The student should strive to meet the following performance objectives and demonstrate an understanding of the facts and principles presented in this chapter through written and oral communication.

1. Define the key terms as presented in the glossary.
2. Discuss normal and abnormal temperatures, including factors affecting temperature.
3. Identify and explain the procedures for using, caring for, and storing the various types of thermometers.
4. Discuss the Environmental Protection Agency’s initiative to phase out mercury thermometers and other mercury-containing equipment.
5. Describe the locations and procedure for obtaining pulse rates.
6. Explain the procedure for obtaining respiration rates.
7. Identify and describe normal and abnormal pulse and respiratory rates and the factors affecting each.
OBJECTIVES (continued)
8. Describe the appropriate equipment and procedure for obtaining a blood pressure measurement.
9. Identify normal and abnormal blood pressure, including factors affecting blood pressure.
10. Describe the procedures for obtaining height, weight, and chest measurements of adults.
11. Accurately record measurements on the patient’s chart or electronic medical record.
12. Explain two reasons why a professional individual shows responsibility by learning about the dangers of mercury.

Scenario
The medical office of Drs. Lewis and King, clinical medical assistant Joe Guerrero, CMA (AAMA), assists both providers in taking patients’ vital signs. One of his favorite patients is Abigail Johnson, a friendly woman in her 70s who always has a kind disposition despite her financial and medical difficulties. Abigail is overweight and has hypertension, so her blood pressure is monitored on a regular basis to be certain that it is under control. In reviewing Abigail’s chart, Joe notices that her blood pressure has been quite stable for the last few visits. He also checks her weight and notices that Abigail is slowly losing weight. Abigail’s chart, with its history of blood pressure and other measurements, informs Joe’s perspective and is a helpful record when evaluating the progress Abigail has made since she became a patient 3 years ago.

INTRODUCTION
One of the most important and commonly performed tasks of a medical assistant is obtaining and recording patient vital signs and body measurements. Vital signs, also sometimes referred to as cardinal signs, include temperature, pulse, respiration, and blood pressure, abbreviated TPR B/P. They are indicative of the general health and well-being of a patient and, with regular monitoring, may measure patient response to treatment. Vital signs, in total or in part, are an important component of each patient visit. Height and weight measurements, although not considered vital signs, are often a routine part of a patient visit.

Patients will exhibit vital sign readings that are uniquely their own. As a result, baseline assessments of vital signs are usually obtained during the patient’s initial visit. These baseline results are used as a reference point for future readings, differentiating between what is normal and abnormal for the patient.

Two important habits must be developed by the medical assistant before taking a patient’s vital signs: aseptic technique in the form of hand washing and recognition and correction of factors that may influence results of vital signs. Proper hand washing before taking vital signs will assist in preventing cross contamination of patients. Refer to the discussion on Standard Precautions and medical asepsis in Chapter 22. Also, emotional factors of patients must be recognized and addressed. Explaining procedures and allowing the patient the opportunity to relax will ease apprehension that may affect vital sign readings.

THE IMPORTANCE OF ACCURACY
Vital signs may be altered by many factors. Medical assistants must recognize and correct factors that may produce inaccurate results. For example, patients may exhibit anxiety over potential test results or findings of the provider. They may be angry or may have rushed into the office. A patient may have had something to eat or drink before the visit or may have had a long wait in the reception area. Patient apprehension and mood must always be considered by the medical assistant, because these factors can affect vital signs.
The medical assistant may be required to take vital signs more than once during an office visit to ascertain a baseline and obtain an impression of overall well-being of the patient. Body measurements such as weight may be influenced by what the patient is wearing; height may be influenced by the patient’s shoes and how his or her posture is while being measured.

Accuracy in taking vital signs is necessary because treatment plans are developed according to the measurement of the vital signs (Figure 24-1). Variations can indicate a new disease process or the patient’s response to treatment. They may also indicate the patient’s compliance with a treatment plan. Although taking vital signs is a task commonly performed by the medical assistant, it is never to be taken casually or lightly, and it should never be rushed or incompletely performed. Concentration and attention to proper procedure will help ensure accurate measurements and quality care of the patient. The following text discusses procedures used to measure the vital signs of children and adults. Procedures used for infant examinations are discussed in Chapter 27.

TEMPERATURE

Body temperature is maintained and regulated by two processes functioning in conjunction with one another: heat production and heat loss.

Body heat is produced by the actions of voluntary and involuntary muscles. As the muscles move, they use energy, which produces heat. Cellular metabolic activities, such as the process of breaking down food sugars into simpler components (catabolism), are another source of heat.

The body loses heat by a combination of five processes:

1. Convection. The process by which heat is lost through the skin by being transferred from the skin by air currents flowing across it, such as a fan used on a hot day for cooling purposes.

2. Conduction. The transfer of heat from within the body to the surface of the skin and then to surrounding cooler objects touching the skin, such as clothing.

3. Radiation. Body heat lost from the surface of the skin to a cooler environment, much like a cool room becoming warm when occupied by many people.

4. Evaporation. A heat loss mechanism that uses heat absorption through vaporization of perspiration.

5. Elimination. Heat that is lost through the normal functioning of the intestinal, urinary, and respiratory tracts.

The delicate balance between heat production and heat loss is maintained by the hypothalamus in the brain. The hypothalamus monitors
blood temperature and will trigger either the heat loss or heat production mechanism with as little as 0.04°F change in blood temperature.

Body temperature is measured in degrees and is influenced by several factors, including:

- An increase in temperature may result from a bacterial infection, increased physical activity or food intake, exposure to heat, pregnancy, drugs that increase metabolism, stress and severe emotional reactions, and age. Age becomes a factor in that infants have an average body temperature that is one to two degrees higher than adults.
- Decrease in temperature may result from viral infections, decreased muscular activity, fasting, a depressed emotional state, exposure to cold, drugs that decrease metabolic activities, and age. Age in this instance refers to older adults, in that older adults have decreased metabolic activity resulting in a decrease in body temperature.
- Another factor that can increase or decrease body temperature is time of day. During sleep and early morning, the temperature is at its lowest, whereas later in the day with muscular and metabolic activity, the temperature increases.

Because of the many factors influencing body temperature and the uniqueness of individuals, there is no "normal" temperature. The medical assistant must think of temperatures in terms of the "average," which for an adult is 98.6°F, or 37.0°C.

Terms Used to Describe Body Temperature

The following terms are used to describe body temperature:

- **Afebrile:** absence of fever
- **Febrile:** fever is present
- **Fever:** body temperature increased beyond normal range; **pyrexia** is another term for fever
- **Onset:** time when fever begins
- **Lysis:** body temperature gradually returns to normal after a period of fever
- **Crisis:** body temperature decreases suddenly to normal levels; the patient may perspire profusely (diaphoresis)
- **Intermittent:** a fluctuating fever that returns to or below baseline, then increases again
- **Remittent:** a fluctuating fever that does not return to the baseline temperature; it fluctuates but remains increased
- **Continuous:** a fever that remains above the baseline; it does not fluctuate but remains fairly constant

Figure 24-2 depicts types of fever.

Phase Out of Mercury Thermometers and Other Mercury-Containing Equipment

Glass mercury thermometers have been used for decades and have been common in health care agencies as well as the home. In recent years, concerns have arisen about mercury toxicity when mercury thermometers or other equipment containing mercury breaks and spills mercury into the environment.

This can create a mercury vapor in the indoor air, which is a serious problem. The mercury also can cause environmental damage if it enters lakes and rivers where it can contaminate fish, which are part of the food chain. Even small amounts of mercury can do great harm. The fetus is at risk because its developing nervous system is susceptible to mercury toxicity if a pregnant woman eats fish contaminated with mercury. When thermometers break or are disposed of improperly, the mercury can enter the atmosphere, especially if the mercury waste is burned in an incinerator.

If spilled mercury is not cleaned up (perhaps the individual using the thermometer is unaware that it is broken, and the mercury has seeped into a carpet or crevice), the mercury will evaporate and can reach dangerous levels in indoor air. There is medical literature that illustrates some cases of serious illnesses and even death from exposure to mercury from broken thermometers. Most cases involved young children. According to the Environmental Protection Agency (EPA), a 32-month-old child who was exposed to mercury became ill with hypertension, tachycardia, apathy, pulmonary edema, and coma. The mercury from a broken thermometer had not been cleaned up.

Even small mercury spills should be cleaned up as soon as possible. Becton-Dickinson, a thermometer manufacturer, makes the following recommendations for cleaning up a broken thermometer:

- Pick up the mercury with an eyedropper or scoop up the beads of mercury with a piece of heavy paper (cardboard, index card, or playing card).
- Place mercury, the dropper, heavy paper, and any broken glass in a plastic resealable bag. Place this bag into two more resealable bags, zipping each within the other, finishing up with the contents.
Figure 24-2 Types of fevers. (A) Continuous—remains above baseline. Does not fluctuate. (B) Intermittent—a fluctuating fever. Returns to or below baseline, then rises again. (C) Remittent—a fluctuating fever but does not return to baseline temperature. Remains elevated, but fluctuates.
bagged three times. Place this into a wide-mouth, sealable plastic container.

• Call the local health department for the nearest mercury disposal location. If no disposal location is available, dispose of the container according to local and state regulations. The health department can inform you regarding how to obtain the information.

• Leave windows open for about 2 days to ensure complete ventilation.

These recommendations can be applied to mercury spillage caused by other mercury-containing equipment. Do not do the following:

• Do not use household cleaning products. Combinations of some cleansers with mercury can release toxic gases.

• Do not use a broom or brush to clean up mercury; they only spread it around.

• Do not use a vacuum cleaner or shop vacuum. The mercury vapor escapes into the air and increases exposure to individuals in the area.

In 1998, the American Hospital Association signed an agreement with the EPA to eliminate mercury from their hospitals’ waste systems. Hospitals and other health care agencies are phasing out the use of mercury thermometers and other medical equipment that contain mercury, such as sphygmomanometers, among others. Many states have recalled mercury thermometers and replaced them with digital ones.

The best alternative is use of nonmercury thermometers, such as digital and electronic. These can be used orally, rectally, or axillary. Also available are tympanic (ear canal) a temporal artery; and flexible, disposable, forehead, or oral thermometers (less accurate). There are no known risks with any of the above thermometers.

Types of Thermometers

The following are types of thermometers available for use in the ambulatory care setting:

• Disposable strips
• Electronic/digital
• Tympanic
• Temporal artery

Disposable Thermometers. Disposable thermometers are individually wrapped strips with heat-sensitive dots that change color to indicate temperature. They are used once and then discarded. There are strips for use on the forehead and others for oral use. Although strips are easy to use and prevent patient cross contamination, accuracy is questionable.

Electronic and Digital Thermometers. Electronic thermometers are widely used, handheld, battery-operated or plug-in units that have easy-to-read electronic display screens to indicate results (Figure 24-3). Electronic thermometers in Fahrenheit or Celsius scales are available. Probes are attached and are color-coded blue for oral and red for rectal. The probes have disposable plastic covers. The plastic cover acts as a barrier to prevent contamination of the probe and is replaced for each patient to prevent cross contamination. An accurate result can be obtained in approximately 10 seconds.

Inexpensive digital thermometers are widely available for home use (Figure 24-4). They are quick, easy to use, and accurate. Encourage your patients to switch to these from the mercury glass thermometers. These lightweight thermometers do not require recharging; their small imbedded batteries last for years but are not replaceable.

Suggest patients watch for “Turn in Your Mercury Thermometer Days.” Some communities, in conjunction with local pharmacies, set aside a day or two each year for residents to take mercury thermometers to their local pharmacy. In exchange for the mercury thermometers, free digital thermometers are given as replacements.
Tympanic Thermometers. The use of tympanic thermometers is becoming more popular because they are fast, provide no discomfort to the patient, can be used on patients over 2 years of age as well as adults, and usually are accurate. They consist of a handheld unit with a probe tip that is inserted into the ear securely to make a seal. Disposable tips are used to prevent cross contamination. With the tympanic method of measuring body temperature, the procedure is complete in a few seconds. It is comfortable for the patient, nonthreatening to infants and children, and can be used when other methods are inappropriate. It is the thermometer of choice for pediatric patients older than 2 years. However, providers have found that inaccurate readings can result if patients have impacted cerumen in the ear of which they may be unaware. Also, if the patient has otitis media, a middle ear infection, the reading tends to be inaccurate and the procedure is painful.

Temporal Artery Thermometers. A noninvasive thermometer known as a temporal artery thermometer, or TA thermometer, has been developed and is currently in use. Studies performed at Harvard Medical School and the Hospital for Sick Children found the TA thermometer to be more accurate than the aural (tympanic) and rectal thermometers. It is used on adults and children.

The temporal artery is a major blood vessel in the head. The thermometer measures the temperature of the skin surface over the temporal artery.

The thermometer has a probe that contains a sensor. When the TA thermometer is slid straight across the forehead (midline forehead), the infrared heat from the artery is picked up by the sensor (Figure 24-5). Software accurately determines and displays the temperature. The TA thermometer can also be used behind the ear lobe (if the forehead is wet with perspiration). See Procedure 24-3. There are many advantages to the TA thermometer: It can be used for patients of all ages; it is accurate, painless, fast, convenient, safe, comfortable, and noninvasive; and it can be cleaned with an alcohol wipe between patients.

Some considerations should be kept in mind when using a TA thermometer. If there is perspiration on the forehead, an inaccurate measurement could occur. Other sites that can be used are the femoral, axillary, and behind the ear. Scanning too rapidly can cause a false reading, as can a hat or hair covering the forehead. The TA thermometer must be the same temperature as the room in which it is used. It cannot be stored in the sun or...
in a room where air-conditioned air has been blowing on the thermometer.

**Measuring Temperature**

To convert °F to °C:
Subtract 32 from F temperature, then multiply by 5/9.

**Example:**

\[97^\circ F = 97 - 32 = 65 \times \frac{5}{9} = 36.1^\circ C\]

\[32\] \[27\] \[55\]

To convert °C to °F:
Multiply C temperature by 9/5, then add 32.

**Example:**

\[\frac{36.1^\circ C}{1} \times \frac{9}{5} + 32 = \frac{324}{45} + \frac{32}{45} = 97^\circ F\]

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**Oral Temperatures.** To use an oral strip for taking a temperature, make certain that the package is not damaged, then peel it back to reveal the strip. Insert the strip into the patient’s mouth. After the appropriate time interval has elapsed, remove the thermometer. The dots that have changed color are read using the scale located on the strip. Although convenient to use, accuracy is not always ensured with the strips, so these strips may not be the best choice for clinical use. Procedure 24-5 gives steps for taking an oral temperature using a disposable oral strip thermometer.

The procedure for obtaining an oral temperature with an electronic thermometer is quick, easy, and accurate (Procedure 24-1). Some electronic thermometers are stored on a recharging base. When removed from the base, they are turned on and ready for use. A disposable cover is placed over the probe, and the probe is placed in the patient’s mouth. When temperature measurement is complete, the thermometer beeps and the temperature is displayed on the screen. The probe cover is ejected into a biohazard container without touching the container, and the unit is returned to the base. The temperature is then recorded in the patient’s chart. Always read and follow the manufacturer’s directions for use and care of a digital unit.

**Aural Temperature.** Taking a temperature with a tympanic thermometer is a fast, safe method for obtaining a patient’s temperature (Figure 24-6). It is common in ambulatory care settings. Tympanic temperature can be obtained without discomfort for all patients except for children under 2 years of age.

The tympanic thermometer measures the patient’s temperature by measuring the infrared waves produced by the tympanic membrane and records the temperature in less than 2 to 3 seconds on a digital screen. The tympanic membrane and the hypothalamus of the brain share the same blood supply, so an accurate measurement of the body temperature can be obtained.

The greatest benefits of the tympanic thermometer are that it gives nearly instant results; does not come into contact with mucous membranes, thereby minimizing cross contamination; uses a site that is readily accessible; is not affected by the patient smoking or drinking hot or cold liquids; does not require that the patient be conscious; and is an easy instrument to use. The unit is battery operated and uses a disposable probe cover or ear speculum.

Drawbacks to the tympanic thermometer have been demonstrated in pediatric patients with ear conditions such as otitis media. An inaccurate recording can result because fluid buildup in the inner ear limits infrared wave transmission.

The tympanic thermometer is a handheld unit that is inserted into the outer third of the ear canal. Procedure 24-2 gives steps for obtaining an aural temperature using a tympanic thermometer.

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**Patient Education**

Teach patients the importance of replacing mercury thermometers with an alternative such as digital, disposable, or aural (tympanic) thermometers. The risk for mercury poisoning is great if a mercury thermometer (or other mercury-containing item) is broken and the mercury escapes into the environment.
Rectal and Axillary Temperatures. The rectal and axillary methods for obtaining a temperature were widely used for infants, young children, and patients who were unable or uncooperative with oral temperature measurement. The new technology—tympanic, temporal artery, and electronic and digital thermometers—have simplified temperature measurement. These thermometers are safe, readily accepted by patients, greatly reduce microorganism transmission, are accurate, give a rapid reading, and are widely used in health care settings including ambulatory care. Although the newer eventually will replace the electronic digital method for measuring temperatures, including the rectal and axillary routes, the steps for obtaining rectal and axillary temperature measurements are included in Procedures 24-4 and 24-5.

Recording Temperature

Temperature may be taken on each visit to the provider’s office to obtain a baseline for the patient. When recording the temperature in the patient’s electronic medical record, the scale used for the results must be designated F for Fahrenheit and C for Celsius. The route used must be labeled as well; methods other than oral must be labeled according to the route used because there is a difference in the measurement. Use R for rectal, A for axillary, Tym for tympanic, and TA for temporal artery.

Temperatures is recorded as shown:
- Oral T 98.6°F
- Rectal T 99.6°(R) F
- Axillary T 97.6°(Ax) F
- Tympanic T 98.6°(Tym) F
- Temporal artery T 99.4°(TA) F

When a facility uses a tympanic thermometer exclusively, the route is known and therefore does not have to be labeled.

The medical assistant must read all manufacturer’s instructions before using any digital, tympanic, or temporal artery thermometer. Each may have a slight difference in operating procedure. Procedures 24-1 through 24-6 detail steps involved in taking temperature by various routes.

Cleaning and Storage of Thermometers

Oral and rectal thermometers should be separated. Storage depends on the policy of the facility.

Digital, electronic, tympanic, and temporal artery thermometers are cleaned according to the manufacturer’s directions. The covers protect the probes from contamination. Each type of thermometer has a storage case or a wall-mounted base made especially for storing the unit. Disinfect these types of thermometers by wiping with a mild disinfectant as instructed by the manufacturer.

PULSE

The pulse rate consists of two phases of the heart action and can be felt when compressing an artery. As the heart contracts, it increases pressure on the arterial walls. The increased pressure passes through the arteries in a wave-like movement resulting in a slight expansion of the arterial wall (contraction). When the heart relaxes, (relaxation) the pressure is decreased in the arteries, resulting in the wall returning to its previous position. One contraction and one relaxation of the heart is equal to one heart cycle or heart beat. The pulse and heartbeat rate are usually identical in healthy individuals.

Pulse Sites

The pulse can be felt in areas of the body where an artery is close to the surface and to an underlying solid structure such as a bone. Common pulse
sites include the radial, carotid, temporal, brachial, femoral, popliteal, and dorsalis pedis arteries (Figure 24-7). An apical pulse, located at the apex of the heart, may also be taken. Although the radial, brachial, and carotid arteries are the most frequently used sites for pulse rates, it is important to recognize pulse beats because circulation may be monitored by palpating the other sites. Pulse sites are also used when necessary as pressure points for controlling severe bleeding.

- The **radial** pulse is located at the thumb side of the wrist approximately 1 inch above the base of the thumb. This is the most commonly used site for obtaining a pulse rate.
- The **carotid** pulse, used during emergency situations and when performing cardiopulmonary resuscitation (CPR), is found between the larynx and sternocleidomastoid muscle in the front side of the neck on either side of the trachea. When measuring the pulse at the carotid site, compress only one side at a time.
- The **brachial** pulse is found in the inner aspect of the elbow called the antecubital space. This pulse site is the most commonly used site to obtain blood pressure measurements.
- The **temporal** pulse is located at the temple area of the head. It is rarely used to obtain a pulse rate but may be used to monitor circulation, control bleeding from the head and scalp, and to take a temporal artery temperature.
- The **femoral** pulse is located in the groin area. It is a deep artery and must be compressed firmly to be felt.
- The **popliteal** pulse is located at the back of the knee. The patient must be in a supine position with the knee flexed for it to be felt because the artery is deep within the knee. This artery is used for leg blood pressure measurements and to monitor circulation.
- The **dorsalis pedis** pulse is felt on the top of the foot slightly to the side of midline next to the extensor ligament of the great toe, between the first and second metatarsal bones. It is commonly used to monitor lower limb circulation.

- **Apical** pulse is found at the apex of the heart, located at the fifth intercostal space left side, midclavicular line, that is, between the fifth and sixth ribs perpendicular to the middle of the clavicle, left of the sternum. A stethoscope is required to obtain an apical pulse. Apical pulse is used for cardiac patients and patients with an arrhythmia, and to obtain infant pulse rates because they are difficult to obtain by the usual methods.

### Measuring and Evaluating a Pulse

When measuring a pulse rate, other characteristics besides the rate are noted, such as rhythm, volume of pulse, and condition of the arterial wall.

The rate is the number of pulsations or beats felt in 1 minute. The pulse is counted for 30 seconds, then the number is doubled. Pulse rates may vary according to age, activities, general health, sex, emotions, pain, and medications. The rate is lower when sleeping and higher when active or exercising. Rates for infants and children are greater than for adults. Well-conditioned athletes have a lower than average resting rate because their cardiovascular system has been developed to function more efficiently.

Rhythm of the pulse refers to the time between pulsations and regularity of the beat. Normal rhythm occurs when the beats are felt at regular intervals. In abnormal rhythms, arrhythmias, the interval between pulsations is altered by either an increased or decreased time span. Arrhythmias must be noted and reported because they may indicate heart disease.

The volume of the pulse refers to the strength of the beat that is felt. The pulsations may feel full, strong, hard, soft, thready, or weak. A pulse may have
a regular rate and yet have a variation in intensity or volume. Volume should be noted and reported.

Condition of the arterial wall can be felt as the pulse is taken. The normal artery feels soft and elastic. The abnormal artery may feel hard, knotty, wiry, or a combination of these. These should be noted and reported because they may indicate cardiac disease.

Normal Pulse Rates

Average pulse rates vary from birth to adulthood. At birth, the pulse rate is much higher; as we age, it generally decreases.

<table>
<thead>
<tr>
<th>NORMAL PULSE RATES</th>
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<tbody>
<tr>
<td>Birth</td>
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<tr>
<td>Infants 1 year</td>
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<tr>
<td>2 years</td>
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<td>3 years</td>
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<tr>
<td>7–14 years</td>
</tr>
<tr>
<td>Adults</td>
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</tbody>
</table>

Pulse Abnormalities

Abnormalities may occur in the rate, rhythm, and feel of the arterial wall. Common pulse rate abnormalities include **bradycardia**, a pulse rate less than 60 beats per minute, and **tachycardia**, a pulse rate greater than 100 beats per minute. Common arrhythmias include a pulsation felt before expected, which is called a premature contraction, and sinus arrhythmia. An occasional premature contraction can occur in response to stress, caffeine, nicotine, alcohol, or lack of sleep. Sinus arrhythmia may occur during respiration and can be found in some children and young adults. The rate increases with inspiration and decreases with expiration. It usually does not require treatment.

When any pulse rate abnormalities or arrhythmias are felt, take the pulse for 1 full minute, note the frequency of the abnormality, record the abnormality, and alert the provider. The provider may want you to take an apical pulse (see Chapter 37).

Recording Pulse Rates

Pulse rates are normally recorded after the temperature; for example: T 98.6°F P 72 regular. Any unusual findings should be recorded and reported to the provider; for example: P 72 irregular × 2 minutes.

Procedure 24-7 describes measuring a radial pulse; Procedure 24-8 describes measuring an apical pulse.

**RESPIRATION**

The function of respiration (breathing) is the exchange of the gases oxygen and carbon dioxide. External respiration occurs when oxygen is drawn into the lungs when breathing in and carbon dioxide is expelled from the lungs when breathing out. Internal respiration occurs when oxygen is used by the cells for cellular function. Carbon dioxide is a by-product of cellular function and is expelled via exhalation as a waste product. Respiration is an involuntary act controlled by the medulla oblongata of the brain. The medulla oblongata measures blood levels of carbon dioxide and triggers a respiration when the level of carbon dioxide increases. Although it is an involuntary act, respiration may be altered by holding the breath or when hyperventilation occurs. One inspiration (inhalation) drawing in of air and one expiration (exhalation) expelling air together equals one respiration.

Abnormalities in the characteristics of respiration, such as rate, rhythm, and depth, are noted when measuring respiration.

Respiratory rate is the number of respirations per minute. The normal respiratory rate, **eupnea,** varies with age, activities, illness, emotions, and drugs. The average respiratory rate to pulse rate is 1:4, one respiration to four pulse beats.

Respiratory rhythm refers to the pattern of breathing. It can vary with age, with adults having a regular pattern, but infants having an irregular pattern. Rhythm may be altered by laughing and sighing.

<table>
<thead>
<tr>
<th>NORMAL RESPIRATORY RATES</th>
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<tbody>
<tr>
<td>Newborns</td>
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<tr>
<td>Infants</td>
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<tr>
<td>Children (1–7 years)</td>
</tr>
<tr>
<td>Adults</td>
</tr>
</tbody>
</table>

Depth of respiration is the amount of air that is inspired and expired with each respiration. In the resting state, the amount should be consistent. Depth is noted by watching the degree of rise and fall of the chest wall when measuring respiration rate.
Respiration Rate

Respiratory rate is measured by counting breaths for 30 seconds and doubling the amount. This will give the number of respirations per minute. It is important that patients not be aware you are measuring their respirations. The rate may change if the patient knows they are being counted. Procedure 24-9 gives steps for measuring respiration rate.

Abnormalities

Abnormalities of the respiration rate may be found in the rate, depth, rhythm, and sounds of respiration. Some rate abnormalities include apnea, tachypnea, bradypnea, and Cheyne–Stokes. Sleep apnea and narcolepsy are considered sleep disorders and involve the respiratory system.

Apnea is the temporary complete absence of breathing. It may result from a reduction in stimuli to the respiratory center in the brain. Apnea will occur when the breath is voluntarily held and in Cheyne-Stokes respiration. It can be a serious symptom of other conditions of the cardiovascular and renal systems. It also can result from a head injury such as a concussion.

Tachypnea is a respiratory rate greater than 40 respirations per minute. It may be caused by hysteria or be transient in the newborn. Excessive loss of carbon dioxide may occur if tachypnea is prolonged; there is a potential for this to lead to more serious problems.

Bradytnea is a decrease in the number of respirations and is commonly seen during sleep or because of certain diseases.

Cheyne-Stokes is a breathing pattern that starts with a period of apnea lasting 10 to 60 seconds followed by increasing depth and rate of respiration, which is then followed by a decrease in rate with apnea starting the cycle once again. This cycle may be normal for children but may indicate brain dysfunction in other age groups.

Orthopnea is a respiratory condition of severe dyspnea (labored breathing). Breathing is difficult in any position other than sitting erect or standing. This condition may be seen in patients with heart failure, angina pectoris, asthma, pulmonary edema, emphysema, pneumonia, and spasmodic coughing. Patients who experience orthopnea must be examined in a sitting position. Other positions will cause discomfort and may not be possible.

Abnormalities in the depth of respiration are divided into shallow abnormalities, such as hypoventilation, and deep abnormalities, such as hyperpnea and hyperventilation.

Hypoventilation occurs when respiration is decreased in rate and shallow in depth. It may result from a depression of nervous stimuli of the respiratory center in the brain.

Hyperpnea is respiration that is increased in both depth and rate. It is commonly seen with activities such as physical exercise. It can also be associated with pain, respiratory diseases, cardiac diseases, hysteria, and use of certain drugs.

Hyperventilation is a type of breathing in which the amount of oxygen drawn in during inspiration is greatly increased, resulting in a decrease in the amount of blood carbon dioxide. Hyperventilation may be associated with asthma, pulmonary embolism or edema, and acute anxiety. The patient can be treated by reducing the amount of oxygen inhaled during an inspiration. The patient may be instructed to hold one nostril closed while breathing or may be instructed to breathe into a paper bag. Either procedure will reduce the amount of inspired oxygen and bring the oxygen and carbon dioxide blood levels back to within normal range.

Sleep Apnea. Airflow during respiration that stops for more than 10 seconds is considered to be sleep apnea. The periods of apnea cause carbon dioxide to accumulate in the blood and oxygen to be depleted. For these reasons, sleep apnea can be dangerous. Oxygen depletion to the brain can cause memory impairment, cognitive changes, and daytime sleepiness. If the condition goes untreated, sleep apnea can result in cardiac arrhythmias, congestive heart failure, cerebral vascular accident (CVA), hypertension, and death.

Sleep apnea is associated with airway obstruction. The soft palate (especially in males who are overweight and who snore) can collapse while the patient is asleep. The result is apnea. The patient usually awakens from sleep enough to resume breathing.

Sleep apnea is diagnosed by sleep laboratory studies when apnea is observed while the patient is sleeping.

Treatment of sleep apnea consists of weight loss and continuous positive airway pressure (CPAP), a device that puts pressure on the airway while the patient sleeps. A mask is placed over the patient’s face to keep the airway open. This prevents sleep apnea. A surgical procedure can be performed to remove parts of the soft palate and uvula.

Narcolepsy. Narcolepsy is another type of sleep disorder that causes patients to have daytime sleeping while driving, eating, or sitting in a movie theater. The patient can become paralyzed from the
sleep, being unable to move, but can still breathe. The cause may be genetic.

The diagnosis is made by ruling out sleep apnea (through sleep studies) and by the history of repeated episodes of daytime sleeping for a few seconds to half an hour. The disorder is not under the patient’s control.

**Breath Sounds.** The presence or absence of breath sounds can be indicative of respiratory problems. Sounds should be listened for and noted when taking the patient’s respiratory rate.

**Rales** (pronounced “rawles”) are rattling sounds heard during inspiration and expiration when the lung passageways contain secretions. The provider uses a stethoscope to auscultate or listen for rales, which are associated with some lung diseases. Rhonchi are sounds similar to snoring, usually produced by a rattle in the throat. These are also heard by auscultation.

**Wheezees** are high-pitched musical sounds heard on expiration. They can be the result of an obstruction in the bronchi and bronchioles of the lungs. Wheezes are commonly associated with asthma and emphysema, a chronic pulmonary disease characterized by dilated and damaged alveoli.

**Stridor** is a crowing sound heard on inspiration as a result of an obstruction of the upper airway. It is associated with laryngitis, a foreign body obstruction, and croup in children.

**Stertorous** respiration is described as a snoring sound with labored breathing. The sound usually is created by partial obstruction of the upper airway.

**BLOOD PRESSURE**

Blood pressure measures cardiovascular function by measuring the force of blood exerted on peripheral arteries during the cardiac cycle or heartbeat. The measurement consists of two components. The first is the force exerted on the arterial walls during cardiac contraction and is called **systole**. The second is the force exerted during cardiac relaxation and is called **diastole**. They represent the highest (systole) and lowest (diastole) amount of pressure exerted during the cardiac cycle. Blood pressure is recorded as a fraction, with the systolic measurement written, followed by a slash and then the diastolic measurement.

**Example:** systole/diastole or 120/80

Blood pressure may be affected by many factors, including blood volume, peripheral resistance, vessel elasticity, condition of the muscle of the heart, genetics, diet and weight, activity, and emotional state.

- Blood volume is the amount of blood within the arteries. Increased volume of blood increases blood pressure, whereas a decrease in blood volume decreases blood pressure, as in the case of a hemorrhage or severe dehydration.
- Peripheral resistance is the resistance to blood flow within the arteries. The resistance is in direct relation to the **lumen** of the arteries. The smaller the lumen, the more pressure needed to push blood through. The reverse is also true: the larger the lumen, the less resistance and less pressure needed to push the blood through. The size of the lumen can become smaller from deposits of fatty cholesterol (plaque), resulting in an increase in blood pressure.
- Vessel elasticity refers to the ability of arteries to expand and contract to provide a steady flow of blood. As a person ages, elasticity of the vessels is reduced. **Atherosclerosis** can cause an increase in arterial wall resistance, resulting in an increase in blood pressure.
- The condition of the heart muscle is extremely important to blood flow and blood pressure. A strong heart muscle provides a forceful pump resulting in efficient blood flow and normal blood pressure. A weak heart muscle results in an inefficient pumping action of the heart leading to a decrease in blood pressure and blood flow (see Chapter 37).

The viscosity of the blood also is a factor in blood pressure. Viscosity refers to how sticky a substance is, in this case, the blood. If the blood is sticky, it acts thicker. Imagine holding a bottle of thin syrup upside down over your pancakes. The thin syrup comes out of the bottle quite readily. Now imagine holding a bottle of thick molasses over the pancakes. Being very viscous, the molasses is thicker and much more difficult to pour. So it is with viscous blood; it is thicker and requires a lot more work for the heart muscle to move it through the vessels, thus increasing the pressure inside the walls of the arteries. In fact, it may be so viscous that it might not be able to reach the tiniest capillaries of the kidney, eyes, and other areas without substantial increase in blood pressure.

**Equipment for Measuring Blood Pressure**

Blood pressure is measured by the auscultatory (listening) method using a sphygmomanometer and a stethoscope (Figure 24-8). Three types of sphygmomanometers are commonly used in the ambulatory care setting: mercury, aneroid, and electronic (digital) manometers (Figures 24-9 to 24-12).
Mercury sphygmomanometers are being phased out with other mercury-containing medical equipment, such as mercury thermometers. Aneroid and electronic blood pressure measuring devices are more commonly used. Many medical facilities continue to use mercury sphygmomanometers while phasing them out in agreement with the EPA, but the process has been slower than the phasing out
of mercury thermometers; therefore, information about the mercury sphygmomanometers is provided in this chapter.

The mercury \textit{manometer} consists of a cuff containing a rubber bladder attached by rubber tubing to a glass column of mercury. The blood pressure is read at the \textit{meniscus} of the mercury as it descends the column. Mercury manometers are the most accurate method of blood pressure measurement and are considered the standard because blood pressure is measured in millimeters of mercury. Although the most accurate, mercury manometers do have disadvantages: they are not as portable as aneroid manometers, and there is always the danger of a mercury spill should the glass column break and cause health and environmental problems. Mercury manometers need to be cleaned and checked regularly for accuracy by a professional technician. Care in handling and storage is important to prevent air bubbles and dirt from forming in the column or breaking the glass containing the mercury.

The aneroid manometer is a cuff containing a rubber bladder attached to a dial. The blood pressure is read at the point of the needle descending the dial. Aneroid manometers need to be calibrated regularly because they do not maintain calibration easily. Care in handling and storage will decrease the loss of calibration. Although not as accurate as a mercury manometer, aneroid manometers are easily portable and there is no danger of a mercury spill.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{aneroid_manometer}
\caption{(A) Mobile aneroid sphygmomanometer. (B) Wall-mounted aneroid sphygmomanometer. (Courtesy of Welch-Allyn.)}
\end{figure}
An electronic sphygmomanometer is automatic and registers blood pressure in digital form on a screen (Figure 24-13). No stethoscope is needed. Once the cuff is secured on the patient’s upper arm, the medical assistant pushes a button and the cuff inflates; the medical assistant then releases the pressure slowly. A readout is visible on the screen (124/75). In addition to blood pressure reading, the unit can automatically measure pulse rate and other vital signs. A pulse oximeter (Figure 24-14) measures the amount of oxygen present in the patient’s blood. The measurement automatically appears on the screen when the device is attached to the patient.

Cuff sizes for manometers range from the smallest pediatric cuff to the largest obese and thigh cuff (Figure 24-15). The appropriate cuff size is necessary to obtain an accurate blood pressure measurement. A cuff that is too small will give an artificially high blood pressure reading, whereas a cuff that is too large will give an artificially low reading. The selection of the cuff size depends on the size of the arm, not the age of the patient. Due to the size of the arm, it may be necessary to use an adult-size cuff on a child or a pediatric-size cuff on an adult. Adult cuffs should have a width that covers one third to one half the circumference of the arm. The length of the bladder should cover approximately 80% of the arm (about twice the size of the width). The cuff for a child should cover two thirds of the upper arm. The American Heart Association recommends if there has been a weight loss or gain of 10 pounds, then the cuff size should be reassessed for the appropriate size.

### Measuring Blood Pressure

The sounds heard during blood pressure measurement are named the Korotkoff sounds. The cause of the sounds is not known. They may be a result of distention of the vessels or the sound of the blood passing through the vessels. In either case, Korotkoff sounds have five distinct phases. Not all phases are heard easily, especially for beginners.

- **Phase I.** Begins with the first sound heard when deflating the cuff. It is a sharp tapping sound. Note this first sound as this will be the *systolic reading* of the blood pressure.

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**Figure 24-13** An electronic sphygmomanometer can measure pulse and other vital signs simultaneously.

**Figure 24-14** Pulse oximeter.

**Figure 24-15** Blood pressure cuffs in sizes to fit the arm of a small child to the thigh of an adult. It is important to have the correct size to obtain an accurate reading.
Phase II. This sound is the result of more blood passing through the vessels as the cuff is deflated. The sound is that of a soft swishing sound.

Phase III. More blood continues to pass through the vessels as the cuff is deflated. The sound is a rhythmic tapping sound. If blood pressure measurements are not carefully followed and Phases I and II are missed, Phase III may erroneously be reported as the systolic pressure.

Phase IV. Blood is now passing through the vessels fairly easily as the cuff is deflated. The sounds heard will be a muffling and fading of the tapping sounds. This phase may be used to record the diastolic pressure in children and in those patients where a tapping sound is heard to zero.

Phase V. Blood is flowing freely at this time; consequently all sounds disappear. The disappearance of sounds is noted and recorded as the diastolic pressure.

When measuring blood pressure, keep two things in mind: patient comfort and accuracy. Auscultatory gap is heard in some patients. It is a time, usually between Phases I and II or III, when all sounds disappear. Within 20 to 30 mm Hg, or 20 to 30 increments on the aneroid, the sounds reappear. If the procedures are not followed carefully, the auscultatory gap is easily missed, and the blood pressure measurement is incorrect in that systolic and diastolic readings may be in error according to the length of the gap (Table 24-1).

Pulse pressure is the difference between the systolic and diastolic measurements. The normal range for pulse pressure is 30 to 50 mm Hg. The difference should be no more than one third of the systolic reading. For example, if the blood pressure is 120/80 a normal pulse pressure should be 120 minus 80 or 40. One third of the systolic reading of 120 is 40. Therefore, 40 mm Hg pulse pressure is within the normal range.

**Recording Blood Pressure Measurement**

The blood pressure is recorded on the patient chart or electronic medical record in a fraction format. The position of the patient (sitting or lying down) may be noted. The arm used is also noted, particularly if the blood pressure was taken in both arms.

**Example:** 120/80, ® arm, supine or 120/80 ® arm, supine

For children and those patients whose blood pressure can still be heard to zero, the beginning of Korotkoff Phase IV and zero both are recorded.

**Table 24-1 Errors in Blood Pressure Measurement Procedures**

| Errors in measuring blood pressure must be avoided. Common errors include: |
| 1. Improper cuff size. |
| 2. The arm is not at heart level. Do not hold the arm up or let the patient hold up the arm. Pressure is increased when this is done. |
| 3. Cuff is not completely deflated before use or after palpatory method, resulting in a higher pressure measurement. |
| 4. Deflation of the cuff is faster than 2 to 4 mm Hg per heartbeat or 20–30 increments on the aneroid. Sounds are missed if this happens. |
| 5. Reinfating the cuff during the procedure without allowing the arm to rest for 1 to 2 minutes. |
| 6. Patient is not relaxed and comfortable. An anxious, apprehensive patient will have a reading that is higher than the actual blood pressure. |
| 7. Improper cuff placement. Cuff is too loose, too tight, or not positioned correctly over the brachial artery. |
| 8. Defective equipment in which there are air leaks in the bladder or valve, the mercury column is dirty, or air bubbles are present. Mercury and aneroid sphygmomanometers are not calibrated at zero. |
| 9. Measuring blood pressure with thumb on the head of the stethoscope. |

All of these errors are easily corrected by following careful procedure and by having the manometers calibrated and cleaned according to a regular maintenance schedule.

**Example:** 120/70/0 or 120/70/0

Procedure 24-10 outlines the procedure for measuring blood pressure.

**Normal Blood Pressure Readings**

Normal blood pressure is low at birth and gradually increases with age until adulthood, at which point it should remain fairly constant. Blood pressure measurements are taken during yearly physical examinations beginning at age 3.
**NORMAL BLOOD PRESSURE READINGS**

In a healthy child, blood pressure is taken for the first time during the physical exam when the child is 3 years old. Blood pressure in children varies based on their gender and height percentile.

<table>
<thead>
<tr>
<th>Age</th>
<th>Systolic</th>
<th>Diastolic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child 10 years</td>
<td>100/65</td>
<td></td>
</tr>
<tr>
<td>Adolescent 16 years</td>
<td>118/75</td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>Systolic less than 120</td>
<td>Diastolic less than 80</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120–139/80–89</td>
<td></td>
</tr>
<tr>
<td>High blood pressure</td>
<td>Above 140/90</td>
<td></td>
</tr>
</tbody>
</table>

Blood Pressure Abnormalities

There are only two possible blood pressure abnormalities: hypertension, blood pressure that is consistently above normal, and hypotension, blood pressure that is consistently below normal in which patients are unable to perform their normal activities without dizziness and extreme fatigue.

**Hypertension.** There are five types of hypertension: primary or essential, secondary, benign, and malignant.

- The most commonly seen form of hypertension is primary or essential. It is hypertension with no apparent cause or cure but is treatable. Treatment is designed to control hypertension and is a lifelong process. It will not be cured, just controlled. The American Heart Association (AHA) suggests that to diagnose hypertension, the diagnosis is based on the average of three readings at each of three visits to the provider’s office after the initial baseline screening. According to the AHA, normal blood pressure for adults 18 years and older is less than 120/80, prehypertension is 120–139/80–89, hypertension stage 1 is 140–159/90–99, and hypertension stage 2 is ≥160/≥100.

- Secondary hypertension is the result of some underlying problem, such as renal disease, pregnancy, endocrine imbalances, obesity, arteriosclerosis, or atherosclerosis. Once the underlying problem is removed, the blood pressure returns to normal or near normal. Secondary hypertension can be successfully treated.

- Hypertension that has a slow progression but may progress to the same end point as malignant hypertension is referred to as benign hypertension.

- Malignant hypertension (no association with cancer) progresses rapidly with severe damage to the cardiovascular system, possibly to the point of death.

- White coat hypertension is hypertension that can occur in some individuals. It is caused by anxiety or fear when blood pressure measurements are taken by a provider.

**Hypotension.** Hypotension is blood pressure persistently less than normal, usually less than 90/60, although this may be normal for some healthy adults. Hypotension is defined as a blood pressure so low that the patient is unable to function normally. It is usually a result of various shocklike conditions such as hemorrhage, traumatic or emotional shock, central nervous system disorders, or chronic wasting diseases. With successful treatment of the underlying problems, the blood pressure usually will be in the range of normal readings.

Orthostatic hypotension, sometimes called postural hypotension, occurs when a person rapidly changes position from supine to standing, when

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**Patient Education**

Hypertension is at epidemic proportions in the United States, and many patients are not treated because they do not know that they have the problem. It is known as the “silent epidemic” because most people do not experience any symptoms over a span of years. However, untreated or poorly treated hypertension over time can damage the heart, cause myocardial infarction, cause a stroke (cerebrovascular accident), or lead to kidney failure.

There are several nondrug ways to reduce blood pressure, even for people who have inherited hypertensive tendencies. With the provider’s advice, there are steps to take include: eating plenty of produce, grains, and low-fat dairy foods; cutting back on salt; stopping smoking; exercising regularly; maintaining a healthy weight; limiting alcohol intake; and reducing stress. It is easy to see that these recommendations all are lifestyle changes.

They can significantly reduce blood pressure if practiced daily. Blood pressure must be monitored regularly by your provider.
standing in one position for too long, or as a side effect of certain medications. In this instance, the blood pressure has momentarily decreased, and the person experiences vertigo (dizziness) and may have blurred vision. These symptoms usually last only a few seconds, just long enough for the blood pressure to return to normal. Care should be taken when helping patients to an upright position from a supine position because orthostatic hypotension can lead to syncope (fainting) and injury from falling.

HEIGHT AND WEIGHT

Although not considered a vital sign, height and weight are routinely measured if warranted by the age and the physical condition of the patient. Many providers prefer that height and weight be measured as part of a yearly physical examination and otherwise may vary the frequency of patient height and weight measurements. Height and weight are normally measured simultaneously.

For children, height and weight are typically measured during each provider visit. The height of adults may be obtained on the initial visit only and weight taken on all visits. An adolescent or young adult may have height measured more frequently to plot body changes. Because older adult patients tend to lose the cushioning between vertebrae through osteoporosis as part of aging, they may need to have their height measured more frequently to check the stage of any degeneration.

Older adult patients require special attention by the medical assistant when measuring height and weight. It is especially important to assist older patients both on and off the scale, because the scale platform is movable, and older patients may lose their balance and fall if unassisted. A stand-alone walker can be placed over the scale platform to aid in stabilizing the patient.

Height

To measure a patient’s height, a scale with a measuring bar is necessary (Figure 24-16A). A paper towel is placed on the scale because the patient’s shoes should be removed for accurate measuring.

The patient is asked to step on the scale and face away from the measuring bar. Assist patient onto the scale; the scale platform is movable and the patient could fall.

There are two reasons for having the patient’s back to the scale. When the measuring bar is lifted, it could cause face or eye injuries if the patient were facing the bar. Lifting the measuring bar prior to the patient stepping on the scale can also lead to eye and face injuries in that the patient could inadvertently walk into the bar. Another reason to have the patient’s back to the scale is if the patient does

Critical Thinking

Discuss the normal vital signs differences expected between an infant and an adult. Why do they occur?
not look straight ahead, the head is not level, which could result in a less than accurate measurement.

After the patient is on the platform, the measuring bar is placed firmly on the patient’s head, and the line between where the solid bar and sliding bar meet is read. The bars are measured in quarter inches (Figure 24-16B). Children’s heights are recorded in inches, whereas adults are recorded in feet and inches. Conversion from inches to feet is accomplished by taking the number of inches and dividing by 12. Procedure 24-11 gives steps for measuring height.

Weight

Provider preference and patient health dictate the frequency of measuring an adult’s weight. Some providers require the patient’s weight to be measured on each visit, whereas others do not if there are no health problems that require weight monitoring. Some health conditions that do require weight monitoring include obesity, eating disorders, hormone disorders such as diabetes and thyroid malfunction, hypertension, pregnancy, cancer, and some digestive disorders.

When measuring the weight of a patient, the medical assistant must maintain the patient’s privacy. Most people are conscious of their weight and may become embarrassed if the measurement is taken where others may see and hear. Privacy is important and often overlooked. The medical assistant must also be careful of comments regarding a patient’s weight, particularly with the obese patient and with those being treated for eating disorders (see Chapter 34). Encouragement for weight loss for the dieting patient is beneficial but must be done in privacy. Other comments are inappropriate.

Occasionally a patient will be instructed by the provider to monitor weight at home. It is important for the patient to understand the necessity of weighing at the same time each day because weight may vary significantly throughout the day. A normal routine is to measure weight before breakfast.

Before an accurate weight can be obtained, the scale must be calibrated. The point of the balance beam must be floating in the center when no weight is applied to the scale. Some scales are equipped with a screw at the end that can be turned slightly until the beam is in the correct floating position. Once it is centered, it is calibrated and ready for use (Figure 24-17).
An eye-level digital scale with measuring bar measures height in the same way on the measuring bar of the digital scale as it is on the balance beam measuring bar. Weight measurement is quicker, easier, and usually safer taken on the digital scale. The scale platform is stationary, and the patient is assisted as needed onto the scale; the digital reading is ready in a few seconds (Figure 24-18).

The patient can wear normal indoor clothing, rather than disrobing, for weight measurement. Heavy coats or other outerwear should be removed. Heavy objects and purses should not be held during the procedure. A chair or counter should be provided to place these objects on while the procedure is being performed. Shoes should be removed. Procedure 24-12 gives steps for measuring adult weight.

Occasionally, as in the case of medication dosage, the medical assistant is required to convert pound weight into kilogram weight.

1 kilogram = 2.2 pounds

To convert pounds to kilograms:
Take the number of pounds and divide by 2.2

Example:

130 pounds divided by
2.2 = 59.09 kg

To convert from kilograms to pounds:
Take the number of kilograms and multiply by 2.2

Example:

50 kilograms multiplied by
2.2 = 110 lb.

Significance of Weight
The careful monitoring of a patient’s weight may provide an insight into metabolic, nutritional, and emotional problems.

MEASURING CHEST CIRCUMFERENCE

Occasionally, the medical assistant is instructed to measure the chest of an adult. This procedure may be done on patients with emphysema and as a requirement for insurance and truck driver licenses. Two measurements are taken, one on the deepest inspiration and one on the deepest expiration. A comparison is then made to ascertain chest capacity. To perform the procedure, ask the patient to disrobe from the waist up. Place a tape measure around the chest at nipple level. Instruct the patient to inhale deeply while you measure, then ask the patient to exhale completely while you take the second measurement. Record the results as inspiration number and expiration number (see Chapter 30).

Critical Thinking
Discuss the methods the medical assistant may use to obtain patient cooperation when taking vital signs. Describe and demonstrate the appropriate charting procedure for normal vital sign results.
Procedure 24-1

Measuring an Oral Temperature Using an Electronic Thermometer

STANDARD PRECAUTIONS:

PURPOSE:
To obtain an oral temperature.

EQUIPMENT/SUPPLIES:
Electronic thermometer
Probe covers
Biohazard waste container

PROCEDURE STEPS:
1. Wash hands and follow Standard Precautions.
2. Assemble equipment.
3. Identify patient.
4. Position the patient in a comfortable position.
5. Determine if the patient has ingested hot or cold drinks or food or has been smoking within the previous half hour. RATIONALE: Ingesting hot or cold substances or smoking can result in an arbitrary increase or decrease in temperature results.
6. Explain the procedure. RATIONALE: To obtain patient cooperation and consent.
7. Select blue (oral) probe.
8. Cover with probe cover (Figure 24-19). RATIONALE: To prevent microorganism cross contamination.
9. Insert under the tongue to either side of the mouth (Figure 24-20). RATIONALE: Under the center of the tongue is the frenulum, which impedes placement in this area.
10. Instruct patient to close mouth without placing teeth on thermometer. RATIONALE: To prevent air leakage.
11. Leave in place until the beep is heard.
12. Remove thermometer after appropriate time has elapsed.
13. Read the results on the digital display window.
15. Replace electronic thermometer in the base holder, if required for recharging.
16. Wash hands.
17. Record temperature in patient’s chest or electronic medical record.

DOCUMENTATION
5/26/20XX 11:00 AM T 99.2°F, P 96, R 14. C. McInnis, RMA

Figure 24-19  Slide the probe into the disposable cover, adjusting if necessary.

Figure 24-20  Insert the thermometer under tongue to either side of mouth.
Procedure 24-2

Measuring an Aural Temperature Using a Tympanic Thermometer

STANDARD PRECAUTIONS:

PURPOSE:
To obtain an aural temperature using a tympanic thermometer.

EQUIPMENT/SUPPLIES:
Tympanic thermometer (Figure 24-21)
Probe covers or ear speculum
Waste container

PROCEDURE STEPS:
1. Wash hands following Standard Precautions.
2. Assemble equipment.
3. Identify the patient.
4. Explain procedure. RATIONALE: This will help gain patient’s cooperation and consent.
5. Place cover on thermometer (Figure 24-22).
6. Set thermometer to start.
7. Gently straighten ear canal up and back for adults and place probe into ear canal to seal the area and activate the system (Figure 24-23). RATIONALE: Air leaks will occur if the ear canal is not sealed.
8. Wait until the temperature is displayed on the screen.
9. Remove from the ear.
10. Discard cover into waste container by pressing the release button.
11. Wash hands.
12. Replace thermometer.
13. Record temperature in patient’s chart or electronic medical record, indicating tympanic measurement (Tym).

DOCUMENTATION
5/26/2XX 4:00 PM T 99.6°F (Tym), P 100, R 20. C. McInnis, RMA

Figure 24-22 Attach the disposable speculum or cover to the tympanic thermometer to prevent spread of microorganisms between patients.

Figure 24-21 Tympanic thermometer: (A) Holder. (B) Tympanic thermometer. (C) Disposable speculum or cover.

Figure 24-23 Pull up on the ear to straighten the auditory canal for an accurate reading.
**Procedure 24-3**

Measuring a Temperature Using a Temporal Artery (TA) Thermometer

**STANDARD PRECAUTIONS:**

**PURPOSE:**
To obtain a temporal artery temperature using a temporal artery (TA) thermometer.

**EQUIPMENT/SUPPLIES:**
Temporal artery thermometer
Alcohol wipes, probe cap or cover, or sheath

**PROCEDURE STEPS:**
1. Wash hands and follow Standard Precautions.
2. Assemble equipment. Clean probe with alcohol or attach a probe. **RATIONALE:** The lens of the thermometer must be clean to work properly.
3. Identify the patient. **RATIONALE:** To be certain you have the correct patient.
4. Explain the procedure. **RATIONALE:** Gain patient’s cooperation and permission.
5. Remove perspiration from forehead, remove hat, push back hair from forehead. **RATIONALE:** False readings can occur from moisture (perspiration) on forehead cooling the skin or from a hat or hair covering forehead, raising the temperature.
6. Hold the probe in the center of patient’s forehead flush against the skin. **RATIONALE:** Probe must be centered properly for accurate reading over area.
7. Press the scan button and hold while sliding the thermometer slowly across the forehead to the temple area hair line. There will be a tapping or clicking sound that will stop when the temperature has been reached.
8. Release the button and remove the thermometer from the forehead.
9. Read the display for temperature measurement.
10. Turn upside down and wipe probe with alcohol wipe. Let dry. Return to holder. **RATIONALE:** TA thermometer must be dry to work effectively.
11. Wash hands.
12. Record temperature in patient’s chart or electronic medical record, indicating TA temperature.

**PRECAUTIONS:**
Check the manufacturer’s manual. Some models cannot be used when oxygen is being used or when in close proximity to aerosols.

**DOCUMENTATION:**
8/31/20XX T 99.8° F (TA) C. McInnis, RMA

**Procedure 24-4**

Measuring a Rectal Temperature Using a Digital Thermometer

**STANDARD PRECAUTIONS:**

**PURPOSE:**
To obtain a rectal temperature using a digital thermometer.

**EQUIPMENT/SUPPLIES:**
Digital thermometer with red probe (rectal)
Probe cover

**PROCEDURE STEPS:**
1. Wash hands and follow Standard Precautions.
2. Assemble equipment.
3. Identify patient.
4. Lubricating jelly on a 4 x 4 gauze or in packet
5. Gloves
6. Biohazard waste container

**PRECAUTIONS:**
Check the manufacturer’s manual. Some models cannot be used when oxygen is being used or when in close proximity to aerosols.

**DOCUMENTATION:**
8/31/20XX T 99.8° F (TA) C. McInnis, RMA
CHAPTER 24  Vital Signs and Measurements  587

Procedure 24-4 (continued)

4. Explain procedure to patient. **RATIONALE:** Ensures understanding and gains patient cooperation and consent.

5. Remove patient’s clothing from the waist down; drape as necessary. **RATIONALE:** Maintains patient’s modesty, privacy, and warmth.


7. Place probe cover on red probe (rectal). **RATIONALE:** To prevent microorganism cross contamination. Red probe indicates rectal thermometer.

8. Lubricate with lubricating jelly. **RATIONALE:** Easier insertion of thermometer and safety for patient.

9. Spread buttocks and gently insert thermometer into the rectum past the sphincter (1½ inches) for adult.

10. Hold buttocks together while holding the thermometer. Do not let go of thermometer. **RATIONALE:** Holding buttocks together prevents air leaks and inaccurate recording. Holding onto thermometer ensures patient safety.

11. Hold in place until the beep is heard.

12. Read results on digital display window.

13. Remove from rectum.

14. Discard probe cover into biohazard waste container by pushing the release button.

15. Replace thermometer on holder base.

16. Remove gloves, discard in biohazard waste container, and wash hands.

17. Offer tissue to patient to wipe anus. Assist patient in dressing and position as necessary.

18. Record temperature in patient’s chart or electronic medical record, indicating a rectal temperature (R).

**DOCUMENTATION**

5/28/20XX 8:00 AM  T 99.6° F (R), P 104, R 20. C. McInnis, RMA

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Procedure 24-5

Measuring an Axillary Temperature

**STANDARD PRECAUTIONS:**

- **PURPOSE:** To obtain an axillary temperature using a digital thermometer.

**EQUIPMENT/SUPPLIES:**

- Digital thermometer
- Sheath
- Towelettes
- Paper towels

**PROCEDURE STEPS:**

1. Wash hands following Standard Precautions.

2. Assemble equipment; place sheath on thermometer.

3. Identify patient.

4. Explain procedure. **RATIONALE:** This elicits patient cooperation and consent.

5. Ask patient to remove clothing to provide access to axilla.

6. Cover patient with gown as necessary to maintain patient modesty and warmth.

7. Wipe axillary area with dry towel or towelette to remove moisture. **RATIONALE:** Moisture in the axilla will cause inaccurate reading.

8. Place thermometer in axilla (Figure 24-24).

9. Ask patient to fold arm against chest or abdomen.

10. Leave in place for appropriate time according to manufacturer’s instructions, usually 10 minutes.

11. Carefully remove.

12. Remove sheath and discard.

13. Read thermometer.

**DOCUMENTATION**

5/28/20XX 8:00 AM  T 99.6° F (R), P 104, R 20. C. McInnis, RMA

continues
15. Wash hands.
16. Place clean thermometer in alcohol for 30 minutes.
17. Record temperature in patient’s chart or electronic medical record, indicating axillary temperature (A).

**DOCUMENTATION**

4/30/20XX 2:00 pm T 97° F (A), P 64, R 12. J. Guerr, CMA (AAMA)

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**Procedure 24-6**

**Measuring an Oral Temperature Using a Disposable Oral Strip Thermometer**

**STANDARD PRECAUTIONS:**

PURPOSE:
To obtain an oral temperature.

EQUIPMENT/SUPPLIES:
Oral strip thermometer (Figure 24-25)
Gloves
Biohazard waste container

PROCEDURE STEPS:
1. Wash hands following Standard Precautions.
2. Assemble equipment.
3. Identify patient.
4. Position the patient in a comfortable position.
5. Determine if the patient has ingested hot or cold drinks or food or has smoked within the previous half hour. RATIONALE: Ingesting hot or cold substance or smoking can result in an arbitrary increase or decrease in temperature results.
6. Explain the procedure. RATIONALE: To obtain patient cooperation and consent.
7. Apply gloves.
8. Insert disposable oral strip thermometer under the tongue to the side of the mouth. RATIONALE: Under the center of the tongue is the frenulum, the fold of mucus membrane that attaches the tongue to the floor of the mouth, which impedes placement in this area.
9. Instruct patient to close mouth tightly. RATIONALE: To prevent air leakage.
10. Leave in place for 60 seconds.
11. Remove thermometer after appropriate time has elapsed.

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**Figure 24-24** After placing thermometer in axilla, ask patient to fold arm against chest or abdomen.
12. Wait 10 seconds to read the dots.
13. Read temperature by locating the last dot that has changed color (Figure 24-26).
14. Discard strip in biohazard waste container.
15. Remove gloves and discard in biohazard waste container.
16. Wash hands.

17. Record temperature in patient’s chart or electronic medical record.

**DOCUMENTATION**

4/16/20XX 3:15 PM  T 101°F, P 100, R 22 (disposable oral thermometer reading)  J. Guerra, CMA (AAMA)

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**Figure 24-25**  Disposable oral strip thermometer.

**Figure 24-26**  The reading on this disposable oral thermometer is 101°F.
STANDARD PRECAUTIONS:

PURPOSE:
To obtain a radial pulse rate.

EQUIPMENT/SUPPLIES:
Watch with second hand

PROCEDURE STEPS:
1. Wash hands.
2. Identify patient.
3. Explain procedure. RATIONALE: Ensures patient cooperation and consent.
4. Position patient with the wrist resting either on a table or on lap (Figure 24-27).
5. Locate the radial pulse with the pads of your first three fingers. Do not use thumb; it has its own pulse.
6. Gently compress the radial artery enough to feel the pulse.
7. Count the pulsations for 1 full minute.
8. Note any irregularities in rhythm, volume, and condition of artery.
9. Wash hands.
10. Record pulse in patient chart or electronic medical record after the temperature, noting any irregularities.

DOCUMENTATION
2/10/20XX 3:00 pm  T 98.2˚F  P 80, regular and strong. D. Kolter, RMA
Procedure 24-8

Taking an Apical Pulse

STANDARD PRECAUTIONS:

PURPOSE:
To obtain an apical pulse rate.

EQUIPMENT/SUPPLIES:
Stethoscope
Watch with second hand
Alcohol wipes

PROCEDURE STEPS:
1. Wash hands.
2. Assemble equipment.
3. Wipe earpiece with alcohol wipes.
4. Identify patient.
5. Explain procedure. RATIONALE: Ensures patient cooperation and consent.
6. Assist patient in disrobing, removing clothing from the waist up.
7. Provide a gown or drape for patient modesty and warmth.
8. Position the patient in a supine position. RATIONALE: Easier access to apex of heart.
9. Locate the fifth intercostal space, midclavicular, left of sternum (Figure 24-28). RATIONALE: Location of apex of heart.
10. Place stethoscope on the site and listen for the lub-dub sound of the heart.
11. Count the pulse for 1 minute; each lub-dub equals one pulse.
12. Assist the patient to sit up and dress.
13. Wash hands.
15. Record pulse in patient chart or electronic medical record with the designation of apical pulse (AP) to denote method of obtaining the pulse and note any arrhythmias.

NOTE: Apical pulse and radial pulse are frequently taken simultaneously, with the radial pulse taken by another individual (Figure 24-29). Both pulse rates should be identical. A discrepancy may indicate a cardiac problem.

DOCUMENTATION
7/8/20XX 12 pm T 98.6°F, P (AP) 96 reg. (radial) 100 slightly irregular. Dr. King notified. D. Kolter, RMA

Figure 24-28 Locate the apical pulse by counting intercostal spaces. Locate the fifth intercostal space.

Figure 24-29 Sometimes apical and radial pulses are taken simultaneously.
Procedure 24-9

Measuring the Respiration Rate

STANDARD PRECAUTIONS:

NOTE: The respiration rate is normally taken immediately before or after the pulse rate. It should be taken without patient knowledge because respiration can voluntarily be altered. While counting respirations, it is best to continue grasping the wrist as if still taking the pulse. This procedure will assist in preventing alteration of breathing by the patient.

PURPOSE:
To obtain an accurate respiratory rate.

EQUIPMENT/SUPPLIES:
Watch with second hand

PROCEDURE STEPS:
1. Wash hands.
2. Identify the patient.
4. Watch the rise and fall of the chest wall for 1 minute, or while holding the patient’s arm, place it across the chest and feel for the rise and fall of chest wall. Alternatively, place a hand on the patient’s shoulder and feel and watch for the rise and fall of the chest wall.
5. Note depth, rhythm, and breath sounds while counting.
6. Wash hands.
7. Record respiration rate in patient’s chart or electronic medical record, noting any irregularities and sounds.

DOCUMENTATION
8/7/20XX 2:00 PM T 98.6°F, P 84. Rate and rhythm regular.
J. Guerr, CMA (AAMA)

Procedure 24-10

Measuring Blood Pressure

STANDARD PRECAUTIONS:

PURPOSE:
To measure blood pressure.

EQUIPMENT/SUPPLIES:
Stethoscope
Sphygmomanometer
Alcohol wipes

PROCEDURE STEPS:
1. Wash hands.
2. Identify patient.
3. Clean earpieces of stethoscope with alcohol wipe.
4. Assemble equipment, making sure that cuff size is correct. RATIONALE: Inappropriate cuff size will result in inaccurate measurement.
5. Explain procedure. RATIONALE: May be the first instance where blood pressure is measured; to allay anxiety and ensure cooperation and consent.
6. Position patient comfortably; feet flat on the floor, arm resting at heart level on the lap or a table. RATIONALE: Legs crossed may arbitrarily increase blood pressure; arm above heart level may result in inaccurate reading.
7. Bare the right upper arm. If clothing is restricting, have patient remove it. RATIONALE: Tight clothing on the arm can produce inaccurate results. Right arm is used for consistency, but if one arm measures a higher reading, then that arm is used consistently to measure the blood pressure.
8. Palpate brachial artery.
9. Securely center the bladder of the cuff over the brachial artery above the bend of the elbow. **RATIONALE:** Cuff should be high enough so stethoscope does not touch it. Extraneous sounds may be heard. Be certain the gauge is on zero.
10. Palpate the radial pulse and smoothly inflate cuff until the pulse is no longer felt; note the number.
11. Quickly deflate the cuff and allow arm to rest for about one minute. Calculate peak inflation level. **RATIONALE:** This ensures that an auscultatory gap is not missed.
12. Make sure cuff is completely deflated.
13. Position stethoscope over the brachial artery and hold in position with the fingers only.
14. Inflate cuff smoothly and quickly to the peak inflation level plus 30 mm Hg (Figure 24-30).
15. Deflate the cuff at a rate of 2 to 4 mm Hg per heartbeat. **RATIONALE:** No matter how experienced you become, accurate blood pressure readings cannot be obtained if the cuff deflation is greater than 2 to 4 mm Hg per heartbeat.
16. Listen for Korotkoff Phase I; note when it appears.
17. Continue deflation, noting the Korotkoff phases.
18. Note when all sounds disappear, Korotkoff Phase V.
19. Continue deflating the cuff at the same rate for at least another 10 mm Hg after sounds have disappeared. **RATIONALE:** To hear an auscultatory gap should one be present.
20. Deflate the cuff quickly.
21. Remove the cuff.
22. Clean earpieces and diaphragm of stethoscope with alcohol wipes.
23. Wash hands.
24. Record blood pressure in patient’s chart or electronic medical record.

**NOTE:** On a patient’s initial visit and in patients with hypertension, the provider may want the blood pressure taken in both arms. There is normally a slight variation in pressure between the arms. If it is necessary to repeat the procedure, wait approximately 5 minutes before doing so.

**DOCUMENTATION**

2/16/20XX 3:00 PM BP 146/90 in right arm. BP 150/92 in left arm. D. Swingle, CMA (AAMA)
Procedure 24-11

Measuring Height

STANDARD PRECAUTIONS:

PURPOSE:
To obtain the height of a patient.

EQUIPMENT/SUPPLIES:
Scale with measuring bar
Paper towel

PROCEDURE STEPS:
1. Wash hands.
2. Identify patient.
3. Explain the procedure to patient to ensure understanding, cooperation, and consent.
4. Instruct patient to remove shoes and stand on paper towel on scale with back against scale, looking straight ahead. RATIONALE: Back against scale aids patient safety.
5. Assist patient onto scale. RATIONALE: Scale platform is movable, and patient may become unsteady and lose balance and fall.
6. Lower measuring bar until firmly resting on top of head (Figure 24-31).
7. Assist patient’s stepping off the scale. Allow patient to sit and help with shoes if necessary.
8. Read line where measurement falls.
9. Lower measuring bar to its original position.
10. Wash hands.
11. Record height in patient’s chart or electronic medical record.

DOCUMENTATION
3/4/20XX 2:00 PM  Ht. 59 60. B. Abbott, RMA

Figure 24-31  To measure height, have the patient stand with back against scale and keep head level.
Procedure 24-12

Measuring Adult Weight

STANDARD PRECAUTIONS:

PURPOSE:
To obtain the weight of the patient.

EQUIPMENT/SUPPLIES:
Balance beam or digital scale
Paper towels

PROCEDURE STEPS:
1. Wash hands.
2. Identify patient.
3. Explain the procedure to patient to ensure understanding and cooperation.
4. Place a paper towel on scale. RATIONALE: Paper towel protects patient’s feet from microorganisms.
5. Instruct the patient to place heavy objects on the area provided, including heavy objects that may be in pockets.
6. Instruct the patient to remove shoes, jacket, and heavy sweater and step on the scale. Assist patient to the center of the scale. RATIONALE: The scale platform is movable, and the patient may become unsteady, lose balance, and fall. The platform on the digital scale is stationary, but assist the patient onto the scale platform and read the digital reading. If using a balance beam scale, continue with Steps 7 through 14.
7. Move the lower weight bar (measured in 50-pound increments) to the estimated number (the patient may be asked for approximate weight).
8. Slowly slide the upper bar until the balance beam point is centered (Figure 24-32).
9. Read the weight by adding the upper bar measurement to the lower bar measurement (see Figure 24-17).
10. Assist the patient in stepping off the scale.
11. Provide a chair for the patient to sit and put on shoes. Return objects to the patient.
12. Return the weights to zero.
13. Wash hands.
14. Record weight in patient’s chart or electronic medical record.

DOCUMENTATION
5/2/20XX 3:00 PM   Wt. 142 lbs.  B. Abbott, RMA

Figure 24-32 When weighing the patient, slide the upper bar until the balance beam point is centered.
Case Study 24-1

Refer to the scenario at the beginning of the chapter.

CASE STUDY REVIEW

1. There are three different kinds of sphygmomanometers. Give advantages and disadvantages of each.
2. When you weigh Mrs. Williams, you notice from her record that she has lost 10 pounds in 6 months. What questions will you ask her about her weight loss?
3. Height and weight measurements are important for many reasons. What do you consider the most important of the many reasons? What do you consider the least important reason? Why?

Case Study 24-2

Herb Fowler, a regular patient of Dr. Lewis at the medical facility of Drs. Lewis and King, is an African-American in his 50s. He has smoked for many years and only recently has thought about quitting smoking because of a chronic cough. Herb is significantly overweight but is having a hard time making the decision to give up smoking and change his diet. Although his blood pressure has been stable for the last few years, Audrey Jones, CMA (AAMA), is concerned when she takes Herb’s vital signs during his most recent checkup. His weight is slightly up, and his blood pressure has jumped from 140/90 to 156/100.

CASE STUDY REVIEW

1. Is a blood pressure reading of 156/100 a cause for concern? Should Audrey take a second reading?
2. In addition to alerting the provider to the change in Mr. Fowler’s blood pressure and weight, Audrey feels she may be able to provide advice to the patient (with provider permission). How can Audrey use her communication and medical assisting knowledge to counsel Herb Fowler on lifestyle changes?
3. To follow up, Audrey reviews her knowledge of hypertension and discusses the four types with the provider. What are the four kinds of hypertension and what are their characteristics?

SUMMARY

Throughout life, a patient will undergo various measurements to ascertain growth, development, and general health and well-being. The normal range for each of these measurements will vary according to the stage of life of the patient at the time of examination. The medical assistant must be aware of what to expect when measuring a patient in each life stage. Awareness of normal expectations for each stage of life will help the medical assistant to perform the procedures in a more effective and efficient manner and aid in observing any abnormal signs and measurements.

Together with differences seen with age, the medical assistant will see differences in patients because each patient has unique medical problems.

The medical assistant has a great responsibility when performing patient measurements and must ensure accuracy, patient safety, comfort, and confidentiality while obtaining accurate results.
STUDY FOR SUCCESS

- Review the Key Terms
- Practice the Procedures
- Consider the Case Studies and discuss your conclusions
- Answer the Review Questions
  - Multiple Choice
  - Critical Thinking
- Navigate the Internet by completing the Web Activities
- Practice the StudyWARE activities on your student CD
- Apply your knowledge in the Student Workbook activities
- Complete the Web Tutor section
- View and discuss the DVD situations

REVIEW QUESTIONS

Multiple Choice

1. This type of thermometer measures the temperature of the skin surface over the temporal artery:
   a. aural
   b. TA
   c. tympanic
   d. axillary
2. The artery commonly used for taking a patient’s pulse is:
   a. carotid       c. radial
   b. brachial       d. popliteal
3. A blood pressure cuff that is too small for the patient’s arm will:
   a. have no effect on the results
   b. give an arbitrarily low result
   c. give an arbitrarily high result
   d. have an effect on certain patients only
4. The term used to indicate a pulse rate significantly above the average is:
   a. bradycardia   c. arrhythmia
   b. tachycardia   d. sinus rhythm

Critical Thinking

1. Discuss the responsibilities of the medical assistant when measuring vital signs.
2. Describe the care and use for each of the various types of thermometers.
3. Discuss the reasons that a professional must be aware that mercury thermometers and other mercury-containing equipment are being phased out of use.
4. Demonstrate the procedure for converting temperatures from Fahrenheit to Celsius and vice versa and calculate the following conversions:
   a. 98.6°F = _____________ °C
   b. 39.1°C = _____________ °F
5. Discuss the rationale for not using the thumb for taking the pulse rate of a patient.
6. Discuss the reasons for taking the respiratory rate of a patient without the patient’s knowledge.
7. Discuss the importance of using the appropriate blood pressure cuff size when measuring a patient’s blood pressure.
8. Describe the following:
   a. hypertension   c. apnea
   b. tachycardia   d. remittent fever

WEB ACTIVITIES

1. Using a search engine, access information on the Internet from the American Heart Association regarding essential hypertension and answer the following:
   a. What population of people in the United States is at greatest risk for essential hypertension?
598  UNIT 6  Integrated Clinical Procedures

b. List four patient education tips for reducing blood pressure without the aid of medication.
c. Check the list of normal blood pressure readings in this chapter and compare it with what the American Heart Association says are normal blood pressure measurements at various ages.

2. Access information on the Internet from the National Research Council and list its recommendations for weight of the following women:

<table>
<thead>
<tr>
<th>Height</th>
<th>Age</th>
<th>Weight in Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>5' 2&quot;</td>
<td>19–34 years</td>
<td>?</td>
</tr>
<tr>
<td>5' 4&quot;</td>
<td>19–34 years</td>
<td>?</td>
</tr>
<tr>
<td>5' 6&quot;</td>
<td>19–34 years</td>
<td>?</td>
</tr>
</tbody>
</table>

THE DVD HOOK-UP

This chapter discusses the proper techniques for obtaining the patient’s vital signs and steps for measuring and weighing the patient.

This program illustrated many techniques for obtaining various vital signs. In the taking a radial pulse scene, the medical assistant noticed a problem with the patient’s rhythm and decided to take an apical pulse as well. The chapter states that you should place the patient in a supine position and locate the apex of the heart when taking an apical pulse. The DVD program illustrated the medical assistant taking an apical pulse with the patient sitting in an upright position. It also had a more complicated technique for finding the apex of the heart.

1. How do you think you should manage a patient with an arrhythmia? How can you keep the patient from becoming concerned?
2. Which method do you think would work better for measuring an apical pulse: the method listed in the book or in the DVD program? Why?

REFERENCES/BIBLIOGRAPHY


THE DVD HOOK-UP

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1. How do you think you should manage a patient with an arrhythmia? How can you keep the patient from becoming concerned?
2. Which method do you think would work better for measuring an apical pulse: the method listed in the book or in the DVD program? Why?

DVD Journal Summary

Write a paragraph that summarizes what you learned from watching today’s DVD program. At the end of the blood pressure scene, the medical assistant told the patient that her blood pressure was 158/100, which is quite elevated. Do you think it was wise of the medical assistant to tell the patient her reading? Do you think it is acceptable to tell patients their blood pressure when it is normal? Why or why not?