CHAPTER OUTLINE

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- Gloves
- Antiseptics
- Spill Kit Supplies and Instructions
- Gauze Pads
- Bandages
- Needle and Sharps Disposal Containers

VENIPUNCTURE EQUIPMENT
- Tourniquets
- Needles

BLOOD COLLECTION SYSTEMS
- Evacuated Tube System
- Tube Additives
- Syringe System
- Winged Infusion Set
- Order of Draw

SKIN PUNCTURE (MICROCOLLECTION) EQUIPMENT
- Lancets
- Microhematocrit Tubes
- Microcollection Containers
- Filter Paper Test Requisitions
- Warming Devices

PATIENT PREPARATION

PERFORMING A VENIPUNCTURE
- Selection of the Venipuncture Site
- Complications of Venipuncture

PERFORMING A SKIN PUNCTURE
- Complications of Skin Puncture

ROLE DELINEATION COMPONENTS

CLINICAL: FUNDAMENTAL PRINCIPLES
- Apply principles of aseptic technique and infection control
- Comply with quality assurance practices

CLINICAL: DIAGNOSTIC ORDERS
- Collect and process specimens
- Perform diagnostic tests

CLINICAL: PATIENT CARE
- Adhere to established patient screening procedures

GENERAL: PROFESSIONALISM
- Display a professional manner and image
- Prioritize and perform multiple tasks

GENERAL: COMMUNICATION SKILLS
- Adapt communications to individual’s ability to understand

CLINICAL: LEGAL CONCEPTS
- Perform within legal and ethical boundaries
  Document accurately
CHAPTER COMPETENCIES

LEARNING OBJECTIVES
Upon successfully completing this chapter, you will be able to:

1. Define and spell the key terms.
2. Identify equipment and supplies used to obtain a routine venous specimen and a routine capillary skin puncture.
3. List the major anticoagulants, their color codes, and the suggested order in which they are filled from a venipuncture.
4. Describe the location and selection of the blood collection sites for capillaries and veins.
5. Explain the importance of correct patient identification and complete specimen and requisition labeling.
6. Describe the steps in preparation of the puncture site for venipuncture and skin puncture.
7. Describe care for a puncture site after blood has been drawn.
8. List precautions to be observed when drawing blood.

PERFORMANCE OBJECTIVES
Upon successfully completing this chapter, you will be able to:

1. Obtain a blood specimen from a patient by venipuncture (Procedure 26-1).
2. Obtain a blood specimen from a patient by skin puncture (Procedure 26-2).
3. Use a butterfly collection system.

KEY TERMS

anticoagulant  evacuated tube  hemolysis
antecubital space  gauge  palpate
antiseptic  gel separator  prophylaxis
bevel  hematoma  sharps container
edematous  hemoconcentration  syncope

SUCCESSFULLY OBTAINING blood specimens requires study and practice. Blood is collected by several methods, including arterial puncture, skin puncture, and venipuncture. This chapter describes blood collection equipment and supplies for safe venipuncture and skin puncture. Use of arterial specimens is limited to the evaluation of respiratory function. You must perform blood collection in the safest manner possible. Blood is a biohazardous material, so it should be handled with standard precautions and appropriate barrier precautions.

Needlestick injuries contribute to the overall burden of health care worker injuries. Estimates indicate that 600,000 to 800,000 such injuries occur annually, and about half go unreported. Needlestick injuries may expose workers to blood-borne pathogens, such as human immunodeficiency virus (HIV), hepatitis B virus, and/or hepatitis C virus. A health care worker’s risk of infection depends on the pathogen, the severity of the needlestick injury, and the use of vaccination before the exposure and prophylaxis (protective treatment for the prevention of disease once exposure has occurred) after it. Become familiar now with the instructions for immediate action from the Centers for Disease Control and Prevention (CDC) in case of a needlestick injury (Box 26-1).

GENERAL BLOOD DRAWING EQUIPMENT

Blood Drawing Station

A blood drawing station is equipped for performing phlebotomy procedures on outpatients or patients in medical offices sent by their physicians for laboratory testing (Fig. 26-1). This station includes a table close at hand for supplies and a chair or bed for the patient. The table should be at a convenient height for working with enough space to hold numerous supplies. Phlebotomy chairs are available from several manufacturers. The chair should be comfortable and have adjustable armrests to allow proper positioning of either arm. A safety device locks the armrest in place in front of the patient to prevent falling from the chair if fainting occurs. A bed or reclining chair should be available for patients with a history of fainting and to perform heel sticks or other procedures on infants and small children.

Gloves

Guidelines from the CDC and the Occupational Safety and Health Administration (OSHA) require that gloves be worn during phlebotomy procedures. A new pair of gloves must
be used for each patient and removed when the procedure is finished. Nonsterile, disposable latex, nitrile, vinyl, or polyethylene gloves are acceptable.

Standard precautions require handwashing after glove removal. Good glove fit enhances safe manipulation. Gloves that are dusted with powder can be a source of contamination for some tests, especially those collected by capillary puncture. Some users have allergic responses to glove powder. Powder in latex gloves can facilitate suspension of latex particles in the air, posing danger to those with latex allergy.

**Antiseptics**

Antiseptics inhibit the growth of bacteria. They are safe for use on human skin and are used to clean the skin before skin puncture or venipuncture. The most commonly used antiseptic for routine blood collection is 70% isopropyl alcohol. Other antiseptics used for blood collection are povidone iodine, 0.5% chlorhexidine gluconate, and benzalkonium chloride.

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**Spill Kit Supplies and Instructions**

The supplies available in a biohazard spill kit should include but are not limited to the following:

- A copy of these biohazardous spill cleanup instructions
- Nitrile disposable gloves
- Laboratory coat
- Absorbent material, such as absorbent paper towels, granular absorbent material
- All-purpose disinfectant, such as normal household bleach (diluted 1:10) or an iodophor
- Bucket for diluting disinfectant (can be used to store the kit contents when not in use)
- Dustpan, broom, hand broom (for picking up broken glass and other contaminated sharps)
- Sharps waste containers
- Biohazard waste bags

All reusable items should be autoclavable or compatible with the disinfectant used. Most of the listed items and other biohazard spill control items are sold in biohazardous-spill control kits.

When cleaning blood spills, you should wear disposable gloves of sufficient sturdiness that they will not tear while you clean. If the gloves develop holes, tears or splits, remove them, wash hands immediately, and put on fresh gloves. Disposable gloves must never be washed or reused.

Spills of blood and blood-contaminated fluids should be properly cleaned using either a chemical germicide approved for use as a hospital disinfectant and tuberculocidal at recommended dilution or a solution of 5.25% sodium hypochlorite (household bleach) diluted 1:10 with water.

**Cleaning up Blood and Body Fluids**

1. Secure spill area.
2. Locate a spill cleanup kit.
3. Wear gloves during cleanup.
4. Pour or place absorbent material over the spill.
5. Use a scoop or dustpan to pickup material.
6. Wipe blood up with an absorbent towel.
7. Apply a disinfectant to the area.
8. Double-bag all cleanup materials in red biohazard bags for disposal.

**Cleaning up Glass, Blood, and Body Fluids**

- Wear double gloves or utility gloves if there is broken glass in a blood or fluid spill.
- Pick up the glass with a mechanical device, such as forceps, or scoop it up with a broom and dustpan or cardboard. (DO NOT USE YOUR HANDS TO PICK UP THE GLASS!)  
- Place the broken glass in a sharps (needle disposal) container.
- Follow steps listed earlier for cleaning up blood or fluid spills.
**Gauze Pads**

Clean 2 × 2 gauze pads folded in fourths are used to hold pressure over the puncture site. Cotton or rayon balls may be used but are not recommended because of their tendency to stick to the site and cause bleeding when removed.

**Bandages**

An adhesive bandage (e.g., Band-Aid) is used to cover the site once the bleeding has stopped. If a patient is allergic to adhesive bandages, use paper, cloth, or knitted tape over a folded gauze square. Do not use a bandage on infants under 2 years of age because of the danger of aspiration and suffocation. Latex-free bandages are available in case of latex allergy.

**Needle and Sharps Disposal Containers**

Regardless of safety features, immediately dispose of used needles, lancets, and other sharp objects in a puncture-resistant, leakproof disposable container called a sharps container. These containers are usually marked as biohazard and are red or bright orange for easy identification. Needles should never be cut, bent, or broken before disposal.

**Check Point Question**

1. What are disinfectants and antiseptics used for?

**VENIPUNCTURE EQUIPMENT**

Venipuncture procedures require the use of the following special equipment.

**Tourniquets**

The tourniquet constricts the flow of venous blood in the arm and makes the veins more prominent, so they are easier to find and penetrate with a needle. The tourniquet is a soft, pliable rubber strip, usually 1 inch wide and 15 to 18 inches long. It can easily be released with one hand, does not cut into the patient’s arm, and is inexpensive enough that a new tourniquet can be used for each patient.

**Needles**

OSHA requires needles to have safety features to minimize accidental needlesticks. Manufacturers provide needles with various features to facilitate this requirement. Users can select products that both meet requirements and provide ease of use.

Sterile, disposable, single-use-only needles are used for venipuncture. They are silicon-coated, which enables them to penetrate the skin smoothly. The end of the needle that pierces the vein is cut on a slant or bevel. The bevel allows the needle to penetrate the vein easily and prevents coring, removal of a portion of skin or vein. The long, cylindrical portion of the needle is called the shaft, and the end that connects to the blood-drawing apparatus is called the hub.

The gauge of a needle indicates the size of the lumen (bore size or opening) of the needle. The larger the gauge number, the smaller the diameter of the needle (e.g., 20 gauge is larger than 25 gauge). Selection of the gauge is based on the size and condition of the patient’s vein. A 21- to 22-gauge needle is used for most routine blood collection. Never use a 24-gauge needle to collect blood, as the lumen is too small and will rupture blood cells, causing hemolysis of the specimen.

**BLOOD COLLECTION SYSTEMS**

Two blood collection systems are commonly used for venipuncture: the vacuum or evacuated tube system and the syringe system.

**Evacuated Tube System**

The evacuated tube system consists of a tube holder (adapter) and evacuated tube needle. This is a closed system allowing the patient’s blood to flow from the vein through the needle and into the collection tube without exposure to the air. This system facilitates collecting multiple tubes with a single venipuncture. Evacuated tube systems are composed of three components: a multisample needle (allows collection of multiple tubes of blood during one venipuncture), a plastic needle holder that holds the collection tubes, and various collection tubes (Fig. 26-2).

With beveled points on both ends, multisample needles are threaded in the middle to screw into the needle holder. One end of the needle is longer and is exposed for piercing the patient’s skin and entering the vein. The shorter end penetrates the rubber stopper of the collection tube and with its retractable rubber sleeve prevents leakage of blood during tube changes. The sleeve is pushed back when it goes into the stopper; it allows blood to flow into the tube and recovers the end of the needle when the tube is removed. A multisample needle with safety features is shown in Figure 26-3.

The holder, sometimes called an adapter, has an indentation about half an inch from the hub (Fig. 26-4). This indentation marks the point where the short, sleeved end of the needle starts to enter the rubber stopper of the tube. A large opening at the other end of the holder accepts the blood collection tube. There are flanges (extensions) on the sides of the rim of the holder to aid in tube placement and removal. Holder safety features include a shield that covers the needle or device that retracts the needle into the holder after it is withdrawn from the vein (Fig. 26-5).

Evacuated tubes contain a vacuum with a rubber stopper sealing the tube. These tubes are made of glass or plastic.
and range in size from 2 to 15 mL. Tube size is selected according to the patient’s age, amount of blood needed, and the size and condition of the patient’s vein. The tubes are sterile to prevent contamination of the specimen and the patient. Because of the vacuum inside the tube, evacuated tubes fill with blood automatically. The vacuum is premeasured by the manufacturer to draw the precise amount of blood into the tube. The tube fills until the vacuum is exhausted, so that a tube that has lost all or part of its vacuum will not fill completely, if at all.
Tube Additives

Different laboratory tests require different types of blood specimens. Some tests require serum samples; for these the blood is drawn into a tube that allows clotting. Other tests require whole blood or plasma, and these samples are drawn into a tube that contains an anticoagulant additive because it prevents clotting.

An additive is any substance (other than the tube coating) that is placed in a tube. Additives have specific functions. Below is a list of the most common additives and their functions:

- Anticoagulants prevent the blood from coagulating or clotting.
- Clot activators enhance coagulation.
- Thixotropic gel separator, an inert substance, forms a physical barrier between the cellular portion of a specimen and the serum or plasma portion after the specimen has been centrifuged.

The evacuated tube system uses color-coded stoppers as a means of identifying the additive content of each type of tube (TABLE 26-1). It is necessary to use the correct anticoagulant because improper anticoagulant use can alter test results.

Syringe System

Syringes are made of glass or disposable plastic and vary in volume from 1 to 50 mL. Choose a syringe whose volume will accommodate all of the blood necessary for the tests the physician has requested.

The barrel of the syringe is graduated in milliliters. Pulling on the plunger of the syringe creates a vacuum in the barrel. The plunger often sticks and is hard to pull. A technique called breathing the syringe makes the plunger easier to move. To do this, before beginning the procedure, pull back the plunger to about halfway up the barrel, then push it back. This makes the plunger move more smoothly and reduces the tendency to jerk when it is first pulled after insertion into the vein.

The vacuum created by pulling on the plunger while a needle is in a patient’s vein fills the syringe with blood. Pulling the plunger slowly and resting between pulls allows the vein time to refill with blood.

Using a syringe for blood collection requires transfer of blood to a collection tube. Various brands of devices ensure safety during the transfer of blood from a syringe into an evacuated tube. Force on the syringe plunger is not required because the vacuum in the tube will draw the specimen from the syringe.

Blood specimens collected by syringe must be transferred to evacuated tubes following proper order of draw (discussed later in the chapter).

Winged Infusion Set

The butterfly collection system, or winged infusion set, has a stainless steel beveled needle with attached winged-shaped plastic extensions connected to a 6- to 12-inch length of tubing. The most common butterfly needle sizes are 21 to 23 gauge and half an inch to three-quarters of an inch long. Butterflies come with attachments to be used with syringes and a special multisample Luer adapter (a device for connecting a syringe or evacuated holder to the needle) that allows them to be used in an evacuated tube system (FIG. 26-6). The set is an essential tool for collecting blood from difficult or small veins, such as hand veins or fragile veins of children and the elderly. Figure 26-7 shows how to use the butterfly system.
<table>
<thead>
<tr>
<th>BD Vacutainer™ Tubes With Hemogard™ Closure</th>
<th>BD Vacutainer™ Tubes With Conventional Stopper</th>
<th>Additive</th>
<th>Inversions at Blood Collection*</th>
<th>Laboratory Use</th>
<th>Your Lab’s Draw Volume/Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Clot activator and gel for serum separation</td>
<td>5</td>
<td>BD Vacutainer™ SST™ Tube for serum determinations in chemistry. Tube inversions ensure mixing of clot activator with blood. Blood clotting time 30 minutes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Lithium heparin and gel for plasma separation</td>
<td>8</td>
<td>BD Vacutainer™ PST™ Tube for plasma determinations in chemistry. Tube inversions prevent clotting.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• None (glass)</td>
<td>0</td>
<td>For serum determinations in chemistry and serology. Glass serum tubes are recommended for blood banking. Plastic tubes contain clot activator and are not recommended for blood banking. Tube inversions ensure mixing of clot activator with blood and clotting within 60 minutes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Clot activator (plastic tube with Hemogard closure)</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Thrombin</td>
<td>8</td>
<td>For stat serum determinations in chemistry. Tube inversions ensure complete clotting which usually occurs in less than 5 minutes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sodium heparin</td>
<td>8</td>
<td>For trace-element, toxicology and nutritional-chemistry determinations. Special stopper formulation provides low levels of trace elements (see package insert). For plasma determinations in chemistry.</td>
<td></td>
<td></td>
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<tr>
<td>• Na₂EDTA</td>
<td>8</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• None (serum tube)</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sodium heparin</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Lithium heparin</td>
<td>8</td>
<td>Tube inversions prevent clotting.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Potassium oxalate/sodium fluoride</td>
<td>8</td>
<td>For glucose determinations. Oxalate and EDTA anticoagulants will give plasma samples.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sodium fluoride/Na₂EDTA</td>
<td>8</td>
<td>Sodium fluoride is the antiglycolytic agent. Tube inversions ensure proper mixing of additive and blood. For lead determinations. This tube is certified to contain less than 0.1 µg/mL/ppm lead. Tube invasions prevent clotting.</td>
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<tr>
<td>• Sodium fluoride (serum tube)</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• Sodium heparin (glass)</td>
<td>8</td>
<td></td>
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<td></td>
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<tr>
<td>• K₂EDTA (plastic)</td>
<td>8</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• Sodium polyanethol sulfonate (SPS)</td>
<td>8</td>
<td>SPS for blood culture specimen collections in micro-biology. Tube inversions prevent clotting.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Acid citrate dextrose additives (ACD): Solution A - 22.0g/L trisodium citrate, 8.0g/L citric acid, 24.5g/L dextrose</td>
<td>8</td>
<td>ACD for use in blood bank studies. HLA phenotyping, DNA and paternity testing.</td>
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</tr>
<tr>
<td>Solution B - 13.2g/L trisodium citrate,</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BD Vacutainer™ Tubes With Hemogard™ Closure</td>
<td>BD Vacutainer™ Tubes With Conventional Stopper</td>
<td>Additive</td>
<td>Inversions at Blood Collection*</td>
<td>Laboratory Use</td>
<td>Your Lab’s Draw Volume/Remarks</td>
</tr>
<tr>
<td>-------------------------------------------</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>4.8g/L citric acid, 14.7g/L dextrose</td>
<td>8 K&lt;sub&gt;2&lt;/sub&gt;EDTA for whole blood hematology determinations. K&lt;sub&gt;2&lt;/sub&gt;EDTA for whole blood hemat...</td>
<td>Tube inversions prevent clotting.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Liquid K&lt;sub&gt;2&lt;/sub&gt;EDTA (glass)</td>
<td>8 K&lt;sub&gt;2&lt;/sub&gt;EDTA for whole blood hematology determinations and immunohematology testing (ABO grouping, Rh typing, antibody screening).</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Spray-dried K&lt;sub&gt;2&lt;/sub&gt;EDTA (plastic)</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Spray-dried K&lt;sub&gt;2&lt;/sub&gt;EDTA</td>
<td>8</td>
<td>For whole blood hemat...</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 106M sodium citrate (3.2%)</td>
<td>3–4</td>
<td>For coagulation determinations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 129M sodium citrate (3.8%)</td>
<td>3–4</td>
<td>NOTE: Certain tests may require chilled specimens. Follow your institution’s recommended procedures for collection and transport. CTAD for selected platelet function assays and routine coagulation determination. Tube inversions prevent clotting.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Citrate, theophylline, adenosine, dipyridamole (CTAD)</td>
<td>3–4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Partial-draw Tubes (2 ml and 3 ml, 13 × 15 mm) Small-volume Pediatric Tubes (2 ml: 10.25 × 47 mm, 3 ml: 10.25 × 64 mm)

<table>
<thead>
<tr>
<th>Additive</th>
<th>Inversions at Blood Collection*</th>
<th>Laboratory Use</th>
<th>Your Lab’s Draw Volume/Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• None</td>
<td>0</td>
<td>For serum determinations in chemistry and serology. Glass serum tubes are recommended for blood banking. Plastic tubes contain clot activator and are not recommended for blood banking. Tube inversions ensure mixing of clot activator with blood and clotting within 60 minutes</td>
<td></td>
</tr>
<tr>
<td>• Sodium heparin</td>
<td>8</td>
<td>For plasma determinations in chemistry. Tube inversions prevent clotting.</td>
<td></td>
</tr>
<tr>
<td>• Lithium heparin</td>
<td>8</td>
<td>K&lt;sub&gt;2&lt;/sub&gt;EDTA for whole blood hematology determinations. K&lt;sub&gt;2&lt;/sub&gt;EDTA for whole blood hematology determinations and immunohematology testing (ABO grouping, Rh typing, antibody screening).</td>
<td></td>
</tr>
<tr>
<td>• Liquid K&lt;sub&gt;2&lt;/sub&gt;EDTA (glass)</td>
<td>8</td>
<td>Tube inversions prevent clotting.</td>
<td></td>
</tr>
<tr>
<td>• Spray-dried K&lt;sub&gt;2&lt;/sub&gt;EDTA (plastic)</td>
<td>8</td>
<td>For coagulation determinations. Tube inversions prevent clotting. NOTE: Certain tests may require chilled specimens. Follow your institution’s recommended procedures for collection and transport of specimen.</td>
<td></td>
</tr>
<tr>
<td>• .105M sodium citrate (=3.2%)</td>
<td>3–4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• .129M sodium citrate (3.8%)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
**Figure 26-6.** Winged infusion sets. Left: Attached to a syringe. Right: Attached to evacuated tube holder by means of a Luer adapter.

**Figure 26-7.** Procedure for using butterfly in a hand vein. (A) Hand with tourniquet in place reveals prominent vein. (B) With the skin pulled taught over the knuckles, the needle is inserted into the vein until there is a flash of blood in the tubing. (C) Using the nondominant hand, a wing of the butterfly is held against the patient’s hand to steady the needle while the blood collecting tube is pushed onto the blood collecting needle. (D) Once the proper tubes have been drawn, gauze is placed over the vein and the needle is removed.
Checkpoint Question
2. What are three chemical substances that may be added to collection tubes? Explain the function of each.

ORDER OF DRAW
A designated order of draw is recommended to avoid contamination of nonadditive tubes by additive tubes, cross-contamination between different types of additive tubes, contamination with tissue thromboplastin, and microbial contamination.

The National Committee for Clinical Laboratory Standards (NCCLS) is an organization of representatives from the health care community, industry, and government who use consensus to develop voluntary guidelines and standards for the laboratory. NCCLS recommends one order of draw for both collection of evacuated tubes and filling evacuated tubes from a syringe (Table 26-2).

SKIN PUNCTURE (MICROCOLLECTION) EQUIPMENT
Capillary puncture or skin puncture requires penetration of the capillary bed in the dermis of the skin with a lancet or other sharp device. The small specimen volumes required by point-of-care instruments allow more laboratory tests to be collected by skin puncture. The equipment used to collect the specimen depends on the test being performed.

| Table 26-2 NCCLS ORDER OF DRAW, STOPPER COLOR, AND RATIONALE FOR COLLECTION ORDER |
|---------------------------------|---------------------------------|---------------------------------|
| Order of Draw                   | Tube Stopper Color              | Rationale for Collection Order  |
| Blood cultures (sterile collections) | Yellow sodium polyanetholesulfonate (SPS) (or sterile media containers) | Minimizes chance of microbial contamination |
| Plain (nonadditive) tubes       | Red                             | Prevents contamination by additives in other tubes. |
| Coagulation tubes               | Light blue                      | Second or third position in order of draw prevents tissue thromboplastin contamination. Must be the first additive tube in the order because all other additive tubes affect coagulation tests. |
| Serum separator gel tubes (SSTs) | Red and gray rubber Gold plastic | Prevents contamination by additives in other tubes. Comes after coagulation tests because silica particles activate clotting and affect coagulation tests. Carryover of silica into subsequent tubes can be overridden by the anticoagulant in them. |
| Plasma separator gel tubes (PSTs) | Green and gray rubber Light green plastic | Contains heparin, which affects coagulation tests and interferes in collection of serum specimens. Causes the least interference in tests other than coagulation tests. |
| Heparin tubes                   | Green                           | Same as PST. |
| Ethylenediaminetraacetic acid (EDTA) tubes | Lavender                       | Causes more carryover problems than any other additive. Elevates sodium and potassium levels. Chelates and decreases calcium and iron levels. Elevates prothrombin time and partial thromboplastin time results. |
| Oxalate/fluoride tubes          | Gray                            | Sodium fluoride and potassium oxalate elevate sodium and potassium levels, respectively. Comes after hematology tubes because oxalate damages cell membranes and causes abnormal red blood cell morphology. |
Lancets

A sterile disposable lancet is used to pierce the skin to obtain drops of blood for testing. Lancets are designed to control depth of puncture and have safety features to reduce accidental sharps injuries. Manufacturers offer lancets in a range of lengths and depths to facilitate varying puncture situations and sample requirements. FIGURE 26-8 shows several types of lancets used for microcollection.

Microhematocrit Tubes

Microhematocrit tubes are narrow-bore glass or plastic disposable capillary tubes used for hematocrit determinations. They fill by capillary action and hold 50 to 75 mL of blood. Microhematocrit tubes for sampling specimens directly from a lavender-top tube are plain; those used for collecting hematocrit specimens directly from a capillary puncture are coated with ammonium heparin. Plain tubes have a blue band on one end of the capillary tube, and ammonium heparin–coated tubes have a red band. A plastic or clay sealant is used to close one end of the tube (Fig. 26-9).

Microcollection Containers

Micro containers consist of small, round-bottomed nonsterile plastic tubes and color-coded stoppers that indicate the presence or absence of an additive. The color coding is identical to that of blood collection tubes used in venipuncture. Micro containers are used for filling, measuring, stoppering, centrifuging, and storing blood, all in one container. Samples for bilirubin are collected in an amber-colored plastic tube that protects the blood from light.
Filter Paper Test Requisitions

Another microcollection device is filter paper that is part of a test requisition. It is used to test newborns for genetic defects, such as hypothyroidism and phenylketonuria. The filter paper is printed with circles that must be filled with blood (Fig. 26-10). The lateral surface of the newborn’s heel is punctured and the blood droplet is absorbed into individual circles on a filter paper card. A large drop of blood must be applied from one side of the paper, and the blood must soak through to the other side.

The specimen should air dry in a horizontal position and not be stacked with other collection requisitions.

Warming Devices

Important especially for heel sticks, warmers increase blood flow before the skin is punctured. Heel-warming devices (Fig. 26-11) provide a temperature not exceeding 42°C. Alternatively, a diaper or towel may be wet with warm tap water and used to wrap the hand or foot before skin puncture. Do not use water so hot that it might burn the patient.

PATIENT PREPARATION

Gaining the patient’s trust and confidence and putting the patient at ease will help minimize anxiety and divert attention from any discomfort associated with the procedure. To do this, display a cheerful, confident, and pleasant manner, introduce yourself, explain the procedure in simple terms, and communicate effectively with the patient. Many patients know from experience where it is easiest to find an accessible vein. In conjunction with your knowledge and skill, choosing the best site will make the procedure less traumatic. Talk quietly with the patient and progress through the procedure with confidence.

After identifying the patient and explaining the procedure, verify that the patient has followed any dietary instructions

---

**Figure 26-10.** Newborn screening specimen forms. (A) Initial specimen form. (B) Second specimen form. (Courtesy of Daniel Gray, State of New Mexico Scientific Laboratory, Albuquerque.)
or restrictions ordered by the physician or required by the test requested. Fasting, the most common dietary restriction, requires the patient to refrain from eating for a certain period, usually from midnight until specimen collection the following morning. It is essential to emphasize that fasting does not require the patient to refrain from drinking water. Hydration is important to make veins palpable and accessible for venipuncture.

If the patient indicates that fasting instructions or dietary restrictions were not followed, notify the physician for a decision whether or not to proceed with the venipuncture. If you are instructed to proceed in obtaining the specimen, write “nonfasting” on both the test requisition and the specimen label.

Always believe patients who say they faint during venipuncture. Have these patients lie down during the procedure. This reduces the chance of syncope (fainting), and if the patient does faint, he or she will not fall. If the patient is sitting and feels faint or mentions feeling weak, have him or her lower the head and take deep breaths. Never draw blood from a patient who is likely to faint unless the physician is in the office.

One of the most important steps in specimen collection is identification of the patient. Ask the patient to state his or her name, date of birth, or any other information to verify identity. After you collect the blood specimen, label the sample with the patient’s first and last names, an assigned identification number if available, the date and time, and your initials to verify who drew the sample.

**Checkpoint Question**

3. How should you label the patient’s blood sample?

**Performing a Venipuncture**

The forearm veins in the antecubital space (the inside of the elbow) are commonly used for venipuncture. The three main veins in this area are the cephalic, median cubital, and basilic (Fig. 26-12). The primary vein for venipuncture is the median cubital vein.

Begin the procedure by washing your hands and putting on gloves. Equipment and supplies should be assembled near the phlebotomy chair. The tourniquet should be placed 3 to 4 inches above the planned venipuncture site and secured with a half-bow knot (Fig. 26-13). Apply the tourniquet tightly enough to slow venous blood flow without affecting arterial blood flow. The half-bow makes it easy to remove the tourniquet with one hand. Rapid removal is important in collection procedures and emergencies. Leaving the tourniquet in place longer than 1 minute will change the blood components as a result of hemoconcentration. Velcro closure, rubber tubing, or a blood pressure cuff may also be used as a tourniquet.

Ask the patient to make a fist so that the veins in the arm become more prominent. Do not allow the patient to open and close the fist because it will cause hemoconcentration (pooling of blood components) and lead to erroneous test results.
Selection of the Venipuncture Site

While some veins are visible, the best choice for venipuncture is found by touch. Use the tip of the index finger to palpate (feel) veins to determine their suitability. Palpating helps locate veins and determine their size, depth, and direction. If no suitable antecubital vein can be found, release the tourniquet and repeat the procedure to this point on the other arm.

If no suitable antecubital vein is found in either arm, check hand veins and finally wrist veins. Massaging the arm from wrist to elbow increases blood flow and makes veins more palpable. Warming the site with a warm towel can produce the same effect.

The complete procedure for performing a venipuncture is outlined in Procedure 25-1.

When a blood sample cannot be obtained, you may have to change the position of the needle. Figure 26-14 shows proper and improper needle positions. Rotate the needle half a turn; the bevel of the needle may be against the wall of the vein. If the needle has not penetrated the vein, slowly advance it farther into the vein. If the needle has penetrated too far into the vein, pull it back a little. The tube may not have sufficient vacuum; try another tube before withdrawing the needle.

Never attempt a venipuncture more than twice. If a blood specimen cannot be obtained in two tries, do not try a third time. Have another person attempt the draw or do a microcollection (skin puncture) if possible. Box 26-3 lists some common errors in venipuncture that you need to guard against.

Complications of Venipuncture

The most common complication of venipuncture is hematoma formation caused by blood leaking into the tissues during or after venipuncture. Hematomas are painful, cause unsightly bruising, and can cause compression injuries to nerves. Box 26-2 describes situations that may trigger hematoma formation. If a hematoma begins to form during the venipuncture, release the tourniquet immediately, withdraw the needle, and hold pressure on the site for at least 2 minutes. Cold compresses reduce pain and swelling.
Accidental puncture of an artery is recognized by the blood’s bright red color and the pulsing of the specimen into the tube. In this case, it is important to hold pressure over the site for a full 5 minutes after the needle is removed.

Aseptic techniques used to prevent infection of the venipuncture site include the following:

- Not touching the site after cleaning
- Removing the needle cap at the last possible minute prior to venipuncture
- Not opening bandages ahead of time

Permanent nerve damage may result from poor site selection, movement of the patient during needle insertion, inserting the needle too deeply or quickly, or excessive blind probing.

**PERFORMING A SKIN PUNCTURE**

Adult skin punctures are performed when no veins are accessible, to save veins for procedures such as chemotherapy, and for point-of-care testing. Technology now allows some tests to be performed on very small blood samples, but some results are more accurate on venipuncture specimens than on capillary specimens. Tests that cannot be performed on skin puncture specimens include most erythrocyte sedimentation rate methods, coagulation studies on plasma, cultures, and tests that require large blood volumes.

The skin puncture is the preferred method to obtain blood from infants and children. Venipuncture on infants and children may damage veins and surrounding tissues. Restraining the infant or child may cause injury.
When a vein rolls, the needle may slip to the side of the vein without penetrating it. Correct insertion technique; blood flows freely into needle. Bevel on vein lower wall does not allow blood to flow. Bevel on vein upper wall does not allow blood to flow. Needle partially inserted and causes blood leakage into tissue. When a vein rolls, the needle may slip to the side of the vein without penetrating it.

**Figure 26-14.** Proper and improper needle positioning. (A) Needle correctly positioned in a vein; blood flows freely into the needle. (B) Bevel on the upper wall of the vein prevents blood flow. (C) Bevel on the lower wall of the vein prevents blood flow. (D) Needle inserted too deep runs through the vein. (E) Partially inserted needle causes blood to leak into tissue. (F) Needle slipped beside the vein, not into it; occurs when a vein rolls to the side. (G) Collapsed vein prevents blood flow. (Reprinted with permission from McCall R. Phlebotomy Essentials. Baltimore: Lippincott Williams & Wilkins, 2003.)

The complete procedure for performing a skin puncture is outlined in Procedure 26-2.

**Complications of Skin Puncture**

Obtaining a specimen without clots is a challenge in microcollection. The body’s clotting system is activated to stop the bleeding as soon as the skin is punctured. If an anticoagulated specimen is required, it should be drawn first to get an adequate volume before the blood begins to clot. Any other additive specimens are collected next, and clotted specimens are collected last. If the blood has begun to produce microscopic clots while you are filling the last tube, this is not a problem, because clotting is required in this tube. Box 26-4 lists some common sources of errors in microcollection that you need to guard against.

**Checkpoint Question**

4. What is the proper order of draw when using the evacuated tube system? Why is this important?
Box 26-3

**SOURCES OF ERROR IN VENIPUNCTURE**

**Errors in Venipuncture Preparation**
- Improper patient identification
- Failure to check patient adherence to dietary restrictions
- Failure to calm patient prior to blood collection
- Use of improper equipment and supplies
- Inappropriate method of blood collection

**Errors in Venipuncture Procedure**
- Failure to dry the site completely after cleansing with alcohol
- Inserting needle bevel side down
- Use of needle that is too small, causing hemolysis of specimen
- Venipuncture in an unacceptable area
- Prolonged tourniquet application
- Wrong order of tube draw
- Failure to mix blood collected in additive-containing tubes immediately
- Pulling back on syringe plunger too forcefully
- Failure to release tourniquet prior to needle withdrawal

**Errors after venipuncture completion**
- Failure to apply pressure immediately to venipuncture site
- Vigorous shaking of anticoagulated blood specimens
- Forcing blood through a syringe needle into tube
- Mislabeled of tubes
- Failure to label appropriate specimens with infectious disease precaution
- Failure to put date, time, and initials on requisition
- Slow transport of specimens to laboratory

Box 26-4

**SOURCES OF ERROR IN SKIN PUNCTURE**

- Misidentification of patient
- Puncturing wrong area of infant heel
- Puncturing bone in infant heel
- Puncturing fingers of infants
- Puncturing wrong area of adult finger
- Contaminating specimen with alcohol or Betadine
- Failure to discard first blood drop
- Excessive massaging of puncture site
- Collecting air bubbles in pH or blood gas specimen
- Hemolyzing specimen
- Failure to seal specimens adequately
- Failure to chill specimens requiring refrigeration
- Erroneous specimen labeling
- Failure to document skin puncture collection on the requisition or in the computer
- Failure to warm site
- Delaying specimen transport
- Bruising site as a result of excessive squeezing
Procedure 26-1

Obtaining a Blood Specimen by Venipuncture

Purpose:

Equipment: Needle, syringe, and test tubes or evacuated tubes; tourniquet; sterile gauze pads; bandages; needle and adaptor; sharps container; 70% alcohol pad or other antiseptic; permanent marker or pen; appropriate biohazard barriers (e.g., gloves, impervious gown, face shield)

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check the requisition slip to determine the tests ordered and specimen requirements.</td>
<td>This ensures proper specimen collection.</td>
</tr>
<tr>
<td>2. Wash your hands.</td>
<td>Handwashing aids infection control.</td>
</tr>
<tr>
<td>3. Assemble the equipment. Check the expiration date on the tubes.</td>
<td>Assembling the equipment ensures that everything you need is available. Expired tubes may no longer have a vacuum; additives may no longer be functional.</td>
</tr>
<tr>
<td>4. Greet and identify the patient. Explain the procedure. Ask for and answer any questions.</td>
<td>Identifying the patient prevents errors. Explaining the procedure helps ease anxiety and ensure compliance.</td>
</tr>
<tr>
<td>5. If a fasting specimen is required, ask the patient the last time he or she ate.</td>
<td>For fasting specimens, patient should not have eaten within at least 8 hours.</td>
</tr>
<tr>
<td>6. Put on nonsterile latex or vinyl gloves.</td>
<td>Standard precautions must be observed.</td>
</tr>
<tr>
<td>7. Break the seal of the needle cover and thread the sleeved needle into the adaptor, using the needle cover as a wrench. Tap the tubes that contain additives to ensure that the additive is dislodged from the stopper and wall of the tube. Insert the tube into the adaptor until the needle slightly enters the stopper. Do not push the top of the tube stopper beyond the indentation mark. If the tube retracts slightly, leave it in the retracted position. If using a syringe, tighten the needle on the hub and breathe the syringe.</td>
<td>This ensures proper needle placement and tube positioning and prevents loss of vacuum in the evacuated tubes or sticking of the plunger in the barrel of the syringe.</td>
</tr>
<tr>
<td>8. Instruct the patient to sit with a well-supported arm.</td>
<td>Veins in the antecubital fossa are most easily located when the arm is straight. The tourniquet makes the veins more prominent. Making a fist raises the vessels out of the underlying tissues and muscles.</td>
</tr>
</tbody>
</table>

(continues)
### Obtaining a Blood Specimen by Venipuncture

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Apply the tourniquet around the patient’s arm 3–4 inches above the elbow.</td>
<td></td>
</tr>
<tr>
<td>B. Apply the tourniquet snugly, but not too tightly.</td>
<td></td>
</tr>
</tbody>
</table>

Steps 8A. Apply the tourniquet 3 to 4 inches above the elbow.

Step 8B. Pull the tourniquet snugly around the arm.

(continues)
## Obtaining a Blood Specimen by Venipuncture

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Secure the tourniquet by using the half-bow knot.</td>
<td></td>
</tr>
</tbody>
</table>

D. Make sure the tails of the tourniquet extend upward to avoid contaminating the venipuncture site.

---

Step 8C. Secure the tourniquet by using the half-bow.

Step 8D. The tourniquet should extend upward.

(continues)
### Procedure 26-1 (continued)

#### Obtaining a Blood Specimen by Venipuncture

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. Ask the patient to close make a fist and hold it but not to pump the fist.</td>
<td>The index finger is most sensitive for palpating.</td>
</tr>
<tr>
<td>9. Select a vein by palpating. Use your gloved index finger to trace the path of the vein and judge its depth.</td>
<td>The index finger is most sensitive for palpating.</td>
</tr>
<tr>
<td>10. Release the tourniquet after palpating the vein if it has been left on for more than 1 minute.</td>
<td>The tourniquet should not be left on for more than 1 minute at a time during the procedure.</td>
</tr>
<tr>
<td>11. Cleanse the venipuncture site with an alcohol pad, starting in the center of puncture site and working outward in a circular motion. Allow the site to dry or dry the site with sterile gauze. Do not touch the area after cleansing.</td>
<td>The circular motion helps avoid recontamination of the area. Puncturing a wet area stings and can cause hemolysis of the sample.</td>
</tr>
<tr>
<td>12. If blood being drawn for culture will be used in diagnosing a septic condition, make sure the specimen is sterile. To do this, apply alcohol to the area for 2 full minutes. Then apply a 2% iodine solution in ever-widening circles. Never move the wipes back over areas that have been cleaned; use a new wipe for each sweep across the area.</td>
<td>Ensuring sterility of the specimen will aid accurate diagnosis.</td>
</tr>
<tr>
<td>13. Reapply the tourniquet if it was removed after palpation. Ask patient to make a fist.</td>
<td>Tourniquet time greater than 1 minute may alter findings.</td>
</tr>
</tbody>
</table>

Step 9. Trace the path of the vein.
### Procedure 26-1 (continued)

#### Obtaining a Blood Specimen by Venipuncture

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. Remove the needle cover. Hold the syringe or assembly in your dominant hand, thumb on top of the adaptor and fingers under it. Grasp the patient's arm with the other hand, using your thumb to draw the skin taut over the site. This anchors the vein about 1–2 inches below the puncture site and helps keep it in place during needle insertion.</td>
<td>Anchoring the vein allows for easier needle penetration and less pain.</td>
</tr>
<tr>
<td>15. With the bevel up, line up the needle with the vein approximately one-quarter to half an inch below the site where the vein is to be entered. At a 15–30° angle, rapidly and smoothly insert the needle through the skin. Remove your nondominant hand and slowly pull back the plunger of the syringe. Or place two fingers on the flanges of the adapter and with the thumb push the tube onto the needle inside the adapter. When blood begins to flow into the tube or syringe, release the tourniquet and allow the patient to release the fist. Allow the syringe or tube to fill to capacity. When blood flow ceases, remove the tube from the adapter by gripping the tube with your nondominant hand and place your thumb against the flange during removal. Twist and gently pull out the tube. Steady the needle in the vein. Try not to pull up or press down on the needle while it is in the vein. Insert any other necessary tubes into adapter and allow each to fill to capacity.</td>
<td>The sharpest point of the needle is inserted first. Proper tube filling ensures correct ratio of blood to additive. Removal of the tourniquet releases pressure on the vein and helps prevent blood from seeping into adjacent tissues and causing a hematoma.</td>
</tr>
</tbody>
</table>

Step 15. Insert the needle at a 15 to 30° angle.
Procedure 26-1 (continued)

Obtaining a Blood Specimen by Venipuncture

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. Release the tourniquet and remove the tube from the adapter before removing the needle from the arm.</td>
<td>Removing the last tube from the adapter before removing the needle from the vein prevents any excess blood from dripping from the tip of the needle onto the patient. Pressure decreases the amount of blood escaping into the tissues.</td>
</tr>
</tbody>
</table>

A. Place a sterile gauze pad over the puncture site at the time of needle withdrawal. Do not apply any pressure to the site until the needle is completely removed.

Step 16A. Place a sterile gauze pad over the site.

B. After the needle is removed, apply pressure or have the patient apply direct pressure for 3–5 minutes. Do not bend the arm at the elbow.

Bending the arm increases the chance of blood seeping into the subcutaneous tissues.

Step 16B. Apply pressure for 3 to 5 minutes
### Procedure 26-1 (continued)

#### Obtaining a Blood Specimen by Venipuncture

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. Transfer the blood from a syringe into the tubes in the proper order of draw via the transfer device and allow the vacuum to fill the tubes. Do not hold the tube while using the transfer device; place it in a tube rack and carefully insert the device through the stopper. If the vacuum tubes contain an anticoagulant, they must be mixed immediately by gently inverting the tube 8–10 times. Do not shake the tube. Label the tubes with the proper information.</td>
<td>Mixing anticoagulated tubes prevents clotting of blood. Proper labeling of blood specimens avoids mixup of samples.</td>
</tr>
<tr>
<td>18. Check the puncture site for bleeding. Apply a dressing, a clean 2 × 2 gauze pad folded in quarters held in place by an adhesive bandage or 3-inch strip of tape.</td>
<td>Mixed anticoagulated tubes prevents clotting of blood. Proper labeling of blood specimens avoids mixup of samples.</td>
</tr>
<tr>
<td>19. Thank the patient. Instruct the patient to leave the bandage in place at least 15 minutes and not to carry a heavy object (such as a purse) or lift heavy objects with that arm for 1 hour.</td>
<td>Courtesy helps the patient have a positive attitude about the procedure and the physician’s office.</td>
</tr>
<tr>
<td>20. Properly care for or dispose of all equipment and supplies. Clean the work area. Remove gloves and wash your hands.</td>
<td>Standard precautions must be followed throughout the procedure to prevent the spread of microorganisms.</td>
</tr>
</tbody>
</table>

Step 20. Properly care for or dispose of all supplies.
Procedure 26-1 (continued)

Obtaining a Blood Specimen by Venipuncture

Steps | Reason
--- | ---
21. Test, transfer, or store the blood specimen according to the medical office policy. | 
22. Record the procedure. | Procedures are considered not performed if they are not recorded.

Charting Example
05/31/2005 10:00 A.M. OP venipuncture for platelet count, dx code ###.## per Dr. Jacobs. ______________________
J. Simpson, RMA

Procedure 26-2

Obtaining a Blood Specimen by Skin Puncture

Purpose:
Equipment: Sterile disposable lancet or automated skin puncture device, 70% alcohol or other antiseptic, sterile gauze pads, microcollection tubes or containers, heel-warming device if needed, appropriate biohazard barriers (e.g., gloves, impervious gown, face shield)

Steps | Reason
--- | ---
1. Check the requisition slip to determine the tests ordered and specimen requirements. | This ensures proper specimen collection.
2. Wash your hands. | Handwashing aids infection control.
3. Assemble the equipment. | Having the equipment ready will speed collection so the blood does not clot before the entire specimen has been collected.
4. Greet and identify the patient. Explain the procedure. Ask for and answer any questions. | Identifying the patient prevents errors. Explaining the procedure helps ease anxiety and ensure compliance.
5. Put on gloves. | Standard precautions must be observed.
(continues)
### Procedure 26-2 (continued)

#### Obtaining a Blood Specimen by Skin Puncture

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Select the puncture site (the lateral portion of the tip of the middle or ring finger of the nondominant hand, lateral curved surface of the heel, or the great toe of an infant). The puncture should be made in the fleshy central portion of the second or third finger, slightly to the side of center, and perpendicular to the grooves of the fingerprint. Perform heel puncture only on the plantar surface of the heel, medial to an imaginary line extending from the middle of the great toe to the heel, and lateral to an imaginary line drawn from between the fourth and fifth toes to the heel. Use the appropriate puncture device for the site selected.</td>
<td>The ring and middle fingers are less calloused than the forefinger. The lateral part of the tip is the least sensitive part of the finger. A puncture made across the fingerprints will produce a large, round drop of blood. In an infant skin puncture, the area and the depth designated reduces the risk of puncturing the bone.</td>
</tr>
</tbody>
</table>

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**Step 6. Recommended site and direction of finger puncture.**

**Step 6. Acceptable areas for heel punctures on newborns.**

*(continues)*
Procedure 26-2  (continued)

Obtaining a Blood Specimen by Skin Puncture

Steps                      Reason

7. Make sure the site chosen is warm and not cyanotic or edematous. Gently massage the finger from the base to the tip.
   Massaging the area increases the blood flow. Good circulation at the chosen site yields a better blood sample for analysis.

8. Grasp the finger firmly between your nondominant index finger and thumb, or grasp the infant’s heel firmly with your index finger wrapped around the foot and your thumb wrapped around the ankle. Cleanse the selected area with 70% isopropyl alcohol and wipe dry with a sterile gauze pad or allow to air dry.
   The area must be dry to eliminate alcohol residue, which can cause the patient discomfort and interfere with test results. Maintaining your hold at the site prevents the patient from contaminating the cleansed puncture area and allows you to have control of the puncture site.

(continues)

A B

Step 8. Grasp the finger firmly. Cleanse the site with alcohol and dry with a sterile gauze pad.
**Procedure 26-2 (continued)**

### Obtaining a Blood Specimen by Skin Puncture

<table>
<thead>
<tr>
<th>Steps</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Hold the patient’s finger or heel firmly and make a swift, firm puncture. Perform the puncture perpendicular to the whorls of the fingerprint or footprint. Dispose of the used puncture device in a sharps container.</td>
<td>The proper puncture will allow the blood to form a rounded drop that can be easily collected.</td>
</tr>
<tr>
<td><strong>A.</strong> Wipe away the first drop of blood with a sterile dry gauze.</td>
<td>The first discarded drop may be contaminated with tissue fluid or alcohol residue.</td>
</tr>
<tr>
<td><strong>B.</strong> Apply pressure toward the site but do not milk the site.</td>
<td>Milking the site will dilute the specimen with tissue fluid.</td>
</tr>
<tr>
<td>10. Collect the specimen in the chosen container or slide. Touch only the tip of the collection device to the drop of blood. Blood flow is encouraged if the puncture site is held downward and gentle pressure is applied near the site. Cap microcollection tubes with the caps provided and mix the additives by gently tilting or inverting the tubes 8–10 times.</td>
<td>Scrapping the collection device on the skin activates platelets and may cause hemolysis. Mixing the specimens prevents clotting. Touching the tube to the site may cause contamination.</td>
</tr>
</tbody>
</table>
Procedure 26-2  (continued)

Obtaining a Blood Specimen by Skin Puncture

**Steps**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>When collection is complete, apply clean gauze to the site with pressure. Hold pressure or have the patient hold pressure until bleeding stops. Label the containers with the proper information. Do not apply a dressing to a skin puncture of an infant under 2 years of age. Never release a patient until the bleeding has stopped.</td>
</tr>
<tr>
<td>12.</td>
<td>Thank the patient. Instruct the patient to leave the bandage in place at least 15 minutes.</td>
</tr>
<tr>
<td>13.</td>
<td>Properly care for or dispose of equipment and supplies. Clean the work area. Remove gloves and wash your hands.</td>
</tr>
<tr>
<td>14.</td>
<td>Test, transfer, or store the specimen according to the medical office policy.</td>
</tr>
<tr>
<td>15.</td>
<td>Record the procedure.</td>
</tr>
</tbody>
</table>

**Reason**

<table>
<thead>
<tr>
<th>Step</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>Proper labeling prevents mixup of specimens. Younger children may develop a skin irritation from the adhesive bandage. Also, a young child may put the bandage in the mouth and choke.</td>
</tr>
<tr>
<td>12.</td>
<td>Courtesy helps the patient have a positive attitude about the procedure and the physician’s office.</td>
</tr>
<tr>
<td>13.</td>
<td>Standard precautions must be followed throughout the procedure.</td>
</tr>
<tr>
<td>14.</td>
<td>Procedures are considered not to have been done if they are not recorded.</td>
</tr>
</tbody>
</table>

**Note:** Several precautions should be observed to produce the most accurate specimen. The greatest concern with microcollection specimens is hemolysis, the rupture of erythrocytes with the release of hemoglobin. Do not squeeze or milk the heel or finger to increase blood flow. Never scrape the microcollection device on the skin; allow the container to touch only the drop of blood. Also, be careful to avoid additional sources of errors, which are listed in Box 26-4.

**Charting Example**

07/12/2005 9:00 A.M. OP fingerstick from prothrombin time dx ###.## per Dr. Robins. ________________________

S. Smith, CMA
SUMMARY

You must always have a professional attitude and be sympathetic to the fears and anxieties of the patient in all areas of patient care. For many patients, venipuncture is particularly frightening. Demonstrate compassion and understanding to allay their fears. Your skill and knowledge, coupled with a caring approach, will help ensure that the patient’s experience in phlebotomy is not unpleasant.

The quality of the test result is only as good as the quality of the specimen. Medical assistants are responsible for collecting specimens properly and testing them accurately. The office laboratory can provide a challenge and opportunity to work with the physician in improving and promoting the health of the patient.

Critical Thinking Challenges

1. Your patient complains of serious pain when you insert the needle into the vein. Explain the steps you will take to make the patient more comfortable.

2. How can you help ease patient anxiety about venipuncture? Explain exactly what steps you will take.

3. Your patient asks you how long you have been drawing blood and whether you are “good.” How do you respond? Justify your response.

Answers to Checkpoint Questions

1. Disinfectants are used to kill bacteria on equipment and surfaces. Antiseptics are safe for people and are used to clean the skin before skin puncture or venipuncture.

2. Common additives include anticoagulants (prevent the blood from coagulating, or clotting); clot activators (enhance coagulation); and thixotropic gel separator (after centrifugation forms a physical barrier between the cellular portion of a specimen and the serum or plasma portion).

3. You should label the blood sample with the patient’s first and last names, an identification number, the date and time, and your initials to verify who drew the sample.

4. When using the evacuated tube system, the proper order of draw is blood culture tubes, plain red, light blue, red/gray and gold, green, lavender, gray. It is important to follow the correct order of draw to avoid contamination between additives.