## Anthropometric Measurements and Vital Signs

### Outline

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<td>Weight</td>
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<td>Blood Pressure</td>
</tr>
<tr>
<td>Height</td>
<td>Pulse</td>
<td></td>
</tr>
</tbody>
</table>

### Learning Outcomes

#### Cognitive Domain

*Note: AAMA/CAAHEP 2008 Standards are italicized.*

1. Spell and define key terms
2. Explain the procedures for measuring a patient’s height and weight
3. Identify and describe the types of thermometers
4. Compare the procedures for measuring a patient’s temperature using the oral, rectal, axillary, and tympanic methods
5. List the fever process, including the stages of fever
6. Describe the procedure for measuring a patient’s pulse and respiratory rates
7. Identify the various sites on the body used for palpating a pulse
8. Define Korotkoff sounds and the five phases of blood pressure
9. Identify factors that may influence the blood pressure
10. Explain the factors to consider when choosing the correct blood pressure cuff size
11. Discuss implications for disease and disability when homeostasis is not maintained

#### Psychomotor Domain

*Note: AAMA/CAAHEP 2008 Standards are italicized.*

1. Measure and record a patient’s weight (Procedure 19-1)
2. Measure and record a patient’s height (Procedure 19-2)
3. Measure and record a patient’s oral temperature using a glass mercury thermometer (Procedure 19-3)
4. Measure and record a patient’s rectal temperature (Procedure 19-4)
5. Measure and record a patient’s axillary temperature (Procedure 19-5)
6. Measure and record a patient’s temperature using an electronic thermometer (Procedure 19-6)
7. Measure and record a patient’s temperature using a tympanic thermometer (Procedure 19-7)
8. Measure and record a patient’s temperature using a temporal artery thermometer (Procedure 19-8)
9. Measure and record a patient’s radial pulse (Procedure 19-9)
10. Measure and record a patient’s respiration (Procedure 19-10)
11. Measure and record a patient’s blood pressure (Procedure 19-11)
12. Obtain vital signs
13. Practice standard precautions
14. Document accurately in the patient record

#### Affective Domain

*Note: AAMA/CAAHEP 2008 Standards are italicized.*

1. Apply critical thinking skills in performing patient assessment and care
2. Demonstrate respect for diversity in approaching patients and families
Vital signs, also known as cardinal signs, are measurements of bodily functions essential to maintaining life processes. Vital signs frequently measured and recorded by the medical assistant include the temperature (T), pulse rate (P), respiratory rate (R), and blood pressure (BP). In addition, medical assistants take anthropometric measurements, or the height and weight, of patients and document them in the medical record. This information is essential for the physician to diagnose, treat, and prevent many disorders.

Measurements taken at the first visit are recorded as baseline data and are used as reference points for comparison during subsequent visits. After the first office visit, the height is usually not taken; however, the vital signs and weight are taken and recorded for each adult patient at each visit to the medical office.

## Anthropometric Measurements

### Weight

An accurate weight is always required for pregnant patients, infants, children, and the elderly. In addition, weight monitoring may be required if the patient has been prescribed medications that must be carefully calculated according to body weight or for a patient who is attempting to gain or lose weight.

Since most medical practices have only one scale, placement of the scale is important. Many patients are uncomfortable if they are weighed in a place that is not private. Types of scales used to measure weight include balance beam scales, digital scales, and dial scales (Fig. 19-1). Weight may be measured in pounds or kilograms, depending upon the preference of the physician and the type of scale in the medical office. Procedure 19-1 describes how to measure and record a patient’s weight.

### Height

Height can be measured using the movable ruler on the back of most balance beam scales. Some offices use a graph ruler mounted on a wall (Fig. 19-2), but more accurate measures can be made with a parallel bar moved down against the top of the patient’s head. Height is measured in inches or centimeters, depending upon the physician’s preference. Procedure 19-2 describes how to measure an adult patient’s height. Refer to Chapter 37.
PART III • The Clinical Medical Assistant

Figure 19-1 The three types of scales used in medical offices include the digital, dial, and balance beam scale.

for the procedure for measuring the height and weight of infants and children.

CHECKPOINT QUESTION

1. Why is it important to accurately measure vital signs at every patient visit?

Figure 19-2 A wall-mounted device to measure height and the sliding bar on the balance beam scale.

VITAL SIGNS

Temperature

Body temperature reflects a balance between heat produced and heat lost by the body (Fig. 19-3). Heat is produced during normal internal physical and chemical processes called metabolism and through muscle movement. Heat is normally lost through several processes, including respiration, elimination, and conduction through the skin (Table 19-1). Normally, the body maintains a constant internal temperature of around 98.6° Fahrenheit (F) or 37.0° Celsius (C) (centigrade). A patient whose temperature is within normal limits is said to be afebrile, whereas a patient with a temperature above normal is considered febrile (has a fever).

Thermometers are used to measure body temperature using either the Fahrenheit or Celsius scale, Box 19-1

Figure 19-3 Factors affecting the balance between heat loss and heat production.
compares temperatures taken a variety of ways in Celsius and in Fahrenheit. Since glass or electronic thermometers used in the medical office may be in either scale, you should be able to convert from one scale to another (see Appendix G). The patient’s temperature can be measured using the oral, rectal, axillary, or tympanic method. The oral method is most commonly used, but use of the tympanic thermometer is also becoming more prevalent, especially in pediatric offices. A newer type of thermometer that you may see is the temporal artery thermometer (Fig. 19-4). This device measures the temperature of the blood within the temporal artery through the skin. If used accurately, both the tympanic thermometer and the temporal artery thermometer give readings that are comparable to the oral temperature.

A reading of 98.6°F orally is considered a normal average for body temperature, with the normal range being 97°F to 99°F. Rectal and axillary readings will vary slightly. Generally, rectal temperatures are 1°F higher than the oral temperatures because of the vascularity and tightly closed environment of the rectum. Axillary temperatures are usually 1°F lower because of lower vascularity and difficulty in keeping the axilla tightly closed. When recording the body temperature, you must...
indicate the temperature reading and the method used to obtain it, such as oral, rectal, axillary, tympanic, or temporal artery. A rectal temperature reading of 101°F is equivalent to 100°F orally, and an axillary reading of 101°F is equivalent to 102°F orally.

**CHECKPOINT QUESTION**

2. How does an oral temperature measurement differ from a rectal measurement? Why?

**Fever Processes**

Although a patient’s temperature is influenced by heat lost or produced by the body, it is regulated by the hypothalamus in the brain. When the hypothalamus senses that the body is too warm, it initiates peripheral vasodilation to carry core heat to the body surface via the blood and increases perspiration to cool the body by evaporation. If the temperature registers too low, vasoconstriction to conserve heat and shivering to generate more heat will usually maintain a fairly normal core temperature. Temperature elevations and variations are often a sign of disease but are not diseases in themselves. The following factors may cause the temperature to vary:

- **Age.** Children usually have a higher metabolism and therefore a higher body temperature than adults. The elderly, who have slower metabolisms, usually have lower readings than younger adults. Temperatures of both the very young and the elderly are easily affected by the environment.
- **Gender.** Women usually have a slightly higher temperature than men, especially at the time of ovulation and during pregnancy.
- **Exercise.** Activity causes the body to burn more calories for energy, which raises the body temperature.
- **Time of day.** The body temperature is usually lowest in the early morning before physical activity has begun.
- **Emotions.** Temperature tends to rise during times of stress and fall with depression.

- **Illness.** High or low body temperatures may result from a disease process.

**Stages of Fever**

An elevated temperature, or fever, usually results from a disease process, such as a bacterial or viral infection. Body temperature may also rise during intense exercise, anxiety, or dehydration unrelated to a disease process, but these elevations are not considered fevers. **Pyrexia** refers to a fever of 102°F or higher rectally or 101°F or higher orally. An extremely high temperature, 105°F to 106°F, is **hyperpyrexia** and is considered dangerous because the intense internal body heat may damage or destroy cells of the brain and other vital organs. The fever process has several clearly defined stages:

1. **The onset** may be abrupt or gradual.
2. The **course** may range from a day or so to several weeks. Fever may be **sustained** (constant), **remittent** (fluctuating), **intermittent** (occurring at intervals), or **relapsing** (returning after an extended period of normal readings). Table 19-2 describes and illustrates these courses of fever.

**Table 19-2 Variations in Fever Patterns: Temperature Comparisons**

<table>
<thead>
<tr>
<th>Fahrenheit</th>
<th>Celsius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>98.6</td>
</tr>
<tr>
<td>Rectal</td>
<td>99.6</td>
</tr>
<tr>
<td>Axillary</td>
<td>97.6</td>
</tr>
<tr>
<td>Tympanic</td>
<td>98.6</td>
</tr>
</tbody>
</table>

**Figure 19-4** A temporal artery scanning thermometer.
3. The resolution, or return to normal, may occur as either a crisis (abrupt return to normal) or lysis (gradual return to normal).

**PATIENT EDUCATION**

**FEVER**

When instructing patients about fever, explain that temperature elevations are usually a natural response to disease and that efforts to bring the temperature back to normal may be counterproductive. However, if the patient is uncomfortable or the temperature is abnormally high, it should be brought down to about 101°F; the body’s natural defenses may still be able to destroy the pathogen without extreme discomfort to the patient.

After consulting with the physician, instruct all patients regarding the following comfort measures:

- Consume clear fluids by mouth as tolerated to rehydrate the tissues if nausea and vomiting are not present.
- Keep clothing and bedding clean and dry, especially after diaphoresis (sweating).
- Avoid chilling. Chills cause shivering, which raises the body temperature.
- Rest and eat a light diet as tolerated.
- Use antipyretics to keep comfortable, but do not give aspirin products to children under 18 years of age. Aspirin has been associated with Reye syndrome, a potentially fatal disorder, following cases of viral illnesses and varicella zoster (chicken pox).

**CHECKPOINT QUESTION**

3. Explain why the body temperature of a young child may be different from that of an adult.

**Types of Thermometers**

**Glass Mercury Thermometers**

In the past, oral, rectal, and axillary temperatures have been measured using a mercury glass thermometer. Because mercury is a hazardous chemical if exposure occurs, a mercury spill kit must be available should a thermometer break. The exposed mercury must be cleaned using proper procedures according to the office policy and procedure manual. Never allow anyone to touch or manipulate the mercury from a broken thermometer.

Although most medical offices today do not use mercury filled glass thermometers, glass thermometers are available that contain a non-mercury substance. Some offices may use these thermometers or have some available for use in the event the electronic thermometers malfunction. These thermometers are similar in appearance to mercury thermometers. Both the mercury and non-mercury glass thermometers consist of a glass tube divided into two major parts. The bulb end is filled with mercury or the non-mercury substance and may have a round or a slender tip. Glass thermometers have different shapes for oral and rectal use. Rectal thermometers have a rounded, or stubbed, end and are usually color-coded red on the opposite flat end of the thermometer. Thermometers with a long, slender bulb are used for axillary or oral temperatures and are color-coded blue (Fig. 19-5). When the glass thermometer is placed in position for a specified period, body heat expands the chemical in the bulb, which rises up the glass column and remains there until it is physically shaken back into the bulb.

The long stem of the Fahrenheit thermometer is calibrated with lines designating temperature in even degrees: 94°, 96°, 98°, 100°, and so on. Uneven numbers are marked only with a longer line. Between these longer lines, four smaller lines designate temperature in 0.2° increments. The thermometer is read by noting the level of the mercury or non-mercury substance in the glass column. For example, if the level of the chemical falls on the second smaller line past the large line marked 100, the reading is 100.4°F. Celsius thermometers are marked for each degree (35°, 36°, 37°, and so on), with 10 markings between the whole numbers (Fig. 19-6). If the mercury falls on the third small line past the line marked 37, the temperature reading is recorded as 37.3°C.

Glass thermometers may be reused if properly disinfected between patients. Also, before using a glass
thermometer, place it in a disposable clear plastic sheath. When you take the thermometer from the patient, remove the sheath by pulling the thermometer out, which turns the sheath inside out and traps the saliva inside it. Dispose of the sheath in a biohazard container, sanitize, and disinfect the thermometer according to the office policy. Usually, washing the thermometers with warm—not hot—soapy water and soaking in a solution of 70% isopropyl alcohol is sufficient for disinfection.

The procedure for measuring an oral temperature using a glass thermometer is described in Procedure 19-3. The procedures for measuring a rectal or axillary temperature using either the glass thermometer or the electronic thermometer are described in Procedures 19-4 and 19-5.

**Electronic Thermometers**

Electronic thermometers are portable battery-operated units with interchangeable probes (Fig. 19-7). The base unit of the thermometer is battery operated, and the interchangeable probes are color-coded blue for oral or axillary and red for rectal. When the probe is properly positioned, the temperature is sensed, and a digital readout shows in the window of the hand-held base. Electronic thermometers are usually kept in a charging unit between uses to ensure that the batteries are operative at all times. The procedure for taking and recording an oral temperature using an electronic thermometer is described in Procedure 19-6.

**Tympanic Thermometers**

Another type of thermometer used in medical offices today is the tympanic, or aural, thermometer. This device is usually battery powered. The end is fitted with a disposable cover that is inserted into the ear much like an otoscope (Fig. 19-8). With the end of the thermometer in place, a button is pressed, and infrared light bounces off the tympanic membrane, or eardrum. When correctly positioned in the ear, the sensor in the thermometer determines the temperature of the blood in the tympanic membrane. The temperature reading is displayed on the unit's digital screen within 2 seconds. This device is considered highly reliable for temperature measurement. Procedure 19-7 describes the complete process for obtaining a body temperature with a tympanic thermometer.

**Temporal Artery Thermometer**

The temporal artery thermometer measures actual blood temperature by placing the unit on the front of the forehead, pressing the “on/off” button, and sliding the probe scanner over the forehead and down to the temporal artery area of the forehead. Upon releasing the “on/off” button, the temperature is immediately
recorded in the digital display box located on the front of the thermometer. Depending on the brand and type of temporal artery thermometer purchased, you should read the manufacturer's instructions carefully for proper use and care of the unit. Procedure 19-8 describes the steps for taking a temperature using the temporal artery thermometer.

**Disposable Thermometers**

Single-use disposable thermometers are fairly accurate but are not considered as reliable as electronic, tympanic, or glass thermometers. These thermometers register quickly by indicating color changes on a strip. They are not reliable for definitive measurement, but they are acceptable for screening in settings such as day care centers and schools (Fig. 19-9). Other disposable thermometers are available for pediatric use in the form of sucking devices, or pacifiers, but these are not used in the medical office setting.

**Checkpoint Question**

4. How is the reading displayed on an electronic, tympanic, and temporal artery thermometer?

**Pulse**

As the heart beats, blood is forced through the arteries, expanding them. With relaxation of the heart, the arteries relax also. This expansion and relaxation of the arteries can be felt at various points on the body where you can press an artery against a bone or other underlying firm surface. These areas are known as pulse points. With **palpation**, each expansion of the artery can be felt and is counted as one heartbeat. A pulse in specific arteries supplying blood to the extremities also indicates that oxygenated blood is flowing to that extremity.

The heartbeat can be palpated (felt) or auscultated (heard) at several pulse points. The arteries most commonly used are the carotid, apical, brachial, radial, femoral, popliteal, posterior tibial, and dorsalis pedis (Fig. 19-10). Palpation of the pulse is performed by placing the index and middle fingers, the middle and ring fingers, or all three fingers over a pulse point (Fig. 19-11). The thumb is not used to palpate a pulse. The apical pulse is auscultated using a stethoscope with the bell placed over the apex of the heart (Fig. 19-12). A Doppler unit may be used to amplify the sound of peripheral pulses that are difficult to palpate (Fig. 19-13). This unit is a small battery-powered or electric device that consists of a main box with control switches, a probe, and an earpiece unit that plugs into the main box and resembles the earpieces to a stethoscope. The earpiece may be detached so the sounds can be heard by everyone in the room if desired. Follow the following steps to use a Doppler device:

1. Apply a coupling or transmission gel on the pulse point before placing the end of the probe, or transducer, on the area. This gel creates an airtight seal between the probe and the skin and facilitates transmission of the sound.
2. With the machine on, hold the probe at a 90-degree angle with light pressure to ensure contact. Move the probe as necessary in small circles in the gel until you hear the pulse. When contact with the artery is made, the Doppler will emit a loud pumping sound with each heartbeat. Adjust the volume control on the Doppler unit as necessary.
3. After assessing the rate and rhythm of the pulse, clean the patient’s skin and the probe with a tissue or soft cloth. Do not clean the probe with water or alcohol, as this may damage the transducer.

**Pulse Characteristics**

While palpating the pulse, you also assess the rate, rhythm, and volume as the artery wall expands with each heartbeat. The **rate** is the number of heartbeats in 1 minute. This number can be determined by palpating the pulse and counting each heartbeat while watching the second hand of your watch either for 30 seconds and then multiplying that number by 2 or for 1 minute. In healthy adults, the average pulse rate is 60 to 100 beats per minute. At other ages, there is a large variance of pulse rates, as shown in Table 19-3.

The **rhythm** is the interval between each heartbeat or the pattern of beats. Normally, this pattern is regular, with each heartbeat occurring at a regular, consistent rate. An irregular rhythm should be counted for 1 full minute to determine the rate, and the irregular rhythm should be documented with the pulse rate.

**Volume**, the strength or force of the heartbeat, can be described as soft, bounding, weak, thready, strong, or full. Usually the volume of the pulse is recorded only if it is weak, thready, or bounding.
Figure 19-10 Sites for palpation of peripheral pulses.
CHAPTER 19 • Anthropometric Measurements and Vital Signs

Factors Affecting Pulse Rates

Many factors affect the force, speed, and rhythm of the heart. Young children and infants have a much faster heart rate than adults. A conditioned athlete may have a normal heart rate below 60 beats per minute. Older adults may have a faster heart rate, as the myocardium compensates for decreased efficiency. Other factors that affect pulse rates are listed in Table 19-4.

The radial artery is most often used to determine pulse rate because it is convenient for both the medical assistant and the patient (Procedure 19-9). If the radial pulse is irregular or hard to palpate, then the apical pulse is the site of choice (Fig. 19-14). To assess the flow of blood into the extremities, you may be asked to palpate peripheral pulses such as the dorsalis pedis. Peripheral pulses that are difficult to palpate may be auscultated with a Doppler unit to check for the presence of blood flow.

Figure 19-11 Measuring a radial pulse.

Figure 19-12 Measuring an apical pulse.

Figure 19-13 The dorsalis pedis pulse being auscultated using a Doppler device.

<table>
<thead>
<tr>
<th>Age</th>
<th>Beats per Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth to 1 year</td>
<td>110–170</td>
</tr>
<tr>
<td>1–10 years</td>
<td>90–110</td>
</tr>
<tr>
<td>10–16 years</td>
<td>80–95</td>
</tr>
<tr>
<td>16 years to midlife</td>
<td>70–80</td>
</tr>
<tr>
<td>Elderly adult</td>
<td>55–70</td>
</tr>
</tbody>
</table>

TABLE 19-3 Variations in Pulse Rate by Age

CHECKPOINT QUESTION

5. What characteristics of a patient’s pulse should be assessed, and how should they be recorded in the medical record?

Respiration

Respiration is the exchange of gases between the atmosphere and the blood in the body. With respiration, the body expels carbon dioxide (CO₂) and takes in oxygen (O₂). External respiration is inhalation and exhalation, during which air travels through the respiratory tract to the alveoli so that oxygen can be absorbed into the bloodstream. Internal respiration is the exchange of gases between the blood and the tissue cells. Respiration is controlled by the respiratory center in the brainstem and by feedback from chemosensors in the carotid arteries that monitor the CO₂ content in the blood.

As the patient breathes in (inspiration), oxygen flows into the lungs, and the diaphragm contracts and flattens out, lifting and expanding the rib cage. During expiration, air in the lungs flows out of the chest cavity as
the diaphragm relaxes, moves upward into a dome-like shape, and allows the rib cage to contract. Each respiration is counted as one full inspiration and one full expiration.

Observing the rise and fall of the chest to count respirations is usually performed as a part of the pulse measurement. Generally, you should not make the patient aware that you are counting respirations because patients often change the voluntary action of breathing if they are aware that they are being watched. Respirations can be counted for a full minute or for 30 seconds with the number multiplied by 2. When appropriate, a stethoscope may be used to auscultate respirations.

Respiration Characteristics
The characteristics of respirations include rate, rhythm, and depth. Rate is the number of respirations occurring in 1 minute. Rhythm is the time, or spacing, between each respiration. This pattern is equal and regular in patients with normal respirations. Any abnormal rhythm is described as irregular and recorded as such in the patient’s record after the rate.

Depth is the volume of air being inhaled and exhaled. When a person is at rest, the depth should be regular and consistent. There are normally no noticeable sounds other than the regular exchange of air. Respirations that are abnormally deep or shallow are documented in addition to the rate. Abnormal sounds during inspiration or expiration are usually a sign of a disease process. These abnormal sounds are usually recorded as crackles (wet or dry sounds) or wheezes (high-pitched sounds) heard during inspiration or expiration.

Factors Affecting Respiration
In healthy adults, the average respiratory rate is 14 to 20 breaths per minute. Table 19-5 shows the normal variations in respiratory rates according to age. Patients with an elevated body temperature usually also

<table>
<thead>
<tr>
<th>Age</th>
<th>Respirations per Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant</td>
<td>20+</td>
</tr>
<tr>
<td>Child</td>
<td>18–20</td>
</tr>
<tr>
<td>Adult</td>
<td>12–20</td>
</tr>
</tbody>
</table>

![Figure 19-14](image-url) The apical is found at the 5th intercostal space at the midclavicular line.
have increased pulse and respiratory rates. A respiratory rate that is much faster than average is called tachypnea, and a respiratory rate that is slower than usual is referred to as bradypnea. Further descriptions of abnormal or unusual respirations include the following:

- **Dyspnea**: difficult or labored breathing
- **Apnea**: no respiration
- **Hyperpnea**: abnormally deep, gasping breaths
- **Hyperventilation**: a respiratory rate that greatly exceeds the body’s oxygen demand
- **Hypopnea**: shallow respirations
- **Orthopnea**: inability to breathe lying down; the patient usually has to sit upright to breathe

Procedure 19-10 lists the steps for counting and recording respirations.

### CHECKPOINT QUESTION

6. What happens within the chest cavity when the diaphragm contracts?

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#### Blood Pressure

Blood pressure is a measurement of the pressure of the blood in an artery as it is forced against the arterial walls. Pressure is measured in the contraction and relaxation phases of the **cardiac cycle**, or heartbeat. When the heart contracts, it forces blood from the atria and ventricles in the phase known as **systole**. This highest pressure level during contraction is recorded as the systolic pressure and is heard as the first sound in taking blood pressure.

As the heart pauses briefly to rest and refill, the arterial pressure drops. This phase is known as **diastole**, and the pressure is recorded as the diastolic pressure. Systolic and diastolic pressure result from the two parts of the cardiac cycle, the period from the beginning of one heartbeat to the beginning of the next. When measured using a stethoscope and **sphygmomanometer**, or blood pressure cuff, these two pressures constitute the blood pressure and are written as a fraction, with the systolic pressure over the diastolic pressure. Table 19-6 describes the classification of blood pressure readings for adults with normal, prehypertension, and hypertension blood pressures. A lower pressure may be normal for athletes with exceptionally well-conditioned cardiovascular systems. Blood pressure that drops suddenly when the patient stands from a sitting or lying position is **postural hypotension**, or **orthostatic hypotension**; it may cause symptoms including vertigo. Some patients with postural hypotension may faint. Extra precautions should be taken when assessing patients going from lying down to sitting or standing.

Two basic types of sphygmomanometers are used to measure blood pressure: the aneroid, which has a circular dial for the readings, and the mercury, which has a mercury-filled glass tube for the readings (Fig. 19-15). Although only one type actually contains mercury, both types are calibrated and measure blood pressure in

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**Table 19-6 Blood Pressure Readings**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Systolic BP</th>
<th>Diastolic BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120 mm Hg</td>
<td>&lt;80 mm Hg</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120–139 mm Hg</td>
<td>80–89 mm Hg</td>
</tr>
<tr>
<td>Hypertension, stage I</td>
<td>140–159 mm Hg</td>
<td>90–99 mm Hg</td>
</tr>
<tr>
<td>Hypertension, stage II</td>
<td>≥160 mm Hg</td>
<td>≥100 mm Hg</td>
</tr>
</tbody>
</table>

Source: U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute
millimeters of mercury (mm Hg). A blood pressure of 120/80 indicates the force needed to raise a column of mercury to the 120 calibration mark on the glass tube during diastole and to 80 during diastole. The elasticity of the person’s arterial walls, the strength of the heart muscle, and the quantity and viscosity (thickness) of the blood all affect the blood pressure.

The sphygmomanometer is attached to a cuff by a rubber tube. A second rubber tube is attached to a hand pump with a screw valve. This device is used to pump air into the rubber bladder in the cuff. When the screw valve is turned clockwise, the bladder in the cuff around the patient’s arm is inflated by multiple compressions of the pump. As the bladder inflates, the pressure created against the artery at some point prohibits blood from passing through the vessel. When the screw valve is slowly opened by turning it counterclockwise, the blood pressure can be determined by listening carefully with the stethoscope placed on the artery to the sounds produced as the blood begins to flow through the vessel. Procedure 19-11 describes the steps for correctly obtaining a patient’s blood pressure using the radial artery.

**CHECKPOINT QUESTION**

7. What is happening to the heart during systole? During diastole?

**Korotkoff Sounds**

Korotkoff sounds can be classified into five phases of sounds heard while auscultating the blood pressure as described by the Russian neurologist Nicolai Korotkoff. Only the sounds heard during phase I (represented by the first sound heard) and phase V (represented by the last sound heard) are recorded as blood pressure. You may hear other Korotkoff sounds during the procedure, but it is not necessary to record them. Table 19-7 describes the five phases of Korotkoff sounds that may be heard when auscultating blood pressure.

**TABLE 19-7 Five Phases of Blood Pressure**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Sounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Faint tapping heard as the cuff deflates</td>
</tr>
<tr>
<td></td>
<td>(systolic blood pressure)</td>
</tr>
<tr>
<td>II</td>
<td>Soft swishing</td>
</tr>
<tr>
<td>III</td>
<td>Rhythmic, sharp, distinct tapping</td>
</tr>
<tr>
<td>IV</td>
<td>Soft tapping that becomes faint</td>
</tr>
<tr>
<td>V</td>
<td>Last sound (diastolic blood pressure)</td>
</tr>
</tbody>
</table>

**Pulse Pressure**

The difference between the systolic and diastolic readings is known as the pulse pressure. For example, with the average adult blood pressure of 120/80, the difference between the numbers 120 and 80 is 40. The average normal range for pulse pressure is 30 to 50 mm Hg. Generally, the pulse pressure should be no more than one-third of the systolic reading. If the pulse pressure is more or less than these parameters, the physician should be notified.

**Auscultatory Gap**

Patients with a history of hypertension, or elevated blood pressure, may have an auscultatory gap heard during phase II of the Korotkoff sounds. An auscultatory gap is the loss of any sounds for a drop of up to 30 mm Hg (sometimes more) during the release of air from the blood pressure cuff after the first sound is heard. If the last sound heard at the beginning of the gap is recorded as the diastolic blood pressure, the documented blood pressure is inaccurate and may result in misdiagnosis and treatment of a condition that the patient does not have. As a result, it is important for you to listen and watch carefully as the dial or column of mercury falls until you are certain that you have heard the last sound, or diastolic pressure.

**Factors Influencing Blood Pressure**

Atherosclerosis and arteriosclerosis are two disease processes that greatly influence blood pressure. These diseases affect the size and elasticity of the artery lumen. The general health of the patient is also a major factor and includes dietary habits, alcohol and tobacco use, the amount and type of exercise, previous heart conditions.
such as myocardial infarctions, and family history for cardiac disease. Other factors that may affect blood pressure include:

- **Age.** As the body ages, vessels begin to lose elasticity and will require more force to expand the arterial wall. The buildup of atherosclerotic patches inside the artery will also increase the force needed for blood flow.
- **Activity.** Exercise raises the blood pressure temporarily, while inactivity or rest will usually lower the pressure.
- **Stress.** The sympathetic nervous system stimulates the release of the hormone epinephrine, which raises the pressure in response to the fight or flight syndrome.
- **Body Position.** Blood pressure will normally be lower in the supine position.
- **Medications.** Some medications will lower the pressure, while others may cause an elevation.

**PATIENT EDUCATION**

**HYPERTENSION**

After taking a patient’s blood pressure, you should tell the patient what you obtained for the blood pressure reading. Patients with hypertension, or high blood pressure, should be encouraged to keep a personal log of their readings and bring this to each physician office appointment. Because the freestanding blood pressure machines found in pharmacies and supermarkets are not always reliable, you should teach patients with hypertension how to take their blood pressure at home.

**Blood Pressure Cuff Size**

Before beginning to take a patient’s blood pressure, assess the size of the patient’s arm, and choose the correct size accordingly. The width of the cuff should be 40% to 50% of the circumference of the arm. To determine the correct size, hold the narrow edge of the cuff at the midpoint of the upper arm. Wrap the width, not the length, around the arm. The cuff width should reach not quite halfway around the arm (Fig. 19-16). Varying widths of cuffs are available, from about 1 inch for infants to 8 inches for obese adults (Fig. 19-17). The blood pressure measurement may be inaccurate by as much as 30 mm Hg if the cuff size is incorrect. Box 19-2 lists causes of errors in blood pressure readings.

**CHECKPOINT QUESTION**

8. How are the pulse pressure and the auscultatory gap different?

**BOX 19-2**

**CAUSES OF ERRORS IN BLOOD PRESSURE READINGS**

- Wrapping the cuff improperly
- Failing to keep the patient's arm at the level of the heart while taking the blood pressure
- Failing to support the patient's arm on a stable surface while taking the blood pressure
- Recording the auscultatory gap for the diastolic pressure
- Failing to maintain the gauge at eye level
- Applying the cuff around the patient's clothing and attempting to listen through the clothing
- Allowing the cuff to deflate too rapidly or too slowly
- Failing to wait 1–2 minutes before rechecking using the same arm
While working in a medical office, you have just taken the following three patients’ vital signs:

A. A 52-year-old woman complaining of dyspnea. Her respiratory rate is 38, her pulse is 112 and irregular, and her blood pressure is 150/86.

B. A 43-year-old man with a pulse of 54 and blood pressure of 98/52. He denies any shortness of breath, chest pain, or dizziness.

C. A 65-year-old man who had open-heart surgery 2 weeks ago. He states that yellow drainage is coming from the surgical wound on his chest. His temperature is 101.8°F orally, his blood pressure is 188/62, and his pulse is 118 and regular.

How do you sort these patients? Who should be seen first? Second? Third?

Patient A should be seen first. The physician should immediately see any patient complaining of trouble breathing. Her respiratory and pulse rates are faster than normal for an adult. Patient C should be seen second because of his temperature and pulse rate. Patient B should be seen last. A pulse rate of 52 and blood pressure of 98/52 are low, but the patient is not complaining of any symptoms. If he is physically fit, his vital signs may normally be lower than average. If he were complaining of dizziness or feeling faint, he would need to be seen sooner.

Voy a tomarle el su pulso radial.
I am going to take your radial pulse.

Voy a tomarle la su presion sanguínea.
I am going to take your blood pressure.

Voy a tomarle la temperatura.
I am going to take your temperature.

¿(Tiene) fiebre?
Fever?
### PSV Procedure 19-1: Measuring Weight

**Purpose:** Accurately measure and record a patient's weight  
**Equipment:** Calibrated balance beam scale, digital scale, or dial scale; paper towel  
**Standard:** This procedure should take 5 minutes.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wash your hands.</td>
<td>Handwashing before contact with patients aids in infection control.</td>
</tr>
<tr>
<td>2. Ensure that the scale is properly balanced at zero.</td>
<td>This helps prevent an error in measurement.</td>
</tr>
<tr>
<td>3. Greet and identify the patient. Explain the procedure.</td>
<td>Identifying the patient prevents errors; explaining the procedure promotes cooperation.</td>
</tr>
<tr>
<td>4. Escort the patient to the scale, and place a paper towel on the scale.</td>
<td>Since the patient will be standing in bare feet or stockings, the paper towel minimizes microorganism transmission.</td>
</tr>
<tr>
<td>5. Have the patient remove shoes and heavy outerwear and put down purse.</td>
<td>Unnecessary items must be removed to get an accurate reading.</td>
</tr>
<tr>
<td>6. Assist patient onto the scale facing forward and standing on paper towel without touching or holding on to anything if possible, while watching for difficulties with balance.</td>
<td>Some patients may feel unsteady as the plate of the scale settles.</td>
</tr>
</tbody>
</table>

---

*Step 2.* A balance beam scale with the weights at zero.  
*Step 6.* The patient should stand erect on the scale.
### Procedure 19-1: Measuring Weight (continued)

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. <strong>Weigh the patient:</strong> <strong>A.</strong> Balance beam scale: Slide counterweights on bottom and top bars (start with heavier bars) from zero to approximate weight. Each counterweight should rest securely in the notch with indicator mark at proper calibration. To obtain measurement, balance bar must hang freely at exact midpoint. To calculate weight, add top reading to bottom one. (Example: If bottom counterweight reads 100 and lighter one reads 16 plus three small lines, record weight as 116 3/4 lb). <strong>B.</strong> Digital scale: Read and record weight displayed on digital screen. <strong>C.</strong> Dial scale: Indicator arrow rests at patient’s weight. Read this number directly above the dial.</td>
<td>If the counterweight is not resting in the notch, the weight will not be accurate. The weight noted on a digital scale may include decimals such as 155.3 pounds. Reading at an angle will result in an incorrect measurement.</td>
</tr>
<tr>
<td>8. <strong>Return the bars on the top and bottom to zero.</strong></td>
<td>A balance beam scale should be returned to zero after each use.</td>
</tr>
<tr>
<td>9. <strong>Assist the patient from the scale if necessary, and discard the paper towel.</strong></td>
<td>Patients may lose balance and fall when stepping down from the scale; they should be observed and assisted as necessary. The paper towel may be left in place on the balance beam scale if the height is going to be obtained using this scale.</td>
</tr>
<tr>
<td>10. <strong>Record the weight.</strong></td>
<td>If the weight and height are measured at the same time, they will be recorded together (see example in Procedure 19-2).</td>
</tr>
<tr>
<td>11. <strong>AFF</strong> Explain how to respond to a patient who is visually impaired.</td>
<td>Observe patients carefully to prevent injury and always ask before offering assistance or taking hold of their arm to guide. Make sure path to scales is clear from items that could trip or cause patient to fall. Assist onto the scales and off of the scales as needed.</td>
</tr>
</tbody>
</table>
# Measuring Height

**Purpose:** Accurately measure and record a patient’s height

**Equipment:** A scale with a ruler

**Standard:** This procedure should take less than 5 minutes.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wash your hands if this procedure is not done at the same time as the weight.</td>
<td>Typically, height is obtained with weight; your hands are already washed.</td>
</tr>
<tr>
<td>2. Have the patient remove shoes and stand straight and erect on the scale, with heels together and eyes straight ahead. (Patient may face the ruler, but a better measurement is made with the patient’s back to the ruler).</td>
<td>The posture of the patient must be erect for an accurate measurement.</td>
</tr>
<tr>
<td>3. With the measuring bar perpendicular to the ruler, slowly lower it until it firmly touches the patient’s head. Press lightly if the hair is full or high.</td>
<td>Hair that is full should not be included in the height measurement.</td>
</tr>
</tbody>
</table>

**Step 3.** Measure where the bar slides out of the scale (or point of movement). This measure reads 63 inches, or 5 feet 3 inches.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Read the measurement at the point of movement on the ruler. If measurements are in inches, convert to feet and inches (e.g., if the bar reads 65 plus two smaller lines, read it at 65 1/2. Remember that 12 inches equals 1 foot; therefore, the patient is 5 feet, 5 1/2 inches tall).</td>
<td>Elderly or ill patients may be unsteady.</td>
</tr>
<tr>
<td>5. Assist the patient from the scale if necessary; watch for signs of difficulty with balance.</td>
<td>Procedures not recorded are considered not to have been done.</td>
</tr>
<tr>
<td>6. Record the weight and height measurements in the medical record.</td>
<td>Solicit assistance from caregiver or other staff member to help patient off and on the scale. Give simple directions to the patient about what he or she should do. Speak clearly, not loudly.</td>
</tr>
</tbody>
</table>

**Charting Example:**

10/14/2012 9:15 am Ht. 5 ft, 5 1/2 inches, Wt. 136 1/4 lb __________________________ Y. Torres, CMA

Note: The medical assistant may sign his or her name in the patient record using only the “CMA” credential if the office has a signature log denoting the entire credential as “CMA(AAMA).”
# PSY Procedure 19-3: Measuring Oral Temperature Using a Glass Thermometer

**Purpose:** Accurately measure and record a patient's oral temperature using a glass thermometer

**Equipment:** Glass oral thermometer; tissues or cotton balls; disposable plastic sheaths; biohazard waste container; cool, soapy water; disinfectant solution

**Standard:** This task should take 10 minutes.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong> Wash your hands and assemble all the necessary supplies</td>
<td>Handwashing aids infection control.</td>
</tr>
<tr>
<td><strong>2.</strong> Dry the thermometer if it has been stored in a disinfectant solution by wiping it from the bulb and going up the stem with a tissue or cotton ball.</td>
<td>Removing the wet disinfectant will allow the thermometer to slip easily into the sheath.</td>
</tr>
<tr>
<td><strong>3.</strong> Carefully check the thermometer for chips or cracks.</td>
<td>A chipped or cracked thermometer could injure the patient.</td>
</tr>
<tr>
<td><strong>4.</strong> Check the reading by holding the stem horizontally at eye level and turning it slowly.</td>
<td>It is easiest to see the column in this position.</td>
</tr>
<tr>
<td><strong>5.</strong> If the reading is above 94°F, shake down the thermometer by securely grasping it at the end of the stem with your thumb and forefinger and snapping your wrist several times. Avoid hitting the thermometer against anything while snapping your wrist.</td>
<td>The reading must be below 94°F to provide an accurate temperature reading. The reading will never decrease in the thermometer unless the mercury or non-mercury substance is physically forced into the bulb.</td>
</tr>
<tr>
<td><strong>6.</strong> Insert the thermometer into the plastic sheath.</td>
<td>Follow the package instructions for placing the thermometer correctly into the sheath.</td>
</tr>
</tbody>
</table>

**Step 2.** Dry the glass thermometer beginning at the bulb and moving up the stem.

**Step 6.** Place the thermometer into a disposable sheath before using.
**PROCEDURE 19-3: Measuring Oral Temperature Using a Glass Thermometer**

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Greet and identify the patient. Explain the procedure and ask about any eating, drinking of hot or cold fluids, gum chewing, or smoking within the past 15 minutes.</td>
<td>Eating, drinking, gum chewing, or smoking may alter the oral reading. If the patient has done any of these within 15 minutes, wait 15 minutes or select another route.</td>
</tr>
<tr>
<td>8. Place the thermometer under the patient's tongue to either side of the frenulum.</td>
<td>This is the area of highest vascularity and will give the most accurate reading.</td>
</tr>
<tr>
<td>9. Tell the patient to keep the mouth and lips closed without biting down on the thermometer.</td>
<td>Keeping the mouth and lips closed prevents air from entering the mouth and causing an inaccurate reading. Biting down on the thermometer may break it.</td>
</tr>
<tr>
<td>10. Leave the thermometer in place for 3–5 minutes. Note: The pulse, respirations, and blood pressure may be taken during this time (see Procedures 19-9 to 19-11).</td>
<td>The thermometer may be left in place for 3 minutes if there is no evidence of fever and the patient is compliant. It should be left in place for 5 minutes if the patient is febrile or noncompliant (talks or opens mouth frequently).</td>
</tr>
<tr>
<td>11. At the appropriate time, remove the thermometer from the patient's mouth while wearing gloves. Remove the sheath by holding the very edge of the sheath with your thumb and forefinger and pulling down from the open edge over the length of the thermometer to the bulb. Discard the sheath into a biohazard container.</td>
<td>Once removed, the soiled area should be inside the sheath.</td>
</tr>
<tr>
<td>12. Hold the thermometer horizontal at eye level and note the level of chemical that has risen into the column.</td>
<td>Holding the thermometer below or above eye level may interfere with seeing the column of chemical and accurately reading the measurement.</td>
</tr>
<tr>
<td>13. Sanitize and disinfect the thermometer according to the office policy and wash your hands.</td>
<td>Wash the thermometer with cool or tepid soapy water, rinse with cool water, and dry well. Place the thermometer in a disinfectant solution, such as 70% isopropyl alcohol, according to office policy.</td>
</tr>
</tbody>
</table>

**Step 8.** Place the thermometer to one side of the frenulum.

**Step 13.** Store clean thermometers in a covered instrument tray padded with gauze to prevent chipping or cracking the glass.
PROCEDURE 19-3: Measuring Oral Temperature Using a Glass Thermometer (continued)

Steps Reasons
14. Record the patient’s temperature in the medical record. Procedures are considered not done if they are not recorded. The vital signs (temperature, pulse, respirations, and blood pressure) are usually recorded together.

15. **AFF** Explain how to respond to a patient who has English as a second language (ESL). Solicit assistance from anyone who may be with the patient or a staff member who speaks the language to interpret if available. If no interpreter is available, use hand gestures or pictures to explain procedure to the patient.

Charting Example:

<table>
<thead>
<tr>
<th>09/10/12 8:50 am</th>
<th>T 100.6°F (O)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. Ervin, CMA</td>
<td></td>
</tr>
</tbody>
</table>

Note: The medical assistant may sign his or her name in the patient record using only the “CMA” credential if the office has a signature log denoting the entire credential as “CMA(AAMA).”

PROCEDURE 19-4: Measuring a Rectal Temperature

**Purpose:** Accurately measure and record a rectal temperature using either a glass rectal thermometer or electronic thermometer with a rectal probe attached.

**Equipment:** Glass rectal thermometer or electronic thermometer with rectal probe; tissues or cotton balls; disposable plastic sheaths; surgical lubricant; biohazard waste container; cool, soapy water; disinfectant solution; gloves

**Standard:** This procedure should take 5 minutes.

Steps Reasons
1. Wash your hands and assemble the necessary supplies. Handwashing aids infection control.

2. Insert the thermometer into a plastic sheath. Follow the package instructions for placing the sheath correctly onto the thermometer. If a glass rectal thermometer is used, follow Steps 2 through 5 in Procedure 19-3 to prepare the thermometer. If an electronic thermometer is used, attach the rectal probe if necessary.

**Step 2.** Rectal thermometers are noted by the red tip.
## PROCEDURE 19-4: Measuring a Rectal Temperature (continued)

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Spread lubricant onto a tissue and then from the tissue onto the sheath of the thermometer.</td>
<td>When using a tube of lubricant, avoid cross-contamination by not applying lubricant directly to the thermometer. A lubricant should always be used for rectal insertion to prevent patient discomfort.</td>
</tr>
<tr>
<td>4. Greet and identify the patient and explain the procedure.</td>
<td></td>
</tr>
<tr>
<td>5. Ensure the patient’s privacy by placing the patient in a side-lying position facing the examination room door and draping appropriately.</td>
<td>If the examination room door is opened, a patient facing the door is less likely to be exposed. The side-lying position facilitates exposure of the anus.</td>
</tr>
<tr>
<td>6. Apply gloves and visualize the anus by lifting the top buttock with your nondominant hand.</td>
<td>Never insert the thermometer without first having a clear view of the anus.</td>
</tr>
<tr>
<td>7. Gently insert the thermometer past the sphincter muscle about 1 1/2 inches for an adult, 1 inch for a child, and 1/2 inch for an infant.</td>
<td>Inserting the thermometer at these depths helps prevent perforating the anal canal.</td>
</tr>
</tbody>
</table>

---

**Step 3.** Place lubricant onto a tissue first.

**Step 5.** The patient is in a side-lying position and draped appropriately.
### Procedure 19-4: Measuring a Rectal Temperature (continued)

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Release the upper buttock and hold the thermometer in place with your dominant hand for 3 minutes. Replace the drape without moving the dominant hand.</td>
<td>The thermometer will not stay in place if it is not held. Replacing the drape will ensure the patient's privacy.</td>
</tr>
<tr>
<td>9. After 3 minutes, remove the glass thermometer and the sheath. The electronic thermometer will signal when the reading is obtained. Discard the sheath into an appropriate waste container and note the reading.</td>
<td>The lubricant or sheath may obscure the column in a glass thermometer and should be removed before you read the thermometer. The electronic thermometer will have a digital display of the reading (see Procedure 19-6).</td>
</tr>
<tr>
<td>10. Sanitize and disinfect the glass thermometer according to the office policy. Replace the electronic thermometer into the charger as necessary.</td>
<td>Always make sure thermometers are ready for the next patient.</td>
</tr>
<tr>
<td>11. Remove your gloves and wash your hands.</td>
<td>This prevents the spread of microorganisms.</td>
</tr>
<tr>
<td>12. Record the procedure and mark the letter R next to the reading, indicating that the temperature was taken rectally.</td>
<td>Temperature readings are presumed to have been taken orally unless otherwise noted in the medical record. The vital signs (temperature, pulse, respirations, and blood pressure) are usually recorded together.</td>
</tr>
<tr>
<td>13. <strong>AFF</strong> Explain how to respond to a patient who is developmentally challenged.</td>
<td>To avoid injury, do not use this method to obtain a temperature on an adult when there is the possibility that the patient may not cooperate to avoid injury.</td>
</tr>
</tbody>
</table>

**Note:** Infants and very small children may be held in the lap or over the knees for this procedure. Hold the thermometer and the buttocks with the dominant hand while securing the child with the nondominant hand. If the child moves, the thermometer and the hand will move together, avoiding injury to the anal canal.

**Charting Example:**

```
09/11/2012 8:30 am T 100.2°F (R) _____________________________________________________________ J. Barth, CMA
```

**Note:** The medical assistant may sign his or her name in the patient record using only the “CMA” credential if the office has a signature log denoting the entire credential as “CMA(AAMA).”
### Purpose:
Accurately measure and record an axillary temperature using a glass thermometer or an electronic thermometer.

### Equipment:
Glass thermometer or electronic thermometer (oral or rectal); tissues or cotton balls; disposable plastic sheaths; biohazard waste container; cool, soapy water; disinfectant solution.

### Standard:
This procedure should take 15 minutes.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wash your hands and assemble the necessary supplies.</td>
<td>Handwashing aids infection control.</td>
</tr>
<tr>
<td>2. Insert the thermometer into a plastic sheath.</td>
<td>Follow the package instructions for placing the sheath correctly onto the thermometer. If a glass thermometer is used, follow Steps 2 through 5 in Procedure 19-3 to prepare the thermometer.</td>
</tr>
<tr>
<td>3. Expose the patient’s axilla without exposing more of the chest or upper body than is necessary.</td>
<td>The patient’s privacy must be protected at all times.</td>
</tr>
<tr>
<td>4. Place the tip of the thermometer deep in the axilla and bring the patient’s arm down, crossing the forearm over the chest. Drape the patient as appropriate for privacy.</td>
<td>This position offers the best skin contact with the thermometer and maintains a closed environment.</td>
</tr>
<tr>
<td>5. After 10 minutes, remove the glass thermometer and the sheath. The electronic thermometer will signal when the reading is obtained. Discard the sheath into an appropriate waste container and note the reading.</td>
<td>Axillary temperatures using a glass thermometer take longer than oral or rectal ones. The sheath may obscure the column in a glass thermometer and should be removed before you read the thermometer. The electronic thermometer will have a digital display of the reading (see Procedure 19-6).</td>
</tr>
<tr>
<td>6. Sanitize and disinfect the glass thermometer according to the office policy. Replace the electronic thermometer into the charger as necessary.</td>
<td>Always make sure thermometers are ready for the next patient.</td>
</tr>
<tr>
<td>7. Wash your hands.</td>
<td>This prevents the spread of microorganisms.</td>
</tr>
<tr>
<td>8. Record the procedure and mark a letter A next to the reading, indicating that the reading is axillary.</td>
<td>Temperature readings are presumed to have been taken orally unless otherwise noted in the medical record. The vital signs (temperature, pulse, respirations, and blood pressure) are usually recorded together.</td>
</tr>
<tr>
<td>9. <strong>AFF</strong> Explain how to respond to a patient who is from a different generation.</td>
<td>Refer to an elderly patient by their correct title (Mr., Mrs., Miss, etc.). Be respectful to the patient by only using their first name after they have given you permission to do so and do not assume the patient is hearing or cognitively impaired.</td>
</tr>
</tbody>
</table>

(continued)
PART III • The Clinical Medical Assistant

PROCEDURE 19-5: Measuring an Axillary Temperature (continued)

Steps Reasons

Charting Example:

02/01/2012 3:45 pm T 97.8°F (A) _________________________________________________________ B. DeMarcus, CMA

Purpose: Accurately measure and record a patient’s temperature using an electronic thermometer

Equipment: Electronic thermometer with oral or rectal probe, disposable probe covers, biohazard waste container, gloves for taking a rectal temperature

Standard: This task should take 5 minutes.

Steps Reasons

1. Wash your hands and assemble the necessary supplies. Handwashing aids infection control.

2. Greet and identify the patient and explain the procedure. Identifying the patient prevents errors.

3. Choose the most appropriate method (oral, axillary, or rectal) and attach the appropriate probe to the battery-powered unit. Many electronic thermometers come with an oral probe and a rectal probe.

4. Insert the probe into a probe cover. Covers are usually carried with the unit in a specially fitted box attached to the back or top of the unit. All probes fit into one size probe cover. If using the last probe cover, be sure to attach a new box of covers onto the unit to be ready for the next patient.

5. Position the thermometer appropriately for the method. If measuring the temperature rectally, be sure to wear gloves, apply lubricant to the probe cover, and hold the probe in place.

6. Wait for the electronic thermometer unit to “beep” when it senses no signs of the temperature rising further. This usually occurs within 20–30 seconds. Removing the thermometer before it signals may result in the recording of an inaccurate temperature.

7. After the beep, remove the probe and note the reading on the digital display screen on the unit before replacing the probe into the unit. Most units automatically shut off when the probe is reinserted into the unit.

8. Discard the probe cover by pressing a button, usually on the end of the probe, while holding the probe over a biohazard container. After noting the temperature, replace the probe into the unit. Probe covers should be discarded appropriately. Placing the probe back in the unit often turns the unit off in most models of electronic thermometers.

9. Remove your gloves, if used, wash your hands, and record the procedure. Be sure to indicate whether the temperature was taken rectally or axillary by placing an R or an A next to the reading in the documentation. The vital signs (temperature, pulse, respirations, and blood pressure) are usually recorded together.

PROCEDURE 19-6: Measuring Temperature Using an Electronic Thermometer

Purpose: Accurately measure and record a patient’s temperature using an electronic thermometer

Equipment: Electronic thermometer with oral or rectal probe, disposable probe covers, biohazard waste container, gloves for taking a rectal temperature

Standard: This task should take 5 minutes.

Steps Reasons

1. Wash your hands and assemble the necessary supplies. Handwashing aids infection control.

2. Greet and identify the patient and explain the procedure. Identifying the patient prevents errors.

3. Choose the most appropriate method (oral, axillary, or rectal) and attach the appropriate probe to the battery-powered unit. Many electronic thermometers come with an oral probe and a rectal probe.

4. Insert the probe into a probe cover. Covers are usually carried with the unit in a specially fitted box attached to the back or top of the unit. All probes fit into one size probe cover. If using the last probe cover, be sure to attach a new box of covers onto the unit to be ready for the next patient.

5. Position the thermometer appropriately for the method. If measuring the temperature rectally, be sure to wear gloves, apply lubricant to the probe cover, and hold the probe in place.

6. Wait for the electronic thermometer unit to “beep” when it senses no signs of the temperature rising further. This usually occurs within 20–30 seconds. Removing the thermometer before it signals may result in the recording of an inaccurate temperature.

7. After the beep, remove the probe and note the reading on the digital display screen on the unit before replacing the probe into the unit. Most units automatically shut off when the probe is reinserted into the unit.

8. Discard the probe cover by pressing a button, usually on the end of the probe, while holding the probe over a biohazard container. After noting the temperature, replace the probe into the unit. Probe covers should be discarded appropriately. Placing the probe back in the unit often turns the unit off in most models of electronic thermometers.

9. Remove your gloves, if used, wash your hands, and record the procedure. Be sure to indicate whether the temperature was taken rectally or axillary by placing an R or an A next to the reading in the documentation. The vital signs (temperature, pulse, respirations, and blood pressure) are usually recorded together.
PROCEDURE 19-6: Measuring Temperature Using an Electronic Thermometer (continued)

Steps
10. Return the unit and probe to the charging base. Although the unit is battery powered, it should be kept in the charging base so that the battery is adequately charged.

11. **AFF** Explain how to respond to a patient who is hearing impaired. Make sure the patient can see your face as you are speaking. Speak clearly, not loudly.

Charting Example:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/28/2012</td>
<td>10:15 am</td>
<td>101°F (O)</td>
</tr>
</tbody>
</table>

D. Shaper, CMA

Note: The medical assistant may sign his or her name in the patient record using only the “CMA” credential if the office has a signature log denoting the entire credential as “CMA(AAMA).”

PROCEDURE 19-7: Measuring Temperature Using a Tympanic Thermometer

**Purpose:** Accurately measure and record a patient’s temperature using a tympanic thermometer

**Equipment:** Tympanic thermometer, disposable probe covers, biohazard waste container

**Standard:** This task should take 5 minutes.

Steps
1. Wash your hands and assemble the necessary supplies. Handwashing aids infection control.

2. Greet and identify the patient and explain the procedure. Identifying the patient prevents errors.

3. Insert the ear probe into a probe cover. Always put a clean probe cover on the ear probe before inserting it.

4. Place the end of the ear probe into the patient’s ear canal with your dominant hand while straightening out the ear canal with your nondominant hand. Straighten the ear canal of most patients by pulling the top, posterior part of the outer ear up and back. For children under 3 years of age, pull the outer ear down and back.

   **Step 4:** Place the probe into the ear canal while straightening the ear canal.

5. With the ear probe properly placed in the ear canal, press the button on the thermometer. The reading is displayed on the digital display screen in about 2 seconds. Pressing the button on the thermometer before the probe is properly placed in the ear will result in an inaccurate reading.

6. Remove the probe and note the reading. Discard the probe cover into an appropriate waste container. The probe covers are for one patient use only.
PSY PROCEDURE 19-7: Measuring Temperature Using a Tympanic Thermometer (continued)

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Wash your hands and record the procedure.</td>
<td>Be sure to indicate that the tympanic temperature was taken. The vital signs (temperature, pulse, respirations, and blood pressure) are usually recorded together.</td>
</tr>
<tr>
<td>8. Return the unit to the charging base.</td>
<td>The unit should be kept in the charging base so that the battery is always adequately charged.</td>
</tr>
<tr>
<td>9. <strong>AFF</strong> Explain how to respond to a patient who is deaf.</td>
<td>Solicit assistance from anyone who may be with the patient or a staff member who knows sign language to interpret if available. If no interpreter is available, use hand gestures or pictures to explain procedure to the patient.</td>
</tr>
</tbody>
</table>

Charting Example:

04/13/2012 2:00 pm T 99.4°F tympanic  _____________________________________________________ M. Smythe, CMA

Note: The medical assistant may sign his or her name in the patient record using only the “CMA” credential if the office has a signature log denoting the entire credential as “CMA(AAMA).”

PSY PROCEDURE 19-8: Measuring Temperature Using a Temporal Artery Thermometer

**Purpose:** Accurately measure and record a patient’s temperature using a temporal artery thermometer

**Equipment:** Temporal artery thermometer, alcohol wipe

**Standard:** This task should take less than 5 minutes.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wash your hands and assemble the necessary supplies.</td>
<td>Handwashing aids infection control.</td>
</tr>
<tr>
<td>2. Greet and identify the patient and explain the procedure.</td>
<td>Identifying the patient prevents errors.</td>
</tr>
<tr>
<td>3. Place the probe end of the hand-held unit on the forehead of the patient. Make sure the patient’s skin is dry.</td>
<td>If the patient is diaphoretic, dry the skin with a towel first or take the temperature using another method.</td>
</tr>
</tbody>
</table>

**Step 3:** The temporal artery thermometer is placed flat against the forehead.
### Measuring Temperature Using a Temporal Artery Thermometer (continued)

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. With the thermometer against the forehead, depress the on/off button, move the thermometer across and down the forehead, and release the on/off button with the unit over the temporal artery.</td>
<td>Some units may indicate that you should lift the thermometer from the temporal artery and place it behind the ear before releasing the on/off button.</td>
</tr>
<tr>
<td><strong>Step 4A.</strong> Slide the unit across the forehead.</td>
<td></td>
</tr>
<tr>
<td><strong>Step 4B.</strong> Stop over the temporal artery before releasing the on/off button.</td>
<td></td>
</tr>
<tr>
<td>5. The reading is displayed on the digital display screen in 1–2 seconds.</td>
<td></td>
</tr>
<tr>
<td>6. Properly disinfect the end of the thermometer according to manufacturer instructions.</td>
<td>Thermometers must be disinfected between patients.</td>
</tr>
<tr>
<td>7. Wash your hands and record the procedure.</td>
<td>Be sure to indicate that a temporal artery temperature was taken. The vital signs (temperature, pulse, respirations, and blood pressure) are usually recorded together.</td>
</tr>
<tr>
<td>8. Return the unit to the charging base.</td>
<td>The unit should be kept in the charging base so that the battery is always adequately charged.</td>
</tr>
<tr>
<td>9. <strong>AFF</strong> Explain how to respond to a patient who is visually impaired.</td>
<td>Observe patients carefully to prevent injury and always ask before offering assistance or taking hold of their arm to guide. Face the patient when speaking and always let them know what you are going to do before touching them.</td>
</tr>
</tbody>
</table>

**Charting Example:**

09/22/2012 9:30 am T 98.6°F temporal artery ____________________________ N. Hoffman, CMA

**Note:** The medical assistant may sign his or her name in the patient record using only the “CMA” credential if the office has a signature log denoting the entire credential as “CMA(AAMA).”
**PROCEDURE 19-9: Measuring the Radial Pulse**

**Purpose:** Accurately measure and record a patient’s radial pulse  
**Equipment:** A watch with a sweeping second hand  
**Standard:** This procedure should take 3–5 minutes.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wash your hands.</td>
<td>Handwashing is an infection control technique and should be performed before and after any patient contact.</td>
</tr>
<tr>
<td>2. Greet and identify the patient and explain the procedure.</td>
<td>In most cases, the pulse is taken at the same time as the other vital signs.</td>
</tr>
<tr>
<td>3. Position the patient with the arm relaxed and supported either on the lap of the patient or on a table.</td>
<td>If the arm is not supported or the patient is uncomfortable, the pulse may be difficult to find and the count may be affected.</td>
</tr>
<tr>
<td>4. With the index, middle, and ring fingers of your dominant hand, press with your fingertips firmly enough to feel the pulse but gently enough not to obliterate it (see Fig. 19-11).</td>
<td>Do not use your thumb; it has a pulse of its own that may be confused as the patient’s. You may place your thumb on the opposite side of the patient’s wrist to steady your hand.</td>
</tr>
<tr>
<td>5. If the pulse is regular, count it for 30 seconds, watching the second hand of your watch. Multiply the number of pulsations by 2 since the pulse is always recorded as beats per minute. If the pulse is irregular, count it for a full 60 seconds.</td>
<td>Counting an irregular pulse for less than 60 seconds will give an inaccurate measurement.</td>
</tr>
<tr>
<td>6. Record the rate in the medical record with the other vital signs. Also note the rhythm if irregular and the volume if thready or bounding.</td>
<td>Procedures are considered not to have been done if they are not recorded. The vital signs (temperature, pulse, respirations, and blood pressure) are usually recorded together.</td>
</tr>
<tr>
<td>7. <strong>AFF</strong> Explain how to respond to a patient who is developmentally challenged.</td>
<td>To avoid injury to the patient, assess for safety before completing a procedure when there is the possibility that the patient may not cooperate.</td>
</tr>
</tbody>
</table>

**Charting Example:**

06/12/2012 11:30 am Pulse 78 and irregular __________________________ E. Kramer, CMA

**Note:** The medical assistant may sign his or her name in the patient record using only the “CMA” credential if the office has a signature log denoting the entire credential as “CMA(AAMA).”
### PSY PROCEDURE 19-10: Measuring Respirations

**Purpose:** Accurately measure and record a patient’s respirations  
**Equipment:** A watch with a sweeping second hand  
**Standard:** This procedure should take 3–5 minutes.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wash your hands.</td>
<td>Handwashing aids in infection control.</td>
</tr>
<tr>
<td>2. Greet and identify the patient and explain the procedure.</td>
<td>In most cases, the respirations are counted at the same time as the pulse.</td>
</tr>
<tr>
<td>3. After counting the radial pulse and still watching your second hand, count a complete rise and fall of the chest as one respiration. Note: Some patients have abdominal movement rather than chest movement during respirations. Observe carefully for the easiest area to assess for the most accurate reading.</td>
<td>A patient who is aware that you are observing respirations may alter the breathing pattern. It is best to begin counting respirations immediately after counting the pulse without informing the patient.</td>
</tr>
<tr>
<td>4. If the breathing pattern is regular, count the respiratory rate for 30 seconds and multiply by 2. If the pattern is irregular, count for a full 60 seconds.</td>
<td>Counting an irregular respiratory pattern for less than 60 seconds may give an inaccurate measurement.</td>
</tr>
<tr>
<td>5. Record the respiratory rate in the medical record with the other vital signs. Also, note whether the rhythm is irregular, along with any unusual or abnormal sounds such as wheezing.</td>
<td>Procedures are considered not to have been done if they are not recorded. The vital signs (temperature, pulse, respirations, and blood pressure) are usually recorded together.</td>
</tr>
<tr>
<td>6. <strong>AFF</strong> Explain how to respond to a patient who has dementia.</td>
<td>Solicit assistance from caregiver or other staff member to help during the procedure. Give simple directions to the patient about what he or she should do. Speak clearly, not loudly.</td>
</tr>
</tbody>
</table>

**Charting Example:**

```
09/15/2012 8:45 am Resp 16  ____________________________________________________________ J. Thompson, CMA
```

Note: The medical assistant may sign his or her name in the patient record using only the “CMA” credential if the office has a signature log denoting the entire credential as “CMA(AAMA).”
### PROCEDURE 19-11: Measuring Blood Pressure

**Purpose:** Accurately measure and record a patient's blood pressure  
**Equipment:** Sphygmomanometer, stethoscope  
**Standard:** This procedure should take 5 minutes.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wash your hands and assemble your equipment.</td>
<td>Handwashing aids infection control.</td>
</tr>
<tr>
<td>2. Greet and identify the patient and explain the procedure.</td>
<td>Identifying the patient prevents errors and explaining the procedure eases anxiety.</td>
</tr>
<tr>
<td>3. Position the patient with the arm to be used supported with the forearm on the lap or a table and slightly flexed, with the palm upward. The upper arm should be level with the patient's heart.</td>
<td>Positioning the arm with the palm upward facilitates finding and palpating the brachial artery. If the upper arm is higher or lower than the heart, an inaccurate reading may result.</td>
</tr>
<tr>
<td>4. Expose the patient's arm.</td>
<td>Any clothing over the area may obscure the sounds. If the sleeve is pulled up, it may become tight and act as a tourniquet, decreasing the flow of blood and causing an inaccurate blood pressure reading.</td>
</tr>
<tr>
<td>5. Palpate the brachial pulse in the antecubital area and center the deflated cuff directly over the brachial artery. The lower edge of the cuff should be 1–2 inches above the antecubital area.</td>
<td>If the cuff is placed too low, it may interfere with the placement of the stethoscope and cause noises that obscure the Korotkoff sounds.</td>
</tr>
<tr>
<td>6. Wrap the cuff smoothly and snugly around the arm and secure it with the Velcro edges.</td>
<td>If the cuff does not fit smoothly and snugly around the arm, the blood pressure reading may be inaccurate.</td>
</tr>
</tbody>
</table>
### PSY Procedure 19-11: Measuring Blood Pressure

**Steps**

1. With the air pump in your dominant hand and the valve between your thumb and the forefinger, turn the screw clockwise to tighten. Do not tighten it to the point that it will be difficult to release.

   **Reasons**

   - The cuff will not inflate with the valve open. If the valve is too tightly closed, it will be difficult to loosen with one hand after the cuff is inflated.

2. While palpating the brachial pulse with your nondominant hand, inflate the cuff and note the point or number on the dial or mercury column at which you no longer feel the brachial pulse.

   **Reasons**

   - The dial or mercury column should be at eye level. Noting this number gives you a reference point for reinflating the cuff when taking the blood pressure.

3. Deflate the cuff by turning the valve counterclockwise. Wait at least 30 seconds before reinflating the cuff.

   **Reasons**

   - Always wait at least 30 seconds after deflating the cuff to allow circulation to return to the extremity.

4. Place the stethoscope earpieces in your ears with the openings pointed slightly forward. Stand about 3 feet from the manometer with the gauge at eye level. Your stethoscope tubing should hang freely without touching or rubbing against any part of the cuff.

   **Reasons**

   - With the earpieces pointing forward in the ear canals, the openings follow the natural opening of the ear canal. The manometer should be at eye level to decrease any chance of error when it is read. If the stethoscope rubs against other objects, environmental sounds may obscure the Korotkoff sounds.

5. Place the diaphragm of the stethoscope against the brachial artery and hold it in place with the nondominant hand without pressing too hard.

   **Reasons**

   - If not pressed firmly enough, you may not hear the sounds. Pressing too firmly may obliterate the pulse.

6. Hold the stethoscope diaphragm firmly against the brachial artery while taking the blood pressure and listening carefully.
### Measuring Blood Pressure (continued)

**Steps** | **Reasons**
--- | ---
12. With your dominant hand, turn the screw on the valve just enough to close the valve; inflate the cuff. Pump the valve bulb to about 30 mm Hg above the number felt during Step 8. | Inflating more than 30 mm Hg above baseline is uncomfortable for the patient and unnecessary; inflating less may produce an inaccurate systolic reading.

13. Once the cuff is appropriately inflated, turn the valve counterclockwise to release air at about 2–4 mm Hg per second. | Releasing the air too fast will cause missed beats, and releasing it too slowly will interfere with circulation.

14. Listening carefully, note the point on the gauge at which you hear the first clear tapping sound. This is the systolic sound, or Korotkoff I. | Aneroid and mercury measurements are always made as even numbers because of the way the manometer is calibrated.

**Step 14A.** The meniscus on the mercury column in this example reads 120 mm Hg.

**Step 14B.** The gauge on the aneroid manometer reads 80 mm Hg.

15. Maintaining control of the valve screw, continue to listen and deflate the cuff. When you hear the last sound, note the reading and quickly deflate the cuff. **Note:** Never immediately reinflate the cuff if you are unsure of the reading. Totally deflate the cuff and wait 1–2 minutes before repeating the procedure. | The last sound heard is Korotkoff V and is recorded as the bottom number or diastolic blood pressure.

16. Remove the cuff and press the air from the bladder of the cuff. | Removing the remaining air from the bladder of the cuff will allow for better storage.

17. If this is the first recording or a new patient, the physician may also want a reading in the other arm or in another position. | Blood pressure varies in some patients between the arms or in different positions such as lying or standing.
### PROCEDURE 19-11: Measuring Blood Pressure (continued)

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>18. Put the equipment away and wash your hands.</td>
<td>Handwashing should be done after any patient encounter.</td>
</tr>
<tr>
<td>19. Record the reading with the systolic over the diastolic pressure, noting which arm was used (120/80 LA). Also, record the patient’s position if other than sitting.</td>
<td>Procedures are considered not done if they are not recorded. The vital signs (temperature, pulse, respiratory, and blood pressure) are usually recorded together.</td>
</tr>
<tr>
<td>20. <strong>AFF</strong> Explain how to respond to a patient who is from a different culture.</td>
<td>Be respectful of the cultural differences by explaining why procedures are important. Provide additional privacy if necessary.</td>
</tr>
</tbody>
</table>

**Charting Example:**

```
11/08/2012 3:30 pm T 98.6°F O, P 78, R 16, BP 130/90 LA sitting, 110/78 LA standing _______________ Y.Torres.CMA
```

Note: The medical assistant may sign his or her name in the patient record using only the “CMA” credential if the office has a signature log denoting the entire credential as “CMA(AAMA).”
Warm Ups for Critical Thinking

1. You are asked to teach a patient, Mr. Stone, how to take his blood pressure at home once in the morning and once at night and record these readings for 1 month. Create a patient education brochure that explains the procedure in understandable terms and design a sheet that Mr. Stone can easily use to record these readings.

2. Ms. Black arrived at the office late for her appointment; she was frantic and explained that she had experienced car trouble on the way to the office, could not find a parking place, and just locked her keys inside her car. How would you expect these events to affect her vital signs? Explain why.

3. What size of cuff would you choose for Mrs. Cooper, an elderly female patient who is 5 feet 3 inches tall and weighs approximately 90 pounds? Why?

4. How would you respond to a patient who asks you to give advice on what type of thermometer to buy for use at home? Would the age of the patient be relevant with regard to the type of thermometer you might suggest?

5. An elderly male patient tells you that he is considering stopping the blood pressure medication the physician ordered at the previous visit. He further explains that he has “read all about this drug on the Internet,” and he informs you that “it has side effects,” although he denies experiencing any at this time. Describe how you would handle this situation.

Chapter Summary

- Anthropometric measurements include height and weight. Vital signs include:
  - temperature (T)
  - pulse (P)
  - respirations (R)
  - blood pressure (BP)

- When a patient first visits the medical office, these measurements are recorded as a baseline and used as a comparison for data collected at subsequent visits. These measurements, which provide important data for the physician to use in diagnosing and treating illnesses, are very frequently performed by medical assistants.