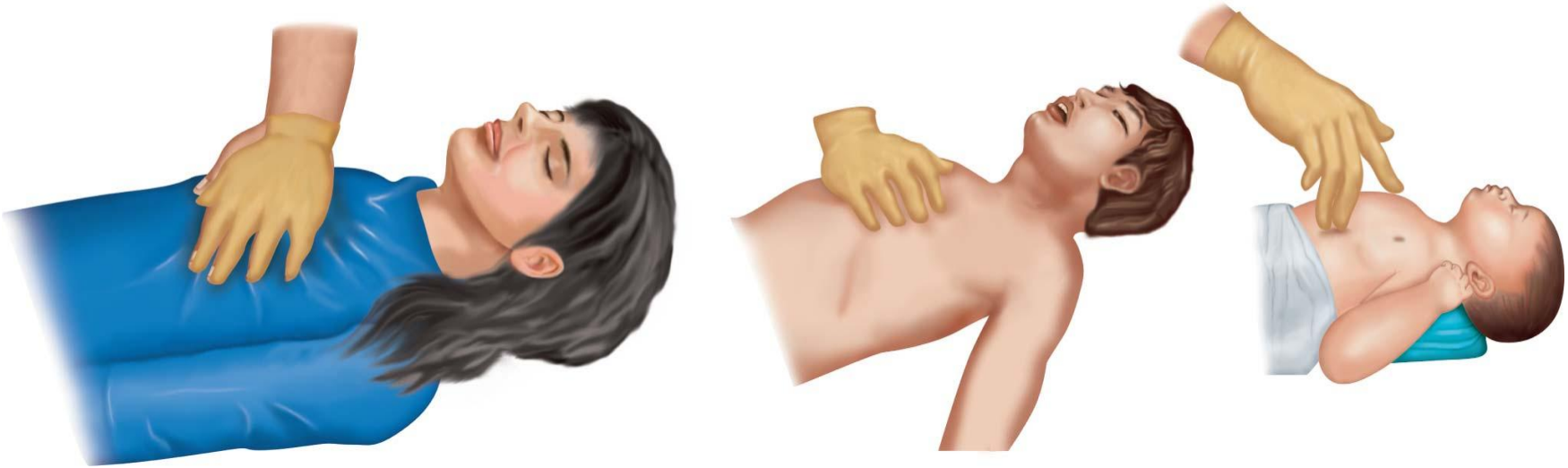
In an infant or child, unresponsiveness is characterized by the following signs and symptoms:

- Gasping, absent, irregular, or slow breathing
- No brachial or carotid pulse (assessed by health care providers only)
- No chest movements Blue or pale skin
- No response to gentle tapping (tap, but never shake, an infant)

CPR for Infants and Children

- Perform CPR for two minutes before activating EMS.
- Place fingers of one hand in center of infant's chest, just below nipples.
- Place other hand on infant's forehead or under shoulders.
- Depress the sternum at least 1/3 the depth of the chest.
- Deliver at least 100 compressions per minute.

CPR Techniques for Adults, Children, and Infants



CPR Complications

- Even when performed properly, CPR may cause complications such as
  - Fracture of ribs or sternum
  - Separation of rib cartilage
  - Pneumothorax
  - Hemothroax
  - Bruising of the lung
  - Lacerations of the liver
- Even with these risks, effective CPR is necessary; the alternative may be death.

The most common ventilation mistakes are:

- Failing to tip the head back far enough in adults
- Failing to maintain an adequate head tilt
- Failing to maintain an adequate seal over the mouth and/or nose, letting air escape
- Not giving slow, full breaths
- Failing to watch and listen for exhalation

Common chest compression mistakes are:

- Bending the elbows
- Not having the shoulders directly over the hands Placing the hands on the victim’s chest improperly
- Letting the fingers touch the victim’s chest during compressions
- Not compressing fast enough Not compressing deep enough
- Jerky rather than smooth compressions
- Lifting or moving the hands between compressions

Withholding CPR

- As a First Aider, you're legally required to perform CPR on any victim who needs it, unless a legal or medical reason exists, such as
  - Rigor mortis or other signs of death appear
  - Victim is decapitated
  - Victim has obviously fatal wounds

Defibrillation

- The application of electricity to the chest of a victim whose heart has stopped
- Performed by an automated external defibrillator (AED)
- One of the most important interventions for cardiac arrest
- Often performed in public places and/or by people with no formal training
- AED functioning can vary; follow the specific instructions posted on each defibrillator.

Using an AED

Two EMTs using an AED with a victim. When an AED is analyzing the victim's data, no one should touch the victim.

Summary

- CPR consists of chest compressions and possibly artificial ventilations if the rescuer is trained and equipped.
- The main purpose of CPR is to circulate the blood of a cardiac arrest victim (keep them alive) until more advanced care is secured.
- Defibrillation is the most effective method of restoring a heartbeat to a pulseless victim.
- CPR techniques should be modified to fit the unique needs of infants and small children.