Foundation Skills

**LEARNING OBJECTIVES**
- Spell and define the key terms.
- Describe the elements of basic health assessment.
- Identify normal and abnormal vital sign values.
- Describe the importance of the values for normal vital signs.
- Perform basic mathematical skills related to health care.
- Use basic medical terminology and abbreviations.
- Identify risk factors for cardiac arrest.

**KEY TERMS**
- Apical (AP-i-kul) Pertaining to the apex or pointed end of the heart
- Auscultation (as-kuh-tyuh-shuhn) Act of listening for sounds within the body
- Blood pressure (blud presh-er) Pressure of circulating blood against the walls of the arteries
- Cardiac arrest (KAHR-dee-uhk uh-REST) Sudden stopping of heart action
- Diastolic (dee-uh-STAHL-ik) Blood pressure during ventricular relaxation
- Integer (IN-teh-jer) Whole number, positive or negative, and zero
- Palpation (pal-PAY-shuhn) Technique used to feel the texture, size, consistency, and location of parts of the body with the hands
- Percussion (per-KUSH-en) Technique of tapping with the fingertips to evaluate size, borders, and consistency of internal structures of the body
- Rational (RAHSH-uh-nal) Number that can be shown as an integer or fraction
- Systolic (sis-TOL-ik) Blood pressure during ventricular contraction
- Vital (VIH-tul) Necessary to life
Health Assessment

Patient Interview and Examination

The basic health assessment may include an interview and physical examination to determine functional, cultural, spiritual, and physical characteristics (Table 7-1). Basic health assessment may be the responsibility of many health care workers and is an ongoing process. The type and extent of assessment are determined by the role of the worker and the type of care being given. Some health care workers, such as the nurse assistant and licensed practical nurse, may collect data that will be analyzed and evaluated by another health care worker, such as the registered nurse.

The initial patient interview may include the health history, nature of the current complaint, and medication record. The medical or health history gathers subjective information about the patient’s health. The physical assessment uses techniques of inspection, auscultation, palpation, percussion, and smell (Table 7-2). Visual observations are used for inspection. Auscultation means listening to sounds, often with a stethoscope (Fig. 7-1). Palpation is using the hands to observe structures by touch (Fig. 7-2). Percussion is striking the body to assess the sound made (Fig. 7-3). The patient is positioned according to physician orders and for comfort during assessment (Fig. 7-4). Information that is gathered during the initial or admission health assessment is used to develop a nursing care plan (see Fig. 1C-3 in Appendix II on pp. 587–588). (See Skill List 7-1, Admitting, Transferring, and Discharging the Patient; and Skill List 7-2, Recording Observations, pp. 125–126).

CASE STUDY 7-1 While giving daily care to a patient, you notice the odor of alcohol from the patient’s mouth. What should you do?

Answers to Case Studies are available on the Evolve website: http://evolve.elsevier.com/Gerdin

Vital Signs

Vital signs or life signs are values that can be used to measure changes in body function, general health, and the response to treatment. Vital signs include blood pressure (BP) and temperature, pulse, and respiration (TPR). The value of vital signs is affected by many factors, including age, activity, nutrition, emotions, fitness, medication, and illness. Height (ht), weight (wt), and fluid balance or intake and output (I&O) also may be used to assess the patient.

Vital signs are ordered with different frequency depending on the type of service being provided. Common orders for assessment include twice a day (bid), three times a day (tid), four times a day (q4d), or routinely once a day (qd). Vital signs may be ordered at regular intervals such as every 4 hours (q4h) or every 15 minutes (q15m).

CASE STUDY 7-2 You notice a patient is scratching her arm repeatedly while you complete daily care. What should you do?

Answers to Case Studies are available on the Evolve website: http://evolve.elsevier.com/Gerdin

Blood Pressure

Blood pressure (BP) is a measurement of the force of the blood against the walls of the arteries as it circulates through the body. It reflects the effort the heart exerts to circulate the blood to the tissues. Two units or values for BP are measured: the maximum pressure at which the pulse can be heard (systolic) and the minimum pressure at which it is audible (diastolic). The systolic reading occurs while the ventricles of the heart are contracting. The diastolic reading occurs during relaxation of the ventricles. Instruments that

TABLE 7-2

Characteristic Odors*

<table>
<thead>
<tr>
<th>Area</th>
<th>Smell</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouth</td>
<td>Alcohol</td>
<td>Drinking alcohol</td>
</tr>
<tr>
<td></td>
<td>Bad breath (halitosis)</td>
<td>Poor dental hygiene, gum disease</td>
</tr>
<tr>
<td></td>
<td>Fruity, sweet</td>
<td>Diabetes acidosis, medication</td>
</tr>
<tr>
<td></td>
<td>Feces</td>
<td>Intestinal obstruction</td>
</tr>
<tr>
<td></td>
<td>Acid breath</td>
<td>Peptic ulcer</td>
</tr>
<tr>
<td></td>
<td>Rotten eggs, garlic</td>
<td>Cirrhosis, medication</td>
</tr>
<tr>
<td></td>
<td>Ammonia</td>
<td>Kidney failure</td>
</tr>
<tr>
<td></td>
<td>Feces</td>
<td>Incontinence</td>
</tr>
<tr>
<td></td>
<td>Foul, body odor</td>
<td>Poor hygiene, excessive sweating</td>
</tr>
<tr>
<td></td>
<td>Stale urine</td>
<td>Uremic acidosis</td>
</tr>
<tr>
<td></td>
<td>Musty</td>
<td>Infection</td>
</tr>
<tr>
<td></td>
<td>Sweet, feld</td>
<td>Bacterial infection (pseudomonas)</td>
</tr>
<tr>
<td></td>
<td>Ammonia</td>
<td>Urinary tract infection</td>
</tr>
<tr>
<td></td>
<td>Foul</td>
<td>Urinary tract infection</td>
</tr>
<tr>
<td></td>
<td>Feces</td>
<td>Bowel obstruction</td>
</tr>
<tr>
<td></td>
<td>Feces</td>
<td>Abscess</td>
</tr>
<tr>
<td></td>
<td>Sweet, heavy</td>
<td>Bacterial infection (pseudomonas)</td>
</tr>
</tbody>
</table>

*Oder may also be due to food eaten, medication, and hygiene practices.

FIGURE 7-1 Students use manikins to demonstrate assessment skills during Health Occupations Students of America (HOSPA) competition. (Photo courtesy National HOSA, Flower Mound, Tex.)

FIGURE 7-2 Touch or palpation is used during the health assessment. (From Bonnett-West K, Hunt S, Aplegate E: Today's medical assistant: clinical & administrative procedures. St. Louis, 2008, Saunders.)
are used to determine the blood pressure are the stethoscope and sphygmomanometer (Fig. 7-5). The stethoscope amplifies the sound. The sphygmomanometer is an inflatable cuff that uses air (aneroid) or a liquid to measure pressure. Automated cuffs may be used to measure BP using the radial artery of the wrist (Fig. 7-6). Mercury is no longer used in thermometers because of its environmental and safety risks, but sphygmomanometers containing mercury are still in use.

Blood pressure varies greatly among people. It is affected by the diameter and flexibility (elasticity) of the blood vessels, force of the heart contraction, and amount of blood in the vessels. Pressure on the area of the brain that controls BP can also change its value. Limits of the usual blood pressure for most individuals have been set. "Normal" blood pressure is commonly said to be 120/80 (systolic/diastolic) (Box 7-1). The range of BP is acceptable with a systolic pressure less than 119 and a diastolic pressure less than 80. (See Skill List 7-3, Taking a Blood Pressure, pp. 126–127).

**Recommended Blood Pressure Levels**

- Normal value 119/79 or below
- Prehypertension 120-139/80-89
- High 140/90 or above


**BRAIN BYTE**

According to the CDC, about a fifth of the people with high blood pressure do not know it.

**CASE STUDY 7-3** You are taking vital signs on patients during morning rounds. You assess a blood pressure of 184/144 for one patient. What should you do?

Answers to Case Studies are available on the Evolve website: http://evolve.elsevier.com/Gerin

**Temperature**

Temperature is the measurement of the balance between the heat produced and lost by the body. Several methods are used to measure temperature. They include the mouth (oral), axillar (axillary), rectum (rectal), ear (temporal), and by infrared radiation (Fig. 7-7). Temperature may be measured with the Fahrenheit or Celsius (Centigrade) scale. The normal reading for temperature depends on the location used to assess it (Table 7-3). An elevation of temperature (fever) may indicate infection or inflammation in the body. Several types of thermometers are available for measuring temperature. The most common type is made of glass with an expandable liquid filling. Glass thermometers are designed differently for oral or rectal use. The bulb of the rectal thermometer is rounded to prevent injury to the tissues of the rectum. The tip of the stem of the rectal thermometer is red, and that of the oral thermometer is blue or silver for easy identification (Fig. 7-8). Rectal thermometers should never be used in the mouth. Mercury thermometers are not commonly used because of environmental and health hazards resulting from the possibility of spilling mercury. Electronic and disposable chemical thermometers are used. (See Skill List
TABLE 7-3
Temperature

<table>
<thead>
<tr>
<th>Method</th>
<th>Time</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>3 min*</td>
<td>97.6°-99.0°F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(96.8°-F = 37.0°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(95.6°-98.0°F)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(97.6° F = 36.4°C)</td>
</tr>
<tr>
<td>Axillary</td>
<td>10 min*</td>
<td>98.6°-100.0°F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(99.6° F = 37.5°C)</td>
</tr>
<tr>
<td>Rectal</td>
<td>3-5 min*</td>
<td>98.4°-100.4°F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(96.4° F = 36.9°C)</td>
</tr>
<tr>
<td>Temporal</td>
<td>*</td>
<td>98.4°-100.4°F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(96.4° F = 36.4°C)</td>
</tr>
<tr>
<td>Infrared</td>
<td>*</td>
<td>97.6°-99.0°F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(96.8° F = 37.0°C)</td>
</tr>
</tbody>
</table>

*Time required to take temperatures may vary with the electrical instruments and is usually signaled by a sound from the device.

7-4, Taking an Oral Temperature; Skill List 7-5, Taking an Axillary Temperature; Skill List 7-6, Taking a Rectal Temperature; and Skill List 7-7, Taking an Infrared Temperature, pp. 127-130.

Pulse and Respiration

Pulse is the heartbeat that can be felt (palpated) on surface arteries as the artery walls expand. The pulse rate is usually counted using the radial artery near the wrist, but it may be found in other locations (Fig. 7-9).

The rate of the heartbeat must be adequate to supply blood and its nutrients to all parts of the body. The pulse of an infant is significantly faster than that of an adult (Table 7-4). The normal adult pulse rate can range between 60 and 100 beats per minute. In addition to the rate, it is important to assess the rhythm and character of the pulse. A regular rhythm is evenly paced. An irregular pulse may be fast or slow or may skip beats. Character, describing the force of the pulse, may be strong, weak, bounding, thready, feeble, or fleeting. (See Skill List 7-8, Taking a Radial Pulse and Measuring Respiration, p. 130).

The pulse can be counted by listening to the heart through a stethoscope placed on the chest. This pulse is called an apical pulse (Fig. 7-10). The apical pulse may differ from the radial pulse in some conditions that affect the peripheral blood flow. (See Skill List 7-8, Taking a Radial Pulse and Measuring Respiration, p. 130).

One respiration includes the inspiration and expiration of a breath. The normal rate for respiration is more rapid in infants than adults (Box 7-2). The rhythm and character of respiration are important

Height and Weight

Health professionals use charts that are developed by insurance companies to determine healthy weight (Fig. 7-11). The insurance companies determine at which weight for a specific height an individual is

FIGURE 7-7 A, A tympanic thermometer may be used to assess temperature. B, Temperature strips may be used for young children. C, Infrared thermometers measure temperature without touching the patient.

FIGURE 7-8 A, During the assessment of an oral temperature, the mouth should remain closed. B, Privacy is a primary consideration during assessment of the rectal temperature.

Observations. The rhythm of respiration describes its regularity. Character describes the depth and quality of the sound. Respirations that are difficult to see may be assessed by feeling the rise (expansion) and fall (contraction) of the chest or by using the stethoscope to listen for the respiratory or breath sounds.
Pulse and respiration are assessed at the same time. (Figure 7.9)

### TABLE 7-4
Pulse Ranges by Age Group

<table>
<thead>
<tr>
<th>Age</th>
<th>Normal Pulse Rates (Beats/Min)</th>
<th>Abnormal Pulse Rates (Beats/Min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn</td>
<td>70-170</td>
<td>&lt;60 (bradycardia)</td>
</tr>
<tr>
<td>Infant</td>
<td>80-130</td>
<td>&gt;100 (tachycardia)</td>
</tr>
<tr>
<td>School age</td>
<td>70-110</td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>60-100</td>
<td></td>
</tr>
</tbody>
</table>

Taking an apical and radial pulse at the same time may be necessary with some circulatory disorders. (Figure 7.10)

### BOX 7-2
Respiration in Adults
- Rate per minute: 14-20
- Rhythm: Regular
- Character: Effortless, deep, quiet

Abnormal parameters:
- Tachypnea >24
- Bradypnea <10
- Shallow
- Stertorous (snoring)
- Apneia
- Cheyne-Stokes

### BOX 7-3
Body Mass Index Formula

Weight (lb)/height (in)² × 703

Information Exchange

Basic Math

Many of the procedures performed by the health care worker include mathematics. For example, the conversion of medication dosages to calculate the correct dosage may be one of the responsibilities of the

CASE STUDY 7-4 You are asked to take a patient's vital signs. When you enter the room, the patient is eating breakfast. What should you do?

Answers to Case Studies are available on the Evolve website: http://evolve.elsevier.com/Geradin

A height and weight chart including body mass index. (Figure 7.11)

A weight scale being used to measure weight. (Figure 7.12)
BOX 7.4

**Metric Conversion Using Ratios**

1. A tablet is marked as "5 gr of medication." The order is to give 15 gr. How many tablets are given?

   
   **Step 1:**
   
   5 gr
   --------
   1 tab
   15 gr
   ---------
   7 tab

   **Step 2:** Multiply each fraction by 7 tab
   
   5 gr x 7 = 15 gr
   ---------
   7 tab

   **Step 3:** Divide each fraction by 5 gr
   
   ? = 3

   The dose would be 3 tablets. (Note that the units "gr" and "tab" cancel.)

2. A patient’s temperature is read as 36° C. The patient asks whether the temperature is high. What should the health care worker tell the patient?

   **Step 1:** Substitute the known value (36° C) in the formula for temperature conversion.

   
   F = (9/5)(36) + 32

   **Step 2:** Complete multiplication and division functions before addition and subtraction unless the addition or subtraction is in parentheses.

   (9 x 36) / 5 = 64.8

   **Step 3:** Complete addition after multiplication and division functions are completed.

   F = 64.8 + 32 = 96.8

   The health care worker should assure the patient that the temperature is within normal limits.

3. If a patient is to be assisted to walk old (four times a day) and the health care worker does not want to wake the patient during the night, when could the patient be assisted to walk?

   **Step 1:** 24 hours per day – 8 hours per night = 16 hours

   **Step 2:** Reduce the fraction.

   16 hours : 4 hours = 4 walks : 1 walk

   The patient would be walked every 4 hours during the day.

4. The health care worker tells the patient that he is 5 feet 9 inches tall. The patient says he is from another country and would like to know the metric value.

   **Step 1:** 5 feet x 12 inches/foot = 60 inches

   **Step 2:** 60 inches + 9 inches = 69 inches

   **Step 3:** Cross-multiply

   69 inches : 1 inch

   7 cm : 2.54 cm

   **Step 4:** 69 inches x 2.54 cm = 175.26 cm

5. The health care worker tells the patient that he weighs 160 lb. The patient says he is from another country and would like to know the metric value.

   **Step 1:** Cross-multiply

   160 lbs : 1 lb

   7 kg : 0.45 kg

   **Step 2:** 160 x 0.45 = 72 kg

Addition and subtraction are methods for counting, resulting in a sum or difference between amounts. Multiplication and division perform addition and subtraction more quickly and result in a product or quotient. A fraction is a comparison of part of a whole to the entire unit. For example, 1/2 indicates that the quantity being considered is 1 of 2 equal parts of the whole. Fractions may be "reduced" by dividing the top number (numerator) and bottom number (denominator) by the same number. For example, 1/2 is equal to 1/2. In health care, fractions or ratios often are used to calculate medications, determine temperature, or determine a schedule for the patient’s care (Box 7.4).

---

**TABLE 7.5**

**Liquid and Solid Systems of Measurement**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Apothecary</th>
<th>Household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.06 ml</td>
<td>1 minim (min)</td>
<td>1 drop (gtt)</td>
</tr>
<tr>
<td>5 ml</td>
<td>1 fluid dram</td>
<td>1 teaspoon (tsp)</td>
</tr>
<tr>
<td>15 ml</td>
<td>3 fluid dram</td>
<td>1 tablespoon (tbs)</td>
</tr>
<tr>
<td>30 ml</td>
<td>1 fluid ounce</td>
<td>2 lbs</td>
</tr>
<tr>
<td></td>
<td>(fl oz)</td>
<td></td>
</tr>
<tr>
<td>240 ml</td>
<td>8 fl oz</td>
<td>1 glass or cup</td>
</tr>
<tr>
<td>473 ml</td>
<td>16 fl oz</td>
<td>1 pint (pt)</td>
</tr>
<tr>
<td>1 liter (L)</td>
<td>32 fl oz</td>
<td>1 quart (qt)</td>
</tr>
<tr>
<td></td>
<td>15 grains (gr)</td>
<td>15.4 grains (gr)</td>
</tr>
</tbody>
</table>

**Solid Measurement**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Apothecary</th>
<th>Household</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 gram (g)</td>
<td>480 gr</td>
<td>1 ounce (oz)</td>
</tr>
<tr>
<td>31 g</td>
<td>1 ounce (oz)</td>
<td>437.5 gr</td>
</tr>
<tr>
<td>373 g</td>
<td>1 pound (lb)</td>
<td>0.75 pounds (lb)</td>
</tr>
<tr>
<td>454 g</td>
<td>1.33 lbs</td>
<td>1 lb</td>
</tr>
<tr>
<td>(0.454 kg)</td>
<td></td>
<td>2.2 lbs</td>
</tr>
<tr>
<td>1 kg</td>
<td>2.7 lbs</td>
<td></td>
</tr>
</tbody>
</table>

**Distance Measurement**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Apothecary</th>
<th>Household</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 meter (m)</td>
<td>39.37 inches (in)</td>
<td></td>
</tr>
<tr>
<td>2.54</td>
<td>1 in</td>
<td></td>
</tr>
<tr>
<td>centimeter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 cm</td>
<td>0.394 in</td>
<td></td>
</tr>
</tbody>
</table>

**Military Time**

Some countries, the military, and the health care industry use a 24-hour system to measure time. In this system the hours are numbered from 0 to 24, with noon being 12:00 (Fig. 7-13). Using the morning (AM) and evening (PM) designation is unnecessary because there are no times with the same number. For example, 15:00 is the same as 3:00 PM. The use of a 24-hour time system in health care eliminates many chances for error in treatment.

**Graphing**

Graphs may be used to interpret data visually. Four types of graphs are the bar graph, pie chart, pictograph, and line graph (Fig. 7-14). The line graph is commonly used to chart vital signs in health care. To read a graph, it must first be analyzed. The title tells what information is being depicted in the graph. The value or scale of each of the measurements is shown on the vertical and horizontal axes of the graph. (See Skill List 7-9, Constructing a Line Graph, pp. 130-131.)

**Computer Literacy**

Computers are electronic equipment that store, manipulate, and retrieve information according to a program (software). The software may allow the computer user to create a document of words, change images, play a game, and use many other applications. Some special applications are designed to input and retrieve information that is used in health care. The program is placed or loaded into the working space (memory) of the equipment. Computer hardware is the physical equipment including the keyboard, central processing unit, viewing screen (monitor), disk drive, and disks. Different operating systems in computers interpret and display the data. They are some variation of Microsoft's Windows Apple's Mac, or Unix/Linux.

The computer may have two types of memory available to store information: (data) read only memory (ROM) and random access memory (RAM). Magnetic recording devices include internal or external disks. Internal disks are called the hard drive. External devices can be used to store information outside of the computer and include USB (thumb drives), CDs, and other drives. When connected to a printer, computers can output paper files. The
A combination of the hardware and software is generally referred to as the computer system. Keyboarding is the set of skills one needs to use a computer effectively. Improper technique in using the computer can lead to mistakes and repetitive strain injury (RSI) and eyestrain. Many different methods are available for learning keyboarding skills. Some keyboards are designed for teaching, such as those with color-coded keys. Free and commercial software is available to help learn the placement of the keys and improve typing speed and accuracy.

Computers are used in all aspects of health care. Laboratory tests and respiratory ventilators are run by computerized equipment. Magnetic resonance imaging (MRI) and heart monitoring equipment are computer driven. Information about patient services and charges for services are maintained on computer systems in most facilities. The health care worker must be able to enter and retrieve data from the computer to provide efficient care. Although each computer system has its own specifications for use, some basic rules apply to all units and programs (Box 7-5).

Personal digital assistants (PDAs) are handheld or mobile computers. They are increasingly being used in health care to record patient care and vital signs (Box 7-6). They can be used to conduct medical information or drug interactions. Benefits of PDA use include faster access to information and fewer billing errors. They also reduce the number of prescription errors caused by handwriting confusion. Often the information on a PDA is transmitted or "beamed" to another device, such as a printer, wirelessly (Fig. 7-15). PDAs must meet HIPAA guidelines for privacy. They also must be guarded against unauthorized use (password protection). (See Skill List 7-10, Using the Computer, p. 131.)

Medial Terminology

Medical terminology as it is used today dates to 300 B.C., in the writings of Hippocrates and Aristotle. The vocabulary is based on Latin and Greek roots for common words. Medical terminology allows health care workers to communicate in a precise and clear manner, so accurate pronunciation and correct spelling are important.

At first, medical terminology appears difficult and confusing. However, each word can be divided into parts that are reused to form new terms. The parts are word roots and combining vowels, prefixes, and suffixes. The root is the central part and determines the main meaning. The root is usually modified by a prefix or suffix to make it more specific. The prefix is the first part, and the suffix is the last part. Not all medical terms have all three parts. Using a combining vowel between the parts of the term may be necessary for easier pronunciation. By memorizing the parts, many word combinations can be formed (Fig. 7-16). For example, the word root for "joint" is arthro-. Combined with the suffix that means "plastic reconstruction," it becomes arthroplasty. It could be combined with "tomy" to make the term arthrotomy, which is an incision into the joint. The word root for "abdomen" is laparo-, so a laparotomy is an incision into the abdomen. A rhinoplasty is a plastic reconstruction of
Nephrectomy + Removal of the kidney

**FIGURE 7.16** Nephrectomy means removal of the kidney.

...the nurse. Therefore, *rhino* must be the word root for “nose.”

Abbreviations and symbols are used by health care workers to save time in conveying information. Some abbreviations are considered standard and are used in all areas of care. Others may be used in only one facility, and they may cause confusion. Abbreviations are learned most easily by use. They may be divided into categories for easier reference. Some categories of abbreviations that may be used include the following:

- **Treatments and tests**
- **Conditions and diagnoses**
- **Titles (associations and personnel)**

Common word roots, prefixes, suffixes, abbreviations, and symbols used in health care are found in Appendix I of the textbook.

Most of the communication among health care professionals involves the use of medical terminology. To provide safe and accurate care to the patient, all health care workers must have knowledge of the basic terms of anatomy and physiology and of tests and treatments.

Knowing the type of care or precautions that are necessary when a specific test or treatment is ordered by a physician may also be necessary. Some diagnostic tests require special diets or physical preparations before the test can be performed. For example, a barium enema (BE) allows the health care provider to view the large intestine, and the patient must have nothing to eat or drink (NPO) for several hours before the test.

**Physician Orders**

Most descriptions of the care that is to be given are written by the physician. These directions for care are called the physician orders and are written in the chart. Some examples of physician orders follow:

- *ac & cl ½ hr ac and hs*  
  
  "Perform Acetaminophen once-every-four-hour for meals and at bedtime." The order probably would include directions for the administration of insulin (Iu), sugar or ketone is present in the urine test.

**BOX 7.7**

**Major Changes in Guidelines for CPR**

- **Airway-Breathing-Compressions (ABC) sequence changed to Compressions-Airway-Breathing (CAB)**
- **Emphasis is placed on effective chest compressions:**
  - Hard, fast (at least 100/min)
  - At least 100/min
  - Minimum interruption
- **Full chest recoil**
- **For untrained lay rescuers continue compressions only**
- **For trained health professionals, begin mouth to mouth after 30 compressions and continue sets of 30:2 ratio**
- **Automated external defibrillators (AEDs) may be used with infants**

The 2010 American Heart Association guidelines for CPR and emergency cardiovascular care replace the previous guidelines.

Cardiopulmonary Resuscitation; Skill List 7-12, Performing Forehead-Body Airway Obstruction, Rescue and Skill List 7-13, Hands-Only CPR, pp. 131-133.

**Cardiac Arrest**

More than 15 million people worldwide have learned how to perform CPR. CPR is a combination of mouth-to-mouth breathing and chest compressions that supply oxygenated blood to the brain (Fig. 7-17). CPR may be necessary when cardiac arrest, drowning, respiratory failure, electrical shock, head injury, or drug overdose occurs.

**Emergency First-Aid**

First-aid is the immediate care given to the victim of injury or sudden illness. The purpose of first aid is to sustain life and prevent death. It includes the prevention of permanent disability and the reduction of time necessary for recovery. First-aid provides basic life support and maintenance of vital functions.

Certification in first aid is awarded by several accredited agencies including the American Red Cross (ARC) and the American Heart Association. The ARC course includes basic first aid for injuries, illness, and CPR procedures. In 2008 the American Heart Association, which teaches only CPR procedures, added "hands-only" (chest compressions only) guidelines for use by untrained bystanders for adults with sudden cardiac arrest. In 2010 it revised all of the guidelines (Box 7.7). Chapter 32 provides more information about first aid. (See Skill List 7-11, Performing...)

**FIGURE 7.17** Students demonstrate the head-lift, chin-lift movement used in CPR. (Photo courtesy of National Health Occupations Students of America, Flower Mound, Tex.)

**BOX 7.8**

**Early Warning Signs of a Heart Attack**

- Anxiety
- Chest pain
- Dizziness
- Dyspnea (shortness of breath)
- Fatigue
- Indigestion
- Nausea
- Pale, clammy skin
- Perspiration
- Sensation of bowel movement

Cardiac arrest also may result from blockage of an artery that supplies the heart or from insufficient supply of oxygen to the heart tissue. Signs and symptoms of a heart attack vary greatly. There may be more than one symptom present or none at all (Box 7-8). Risk factors for cardiac arrest have been identified (Box 7-9). The presence of more than one factor multiplies the risk greatly. Some risk factors can be changed through a prudent lifestyle, which includes regular exercise and a low-fat diet. Other risk factors such as heredity, gender, and age cannot be changed.
3. Describe the risk factors for developing a heart attack that can be reduced by lifestyle changes.

4. Explain the meaning of each of the numbers in 6543.

5. Use Appendix I to complete each of the following phrases of medical terminology:

<table>
<thead>
<tr>
<th>Meaning</th>
<th>Root</th>
<th>Example</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdomen</td>
<td>Laparotomy</td>
<td>Tumor of the abdomen</td>
<td></td>
</tr>
<tr>
<td>Skull</td>
<td>Craniotomy</td>
<td>Tumor of the skull</td>
<td></td>
</tr>
<tr>
<td>Bladder</td>
<td>Cystoscopy</td>
<td>Tumor of the bladder</td>
<td></td>
</tr>
<tr>
<td>Tumor of the</td>
<td>Sun</td>
<td>Sun treatment</td>
<td></td>
</tr>
<tr>
<td>vertebra</td>
<td>Tumor of the vertebra</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pnea</td>
<td>Tachypnea</td>
<td>Tachypnea</td>
<td></td>
</tr>
<tr>
<td>pharyng</td>
<td>Pharyngitis</td>
<td>Pharyngitis</td>
<td></td>
</tr>
<tr>
<td>Tymanitis</td>
<td>Hydropophia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Use Fig. 7-14 to determine at what age girls and boys show the largest growth spurt.

7. Use Fig. 7-13 to determine at what time you wake up and go to bed using military time.

8. Use the following terms in one or more sentences that correctly relate their meaning: blood pressure, diastolic, and systolic.

9. Use the following terms in one or more sentences that correctly relate their meaning: auscultation, palpation, and percussion.

**Critical Thinking**

1. Describe a personal action or lifestyle change that might be taken to eliminate each of the risk factors for heart disease.

2. Describe three activities that might change a person's vital signs.

3. Use the abbreviations in the appendix to write physician orders that would indicate that the patient was not supposed to eat after midnight because of surgery scheduled in the morning for a total abdominal hysterectomy.

4. Make a poster or brochure designed to teach the steps of CPR by the untrained bystander, layperson, or health professional.

5. Use the Internet to research and describe the difference between CPR rescue when it is done by one or by two health professionals.

6. Use the Internet to research and view videos of head-to-toe patient assessment techniques. Make a video or slide show that demonstrates a patient assessment.

7. Use the Internet to research and view videos of vital sign assessment. Make a video or slide show that demonstrates vital sign assessment.

**STANDARDS AND ACCOUNTABILITY***

**Foundation Standard 10: Technical Skills**

Health care professionals will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.

**Accountability Criteria**

**10.1 Technical Skills**

**10.11** Apply procedures for measuring and recording vital signs including the normal ranges.

**EXPLORE THE WEB**

CPR/First Aid

AHA

http://americanheart.org

Red Cross

http://redcross.org

Assessment

Search Key Terms: head-to-toe assessment video
Search Key Terms: vital signs assessment video

**BRAIN BYTE**

Sudden cardiac arrest is the leading cause of death in the United States.

**Summary**

- The elements of basic health assessment include an interview and physical assessment.
- Normal vital signs for an adult include a BP of 120/80, a pulse rate of 60 to 100, a respiration rate of 14 to 20, and a temperature of 98.6°F.
- The normal values of vital signs can be used to measure changes in body function, general health, and the response to treatment.
- Risk factors for cardiac arrest include diabetes, high-fat diet, high BP, and high cholesterol level.

**Review Questions**

1. Describe the elements of a health assessment.

2. Describe the normal parameters for vital signs, indicating which each measures.

3. Describe the risk factors for developing a heart attack that can be reduced by lifestyle changes.

4. Explain the meaning of each of the numbers in 6543.

5. Use Appendix I to complete each of the following phrases of medical terminology:

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6. Use Fig. 7-14 to determine at what age girls and boys show the largest growth spurt.

7. Use Fig. 7-13 to determine at what time you wake up and go to bed using military time.

8. Use the following terms in one or more sentences that correctly relate their meaning: blood pressure, diastolic, and systolic.

9. Use the following terms in one or more sentences that correctly relate their meaning: auscultation, palpation, and percussion.

**Critical Thinking**

1. Describe a personal action or lifestyle change that might be taken to eliminate each of the risk factors for heart disease.

2. Describe three activities that might change a person's vital signs.

3. Use the abbreviations in the appendix to write physician orders that would indicate that the patient was not supposed to eat after midnight because of surgery scheduled in the morning for a total abdominal hysterectomy.

4. Make a poster or brochure designed to teach the steps of CPR by the untrained bystander, layperson, or health professional.
10. When discharge from the facility is ordered, assist the patient to gather belongings in containers for transport.
11. Assist the patient to dress for discharge.
12. Accompany the patient to the car or other method of transport. The patient may need assistance to arrange adequate transportation to the home or another facility.

**SKILL LIST 7-2 Recording Observations**

1. Report any unusual findings to a supervisor before charting observations.
2. Use black ink and print information legibly.
3. Chart observations promptly after making them.

4. Follow all the rules for good charting.
5. Return the chart to the designated location when finished.

**SKILL LIST 7-3 Taking a Blood Pressure**

1. Maintain medical asepsis by using the guidelines provided in the Standard and Transmission-Based Precautions, including good handwashing technique and use of gloves as needed.
2. Gather all necessary equipment, including a stethoscope, sphygmomanometer, alcohol pledget, pen, and paper.
3. Identify the patient, and explain the procedure. Identification of the correct patient and explanation of the procedure prevents errors and misunderstanding.
4. Position the patient in either a sitting or lying position with the upper arm exposed and supported above the level of the heart. Clothing must allow exposure of the upper arm completely without binding. Privacy should be provided if necessary. Either arm may be used, but arms with injuries, IV lines, or other treatments should be avoided, because the procedure may cause injury or pain or the reading may be inaccurate.
5. Wrap the cuff of the sphygmomanometer around the arm 1 inch above the bend of the elbow (antebrachial space). The cuff should be tight enough that two fingers may be placed under the edge comfortably. If the cuff is too tight or too loose, the reading will be inaccurate. The cuff is placed 1 inch above the level of the bend of the elbow to allow room for the flat placement of the stethoscope.
6. While palpating the radial artery, tighten the thumbscrew of the sphygmomanometer, and inflate until the pulse disappears. This reading is an approximate systolic pressure.
7. Deflate the cuff completely and allow the arm to rest for 30 seconds.
8. Clean the earplugs of the stethoscope with alcohol, and place them into the ears with the opening pointing toward the nose.
9. Locate the brachial pulse with the tips of two fingers and place the flat part (diaphragm) of the stethoscope on the location of the pulse.
10. Tighten the thumbscrew valve by turning it clockwise, and inflate the cuff to 20 to 30 mm Hg above the approximate systolic value.
11. Deflate the cuff slowly noting the location on the scale at which the first (systolic) and last (diastolic) pulses are heard. The last distinct beat is considered to be the diastolic pulse. Soft muffled or thumping sounds are not counted.
12. Deflate the cuff completely after the blood pressure is assessed, and remove the cuff from the arm. The blood pressure can be reassessed using the same arm a second time. If a third reading is necessary, the cuff should be removed briefly between readings or moved to the other arm because tightening the cuff repeatedly may change the pressure.

**SKILL LIST 7-4 Taking an Oral Temperature**

1. Maintain medical asepsis by using the guidelines provided in the Standard and Transmission-Based Precautions, including good handwashing technique and use of gloves as needed.
2. Gather necessary supplies and equipment, including a thermometer, tissue, alcohol swab or pledget, pen, and paper.
3. Clean an oral thermometer with disinfectant solution before use. Wash it with cool, soapy water and rinse to remove the disinfectant. The disinfectant may irritate the tissues of the mouth.
4. Shake the liquid in the thermometer down with a sharp movement of the wrist until the reading is 96.0°F or lower. The shaking movement causes the liquid to fall to the bulb end of the thermometer. Activate the electronic thermometer if it is being used. Mercury is no longer used in thermometers because of its environmental and safety risks, but other nontoxic liquids may be used safely.
5. Cover the thermometer with a plastic sheath or wipe with alcohol from stem to bulb. The stem is considered cleaner than the bulb.
6. Identify the patient and explain the procedure. Determine that the patient has not consumed any hot or cold food or beverage or smoked for at least 5 minutes before taking the temperature. The temperature of the food or beverages and smoking will affect the reading.
7. Place the bulb end of the thermometer under the patient’s tongue and instruct the patient to keep the lips closed for 3 minutes, taking care not to bite on the thermometer. If bitten, the thermometer could break and harm the patient. Electronic thermometers are held in place for 45 seconds. The mouth must be closed to obtain an accurate reading.
8. Remove the thermometer by holding it by the stem, and wipe it with alcohol from stem to bulb to prevent the spread of microorganisms. Discard alcohol pledget or swab in the proper container immediately. If a sheath or cover is used, remove it and discard it in the proper container immediately.
9. Read the thermometer by holding it at eye level and twisting the stem until the liquid can be seen. Record the result on paper. Readings that
SKILL LIST 7-4—cont'd
Taking an Oral Temperature

are between two lines on the thermometer are considered to be the higher reading.
10. Report any unusual findings to the supervisor immediately.
11. Clean the thermometer with disinfectant and store it in the designated area. Deactivate an electronic thermometer and place it in the recharging element.
12. Maintain medical asepsis by washing your hands when the procedure is completed.

SKILL LIST 7-5
Taking an Axillary Temperature

1. Maintain medical asepsis by using the guidelines provided in the Standard and Transmission-Based Precautions, including good handwashing technique and use of gloves as needed.
2. Gather the necessary supplies, including an oral thermometer, tissue, dry wash cloth, alcohol pledget or swab, pen, and paper.
3. Clean an oral thermometer with disinfectant solution before use. Wash it with cool, soapy water and rinse to remove disinfectant. The disinfectant may irritate the skin.
4. Shake the liquid level of the thermometer down with a sharp movement of the wrist until the reading is 96.0°F or lower. Activate an electronic thermometer if it is to be used. Mercury is no longer used in thermometers because of its environmental and safety risks, but other nontoxic liquids may be used safely.
5. Cover the thermometer with a plastic sheath or wipe with alcohol from stem to bulb.
6. Identify the patient and explain the procedure. Provide for privacy.
7. Position the patient so that the area under the arm (axilla) is exposed. Pat the axilla dry with a clean cloth. Patting the area dry removes moisture and excess heat. Avoid rubbing and creating friction that may raise the temperature.
8. Place the thermometer with the end bulb in the middle of the axilla, and cross the patient's arm on the chest to keep the thermometer in place for 10 minutes.
9. Remove the thermometer and wipe it with alcohol from stem to bulb. Discard the alcohol swab and any sheath or covering in an appropriately container.
10. Read the thermometer by holding it at eye level and twisting the stem until the liquid can be seen. Record the result on paper. Readings that are between two lines on the thermometer are considered to be the higher reading. Report any unusual findings to the supervisor.
11. Reposition the patient for comfort and privacy.
12. Clean the thermometer with disinfectant solution and store it in the designated area. Deactivate an electronic thermometer and replace it in the recharging element.

SKILL LIST 7-6
Taking a Rectal Temperature

1. Maintain medical asepsis by using the guidelines provided in the Standard and Transmission-Based Precautions, including good handwashing technique and use of gloves as needed.
2. Gather all necessary equipment and supplies, including a rectal thermometer, lubricating jelly, toy tissue, disposable gloves, pen, and paper.
3. Clean a rectal thermometer with alcohol from stem to bulb, or cover with a protective sheath. Rectal thermometers may be tipped with red and have rounded bulbs. Consulting oral with rectal thermometers is not sanitary and may cause illness.
4. Shake the liquid level of the thermometer down with a sharp movement of the wrist until the reading is 96.0°F or lower. Activate an electronic thermometer if it is to be used. Mercury is no longer used in thermometers because of its environmental and safety risks, but other nontoxic liquids may be used safely.
5. Lubricate 2 inches of the bulb end of the thermometer with lubricating jelly.
6. Identify the patient and explain the procedure. Arrange the unit to provide privacy.
7. Wear disposable gloves to prevent the spread of microorganisms.
8. Position the patient on one side, and raise the patient's upper leg slightly toward the head.
9. Expose the anus by raising the upper buttocks. Gently insert the thermometer 1½ inches if the patient is an adult. The rectum of a child is shorter than that of an adult, and special care is necessary when taking a rectal temperature.
10. Remain with the patient while holding the thermometer in place for 3 to 5 minutes. Accidental injury may occur if the patient is left alone with a rectal thermometer in place.
11. Remove the thermometer and wipe with tissue from stem to bulb to remove any fecal material. Discard the tissue and any cover used on the thermometer in the appropriate container immediately.
12. Reposition the patient for comfort, privacy, and safety.
13. Read the thermometer by holding it at eye level and twisting the stem until the liquid can be seen. Record the result on paper. Readings that are between two lines on the thermometer are considered to be the higher reading. Report any unusual findings to the supervisor.
14. Clean the thermometer with disinfectant and store it in the designated area. Deactivate an electronic thermometer if in use and replace it in the recharging unit.
15. Discard gloves in an appropriate container.

SKILL LIST 7-7
Taking an Infrared Temperature

1. Maintain medical asepsis by using the guidelines provided in the Standard and Transmission-Based Precautions, including good handwashing technique and use of gloves as needed.
2. Gather all necessary equipment and supplies, including a thermal thermometer, alcohol swab (pledget), pen, and paper.
3. Press the power button to activate the thermometer.
4. Check that the thermometer is set for the preferred mode (Fahrenheit or Celsius).
5. Press and hold "scan" until the image "00" appears on the screen.
6. Hold the thermometer about 2 to 3 inches away from and in the middle of the forehead.
7. While holding the "scan" button, move the thermometer toward and away from the forehead until it beeps continuously and the light flashes.
<table>
<thead>
<tr>
<th>SKILL LIST 7-7—cont’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking an Infrared Temperature</td>
</tr>
<tr>
<td>8. When the beeping is continuous, release the “scan” button. The thermometer will beep once and show the temperature.</td>
</tr>
<tr>
<td>9. The thermometer will automatically shut off.</td>
</tr>
<tr>
<td>10. Use an alcohol swab to clean the thermometer lens. Store it in the designated area.</td>
</tr>
<tr>
<td>11. Discard the alcohol swab in an appropriate container. Maintain medical asepsis by washing your hands for a minimum of 20 seconds.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SKILL LIST 7-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking a Radial Pulse and Measuring Respiration</td>
</tr>
<tr>
<td>1. Maintain medical asepsis by following the guidelines provided in the Standard and Transfusion-Based Precautions, including proper handwashing technique and use of gloves as needed.</td>
</tr>
<tr>
<td>2. Gather the necessary supplies and equipment, including a watch with a second hand, pen, and paper.</td>
</tr>
<tr>
<td>3. Identify the patient and explain the procedure.</td>
</tr>
<tr>
<td>4. Place the tips of your first two fingers over the radial artery. The thumb is not used because it has a pulse of its own, which may cause confusion.</td>
</tr>
<tr>
<td>5. Using a watch with a second hand, count the pulse beats for 1 minute. The pulse may instead be assessed for 30 seconds and doubled. An assessment less than 30 seconds can lead to error of four beats per minute or more. An irregular pulse must be counted for the complete 1 minute.</td>
</tr>
<tr>
<td>6. While still palpating the radial artery, count respirations for 1 minute. If the wrist is held, the patient will remain quiet so that respirations may be assessed. If coughing, talking, or other verbal reaction occurs during the counting of respirations, the count must be reassessed. The result may be affected if the patient is aware that the respirations are being counted.</td>
</tr>
<tr>
<td>7. Record the time, rate, and character of pulse and respirations.</td>
</tr>
<tr>
<td>8. Report any unusual findings to the supervisor immediately.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SKILL LIST 7-9—cont’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constructing a Line Graph</td>
</tr>
<tr>
<td>7. Draw a straight line to connect the two points.</td>
</tr>
<tr>
<td>8. Chart the third point where the third set of data intersects on the graph.</td>
</tr>
<tr>
<td>9. Join the second point to the third point with a straight line.</td>
</tr>
<tr>
<td>10. Continue charting and joining points on the graph until all data have been noted.</td>
</tr>
<tr>
<td>11. Label each axis with the units of measurement.</td>
</tr>
<tr>
<td>12. Label the graph.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SKILL LIST 7-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using the Computer</td>
</tr>
<tr>
<td>1. Identify the monitor, central processing unit, and disk drive for the computer. Information can be obtained in the central processing unit or on a CD.</td>
</tr>
<tr>
<td>2. Turn the computer on as indicated by the manufacturer’s directions.</td>
</tr>
<tr>
<td>3. Initiate or “boot” a program according to the manufacturer’s instructions.</td>
</tr>
<tr>
<td>4. Enter log-in and password information as needed according to the program instructions.</td>
</tr>
<tr>
<td>5. Enter information by patient.</td>
</tr>
<tr>
<td>6. Save information to the disk according to the program instructions.</td>
</tr>
<tr>
<td>7. Turn the computer off according to the manufacturer’s instruction.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SKILL LIST 7-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performing Cardiopulmonary Resuscitation (CPR)*</td>
</tr>
<tr>
<td>1. Maintain medical asepsis by following the guidelines provided in the Standard and Transfusion-Based Precautions including a CPR mask, eye protection, good handwashing technique, and use of gloves as needed.</td>
</tr>
<tr>
<td>2. Check to see if the person is responsive by gently shaking him or her, rubbing the sternum with your knuckles and shouting.</td>
</tr>
<tr>
<td>3. If the victim does not respond or is gasping only, call 911 or have someone else do it.</td>
</tr>
<tr>
<td>4. Palpate for pulse for 10 seconds.</td>
</tr>
<tr>
<td>5. If pulse is absent, use an AED if available.</td>
</tr>
<tr>
<td>6. If AED is not available, begin chest compressions. Place the heel of one hand in the middle of the victim’s chest and the other hand on the top.</td>
</tr>
<tr>
<td>7. Compress the chest at least 2 inches (adults and children) and then allow it to reexpand or recoil completely. Compress about 1½ inches in infants.</td>
</tr>
<tr>
<td>8. Use the head-lift, chin-lift method to open the airway.</td>
</tr>
</tbody>
</table>

Continued
**SKILL LIST 7-11—cont’d**
Performing Cardiopulmonary Resuscitation (HCP)*

9. Pinch the nose closed and give two slow mouth-to-mouth breaths. Breaths should be about one second long or one breath every 6–8 seconds.
11. Rotate compressors every 2 minutes when two HCP are present.
12. If the victim recovers and there are no other signs of injury to the back or neck, turn the victim to his or her side.

13. Continue monitoring breathing until instructed to stop by advanced emergency personnel.

*These are general guidelines for trained health care professionals (HCP). Two-rescuer CPR may be performed using a modified ratio of 15:2 compressions to ventilations for children and infants.

Automated External Defibrillators (AEDs) can be safely used by lay rescuers with a few hours of training. When the device is attached to the victim with two adhesive pads, it analyzes the heart activity and determines whether shock is necessary.

**SKILL LIST 7-12**
Performing Foreign-Body Airway Obstruction Rescue

1. Maintain medical asepsis by using the guidelines provided in the Standard and Transmission-Based Precautions, including good handwashing technique and use of gloves as needed.
2. Assess whether assistance is necessary. Ask the person if he or she is choking.
3. If the victim cannot speak or cough forcefully, perform abdominal thrusts until the object is dislodged.
4. Lower the victim to the ground if unresponsive-ness occurs.
5. Call 911 or have someone else do it.
6. Attempt cardiopulmonary resuscitation.

**SKILL LIST 7-13**
Hands-Only Cardiopulmonary Resuscitation (CPR)*

1. Maintain medical asepsis by using the guidelines provided in the Standard and Transmission-Based Precautions including a CPR mask, eye protection, good handwashing technique and use of gloves as needed.
2. Check to see if the person is responsive by gently shaking him or her, rubbing the sternum with your knuckles and shouting.
3. If the victim does not respond or is gasping only, call 911 or have someone else do it.
4. Use an AED* if available.
5. Begin chest compressions. Place the heel of one hand in the middle of the victim’s chest and the other hand on the top of the first hand.
6. Compress the chest at least 2 inches (adults and children) and then allow it to reexpand or recoil completely. Compress about 1 1/2 inches in infants.
7. Perform compressions at a rate of at least 100/minute.
8. If the victim recovers and there are no other signs of injury to the back or neck, turn the victim to his or her side.

*These are general guidelines for untrained rescuers. A course given by the AHA or ARC is available, as well as training materials for the layperson.

Automated External Defibrillators (AEDs) can be safely used by lay rescuers with a few hours of training. When the device is attached to the victim with two adhesive pads, it analyzes the heart activity and determines whether shock is necessary.