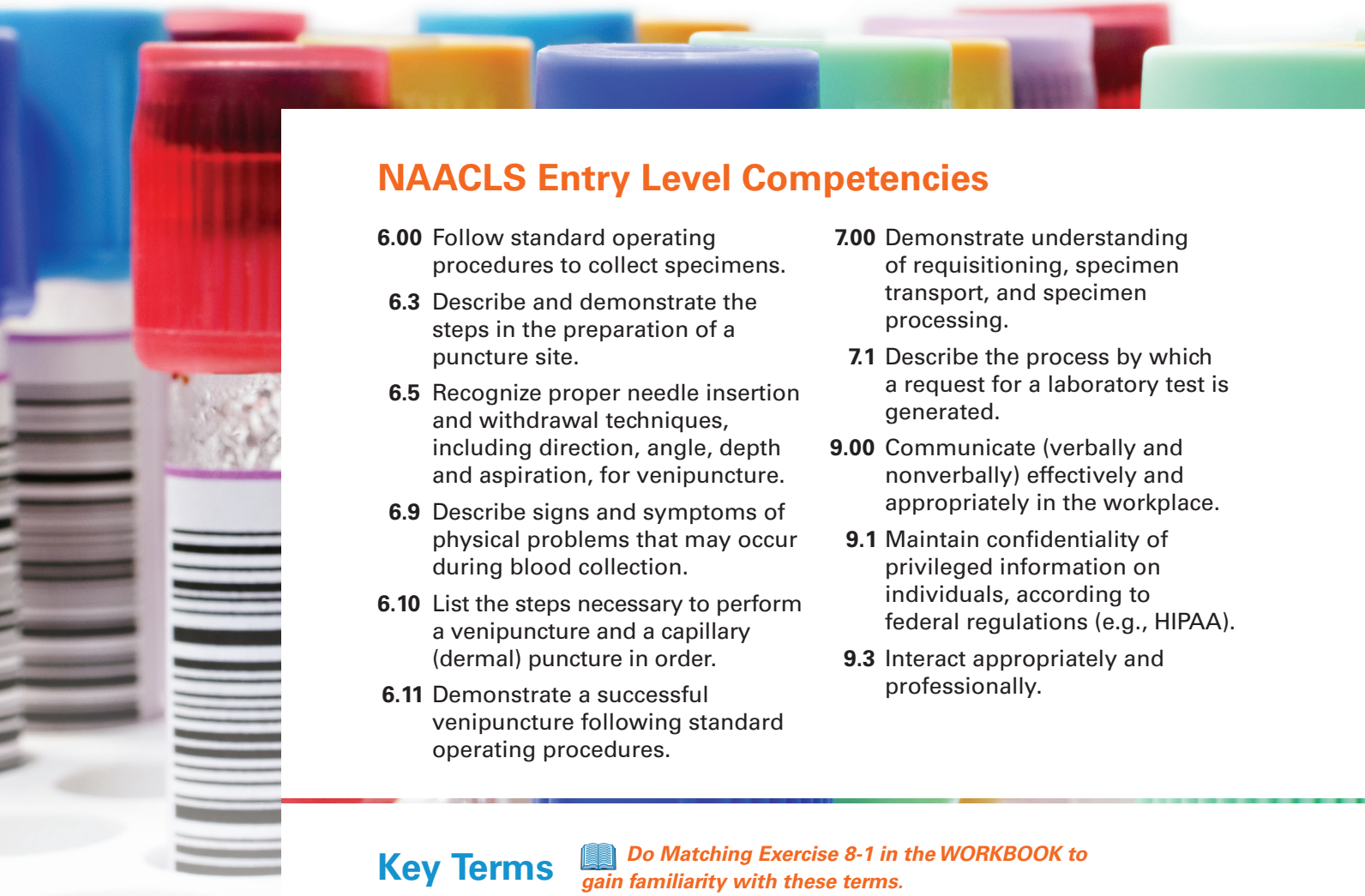
Chapter 8

Venipuncture Procedures



NAACLS Entry Level Competencies

6.00 Follow standard operating procedures to collect specimens.

6.3 Describe and demonstrate the steps in the preparation of a puncture site.

6.5 Recognize proper needle insertion and withdrawal techniques, including direction, angle, depth and aspiration, for venipuncture.

6.9 Describe signs and symptoms of physical problems that may occur during blood collection.

6.10 List the steps necessary to perform a venipuncture and a capillary (dermal) puncture in order.

6.11 Demonstrate a successful venipuncture following standard operating procedures.

7.00 Demonstrate understanding of requisitioning, specimen transport, and specimen processing.

7.1 Describe the process by which a request for a laboratory test is generated.

9.00 Communicate (verbally and nonverbally) effectively and appropriately in the workplace.

9.1 Maintain confidentiality of privileged information on individuals, according to federal regulations (e.g., HIPAA).

9.3 Interact appropriately and professionally.

Key Terms

Do Matching Exercise 8-1 in the WORKBOOK to gain familiarity with these terms.

accession
anchor
arm/wrist band
ASAP
bar code
bedside manner
belonephobia
DNR/DNAR
EMLA
fasting
hospice
ID band/bracelet
ID card
MR number
needle phobia
needle sheath
NPO
palpate
patency
patient ID
preop/postop
reflux
requisition
stat

Objectives

Upon successful completion of this chapter, the reader should be able to:

1. Demonstrate knowledge of each venipuncture step from the time the test request is received until the specimen is delivered to the lab, and define associated terminology.
2. Describe how to perform a venipuncture using ETS, syringe, or butterfly, list required patient and specimen identification information, describe how to handle patient ID discrepancies, and state the acceptable reasons for inability to collect a specimen.
3. Identify challenges and unique aspects associated with collecting specimens from pediatric and geriatric patients.
4. Describe why a patient would require dialysis and how it is performed, and exhibit an awareness of the type of care provided for long-term care, home care, and hospice patients.

Venipuncture is the process of collecting or "drawing" blood from a vein and the most common way to collect blood specimens for laboratory testing. It is the most frequent procedure performed by a phlebotomist and the most important step in this procedure is patient identification. This chapter addresses how to correctly identify all types of patients and how to safely obtain high-quality blood specimens from them. Venipuncture techniques covered in this chapter include ETS, butterfly, and syringe procedures on arm and hand veins. This chapter also addresses challenges and unique issues associated with pediatric, geriatric, dialysis, long-term care, home care, and hospice patients. Venipuncture procedures in this chapter conform to CLSI standards.

Venipuncture Steps

STEP 1: REVIEW AND ACCESSION TEST REQUEST

WORKBOOK Skills Drill 8-3 can help you commit these steps to memory.

Blood-collection procedures legally begin with the test request. This is the first step for the laboratory in the preanalytical (before analysis) or pre-examination phase of the testing process. Typically, a physician or other qualified healthcare professional requests laboratory testing; the exceptions are certain rapid tests that can be purchased and performed at home by consumers and blood specimens requested by law enforcement officials that are used for evidence. Some states have legalized "Direct Access Testing" (DAT), in which patients are allowed to order some of their own blood tests.

Key Point In the interest of achieving global harmonization (worldwide uniformity) and to align the use of terminology with that of the International Standards Organization (ISO), the CLSI has begun using the terms *pre-examination, examination, and postexamination* in place of *preanalytical, analytical, and postanalytical* in recent guidelines.

The Test Requisition

The form on which test orders are entered is called a **requisition**. Test requisitions become part of a patient's medical record and require specific information to ensure that the right patient is tested, the physician's

Box 8-1

Required Requisition Information

- Ordering physician's name
- Patient's first and last names and middle initial
- Patient's medical record number (if inpatient)
- Patient's date of birth or age
- Room number and bed (if inpatient)
- Type of test to be performed
- Date test is to be performed
- Billing information and ICD-9 codes (if outpatient)
- Test status (e.g., timed, fasting, priority)
- Special precautions (e.g., latex sensitivity)

orders are met, the correct tests are performed at the proper time under the required conditions, and the patient is billed properly. Required requisition information is listed in Box 8-1. Requisitions come in manual and computer-generated forms.

Key Point Verbal test requests are sometimes used in emergencies; however, the request is usually documented on standard request forms or entered in the computer by the time the phlebotomist arrives to collect the specimen.

Manual Requisitions

Manual requisitions come in a number of different styles and types as simple as a test request written on a prescription pad by a physician, or a special form (Fig. 8-1) issued by a reference laboratory. With increased use of computer systems, the use of manual requisitions is declining. However, they are typically used as a backup when computer systems fail.

Computer Requisitions

Computer requisitions (Fig. 8-2) normally contain the actual labels that are placed on the specimen tubes immediately after collection. In addition to patient

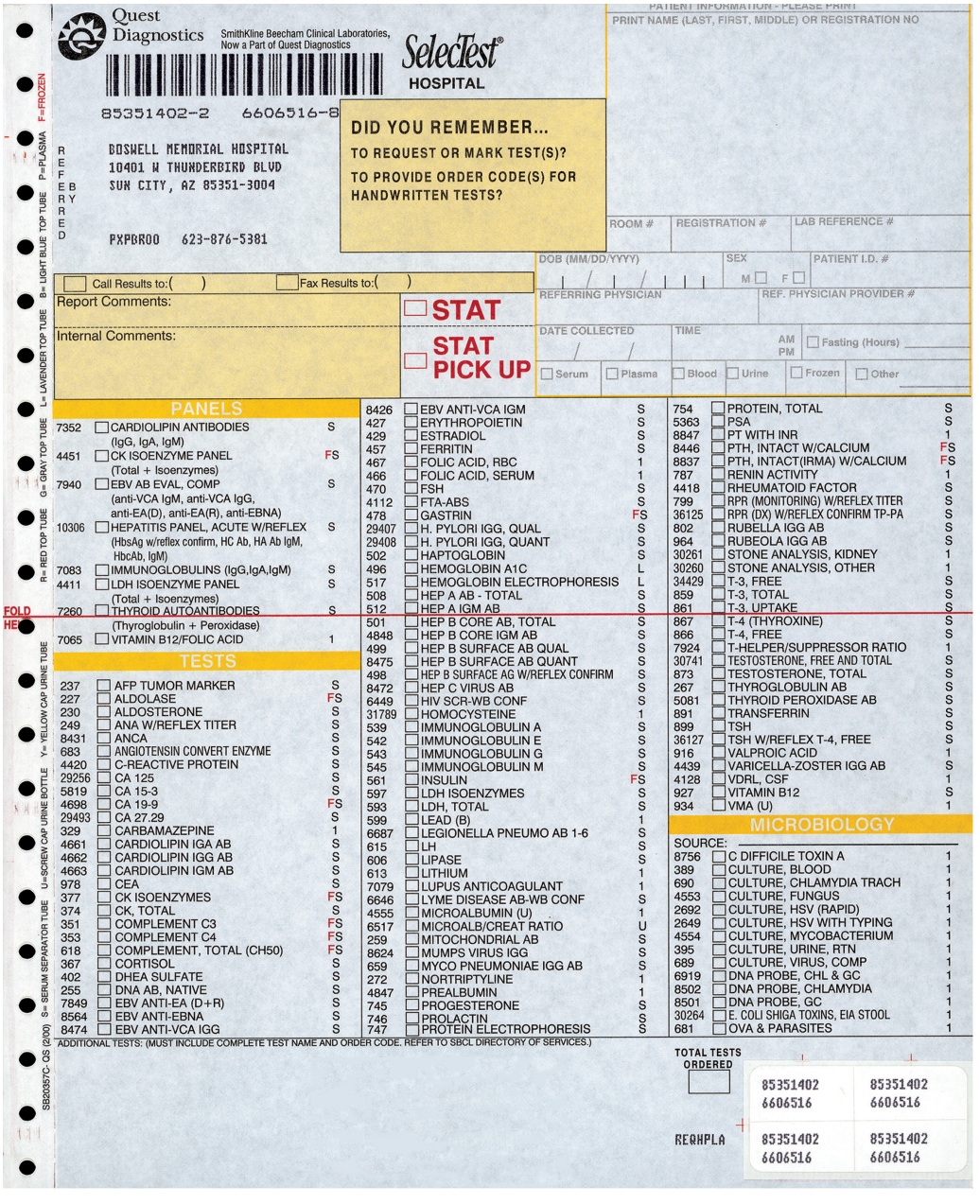


Figure 8-1 A manual requisition. (Courtesy of Sun Health Systems, Sun City, AZ.)

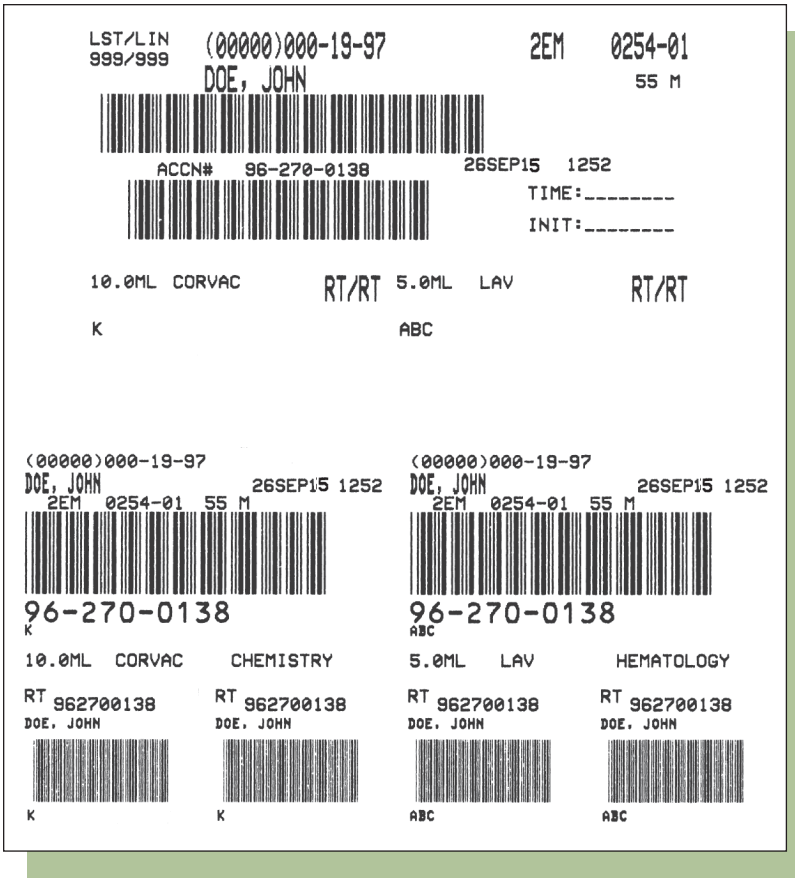


Figure 8-2 A computer requisition with bar code.

identification and test status information, many indicate the type of tube needed for the specimen and some indicate additional patient information such as "potential bleeder" or "no venipuncture right arm."

Key Point When a computer-generated label is used, the phlebotomist is typically required to write the time of collection and his or her initials on the label after collecting the specimen.

Bar-Code Requisitions

Either type of requisition may contain a **bar code**, a series of black stripes and white spaces of varying widths that correspond to letters and numbers (Fig. 8-2). The stripes and spaces are grouped together to represent patient names, identification numbers, or laboratory tests. Manual requisitions that have bar codes normally contain copies of the bar code that can be peeled off and placed on the specimens. Computer requisitions typically have the bar code printed on each label. Bar-code information can be scanned into a computer using a special light or laser to identify the information represented. Bar-code systems allow for fast, accurate processing, and their use has been shown to decrease laboratory errors associated with clerical mistakes.

Key Point With any type of requisition it is essential for the information to be transcribed or entered correctly.

RECEIPT OF THE TEST REQUEST

Computer requisitions for inpatients usually print out at a special computer terminal (Fig. 8-3) at the phlebotomist station in the laboratory. Typically, outpatients are given laboratory requisitions or prescription slips with test orders written on them by their physicians and are responsible for taking them to a blood-collection site. It is up to personnel of the blood-collection site to make certain that all required information is on the requisition provided by the patient or to fill out a requisition from the physician's prescription slip.

REVIEWING THE REQUISITION

A thorough review of the test requisition helps to avoid duplication of orders, ensures that the specimen is collected at the right time and under the proper conditions, and identifies special equipment that may be required. In reviewing a requisition the phlebotomist must:

- Check to see that all required information is present and complete.

Figure 8-3 Computer requisitions printing at a terminal in the laboratory.

- Verify the tests to be collected and time and date of collection.
- Identify diet restrictions or other special circumstances that must be met prior to collection.
- Determine test status or collection priority (Table 8-1).

Accessioning the Test Request

The definition of **accession** is "the process of recording in the order received." To accession a specimen means to take steps to unmistakably connect the specimen and the accompanying paperwork with a specific individual. When a test request is accessioned it is assigned a unique number used to identify the specimen and all associated processes and paperwork and connect them to the patient. This helps to ensure prompt and accurate processing from receipt of the order to reporting of test results.

STEP 2: APPROACH, IDENTIFY, AND PREPARE PATIENT

Approaching the Patient

Being organized and efficient plays a role in a positive and productive collection experience. Before collecting the specimens, the phlebotomist should arrange the requisitions according to priority and review them to see that needed equipment is on the blood-collecting tray or cart before proceeding to the patient's room. Outpatients are typically summoned into the drawing area from the waiting room in order of arrival and check-in. As with inpatients, stat requests take priority over all others.

Looking for Signs

Looking for signs containing information concerning the patient is an important part of the approach to an inpatient. Signs are typically posted on the door to the patient's room or on the wall beside or behind the head of the patient's bed. Of particular importance to phlebotomists are signs indicating that infection-control precautions are to be followed on entering the room and signs that prohibit the taking of blood pressures or blood draws (Fig. 8-4A) from a particular arm. Other commonly encountered signs may identify limits to the number of visitors allowed in the room at one time, indicate that "fall" precautions are to be observed for the patient, or warn that the patient has a severe allergy (e.g., to latex or flowers). A sign with the letters **DNR** (do not resuscitate) or **DNAR** (do not attempt resuscitation) means that there is an order (also called a no code order) stating that the patient should not be revived if he or she stops breathing. A physician—at the request of the patient or the patient's guardian—typically writes the order.

A code is a way to transmit a message, normally understood by healthcare personnel only, over the facility's public address system. A code uses numbers or words to convey information needed by healthcare personnel to respond to certain situations.

Pictures are sometimes used in place of written warnings. For example, a sign with a picture of fall leaves (Fig. 8-4B) is sometimes used to indicate that the patient is at risk of falling. A picture of a fallen leaf with a teardrop on it (Fig. 8-4C) is sometimes used on obstetric wards to indicate that a patient has lost a baby.

Entering a Patient's Room

Doors to patients' rooms are usually open. If the door is closed, knock lightly, open the door slowly, and say something like "good morning" before proceeding into the room. Even if the door is open, it is a good idea to knock lightly to make occupants aware that you are about to enter. Curtains are often pulled closed when nurses are working with patients or when patients are using bedpans or urinals. Make your presence known before proceeding or opening the curtain so as to protect the patient's privacy and avoid embarrassment.

Physicians and Clergy

If a physician or a member of the clergy is with the patient, don't interrupt. The patient's time with these individuals is private and limited. If the draw is not stat, timed or other urgent priority, go draw another patient and check back after that. If that is the only patient,

Table 8-1: Common Test Status Designations

Status	Meaning	When Used	Collection Conditions	Test Examples	Priority
Stat	Immediately (from Latin *statim*)	Test results are urgently needed on critical patients	Immediately collect, test, and report results. Alert lab staff when delivered. ER stats typically have priority over other stats	Glucose H&H Electrolytes Cardiac enzymes	First
Med Emerg	Medical emergency (replaces stat)	Same as stat	Same as stat	Same as stat	Same as stat
Timed	Collect at a specific time	Tests for which timing is critical for accurate results	Collect as close as possible to requested time. Record actual time collected	2-hour PP GTT, Cortisol Cardiac enzymes TDM Blood cultures	Second
ASAP	As soon as possible	Test results are needed soon to respond to a serious situation, but patient is not critical	Follow hospital protocol for type of test	Electrolytes Glucose H&H	Second or third depending on test
Fasting	No food or drink except water for 8–12 hours prior to specimen collection	To eliminate diet effects on test results	Verify patient has fasted. If patient has not fasted, check to see if specimen should still be collected	Glucose Cholesterol Triglycerides	Fourth
NPO	Nothing by mouth (from Latin *nil per os*)	Prior to surgery or other anesthesia procedures	Do not give patient food or water. Refer requests to physician or nurse	N/A	N/A
Preop	Before an operation	To determine patient eligibility for surgery	Collect before the patient goes to surgery	CBC PTT Platelet function studies	Same as ASAP
Postop	After an operation	Assess patient condition after surgery	Collect when patient is out of surgery	H&H	Same as ASAP
Routine	Relating to established procedure	Used to establish a diagnosis or monitor a patient's progress	Collect in a timely manner but no urgency involved. Typically collected on morning sweeps or the next scheduled sweep	CBC Chem profile	None

wait outside the room for a few minutes or go back to the lab and draw the specimen on the next sweep. (In any case, always make certain your actions follow facility policy.) If the request is stat, timed, or other urgent priority, excuse yourself, explain why you are there, and ask permission to proceed.

Family and Visitors

Often there are family members or visitors with the patient. It is best to ask them to step outside the room until you are finished. Most will prefer to do so; however, some family members will insist on staying in the room. It is generally acceptable to let a willing family member help steady the arm or hold pressure over the site while you label tubes.

Unavailable Patient

If the patient cannot be located, is unavailable, or you are unable to obtain the specimen for any other reason, it is the policy of most laboratories that you fill out a form stating that you were unable to obtain the specimen at the requested time and the reason why. The original copy of this form is left at the nurses' station and a copy goes to the lab.

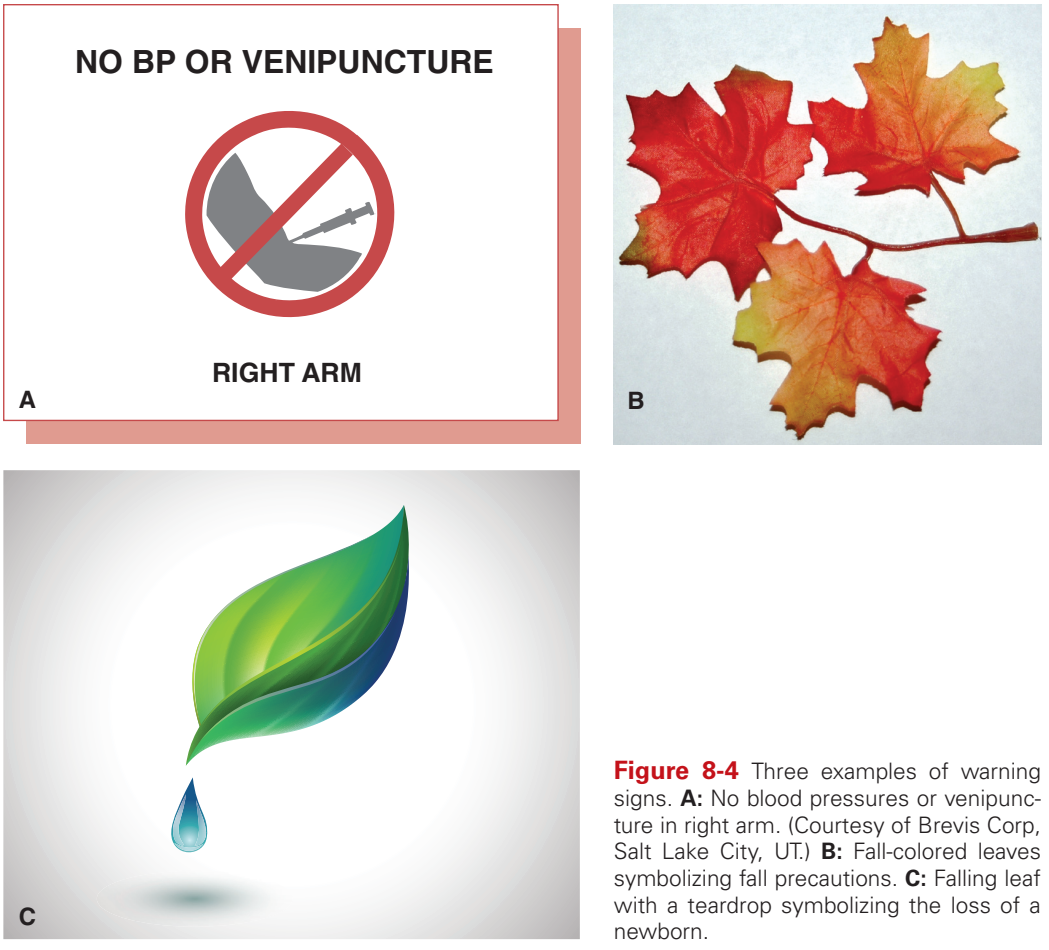


Figure 8-4 Three examples of warning signs. **A:** No blood pressures or venipuncture in right arm. (Courtesy of Brevis Corp, Salt Lake City, UT.) **B:** Fall-colored leaves symbolizing fall precautions. **C:** Falling leaf with a teardrop symbolizing the loss of a newborn.

Identifying Yourself

Identify yourself to the patient by stating your name, your title, and why you are there (e.g., "Good morning. I am Joe Smith, from the lab. I'm here to collect a blood specimen if it is all right with you."). If you are a student, let the patient know this and ask permission to do the blood draw. This is a part of informed consent and patient rights. The patient has a right to refuse to have blood drawn by a student or anyone else.

Obtaining Consent

The patient's consent must be obtained before starting the venipuncture. Always ask a patient for permission to collect the specimen (see "Identifying Yourself," above). This is not only courteous but also legally required. Consent does not always have to be stated verbally, however. It can be implied by actions—for example, if the patient extends an arm when you explain why you are there. A phlebotomist must never collect a blood specimen without permission or against a patient's will. Objections should be reported to the appropriate personnel. (See "Patient Consent" in Chapter 2.)

CAUTION Be aware of conflicting permission statements. This often happens with student phlebotomists. For example, when a student asks permission to collect the specimen, a patient may say "Yes, but I would rather not." The patient has given permission and taken back that permission in the same statement. In this case it is best if the student's instructor or another phlebotomist employed by the facility collects the specimen.

Bedside Manner

The behavior of a healthcare provider toward, or as perceived by, a patient is called **bedside manner**. Approaching a patient is more than simply calling an outpatient into the blood-drawing room or finding an inpatient's room and proceeding to collect the specimen. The manner in which you approach and interact with the patient sets the stage for whether or not the patient perceives you as a professional. Gaining the patient's trust and confidence and putting the patient at ease are important aspects of a successful encounter

and an important part of professional bedside manner. A phlebotomist with a professional bedside manner and appearance will more easily gain a patient's trust. A confident phlebotomist will convey that confidence to patients and help them feel at ease.

Key Point A cheerful, pleasant manner and an exchange of small talk will help to put a patient at ease as well as divert attention from any discomfort associated with the procedure.

Patient Identification

Patient Identification (ID) Importance

thePoint *View the Introductory and Identification Processes Required Prior to Blood Specimen Collection video at http://thepoint.lww.com/McCall6e.*

Patient ID, the process of verifying a patient's identity, is the most important step in specimen collection. Obtaining a specimen from the wrong patient can have serious, even fatal, consequences, especially specimens for type and cross-match prior to blood transfusion. Misidentifying a patient or specimen can be grounds for dismissal of the person responsible and can even lead to a malpractice lawsuit against that person.

Verifying Name and Date of Birth

The patient must be actively involved in the identification process. When identifying a patient, ask the patient to state his or her full name and date of birth. In addition, the CLSI guideline GP33-A (*Accuracy in Patient and Sample Identification*) recommends having the patient spell the last name. This also serves as a memory jogger to help the phlebotomist remember that the patient's ID was verified. The patient's response must match the information on the requisition and/or computer-generated specimen labels. Any errors or differences must be resolved before a sample is collected.

CAUTION When identifying a patient, *never* say, for example, "Are you Mrs. Smith?" A person who is very ill, hard of hearing, or sedated may say "Yes" to anything.

Checking Identification Bracelets

If the patient's response matches the information on the requisition, proceed to check the patient's **ID band** or **bracelet** (Fig. 8-5A) (also called an **arm band** or **wrist band**) if applicable. Inpatients are normally required to wear an ID band, usually on the wrist. The typical ID band (Fig. 8-5B) lists the patient's name and hospital identification number or **medical record (MR) number**. Additional information includes the patient's birth date or age, room number and bed designation, and physician's name.

The patient's name, MR number, and date of birth (DOB) or age on the ID band must match the information on the requisition *exactly*. It is not unusual to have patients with the same or similar names in the hospital at the same time. (Examples are patients with common last names, fathers and sons who have been in accidents, multiple-birth babies, and relatives involved in tissue transplant procedures.) There have even been instances when two unrelated patients shared the same full name and birth date. Two patients will not, however, have the same hospital or medical record number, although they may be similar.

Identification protocol may vary slightly from one healthcare institution to another. Generally, ID information such as room number, bed number, and physician name are allowed to differ. For instance, occasionally a room number will differ because the patient has been moved. The name of the ordering physician may be different, since it is not unusual for a patient to be under the care of several different physicians at the same time.

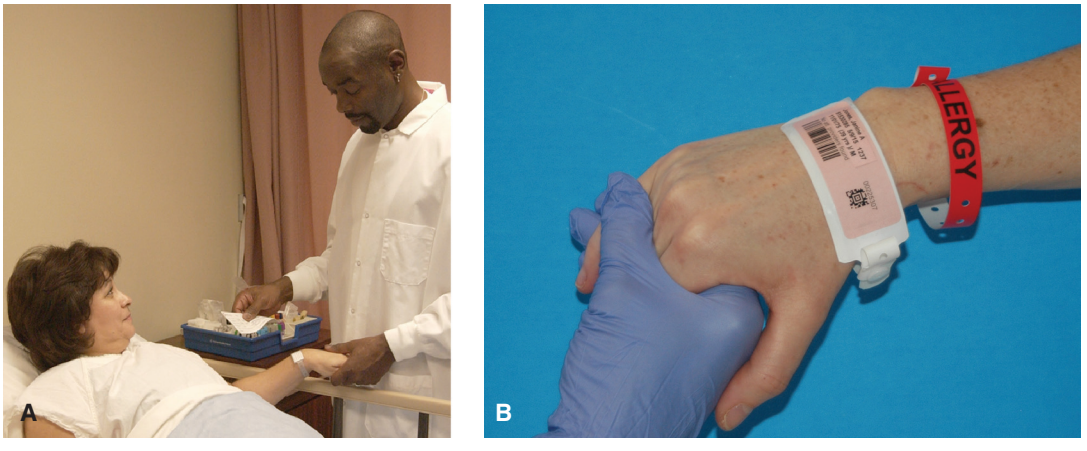


Figure 8-5 **A:** A phlebotomist at bedside checking patient identification band. **B:** Closeup of a typical identification bracelet.

Three-Way ID

To avoid identification and mislabeling errors, some inpatient facilities require what is referred to as three-way ID, in which the patient is identified by three means: the patient's verbal ID statement, a check of the ID band, and a visual comparison of the labeled specimen with the patient's ID band before leaving the bedside. Some facilities are now also showing the labeled specimen to the patient and asking for verification that the correct name is on the label.

ID Discrepancies

If there is a discrepancy between the name, MR number, or date of birth on the ID band and the information on the requisition, the patient's nurse should be notified. The specimen must not be obtained until the discrepancy is addressed and the patient's identity has been verified.

Missing ID

If there is no ID band on either of an inpatient's wrists, ask the patient if you can check to see if it is on an ankle. Intravenous (IV) lines in patient's arms often infiltrate the surrounding tissues and cause swelling, which necessitates removal of the ID band. When this occurs, especially on a patient with IV lines in both arms, nursing personnel sometimes place the ID band around an ankle. (The patient is not always aware that this has been done.) In some instances, an ID band is removed from an IV-infiltrated arm or while other procedures are being performed on the patient and placed on an IV pole or the night table by the patient's bed. An ID band on an IV pole or night table could belong to a patient who previously occupied that bed and should not be used for identification purposes. It is also not unusual for a new patient to occupy a bed before the nursing staff has had a chance to attach his or her ID band.

CAUTION *Never* verify information from an ID band that is not attached to the patient or collect a specimen from an inpatient who is not wearing an ID band.

In rare cases, such as a patient with severe burns, the ID is left off intentionally. In such cases follow facility protocol, which typically involves a verbal statement of ID by the patient and confirmation of ID by a nurse or relative with documentation of that person's name.

If an ID band is required and the patient is not wearing one, it is usually acceptable to ask the patient's nurse to attach an ID band before collecting the specimen. Some sites require the phlebotomist to refrain from collecting the specimen and fill out a special form stating that the specimen was not collected because the patient did not have an ID band. The form is left at the nurse's station. It is then up to the patient's nurse to attach an ID band and inform the lab when it has been done so that the specimen can be collected. In rare emergency situations in which there is no time to wait for the attachment of an ID band, the patient's nurse is allowed to verify the patient's ID. In such cases the nurse must sign or initial the requisition. Follow institution protocol.

Sleeping Patients

Obviously, proper identification and informed consent cannot occur if the patient is asleep. If you encounter a sleeping patient, as is often the case in hospitals and nursing homes, wake the person gently. Try not to startle the patient, as this can affect test results. Speak softly but distinctly. If the room is darkened, avoid turning on bright overhead lighting, at least until the patient's eyes have adjusted to being open, and warn the patient first.

CAUTION *Never* attempt to collect a blood specimen from a sleeping patient. Such an attempt may startle the patient and cause injury to the patient or the phlebotomist.

Unconscious Patients

Unconscious patients are often encountered in emergency rooms and intensive care units. Ask a relative or the patient's nurse or physician to identify the patient and record the name of that person. Speak to the patient as you would to someone who is alert. Identify yourself and inform the patient of your intent. Unconscious patients can often hear what is going on around them even though they are unresponsive.

CAUTION An unconscious patient may be able to feel pain and move when you insert the needle, so it may be necessary to have someone assist you by holding the arm during the blood draw.

Emergency Room ID Procedures

It is not uncommon for an emergency room (ER), or emergency department (ED), to receive an unconscious patient with no identification. Clear guidelines for this situation, provided by the American Association of Blood Banks (AABB), include the following:

- Assign a temporary number to the patient and record it on the test request forms.
- Fill out labels by hand or computer and apply them to the test request and specimens after collection. (Some tubes have bar codes and bar-code labels that can be peeled off and placed on the test request form.)

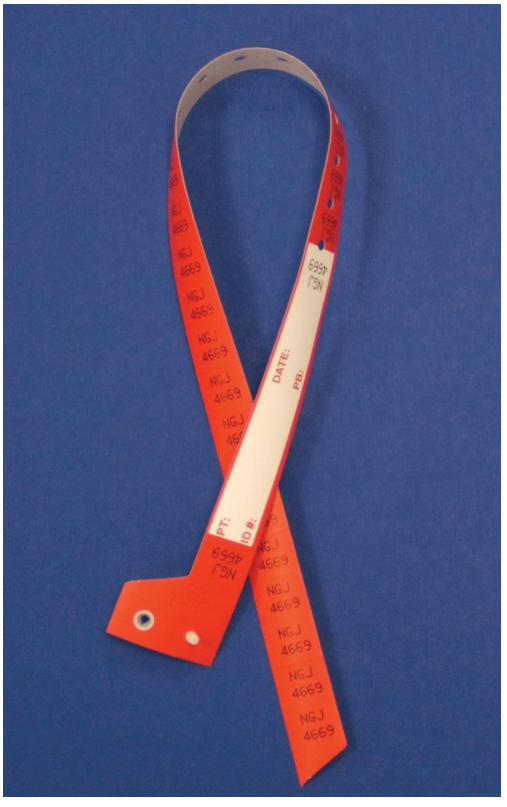


Figure 8-6 An example of a special three-part ID band used for unidentified ER patients.

- When a permanent number is issued, it must be cross-referenced to the temporary number.
- Attach an ID band or device to the patient that has the name and temporary number on it. In many institutions, the phlebotomist is allowed to attach a special three-part identification band (Fig. 8-6) such as a Typenex Blood Recipient ID band (Typenex Medical LLC, Chicago, IL) to an unidentified ER patient's wrist. All three parts contain the same number. The first part becomes the patient's ID band. The second part is attached to the specimen. The third part is used if the patient needs a transfusion, and it is attached to the unit of blood. Follow your institution's protocol for unidentified patients.

CAUTION *Never* collect a specimen without some way to positively connect that specimen to the patient.

Identification of Young, Mentally Incompetent, or Non–English-Speaking Patients

If the patient is young, mentally incompetent, or non–English-speaking, ask the patient's nurse, attendant, relative, or friend to identify the patient by name, address, and identification number or birth date. This information must match the information on the test requisition and the patient's ID band if applicable.

Neonates and Other Infants

ID bands may be placed on the lower leg instead of the arm of inpatient newborns or babies under 2 years of age. (In some facilities, newborns may also have another ID with the mother's information.) In addition, there is usually a card on the isolette with the baby's information on it. It can be used to locate the infant; however, it must not be used for final identification purposes. The child may be identified by a nurse, relative, or guardian. The name and relationship of a relative or guardian or the name and title of a nurse who identifies the child should be recorded on the requisition. Information that must be confirmed on a baby includes the following:

- Name (if available) and date of birth
- Gender
- Medical record number or other unique identifier
- Mother's last name or name of person provided at registration

CAUTION Multiple births present an increased risk of identification error. Follow strict facility identification protocol.

Outpatient ID

Typically, the outpatient collection site's receptionist verifies the patient's identity and fills out the proper lab requisition or generates one via computer. Some labs supply requisition forms to physicians who use their services, so some outpatients arrive at the collection site with lab requisitions that are already filled out. Information must still be verified, and patients may be required to show proof of identification such as a driver's license or other picture ID. Outpatients do not normally have ID bands. However, they may have a clinic-issued **ID card** that contains their name and other information identifying them as clinic patients. ID cards are sometimes used to imprint requisitions or labels using an addressograph type of machine. Even if a receptionist has identified the patient, a phlebotomist must still personally verify the patient's ID after calling him or her into the blood-drawing area from the waiting room. Simply calling a person's name and having someone respond is not verification enough. An anxious or hard-of-hearing patient may think that his or her name has been called when in fact a similar name was called. Always ask an outpatient to state his or her name and date of birth and spell the last name. Make certain that the patient's response matches the requisition information before obtaining the specimen.

Preparing the Patient

Explaining the Procedure

Most patients have had a blood test before. A statement of your intent to collect a specimen for a blood test is usually sufficient for them to understand what is about to occur. A patient who has never had a blood test may require a more detailed explanation. Special procedures may require additional information. If a patient does not speak or understand English, you may have to use sign language or other nonverbal means to demonstrate what is to occur. If this fails, an interpreter must be located. Speaking slowly and distinctly, using sign language, or writing down information may be necessary for patients with hearing problems.

Key Point Regardless of the difficulties involved, you must always determine that the patient understands what is about to take place and obtain permission before proceeding. This is part of informed consent.

Addressing Patient Inquiries

Some healthcare facilities will allow the phlebotomist to tell the patient the name of the test or tests to be performed. Others prefer that all inquiries be directed to the patient's physician. Never attempt to explain the purpose of a test to a patient. Because a particular test can be ordered to rule out a number of different problems, any attempt to explain its purpose could mislead or unduly alarm the patient. Handle such inquiries by stating that it is best to have the doctor or nurse explain the tests to them.

When bedside testing is being performed (such as glucose monitoring), the patient is often aware of the type of test being performed and may ask about results. Follow facility protocol for addressing such requests or check with the patient's nurse or physician to see if it is acceptable to tell the patient the results at this time.

Handling Patient Objections

Although most patients understand that blood tests are needed in the course of treatment, occasionally a patient will object to the procedure. Outpatients rarely object because typically they have been personally directed by their physician to obtain testing and in most cases have been given a test requisition. Inpatients, on the other hand, may not be aware of all the tests that have been ordered or the frequency with which some tests must be repeated. Some may have difficult veins and just get tired of the ordeal. A reminder that the doctor ordered the test and needs the results to provide proper care will sometimes convince the patient to cooperate.

Key Point Do not attempt to badger the patient into cooperating or to restrain a conscious, mentally alert adult patient to obtain a specimen. Remember, a patient has the right to refuse testing.

Sometimes a patient objects at first but is not really serious. However, if a patient truly objects and refuses to let you collect the specimen, write on the requisition that the patient has refused to have blood drawn and notify the appropriate personnel that the specimen was not obtained because of patient refusal. Depending upon institution policy, you may be required to fill out a special form stating why you were unable to collect the specimen.

Handling Difficult Patients

The patient may not echo your cheerful, pleasant manner. Hospitalization or illness is typically a stressful situation. The patient may be lonely, scared, fearful, or just plain disagreeable and may react in a negative manner toward you. It is important to remain calm and professional and treat the patient in a caring manner under all circumstances.

Cognitively Impaired or Combative Patients

Some patients may display unpredictable or sudden movements and behaviors that could pose a danger to themselves, the phlebotomist or others nearby. If a patient exhibits such behaviors it is essential for an additional person or employee to be enlisted to assist if necessary. In addition, make certain you have an obstructed exit route in case it is needed. Also be mindful of where you place equipment, being certain to keep it out of the reach of the patient. As with venipuncture on every patient, always have a gauze pad ready and be prepared to release the tourniquet quickly in case the patient pulls the needle out, or suddenly jerks causing the needle to either come out or go deep into the arm. Should the needle penetrate deep into the arm the patient's nurse or healthcare provider must be informed and the incident documented according to facility policy.

CAUTION Never position a potentially combative patient between yourself and the only exit.

Patients in Altered Mental States

An altered mental state (also called altered state of consciousness or state of mind) is state that is significantly different from the normal waking state of a conscious person. It is characterized by changes in brain function

such as confusion, disorientation, memory loss, disruptions in perception and abnormal behaviors such as emotional outbursts. Examples of patients who may undergo a change in mental status include transplant patients, patients with liver failure, and those suffering from post-traumatic stress syndrome. Alcohol abuse, illegal drugs, marijuana, and even prescription drugs can also be associated with mental problems in patients. Such conditions can cause problems with blood collection including verifying patient identification, obtaining informed consent for procedures, and trying to safely obtain specimens if the patient is combative or unaware of what is happening. Drug addicted patients can have scaring of the skin and veins that makes finding and palpating veins difficult. Assistance with patients who are in an altered state of consciousness is required for the safety of everyone involved and others nearby. In addition certain liabilities may be associated with dealing with these patients. Consult facility protocol for guidance.

Addressing Needle Phobia

An admission of **needle phobia** (intense fear of needles) by a patient or signs that suggest it, such as extreme fear or apprehension in advance of venipuncture, should not be taken lightly. Needle-phobic individuals typically have a heightened sensitivity to pain and can experience a shock type reaction during or immediately following venipuncture. Symptoms include pallor (paleness), profuse sweating, light-headedness, nausea, and fainting. In severe cases, patients have been known to suffer arrhythmia and even cardiac arrest. Needle phobia is estimated to affect more than 10% of the population to such a degree that they avoid medical care. It is important that those who do have the courage to submit to blood tests are treated with empathy and special attention and that steps be taken to minimize any trauma associated with the venipuncture. Basic steps that can be taken include the following:

- Have only the most experienced and skilled phlebotomist perform the venipuncture.
- Have the patient lie down during the procedure, with legs elevated.
- Apply an ice pack to the site for 10 to 15 minutes to numb it before venipuncture.

It is recommended that anyone who has suffered a severe reaction as a result of needle phobia have future procedures involving needles performed at sites where personnel are trained in CPR and a defibrillator is readily accessible.

A persistent irrational fear of pins and needles is called **belonephobia**. It is derived from the Greek word "belone," meaning *needle,* and "phobos," which means *fear.*

Addressing Objects in the Patient's Mouth

Do not allow a patient to eat, drink, chew gum, or have a thermometer, toothpick, or any other foreign object in the mouth during blood collection. Objects in the mouth can cause choking. A bite reflex could break a thermometer and injure a patient. Politely ask patients to stop eating or drinking and remove objects from their mouths until you are finished with the venipuncture.

STEP 3: VERIFY DIET RESTRICTIONS AND LATEX SENSITIVITY

Diet Restrictions

It is important to verify that any special diet instructions or restrictions have been followed. The most common diet requirement is for the patient to fast (refrain from eating) for a certain period of time, typically overnight, such as after the last meal of the day or after midnight in some cases (e.g., outpatients if they will not have the specimen drawn until after 8 AM) until the specimen is collected the following morning. The total time required is usually 8 to 12 hours. If no other restrictions are required, the patient may have water during the fasting period. Drinking water is important so that the patient does not become dehydrated, which can affect test results and make it harder to collect a blood specimen.

Eating can alter blood composition considerably. Consequently, if the patient did not fast or follow other diet instructions, it is important to notify and consult with the patient's physician or nurse so that a decision can be made as to whether or not to proceed with the test.

Key Point If the patient has eaten and you are told to proceed with specimen collection, it is important to write "nonfasting" on the requisition and the specimen label.

Latex Sensitivity

Exposure to latex can trigger life-threatening reactions in those allergic to it. If a patient is allergic to latex, it is extremely important to verify that all equipment used on that individual is latex-free and that no latex items are brought into the room, even if they are for use on another patient in the same room.

STEP 4: SANITIZE HANDS AND PUT ON GLOVES

thePoint *View a video of Hand Washing/Hand Antisepsis at http://thepoint.lww.com/McCall6e.*

Proper hand hygiene plays a major role in preventing the spread of infection by protecting the phlebotomist, patient, and others from contamination. It

Figure 8-7 A phlebotomist applying hand sanitizer.

is an important step in the venipuncture procedure that should not be forgotten or performed poorly. Depending on the degree of contamination, hands can be decontaminated by washing or use of alcohol-based hand sanitizers (Fig. 8-7), which are normally available in the form of gels or foams. In using hand sanitizers it is important to use a generous amount and allow the alcohol to evaporate to achieve proper antisepsis. If hands are visibly dirty or contaminated with blood or other body fluids, they must be washed with soap and water. If hand-washing facilities are not available, visibly contaminated hands should be cleaned with detergent-containing wipes followed by the use of an alcohol-based hand cleaner. Hands must be sanitized in view of the patient, immediately before contact with the patient.

Wearing gloves is required by OSHA to protect the phlebotomist from potential exposure to bloodborne pathogens. Due to infection-control issues, most healthcare facilities require phlebotomists to put on gloves immediately after hand sanitization, before touching the patient. Follow facility protocol.

In absence of facility protocol, some phlebotomists prefer to wait until after vein selection to don gloves because they find it easier to feel veins without gloves on.

CAUTION Gloves must remain intact throughout the procedure (e.g., do not remove the fingertips).

STEP 5: POSITION PATIENT, APPLY TOURNIQUET, AND ASK PATIENT TO MAKE A FIST

Positioning the Patient

Inpatients normally have blood drawn while lying down in their beds. Outpatients at most facilities are drawn while sitting up in special blood-drawing chairs (Fig. 8-8A). If a special phlebotomy chair is not available (e.g., home draws), the patient should be seated in one that is sturdy and comfortable and has armrests in case the patient faints. If a suitable chair is not available or an outpatient is in a weakened condition or known to have fainting tendencies, the blood can be drawn with the patient in a reclining chair (Fig. 8-8B) or lying on a sofa or bed. With all blood draws, be prepared to react in case the patient feels faint or loses consciousness.

Figure 8-8 **A:** A patient seated in a special blood-drawing chair. **B:** A home-draw patient seated in a reclining chair.

CAUTION Because of the possibility of fainting, a patient should *never* be standing or seated in a chair without arms or on a high or backless stool during blood collection.

When venipuncture is performed on a hand or wrist vein, the patient's hand must be well supported on a bed, rolled towel, or armrest. For venipuncture in the antecubital (AC) area, the patient's arm should extend downward in a straight line from shoulder to wrist and *not* be bent at the elbow. (In some cases a slight bend may be necessary to avoid hyperextension of the elbow.) This position helps "fix" the veins so they are less apt to roll and makes them easier to locate because gravity causes them to enlarge and become more prominent. In addition, a downward position is necessary to ensure that blood-collection tubes fill from the bottom up. This prevents reflux or backflow of tube contents into the patient's vein (see Chapter 9) as well as additive carryover between tubes if multiple tubes are collected.

Proper positioning is somewhat harder to achieve with patients who are lying down, especially if the head of the bed cannot be raised. If necessary, a pillow or rolled towel can be used to support and position the arm so that at least the hand is lower than the elbow. Bed rails may be let down, but be careful not to catch IV lines, catheter bags and tubing, or other patient apparatus. Bed rails *must* be raised again when the procedure is finished. Many phlebotomists have learned to draw blood specimens with bed rails in place, so they don't have to worry about forgetting to put them back up when they are finished.

CAUTION A phlebotomist who lowers a bed rail and forgets to raise it can be held liable if the patient falls out of bed and is injured.

Tourniquet Application and Fist Clenching

thePoint ***View the Proper Tourniquet Application for Venipuncture video at http://thepoint.lww.com/McCall6e.***

A tourniquet is applied 3 to 4 inches above the intended venipuncture site to restrict venous blood flow and make the veins more prominent. If it is closer to the site, the vein may collapse as blood is removed. If it is too far above the site, it may be ineffective. When drawing blood from a hand vein, the tourniquet is applied proximal to the wrist bone.

Key Point If a patient has prominent, visible veins that can be palpated and determined to be patent without it, tourniquet application can wait until after the site has been cleaned and you are ready to insert the needle.

The tourniquet should be tight enough to slow venous flow without affecting arterial flow. This allows more blood to flow into the area than out. As a result, blood backs up in the veins, enlarging them so they are easier to see and distending or stretching them so the walls are thinner and easier to pierce with a needle. A tourniquet that is too tight may prevent arterial blood flow into the area and result in failure to obtain blood. A tourniquet that is too loose will be useless. The tourniquet should feel snug or slightly tight to the patient, but not uncomfortable. It should lie flat around the circumference of the arm and not be rolled, twisted, or so tight that it pinches, hurts, or causes the arm to turn red or purple.

A tourniquet has a greater tendency to roll or twist on the arms of obese patients. Bariatric tourniquets are available from manufacturers. However, if one is not available, two tourniquets placed on top of each other and used together will sometimes be sturdy enough to prevent this problem.

For patient comfort or if a patient has sensitive skin or dermatitis, apply the tourniquet over clothing or the sleeve of a hospital gown to prevent pinching the skin. An alternative is to use a clean washcloth or unfolded 4 × 4 gauze wrapped around the arm. Ask patients for permission before applying the tourniquet over street clothing however, as some may object. Instructions for tying a strap tourniquet are shown in Procedure 8-1.

CAUTION *Never* apply a tourniquet over an open sore. Choose another site.

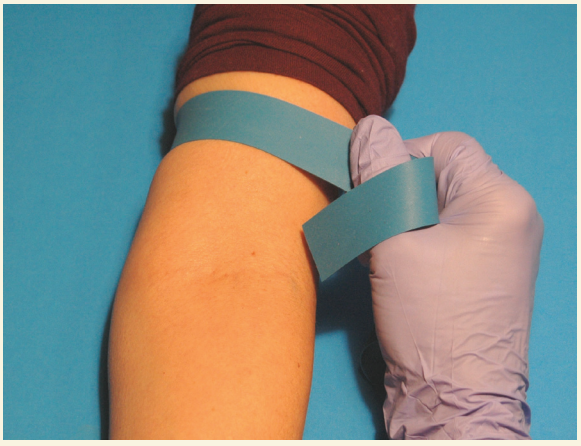
When the tourniquet is in place, ask the patient to clench or make a fist. When a patient makes a fist, the veins in that arm become more prominent, making them easier to locate and enter with a needle. Pumping (repeatedly opening and closing) the fist should be prohibited, as it causes muscle movement that can make vein location more difficult; it can also cause changes in blood components that could negatively affect test results.

Procedure 8-1: Tourniquet Application

PURPOSE: Properly apply a tourniquet to a patient's arm as an aid to venipuncture

EQUIPMENT: Nonlatex strap tourniquet

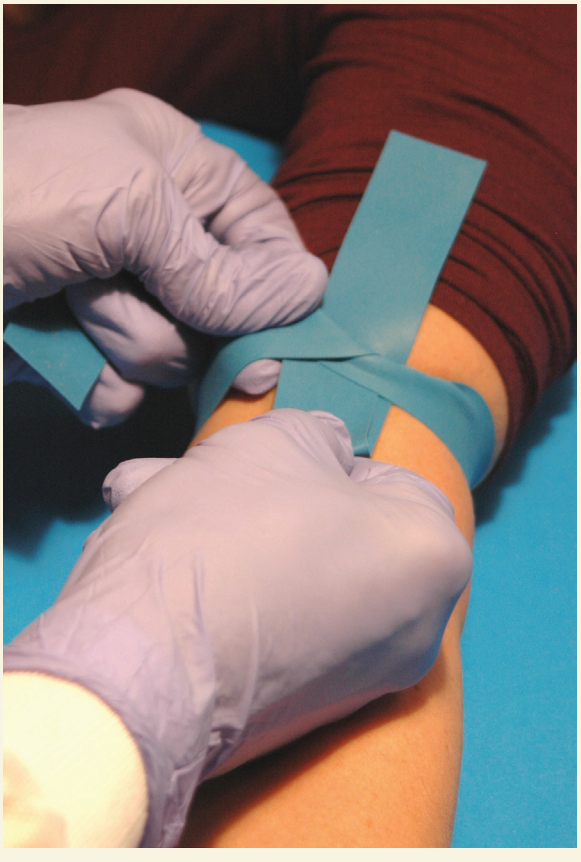
NOTE: Steps listed are for a right-handed individual. If you are left handed, substitute dominant and nondominant, respectively, for right and left references.

Step	Explanation/Rationale
1. Place the tourniquet around the arm 3–4 inches above the intended venipuncture site.	If closer to the site, the vein may collapse as blood is withdrawn. If too far above the site, it may be ineffective.
	
2. Grasp one side of the tourniquet in each hand a few inches from the end.	Allows sufficient length for fastening the tourniquet and creating the loop in step 7.
3. Apply a small amount of tension and maintain it throughout the process.	Tension is needed so the tourniquet will be snug when tied. If too much tension is applied, it will be too tight and will roll up on itself or twist and cause discomfort.
4. Bring the two sides together and grasp them both between the thumb and forefinger of the right hand.	This is preparation for crossing the sides over each other.
	
5. Reach over the right hand and grasp the right side of the tourniquet between the thumb and forefinger of the left hand and release it from the grip of the right hand.	The tourniquet ends will now be held in opposite hands, with the sides crossed over each other.

Procedure 8-1: Tourniquet Application (Continued)

Step	Explanation/Rationale
6. Cross the left end over the right end near the left index finger, grasping both sides together between the thumb and forefinger of the left hand, close to the patient's arm.	If there is too much space between the left index finger and the patient's arm, the tourniquet will be too loose.

7. While securely grasping both sides, use either the left middle finger or the right index finger to tuck a portion of the left side under the right side and pull it into a loop.	The loop allows the tourniquet to be released quickly by a slight tug on the end that forms it.



Procedure 8-1: Tourniquet Application (Continued)

Step	Explanation/Rationale
8. A properly tied tourniquet with the ends pointing toward the shoulder.	The tourniquet ends should point toward the shoulder to prevent them from contaminating the blood-collection site.

Key Point Fist pumping most notably affects levels of potassium and ionized calcium.

STEP 6: SELECT VEIN, RELEASE TOURNIQUET, AND ASK PATIENT TO OPEN FIST

The preferred venipuncture site is the AC area of the arm, where a number of veins lie fairly close to the surface. Typically, the most prominent of these are the median cubital, cephalic, and basilic veins in the "H" pattern and the median, median cephalic, and median basilic veins in the "M" pattern (see Chapter 6). The median cubital and median veins are normally closer to the surface, more stationary, and in an area where nerve injury is least likely. Consequently, they are the first choices for venipuncture, followed by the cephalic and median cephalic veins. The basilic and median basilic veins are the last-choice veins because they are near the median nerve and brachial artery, which could be punctured accidentally.

CAUTION According to CLSI Standards, an attempt must be made to locate the veins in the median aspect (center of the arm) on both arms before considering an alternate vein. Because of the possibility of nerve injury and damage to the brachial artery, the basilic vein or other veins in the medial aspect (inside of the arm) should not be chosen unless it appears that no other vein can be safely or successfully accessed.

A patient will generally have the most prominent veins in the dominant arm. It should be examined first unless there is a reason that it should not be used. However, if the nondominant arm has an equally suitable vein, it may be a good idea to draw that arm since the patient is less likely to use it after the draw and disturb healing at the site that could result in bruising. Some veins may be easily visible (Fig. 8-9); others will have to be located entirely by feel. To locate a vein, **palpate** (examine by touch or feel) the area by pushing down on the skin with the tip of the index finger (Fig. 8-10). In addition to

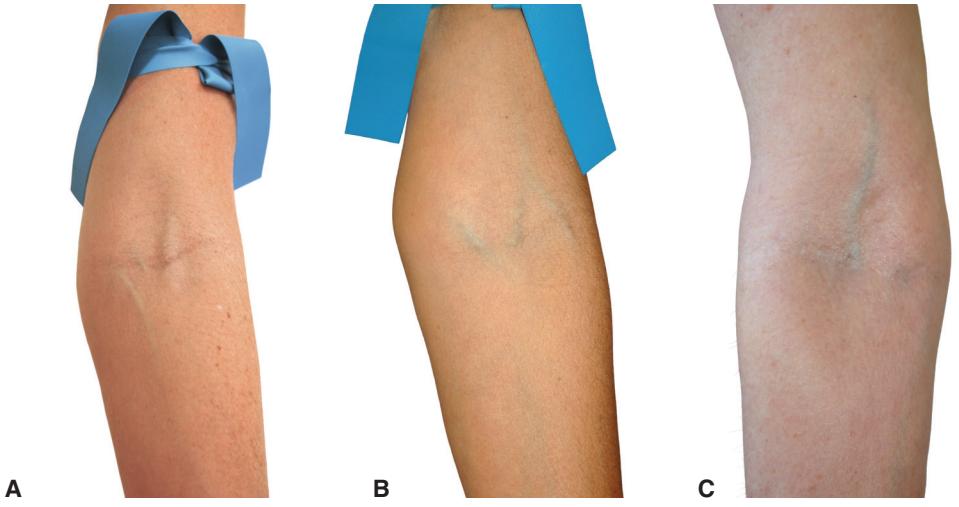


Figure 8-9 Three examples of antecubital vein patterns. **A:** H-pattern. **B:** M-pattern. **C:** Atypical pattern.

locating veins, palpating helps determine their **patency** (state of being freely open), size and depth, and the direction or the path they follow. Consequently, even visible veins must be palpated to judge their suitability for venipuncture.

Have fun unscrambling patency and other words with the Scrambled Words activity in the WORKBOOK.

Figure 8-10 A phlebotomist palpating the antecubital area for a vein.

When you have found a vein, roll your finger from one side to the other while pressing against it to help judge its size. Trace its path to determine a proper entry point by palpating above and below where you first feel it. Press and release it several times to determine depth and patency. Depth is indicated by the degree of pressure required to feel it. A **patent** (freely open) vein is turgid (distended from being filled with blood), giving it a bounce or resilience, and has a tube-like feel. An artery has a pulse and must be avoided. (Do not use your thumb to palpate as it has a pulse that could lead you to think that a vein is an artery.)

CAUTION To avoid inadvertently puncturing an artery, *never* select a vein that overlies or is close to where you feel a pulse.

Do not select a vein that feels hard and cord-like or lacks resilience, as it is probably sclerosed or thrombosed (see Chapter 9). Such veins roll easily, are hard to penetrate, and may not have adequate blood flow to yield a representative blood sample. Tendons are also hard and lack resilience. Rotating the patient's arm slightly helps to locate veins and differentiate them from other structures. Dimming the lights and using a transilluminator device or halogen flashlight can help locate veins, especially in infants and children. Wiping the site with alcohol often makes surface veins such as hand veins appear more visible. (This step *does not* take the place of cleaning after vein selection.) If no suitable AC vein can be found, check the other arm. If no suitable AC vein can be found in either arm, check for veins on the back of the hand or wrist.

CAUTION *Do not* use veins on the underside of the wrist because nerves lie close to the veins in this area and can easily be injured.

If a suitable vein still cannot be found, massage the arm from wrist to elbow to force blood into the area or wrap a warm, wet towel around the arm or hand for a few minutes. Warming the site increases blood flow and makes veins easier to feel. The site should not be manipulated excessively, however, as this may change the composition of blood in the area and cause erroneous test results. In the absence of a suitable vein, a capillary puncture may have to be considered if the test can be performed on capillary blood.

After you have selected a suitable vein, mentally visualize its location if it is not obvious. Making a mental note of the position of the vein in reference to landmarks such as a freckle, mole, hair, skin crease, superficial surface vein, or imperfection makes relocation easier after the delay while the site is cleaned. Do not mark the site with a pen. This contaminates the site and the pen. The pen can become a source of infection transmission if it is used on other patients. An acceptable way to mark the site using an alcohol pad is shown in Figure 8-11. This,

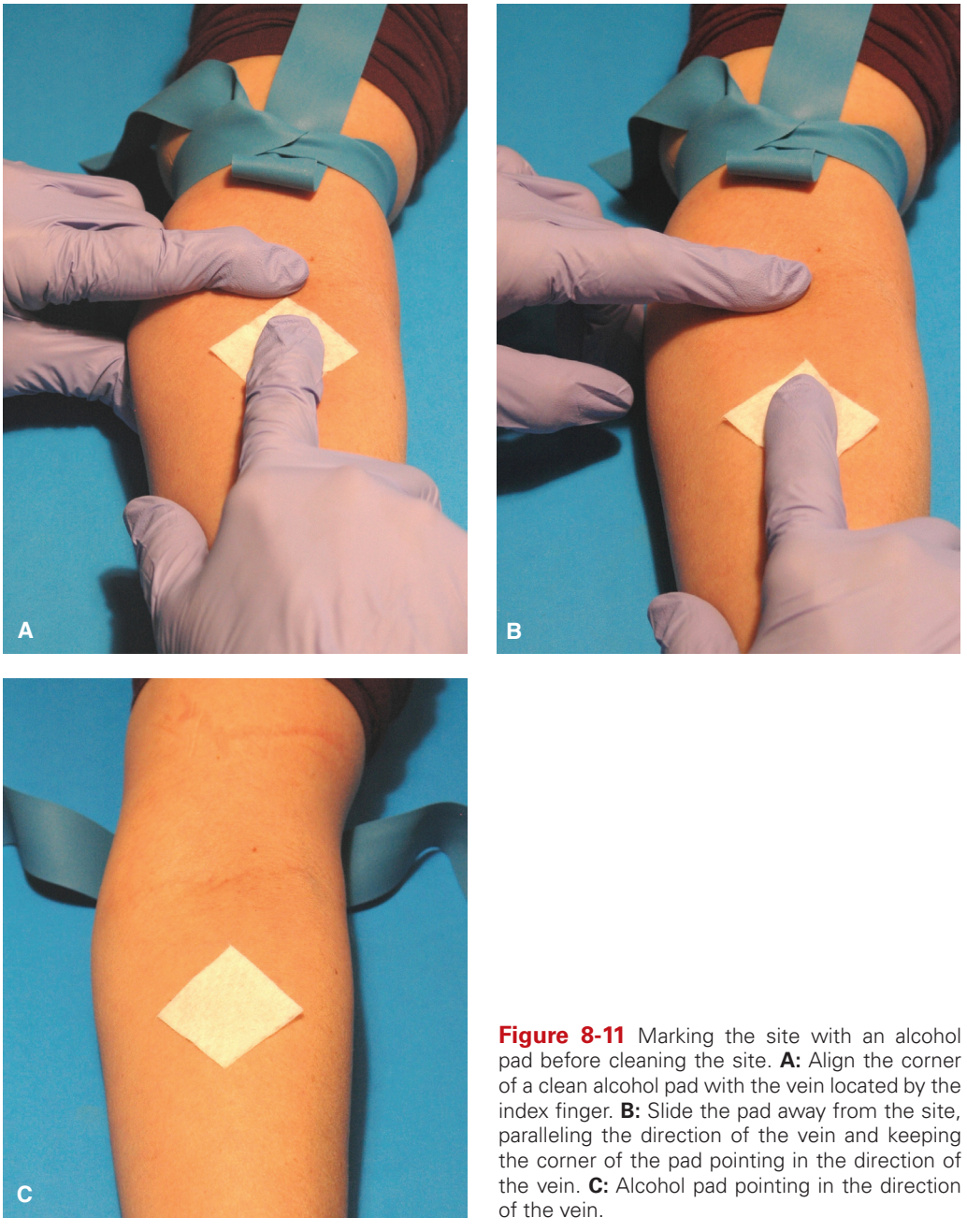


Figure 8-11 Marking the site with an alcohol pad before cleaning the site. **A:** Align the corner of a clean alcohol pad with the vein located by the index finger. **B:** Slide the pad away from the site, paralleling the direction of the vein and keeping the corner of the pad pointing in the direction of the vein. **C:** Alcohol pad pointing in the direction of the vein.

of course, is done before the site is cleaned, so the pad must be placed far enough away from the site so it is not disturbed in the cleaning process.

If the tourniquet was applied during vein selection, release it and ask the patient to open the fist. This allows the vein to return to normal and minimizes the effects of stasis from blockage of blood flow on specimen composition.

Key Point According to the CLSI, when a tourniquet has been in place for longer than one minute, it should be released and reapplied after 2 minutes.

STEP 7: CLEAN AND AIR-DRY THE SITE

The venipuncture site must be cleaned with an antiseptic prior to venipuncture. Otherwise, microorganisms from the skin could be picked up by the needle and carried into the vein, creating the possibility of infection, or flushed into the collection tube on blood flow, contaminating the specimen. The recommended antiseptic for cleaning a venipuncture site is 70% isopropyl alcohol, which is typically available in sterile, prepackaged pads referred to as alcohol prep pads.

An antiseptic does not sterilize the site; however, it does inhibit microbial growth.

Clean the site with a gauze pad soaked with 70% isopropyl alcohol or a commercially prepared alcohol prep pad. Use friction to clean an area 2 to 3 inches in diameter around the selected site of needle entry. Although previous CLSI standards recommended using a circular motion, starting at the point of expected needle entry, and moving outward in ever-widening **concentric circles** (circles with a common center), this is no longer considered necessary. Use sufficient pressure to remove surface dirt and debris but do not rub so vigorously that you abrade the skin, especially on infants and elderly patients whose skin is thin and more delicate. If the site is especially dirty, clean it again using a new alcohol soaked gauze or alcohol prep pad. Allow the area to dry naturally for 30 seconds to 1 minute.

Key Point The evaporation and drying process helps destroy microbes, and avoids a burning or stinging sensation when the needle is inserted.

To prevent contamination of the site,

- *Do not* dry the alcohol with unsterile gauze.
- *Do not* fan the site with your hand or blow on it to hasten drying time.
- *Do not* touch the site after cleaning it.

Key Point If it is necessary to repalpate the vein after the site has been cleaned, the site must be cleaned again.

STEP 8: PREPARE EQUIPMENT

Assemble the components of the blood-collection system and supplies if you have not already done so. Choose the collection system, needle size, and tube volume according to the age of the patient, size and location of the vein, and amount of blood to be collected. Select tubes according to the tests that have been ordered. Select and attach the needle to the collection device but *do not* remove the **needle sheath** (cap or cover) at this time. Put on a clean pair of gloves if you have not already done so.

CAUTION Either the needle, tube holder, or syringe selected must have an OSHA-required safety feature to help protect the user from accidental needlesticks.

ETS Equipment Preparation

Select the appropriate ETS tubes. Check the expiration date on each one to make certain that it has not expired. (Discard any tube that is beyond its expiration date.) Tap additive tubes lightly to dislodge any additive that may be adhering to the tube stopper. Inspect the seal of the needle. If it is broken, discard it and select a new one. Twist the needle cover apart to expose the short or back end of the needle, which is covered by a retractable sleeve. Screw this end of the needle into the threaded hub of an ETS tube holder. Place the first tube in the holder and use a slight clockwise twist to push it onto the needle just far enough to secure it and keep it from falling out but not far enough to release the tube vacuum. It is acceptable to delay positioning the tube in the holder until the needle is inserted in the patient's vein.

Preparation of a Winged Infusion Set (Butterfly)

Although they are available in various gauges, a 23-gauge butterfly is most commonly used for small and difficult veins. Butterfly needles are also available in two basic types. One type has a hub that can be attached to a syringe. The second type has a hub with a multisample Luer adapter that can be threaded onto an ETS tube

holder. The adapter can typically be removed to also allow the needle to be used with a syringe. Select the type according to the system (ETS or syringe) you have chosen to collect the specimen. The system to use typically depends on the size, condition, and location of the vein as well as the skill and personal preference of the user. In some cases a syringe and butterfly are used after a failed attempt at blood collection using a butterfly and ETS holder. For either method, the butterfly needle typically contains the safety feature.

Verify sterility of the butterfly packaging (i.e., package is sealed and intact) before aseptically opening it and removing the butterfly. To help preserve needle sterility (a butterfly needle cover is typically an open-ended tubular sheath), it is a good idea to retain the package so you can put the needle back in it temporarily while retying the tourniquet. Attach the butterfly to the evacuated tube holder or syringe. Butterfly tubing may be coiled somewhat because it was coiled in the package. To help straighten it and keep it from coiling back up, use the thumb and index finger of one hand to grasp the tubing just beyond the point where it attaches to the needle. Gently grasp the tubing a little below this point with the thumb and index finger of the opposite hand and slide these fingers down the length of the tubing while stretching it slightly, until you are just above the point where it attaches to the tube holder. Be extremely careful not to loosen the tubing from the needle or the holder. Select the appropriate small-volume tubes for the tests ordered. (The vacuum draw of large-volume tubes may collapse the vein or hemolyze the specimen.)

Preparation of Syringe Equipment

Select a syringe and needle size compatible with the size and condition of the patient's veins and the amount of blood to be collected. To comply with OSHA regulations, you must select a needle-locking syringe (e.g., Luer lock) to use for the draw and a syringe transfer device to transfer blood from the syringe to the ETS tubes. Syringes and syringe needles designed for blood collection are normally available in sterile pull-apart packages. The syringe plunger is typically already pulled back slightly. To ensure that it moves freely but still maintain syringe sterility, move the plunger back and forth slightly a few times and advance it to the end of the syringe before opening the sterile package. Open the needle packages in an aseptic manner and securely attach the needle to the syringe. A blood specimen collected in a syringe will have to be transferred to ETS tubes. Small-volume tubes are typically chosen because the amount of blood that can be collected in a syringe is limited. Partially open the package containing the transfer device to make removal easy when it comes time to use it.

Positioning Equipment for Use

Place collection equipment and other supplies, such as gauze and alcohol pads, within easy reach, typically on the same side of the patient's arm as your free hand during venipuncture. Make certain that extra supplies, ETS tubes for example, are within easy reach. If you are using a phlebotomy tray, place it within easy reach.

CAUTION *Do not* place the phlebotomy tray on a patient's bed or any other place that could be contaminated by it. If you set it on the patient's bedside table, place it on a clean paper towel.

STEP 9: REAPPLY TOURNIQUET, UNCAP AND INSPECT NEEDLE

Reapply the tourniquet, being careful not to touch the cleaned area. Be aware that there are a few tests (i.e., lactic acid) that must be collected without using a tourniquet.

Pick up collection equipment with your dominant hand. Both an ETS tube holder and a syringe are held close to the needle hub with the thumb on top and two or three fingers underneath and slightly to the side. Turn your wrist upward slightly so the opening of the tube holder remains accessible. Hold the wing portion of the butterfly between your thumb and index finger or fold the wings upright and grasp them together. Cradle the butterfly tubing and holder or syringe in the palm of your dominant hand or lay it next to the patient's hand.

Remove the needle cover and visually inspect the needle. Although rare, a needle can have obstructions that could impair blood flow or imperfections such as roughness or barbs that could hurt the patient or damage the vein. If any are noted, discard the needle and select a new one.

CAUTION Once the cap is removed, *do not* let the needle touch anything prior to venipuncture. If it does, remove it and replace it with a new one.

STEP 10: ASK PATIENT TO MAKE A FIST, ANCHOR VEIN, AND INSERT NEEDLE

At this time the patient is asked to again make a fist. The nondominant hand is used to **anchor** (secure firmly) the vein while the collection equipment is held and the needle inserted using the dominant hand.

Anchoring

To anchor AC veins, grasp the patient's arm with your free hand, using your fingers to support the back of the arm just below the elbow. Place your thumb a minimum of 1 to 2 inches below and slightly to the side of the intended venipuncture site and pull the skin toward the wrist (Fig. 8-12). This stretches the skin taut (pulled tight or without slack), anchoring the vein and helping

Figure 8-12 Proper placement of thumb and fingers in anchoring a vein.

to keep it from moving or rolling to the side upon needle entry. (If the vein rolls, the needle may slip beside the vein, not into it.) In addition, a needle passes through taut skin more easily and with less pain. Even so, it is not uncommon for an apprehensive patient to suddenly pull back the arm as the needle is inserted. Because your fingers are wrapped around the arm, the patient is less likely to pull away from your grasp and the needle is more likely to stay in the vein. This is known as the "L" hold technique for anchoring the vein.

CAUTION For safety reasons, *do not* use a two-finger technique (also called the "C" hold) in which the entry point of the vein is straddled by the index finger above and the thumb below. If the patient abruptly pulls the arm back when the needle is inserted, a reflex reaction could cause the needle to recoil as it comes out of the arm and spring back into your index finger.

One way to anchor a hand vein is to use your free hand to hold the patient's hand just below the knuckles and use your thumb to pull the skin taut over the knuckles while bending the patient's fingers. Another way is to have the patient make a tight fist. Encircle the fist with your fingers and use your thumb to pull the skin over the knuckles.

Needle Insertion

Hold the collection device or butterfly needle in your dominant hand as described in step 9. The bevel of the needle should be facing up. Position the needle above the vein so it is lined up with it and paralleling or following its path. Your body should be positioned directly behind the needle so that you are not trying to insert the needle with your arm or hands at an awkward angle. Warn the patient by saying something like "There is going to be a little poke (or stick) now."

CAUTION If the needle touches the skin, but you change your mind and lift it off of the skin, it is no longer sterile and must be replaced.

For AC site venipunctures, insert the needle into the skin at an angle of 30 degrees or less (Fig. 8-13A), depending on the depth of the vein. (A shallow vein may need an angle closer to 15 degrees, while a deeper vein may require an angle closer to 30 degrees.) Use one smooth, steady forward motion to penetrate first the skin and then the vein. Advancing the needle too slowly prolongs any discomfort. A rapid jab can result in missing the vein or going all the way through it.

Key Point You have less control over the needle the faster it goes into the arm. In addition to possibly missing the vein or going through it, you impair the ability to immediately stop advancing the needle if it hits a nerve.

When the needle enters the vein, you will feel a slight "give" or decrease in resistance. Some phlebotomists describe this as a "pop," although it may be described as a feeling and not a sound. (It is especially important to recognize the decrease in resistance when using an ETS needle and tube holder, because most needles do not provide visual confirmation that the vein has been entered.) When you sense the "pop" or recognize the lessening of resistance signaling that the needle is in the vein, stop advancing it and securely anchor the tube holder or syringe by pressing the back of your fingers or knuckles against the arm. Discontinue anchoring with your thumb and let go of the arm with that hand.

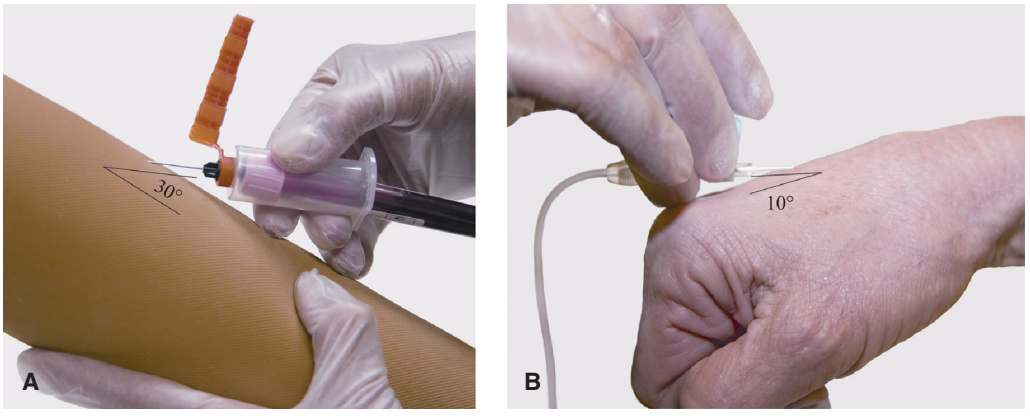


Figure 8-13 **A:** Illustration of a 30-degree angle of needle insertion. **B:** Illustration of a 10-degree angle of needle insertion.

CAUTION Do not deeply depress the skin by forcefully pushing down on the needle as it is inserted. This causes pain and enlarges the vein opening, increasing the risk of blood leakage at the site.

When using a butterfly needle on a hand vein, insert it into the vein at a shallow angle of approximately 10 degrees or less (Fig. 8-13B), being careful not to push it through the back wall of the vein. You may need to slightly increase the angle of the needle bevel at first to get it to slip into the vein. A "flash" or small amount of blood will usually appear in the tubing when the needle is in the vein. "Seat" the needle by slightly threading it within the lumen (central area of the vein). This helps keep the needle from twisting back out of the vein if you let go of it. If the needle does start to come out of the vein, secure it with the thumb of the opposite hand.

At this point, some phlebotomists switch to holding the blood-collection device in their nondominant hand so that tube changes can be made with the dominant hand. This is accomplished by gently slipping the fingers of the opposite hand under the holder and placing the thumb atop the holder as the other hand lets go. Many phlebotomists, particularly those who are left-handed, do not change hands but continue to steady the holder in the same hand and change tubes with the opposite one. Whatever the method, it is important to hold the blood-collection device steady so there is minimal needle movement.

Key Point If the tube holder or syringe is not securely anchored, the needle can push through the back of the vein or pull out of the vein when tubes are changed or the syringe is filled.

STEP 11: ESTABLISH BLOOD FLOW, RELEASE TOURNIQUET, AND ASK PATIENT TO OPEN FIST

To establish blood flow when using the ETS system, the collection tube must be advanced into the tube holder until the stopper is completely penetrated by the needle. This is accomplished most efficiently by pushing the tube with your thumb while your index and middle fingers straddle and grasp the flanges of the tube holder (Fig. 8-14), pulling back on them slightly to prevent forward motion of the tube holder. If the vein has been successfully entered, blood will begin to flow into the tube. If you are using a syringe, a flash of blood in the syringe hub indicates that the vein has been successfully entered. Blood flow into the syringe is achieved by slowly pulling back on the plunger with your free hand.

Release the tourniquet and ask the patient to release the fist as soon as blood flows freely into the first ETS tube or is established in the syringe. Blood should continue to flow until multiple tubes have been collected or the syringe filled. On elderly patients and others with fragile veins that

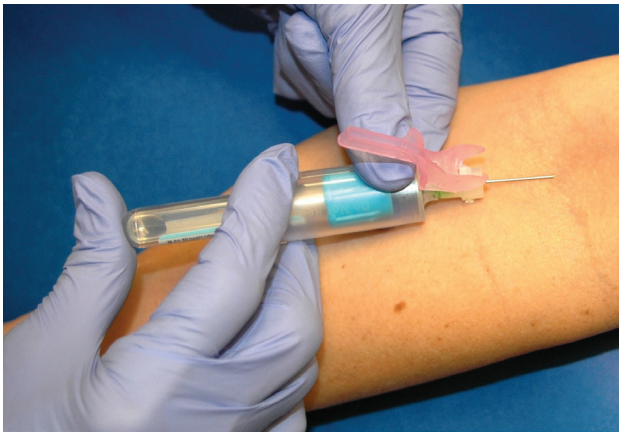


Figure 8-14 Proper placement of fingers and thumb in advancing a tube in an ETS holder.

might collapse or in other difficult-draw situations where release of the tourniquet might cause blood flow to stop, the tourniquet is sometimes left on until the last tube is filled. *Do not*, however, leave the tourniquet on for more than 1 minute, or test results may be affected.

Typically, several tubes can be filled in less than a minute.

STEP 12: FILL, REMOVE, AND MIX TUBES IN ORDER OF DRAW, OR FILL SYRINGE

Following the order of draw, place ETS tubes in the holder and advance them onto the needle.

ETS tubes fill automatically until the tube vacuum is exhausted or lost. A syringe is filled manually by slowly and steadily pulling back on the plunger until the barrel is filled to the appropriate level.

Key Point According to the CLSI, if a coagulation tube is the first tube to be drawn when using a butterfly, a discard tube should be drawn first to fill the tubing dead space and ensure a correct blood-to-anticoagulant ratio when the coagulation tube is filled. The discard tube can be a nonadditive tube or another coagulation tube and does not have to be filled completely.

Maintain needle position while the tubes or syringe are filling. Try not to pull up, press down, or move the needle back and forth or sideways in the vein. These actions can be painful to the patient and enlarge the hole in the vein, resulting in leakage of blood and hematoma formation.

Keep the arm in a downward position so that blood fills ETS tubes from the bottom up and does not contact the needle in the tube holder. Under certain conditions, **reflux** (flow of blood from the tube back into the vein) and a possible adverse patient reaction from additives can occur if tube blood is in contact with the needle. Additive-containing blood on or in the needle could also contaminate subsequent tubes when multiple tubes are collected. Do not change position of the tube or allow back-and-forth movement of the blood in the tube, as this too can cause reflux. A downward arm position also helps maintain blood flow.

Key Point If the stopper end of the tube fills first, blood in the tube is in contact with the needle and reflux can occur if there is a change in pressure in the patient's vein.

Figure 8-15 A phlebotomist mixing a heparin tube.

To ensure a proper ratio of blood to additive, allow ETS tubes to fill until the normal vacuum is exhausted and blood ceases to flow. Tubes do not fill completely to the top. When blood flow stops, remove the tube, using a reverse twist and pulling motion while bracing the thumb or index finger against the flange of the holder. The rubber sleeve will cover the needle and prevent leakage of blood into the tube holder. If the tube contains an additive, mix it by gently inverting it three to eight times (depending upon the type of additive and manufacturer's recommendations) as soon as it is removed from the tube holder and before putting it down (Fig. 8-15). Remember, each inversion requires turning the wrist 180 degrees and back again. Lack of, delayed, or inadequate mixing can lead to clot formation and necessitate recollection of the specimen. Nonadditive tubes do not require mixing.

See how well you know the key points and cautions in this chapter with WORKBOOK Knowledge Drill 8-1.

CAUTION *Do not* shake or vigorously mix blood specimens, as this can cause hemolysis (breakage of red blood cells and release of hemoglobin into the serum or plasma).

If other ETS tubes are to be drawn, place them in the holder, use a clockwise twist to engage them with

the needle, and push them the rest of the way onto the needle until blood flow is established. Steady the tube holder so that the needle does not pull out of or penetrate through the vein as tubes are placed and removed. If the needle backs out of the skin even slightly, the vacuum of the tube will be lost (evidenced by a hissing sound) and the tube will stop filling. Unless the tube already has an adequate amount of blood for the test, a new one will have to be filled. Remember to follow the proper order of draw (see Chapter 7).

When the last ETS tube has been filled, remove it from the holder and mix it, if applicable, before removing the needle from the arm. If the tube is still engaged when the needle is removed from the arm, the needle may drip blood and cause needless contamination.

Key Point The practice of releasing the tube from the needle but leaving it in the holder during needle removal is awkward and increases the chance of needlesticks. It also delays proper mixing of tube contents, which can lead to microclot formation in anticoagulant tubes.

If the tourniquet is still on, release it before removing the needle. If the needle is removed with the tourniquet in place, blood may run down the arm and alarm the patient.

STEP 13: PLACE GAUZE, REMOVE NEEDLE, ACTIVATE SAFETY FEATURE, AND APPLY PRESSURE

After the last tube has been removed from the holder or an adequate amount of blood has been collected (if you are using a syringe), fold a clean gauze square into fourths and place it directly over the site where the needle enters the skin. Hold the gauze lightly in place but do not press down on it until the needle is removed.

CAUTION *Do not* press down on the gauze while the needle is in the vein. It puts pressure on the needle during removal, causing pain, and the needle may slit the vein and skin as it is withdrawn.

If the needle safety feature is designed to function within the vein, activate it according to the manufacturer's instructions. Withdraw the needle from the vein in one smooth motion. If the needle safety feature operates outside the vein, activate it immediately while simultaneously applying pressure to the site with your free hand. Apply pressure to the site for 3 to 5 minutes or until the bleeding stops. Failure to apply pressure or applying inadequate pressure can result in leakage of blood and hematoma formation. It is acceptable to have the patient hold pressure while you proceed to label tubes (or fill them if a syringe was used) provided that the patient is fully alert and able to so. *Do not* ask the patient to bend the arm up. The arm should be kept extended or even raised.

Key Point Studies show that folding the arm back at the elbow to hold pressure or keep the gauze in place after a blood draw actually increases the chance of bruising by keeping the wound open (especially if it is to the side of the arm) or disrupting the platelet plug when the arm is lowered.

If the sharps container has been moved out of reach (as sometimes happens in emergencies when others are working on the patient at the same time) and the patient is not able to hold pressure, it is generally acceptable to bend the patient's arm up temporarily while locating the sharps container and disposing of the collection device.

STEP 14: DISCARD COLLECTION UNIT, SYRINGE NEEDLE, OR TRANSFER DEVICE

CAUTION OSHA regulations prohibit cutting, bending, breaking, or recapping blood-collection needles or removing them from tube holders after use.

A needle and tube holder must be promptly discarded in a sharps container as a single unit. A syringe safety needle, however, may be removed and discarded separately so that the syringe can be attached to a syringe transfer device and tubes filled at this point. A transfer device is similar to an ETS holder but has a permanently attached needle inside. After the device is attached to the syringe, an ETS tube is placed inside it and advanced onto the needle until blood flows into the tube. Additional tubes can be filled as long as there is enough blood left in the syringe. When the transfer is complete, the syringe and transfer device are discarded in a sharps container as a single unit.

STEP 15: LABEL TUBES

thePoint *View the Specimen Labeling and Venipuncture Follow-up Procedures video at http://thepoint.lww.com/McCall6e.*

CAUTION Do not turn your back to the patient after the draw. Face the patient while labeling tubes or finishing paperwork and be prepared to react should the patient have an adverse reaction.

Tubes must be labeled in the presence of the patient immediately after blood collection, never before, and the label must be permanently attached to the tube before leaving an inpatient's bedside or dismissing an outpatient.

If you are using a preprinted computer or bar-code label, you will need to write the date, time, your initials, and other pertinent information on the label immediately before or after attaching it to the tube. If you do not have a preprinted label, you will have to hand print the required information on the tube yourself. Any handwritten labeling must be done with a permanent-ink pen. Labels should include the following information as a minimum:

- Patient's first and last names
- Patient's identification number (inpatient) or date of birth (outpatient)
- Date and time of collection
- Phlebotomist's initials
- Pertinent additional information, such as "fasting"

Before leaving an inpatient, compare the information on each labeled tube with the patient's ID band (Fig. 8-16) and the requisition. Some facilities have the phlebotomist show the labeled tube to the patient and ask the patient to verify that the correct name is on the tube. Both inpatient and outpatient tubes must then be placed upright in a biohazard specimen bag or other suitable container for transport to the laboratory.

Figure 8-16 A phlebotomist comparing labeled tube with patient's ID band.

STEP 16: OBSERVE SPECIAL HANDLING INSTRUCTIONS

Follow applicable special handling requirements. Place specimens that must be cooled (e.g., ammonia) in crushed ice slurry. Put specimens that must be kept at body temperature (e.g., cold agglutinin) in a 37°C heat block or other suitable warming device. Wrap specimens that require protection from light (e.g., bilirubin) in aluminum foil or other light-blocking material or place them in a light-blocking container.

STEP 17: CHECK PATIENT'S ARM AND APPLY BANDAGE

Examine the venipuncture site to determine if bleeding has stopped. (Bleeding from the vein can continue even though it has stopped at the surface of the skin). If you are certain it has stopped, apply an adhesive bandage (or tape and folded gauze square) over the site. If the patient is allergic to adhesive bandages, apply paper tape over a clean, folded gauze square. If the patient has sensitive skin or is allergic to adhesives, place a folded gauze square over the site and wrap gauze around it, fastening the gauze with paper tape, or wrap the site with a self-adhering gauze-like material such as Coban. Instruct the patient to leave the bandage on for a minimum of 15 minutes, after which it should be removed to avoid irritation. Instruct an outpatient not to carry a purse or other heavy object or lift heavy objects with that arm for a minimum of 1 hour.

CAUTION If bleeding has not stopped, the phlebotomist must apply pressure until it does. If the patient continues to bleed beyond 5 minutes, the appropriate personnel such as the patient's physician or nurse should be notified.

STEP 18: DISPOSE OF CONTAMINATED MATERIALS

Dispose of contaminated materials in the proper biohazard containers or according to facility protocol; discard other used disposable items in the regular trash. Make sure that any other equipment is returned to its proper place.

STEP 19: THANK PATIENT, REMOVE GLOVES, AND SANITIZE HANDS

Thank the patient for his or her cooperation. This is courteous and lets the patient know that the procedure is complete. Remove gloves aseptically as described in Chapter 3, discard them in the manner required by your institution, and sanitize your hands before leaving the area.

STEP 20: TRANSPORT SPECIMEN TO THE LAB

Transport specimens to the laboratory or designated pickup site in a timely fashion. Prompt delivery to the laboratory protects specimen integrity and is typically achieved by personal delivery, transportation through a pneumatic tube system, or arranged pickup by a courier service. The phlebotomist is typically responsible for verifying and documenting collection by computer entry or manual entry in a logbook.

Don't forget that questions in the EXAM REVIEW can help you see how well you have learned venipuncture procedures.

Routine ETS Venipuncture

Most venipunctures are routine and can be performed on AC veins using an ETS system. This system is preferred because it is direct, efficient, relatively safe for the patient and the blood drawer, and allows multiple tubes to be easily collected. Routine ETS venipuncture is illustrated in Procedure 8-2.

thePoint *View the Collecting a Blood Specimen by Venipuncture Using the Evacuated Tube System Video at http://thepoint.lww.com/McCall6e. For tips on proper ergonomics for this technique, watch the video Poor and Good Workplace Ergonomics for Phlebotomy, found at the same location.*

Procedure 8-2: Routine ETS Venipuncture

PURPOSE: To obtain a blood specimen for patient diagnostic or monitoring purposes from an antecubital vein using the evacuated tube system (ETS)

EQUIPMENT: Tourniquet; gloves; antiseptic prep pad; ETS needle,* tube holder* and tubes; gauze pads; sharps container; permanent ink pen; bandage

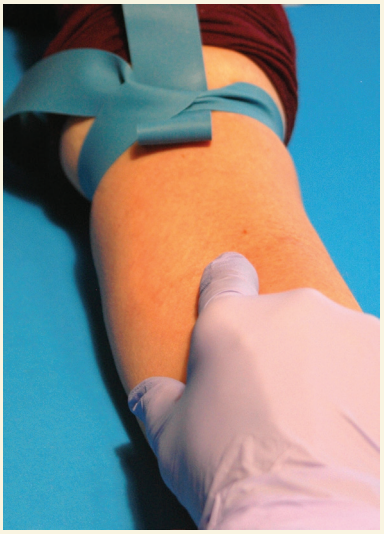
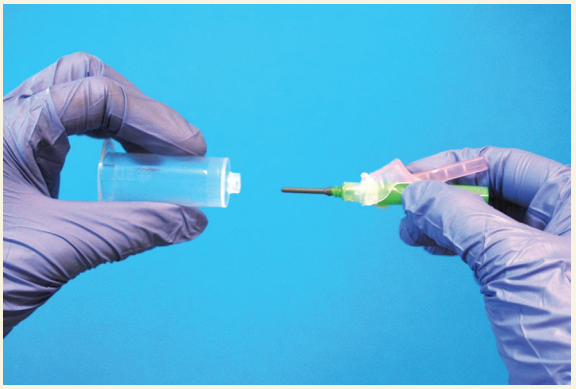
*Either the needle or tube holder must have a safety feature to prevent needlesticks.

Step	Explanation/Rationale
1. Review and accession test request.	A test request must be reviewed for completeness, date and time of collection, status, and priority. The accession process records the request and assigns it a unique number used to identify the specimen, related processes, and paperwork.
2. Approach, identify, and prepare patient. 	The right approach for a successful patient encounter includes a professional bedside manner, being organized and efficient, and looking for signs that convey important inpatient information or infection-control precautions. Correct ID is vital to patient safety and meaningful test results. Name, DOB, and MR number must be verified and matched to the test order and inpatient's ID band. Preparing the patient by explaining procedures and addressing inquiries helps reduce patient anxiety.

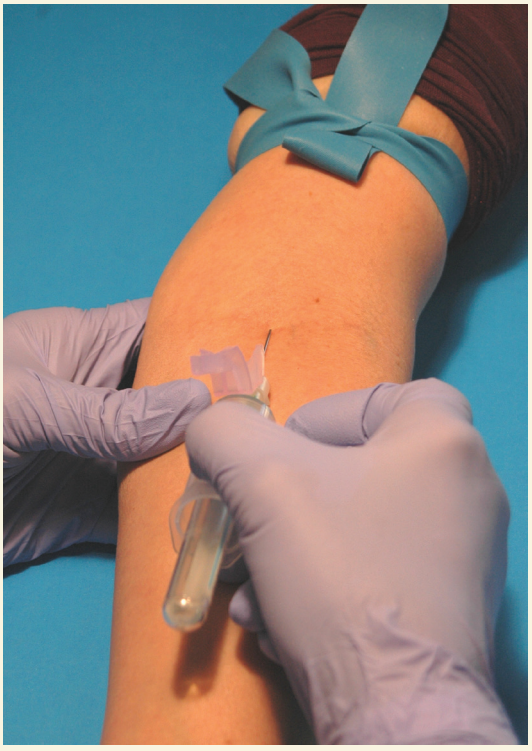
Procedure 8-2: Routine ETS Venipuncture (Continued)

Step	Explanation/Rationale
3. Verify diet restrictions and latex sensitivity.  	Test results can be meaningless or misinterpreted and patient care compromised if diet requirements have not been met. Exposure to latex can trigger a life-threatening reaction in those allergic to it.
4. Sanitize hands and put on gloves.  	Proper hand hygiene plays a major role in infection control by protecting the phlebotomist, patient, and others from contamination. Gloves are required by OSHA to protect the phlebotomist from potential bloodborne pathogen exposure.
5. Position patient, apply tourniquet, and ask patient to make a fist. 	Proper positioning is important to patient comfort and venipuncture success. The patient's arm should be placed downward in a straight line from shoulder to wrist to aid in vein selection and avoid reflux as tubes are filled. Tourniquet application enlarges veins and makes them easier to see, feel, and enter with a needle. A clenched fist make the veins easier to see and feel and helps keep them from rolling.

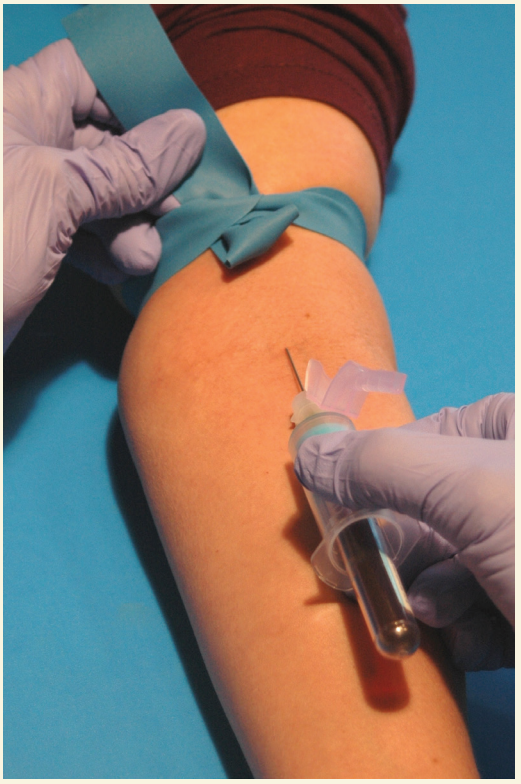
Procedure 8-2: Routine ETS Venipuncture (Continued)

Step	Explanation/Rationale
6. Select vein, release tourniquet, ask patient to open fist. 	Select a large, well-anchored vein. The median cubital should be the first choice, followed by the cephalic. The basilic should not be chosen unless it appears that no other vein can be safely or successfully accessed. Releasing the tourniquet and opening the fist helps prevent hemoconcentration.
7. Clean and air-dry site. 	Cleaning the site with an antiseptic helps avoid contaminating the specimen or patient with skin-surface bacteria picked up by the needle during venipuncture. Letting the site dry naturally permits maximum antiseptic action, prevents contamination caused by wiping, and avoids stinging or burning on needle entry.
8. Prepare equipment. 	Selecting appropriate equipment for the size, condition, and location of the vein is easier after vein selection. Preparing it while the site is drying saves time. Attach a needle to an ETS holder. Put the first tube in the holder now (see step 10) or wait until after needle entry. Gloves must be put on now if not already on.

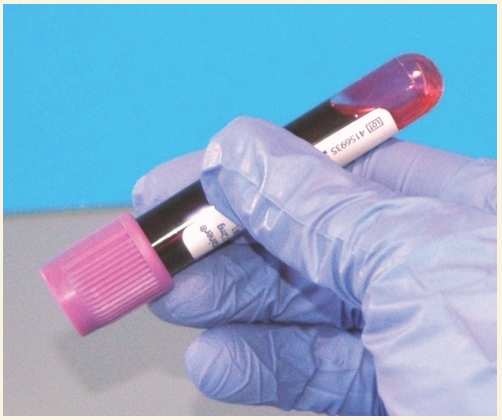
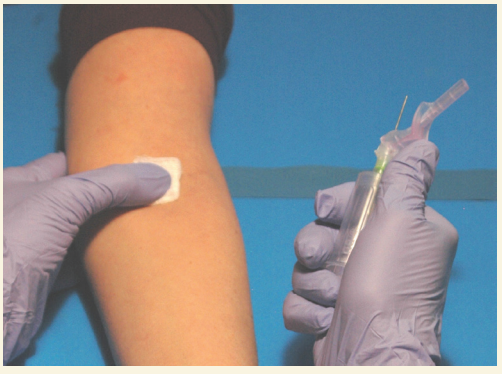
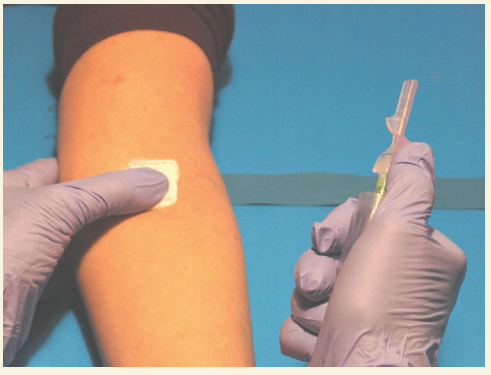
Procedure 8-2: Routine ETS Venipuncture (Continued)

Step	Explanation/Rationale
9. Reapply tourniquet, uncap and inspect needle. 	The tourniquet aids needle entry. Pick up the tube holder with your dominant hand, placing your thumb on top near the needle end and fingers underneath. Uncap and inspect the needle for defects and discard it if flawed.
10. Ask patient to remake a fist, anchor vein, and insert needle. 	The fist aids needle entry. Anchoring stretches the skin so the needle enters easily and with less pain, and keeps the vein from rolling. Warn the patient. Line the needle up with the vein and insert it bevel up into the skin using a smooth forward motion. Stop when you feel a decrease in resistance, often described as a "pop," and press your fingers into the arm to anchor the holder.

Procedure 8-2: Routine ETS Venipuncture (Continued)

Step	Explanation/Rationale
11. Establish blood flow, release tourniquet, ask patient to open fist.  	Blood will not flow until the needle pierces the tube stopper. Place a tube in the holder and push it part way onto the needle with a clockwise twist. Grasp the holder's flanges with your middle and index fingers, pulling back slightly to keep the holder from moving, and push the tube onto the needle with your thumb. Releasing the tourniquet and opening the fist allows blood flow to normalize (see step 6). According to CLSI standards, the tourniquet should be released as soon as possible after blood begins to flow and should not be left on longer than 1 minute.

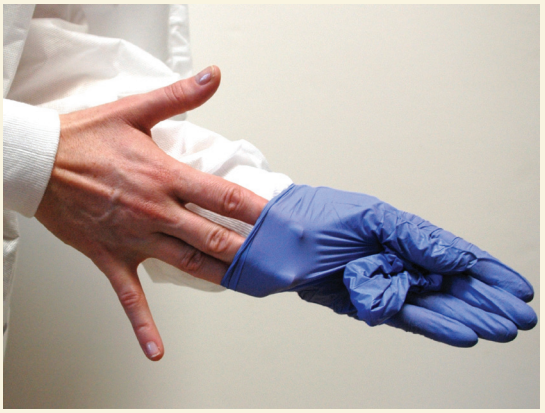
Procedure 8-2: Routine ETS Venipuncture (Continued)

Step	Explanation/Rationale
12. Fill, remove, and mix tubes in order of draw. 	Fill additive tubes until the vacuum is exhausted to ensure correct blood-to-additive ratio and mix them immediately upon removal from the holder using three to eight gentle inversions (depending on type and manufacturer) to prevent clot formation. Follow the CLSI order of draw to prevent additive carryover between tubes.
13. Place gauze, remove needle, activate safety feature, and apply pressure. 	A clean, folded gauze square is placed over the site so pressure can be applied immediately after needle removal. Remove the needle in one smooth motion without lifting up or pressing down on it. Immediately apply pressure to the site with your free hand while simultaneously activating the needle safety feature with the other to prevent the chance of a needlestick.
	
	

Procedure 8-2: Routine ETS Venipuncture (Continued)

Step	Explanation/Rationale
14. Discard collection unit. 	According to OSHA, the needle and the tube holder must go into the sharps container as a unit because removing a needle from the holder exposes the user to sharps injury.
15. Label tubes. 	To avoid mislabeling errors, label tubes before leaving the bedside or dismissing the patient.
16. Observe special handling instructions. 	For accurate results, some specimens require special handling such as cooling in crushed ice (e.g., ammonia), transportation at body temperature (e.g., cold agglutinin), or protection from light (e.g., bilirubin).

Procedure 8-2: Routine ETS Venipuncture (Continued)

Step	Explanation/Rationale
17. Check patient's arm and apply bandage.	The patient's arm must be examined to verify that bleeding has stopped. The site must also be checked for signs of bleeding beneath the skin. If bleeding has stopped, apply a bandage and advise the patient to keep it in place for at least 15 minutes. Note: If bleeding persists beyond 5 minutes, notify the patient's nurse or physician.
18. Dispose of used and contaminated materials.	Materials such as needle caps and wrappers are normally discarded in the regular trash. Some facilities require that contaminated items such as blood-soaked gauze be discarded in biohazard containers.
19. Thank patient, remove gloves, and sanitize hands.	Thanking the patient is courteous and professional. Gloves must be removed in an aseptic manner and hands washed or decontaminated with hand sanitizer as an infection-control precaution.
	
	
20. Transport specimen to the lab.	Prompt delivery to the lab protects specimen integrity and is typically achieved by personal delivery, transportation via a pneumatic tube system, or by a courier service.

Butterfly Procedure

A phlebotomist may elect to use a winged infusion set (butterfly) in attempting to draw blood from AC veins of infants and small children or from difficult adult veins, such as small AC veins or wrist and hand veins. A butterfly needle (i.e., 23 gauge) is appropriate in these situations because it is less likely to collapse or "blow" (rupture) the vein. A butterfly can be used with an ETS tube holder or a syringe (see "Syringe Venipuncture Procedure"). Small-volume tubes should be chosen when a butterfly is used with an ETS holder because the vacuum of large tubes may collapse the vein or hemolyze the specimen. Venipuncture of a hand vein using a butterfly and ETS holder is illustrated in Procedure 8-3.

thePoint ***View the video of the Blood Collection from a Hand Vein Using a Butterfly and ETS Holder procedure at http://thepoint.lww.com/McCall6e.***

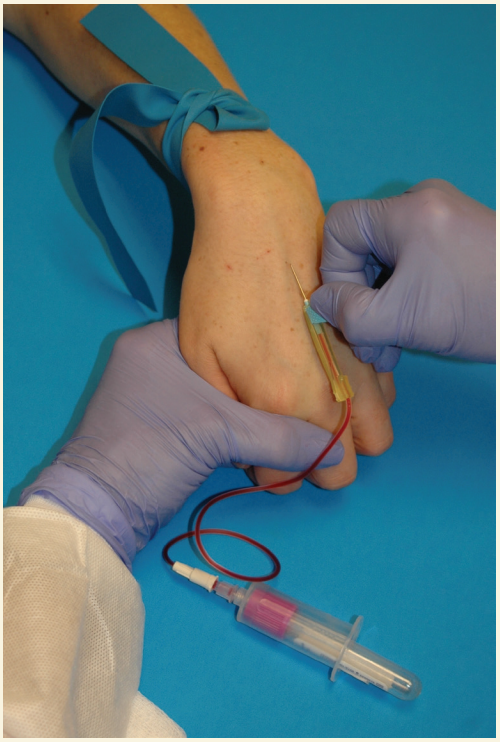
Procedure 8-3: Venipuncture of a Hand Vein Using a Butterfly and ETS Holder

PURPOSE: To obtain a blood specimen for patient diagnostic or monitoring purposes from a hand vein using a butterfly and ETS holder.

EQUIPMENT: Tourniquet, gloves, antiseptic prep pad, butterfly needle with safety feature, ETS tube holder and tubes, gauze pads, sharps container, permanent ink pen, bandage

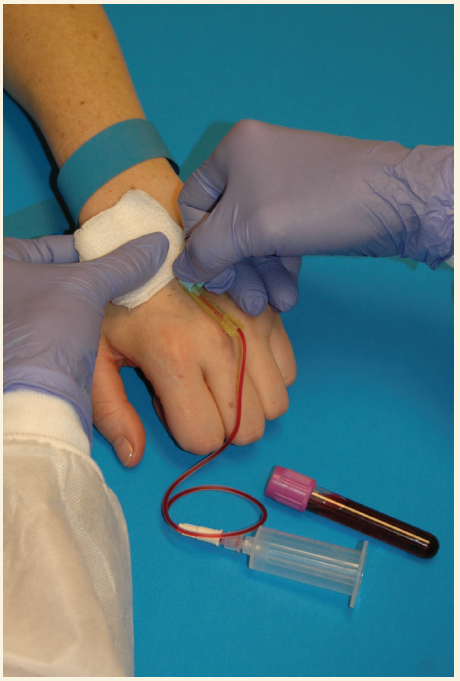
Step	Explanation/Rationale
1–4. (Same as routine ETS venipuncture.)	See Procedure 8-2: steps 1–4.
5. Position hand, apply tourniquet, ask patient to close the hand.	Proper arm position is important to the comfort of the patient and the success of venipuncture. Support the hand on the bed or armrest. Have the patient bend the fingers slightly or make a fist. A tourniquet is necessary to increase venous filling and aid in vein selection. Apply it proximal to the wrist bone. A closed hand or clenched fist sometimes makes the veins easier to see and feel.
6. Select vein, release tourniquet, ask patient to relax hand.	Select a vein that has bounce or resilience and can be easily anchored. Wiping the hand with alcohol sometimes makes the veins more visible. Finding a suitable vein can take a while. Releasing the tourniquet and opening the fist allows blood flow to return to normal and minimizes effects of hemoconcentration.
7. Clean and air-dry site.	Same as routine ETS venipuncture (see Procedure 8-2: step 7).
8. Prepare equipment and put on gloves.	It is easier to select appropriate equipment after the vein has been chosen. Preparing it while the site is drying saves time. Attach the butterfly to an ETS holder. Grasp the tubing near the needle end and run your fingers down its length, stretching it slightly to help keep it from coiling back up. Position the first tube in the holder now or wait until after needle entry. According to the OSHA BBP standard, gloves must be worn during phlebotomy procedures.
9. Reapply tourniquet, uncap and inspect needle.	The tourniquet aids needle entry. Hold the wing portion of the butterfly between your thumb and index finger or fold the wings upright and grasp them together. Cradle the tubing and holder in the palm of your dominant hand or lay it next to the patient's hand. Uncap and inspect the needle for defects and discard it if flawed.

Procedure 8-3: Venipuncture of a Hand Vein Using a Butterfly and ETS Holder (Continued)

Step	Explanation/Rationale
10. Anchor vein and insert needle. 	Anchoring stretches the skin so the needle enters easily and with less pain, and it keeps the vein from rolling. Insert the needle into the vein at a shallow angle of approximately 10 degrees or less. A "flash" or small amount of blood will appear in the tubing when the needle is in the vein. "Seat" the needle by slightly threading it within the lumen of the vein to keep it from twisting back out of the vein if you let go of it.
11. Establish blood flow and release tourniquet. 	The flash of blood in the tubing indicates vein entry. Blood will not flow until the needle pierces a tube stopper. Place a tube in the holder and push it part way onto the needle with a clockwise twist. Grasp the holder flanges with your middle and index fingers, pulling back slightly to keep the holder from moving, and push the tube onto the needle with your thumb. Releasing the tourniquet allows blood flow to normalize (see step 6).

Procedure 8-3: Venipuncture of a Hand Vein Using a Butterfly and ETS Holder (Continued)

Step	Explanation/Rationale
12. Fill, remove, and mix tubes in order of draw.	Maintain tubing and holder below the site, and positioned so that the tubes fill from the bottom up to prevent reflux. Fill additive tubes until the vacuum is exhausted to ensure the correct blood-to-additive ratio and mix them immediately upon removal from the holder, using three to eight gentle inversions (depending on type and manufacturer) to prevent clot formation. Follow the CLSI order of draw to prevent additive carryover between tubes. If a coagulation tube is the first or only tube collected, draw a discard tube first to remove air in the tubing and assure proper filling of the coagulation tube.
13. Place gauze, remove needle, activate safety device, and apply pressure.	A clean, folded gauze square is placed over the site so pressure can be applied immediately after needle removal. Remove the needle in one smooth motion without lifting it up or pressing down on it. Immediately apply pressure to the site with your free hand while simultaneously activating the needle safety device with the other to prevent the chance of a needlestick.



Procedure 8-3: Venipuncture of a Hand Vein Using a Butterfly and ETS Holder (Continued)

Step	Explanation/Rationale
	
14. Discard collection unit.	According to OSHA, the needle and tube holder must go into the sharps container as a unit because removing a needle from the holder exposes the user to sharps injury.
15–20. (Same as routine ETS venipuncture.)	See Procedure 8-2: steps 15–20.

Syringe Venipuncture Procedure

The preferred method of obtaining venipuncture specimens is the evacuated tube method. In fact, according to CLSI standard GP41 blood collection with a needle and syringe should be avoided for safety reasons. Even so, a needle or butterfly and syringe are sometimes used when the patient has extremely small, fragile, or weak veins. The vacuum pressure of an evacuated tube may be too great for such veins and cause them to collapse easily. This is often the case with elderly patients and newborn infants. When a syringe is used, the amount of pressure can be reduced somewhat over that of a tube by pulling the plunger back slowly. If the syringe fills too slowly, however, there is the possibility that the specimen will begin to clot either before enough blood is collected or before it can be transferred to the appropriate tubes. A special syringe transfer device is required to safely transfer blood from the syringe into the ETS tubes. Venipuncture with a needle and syringe is illustrated in Procedure 8-4. Steps to follow when using a transfer device to fill tubes with blood from a syringe are shown in Procedure 8-5.

Procedure for Inability to Collect Specimen

If you are unable to obtain a specimen on the first try, evaluate the problem and try again below the first site, on the opposite arm, or on a hand or wrist vein. If the patient's veins are small or fragile, it may be necessary to use a butterfly or syringe on the second attempt.

thePoint: ***View the video of the procedure for Collecting Blood from an Antecubital Vein Using a Needle and Syringe at http://thepoint.lww.com/McCall6e.***

Procedure 8-4: Needle-and-Syringe Venipuncture

PURPOSE: To obtain a blood specimen for patient diagnostic or monitoring purposes from an antecubital vein using a needle and syringe.

EQUIPMENT: Tourniquet, gloves, antiseptic prep pad, syringe needle,* syringe,* ETS tubes, gauze pads, sharps container, permanent ink pen, bandage

*Either the needle or syringe must have a safety feature to prevent needlesticks.

Step	Rationale/Explanation
1–7. (Same as routine ETS venipuncture.)	See Procedure 8-2: steps 1–7.
8. Prepare equipment and put on gloves.	It is easier to select appropriate equipment after the vein has been chosen. Preparing it while the site is drying saves time. Select the syringe needle according to the size and location of the vein and select the syringe and tube size according to the volume of blood required for the tests. Attach the needle to the syringe but do not remove the cap at this time. Hold the syringe as you would an ETS tube holder. According to OSHA's BBP standard, gloves must be worn during phlebotomy procedures.
9. Reapply tourniquet, uncap and inspect needle.	The tourniquet aids in venipuncture. Hold the syringe in your dominant hand as you would an ETS holder. Place your thumb on top near the needle end and fingers underneath. Uncap and inspect the needle for defects and discard it if flawed. Although it is rare, a needle can have defects.
10. Ask patient to make a fist, anchor vein, and insert needle.	The fist aids needle entry. Anchoring stretches the skin so the needle enters easily and with less pain and keeps the vein from rolling. Anchor by grasping the arm just below the elbow, supporting the back of it with your fingers. Place your thumb 1–2 inches below and slightly beside the vein and pull the skin toward the wrist. Warn the patient. Line the needle up with the vein and insert it into the skin using a smooth forward motion. Stop when you feel a decrease in resistance, often described as a "pop," and press your fingers into the arm to anchor the holder.

Procedure 8-4: Needle-and-Syringe Venipuncture (Continued)

Step	Rationale/Explanation
11. Establish blood flow, release tourniquet, ask patient to open fist. 	Establishment of blood flow is normally indicated by blood in the hub of the syringe. In some cases blood will not flow until the syringe plunger is pulled back. Releasing the tourniquet and opening the fist allows blood flow to return to normal and helps prevent hemoconcentration. According to CLSI Standard H3-A5, the tourniquet should be released as soon as possible after blood begins to flow and should not be left on longer than 1 minute.
12. Fill syringe.	Venous blood will not automatically flow into a syringe. It must be filled by slowly pulling back on the plunger with your free hand. Steady the syringe as you would an ETS holder during routine venipuncture.
13. Place gauze, withdraw needle, activate safety device, apply pressure. 	A clean, folded gauze square is placed over the site so pressure can be applied immediately after needle removal. Remove the needle without lifting it up or pressing down on it. Immediately apply pressure to the site with your free hand and simultaneously activate the needle safety device with the other.

Procedure 8-4: Needle-and-Syringe Venipuncture (Continued)

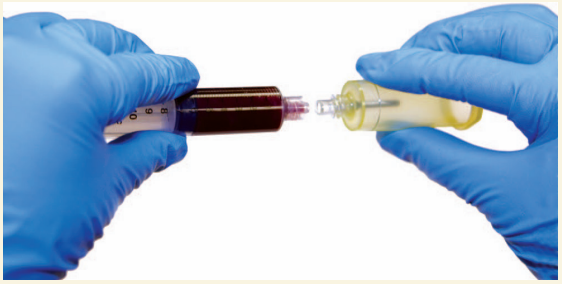
Step	Rationale/Explanation
	
14. Discard needle, fill tubes, discard syringe and transfer device. 	The needle must be removed and discarded in the sharps container so that a transfer device for filling the tubes can be attached to the syringe. A transfer device greatly reduces the chance of accidental needlesticks and confines any aerosol or spraying that may be generated as the tube is removed. An ETS tube is placed in the transfer device in the order of draw and pushed onto the internal needle until the stopper is pierced. Blood from the syringe is then safely drawn into the tube. Several tubes can be filled as long as there is enough blood in the syringe. After use, the syringe and transfer device unit is discarded in the sharps container.
15–20. (Same as routine ETS venipuncture.)	See Procedure 8-2, steps 15–20.

thePoint *View the video Transferring Blood from a Syringe into ETS Tubes at http://thepoint.lww.com/McCall6e.*

Procedure 8-5: Using a Syringe Transfer Device

PURPOSE: To safely transfer blood from a syringe into ETS tubes.

EQUIPMENT: Syringe transfer device

Step	Explanation/Rationale
1. Remove the needle from the syringe and discard it in a sharps container.	The needle must be removed to attach the transfer device.
2. Attach the syringe hub to the transfer device hub, rotating it to ensure secure attachment.	Secure attachment is necessary to prevent blood leakage during transfer.
	
3. Hold the syringe vertically with the tip down and the transfer device at the bottom.	This ensures vertical placement of tubes to prevent additive carryover.
4. Place an ETS tube in the barrel of the transfer device and push it all the way to the end.	The device has an internal needle that will puncture the stopper and allow blood to flow into the tube.
	
5. Follow the order of draw if multiple tubes are to be filled.	The order of draw is designed to prevent additive carryover between tubes.
6. Keep the tubes and transfer device vertical.	This ensures that tubes fill from bottom to top, preventing additive contact with the needle and cross-contamination of subsequent tubes.

Procedure 8-5: Using a Syringe Transfer Device (Continued)

Step	Explanation/Rationale
7. Let tubes fill using the vacuum draw of the tube. Do not push on the syringe plunger. 	Forcing blood into a tube by pushing the plunger can hemolyze the specimen or cause the tube stopper to pop off, splashing tube contents.
8. If you must underfill a tube, hold back the plunger to stop blood flow before removing it.	Tubes quickly fill until the vacuum is gone. Holding back the plunger stops the tube from filling.
9. Mix additive tubes as soon as they are removed.	Additive tubes must be mixed immediately for proper function, including preventing clot formation in anticoagulant tubes.
10. When finished, discard the syringe and transfer device unit in a sharps container.	Removing the transfer device from the syringe would expose the user to blood in the hubs of both units. The transfer device must go into the sharps container because of its internal needle.

If the second attempt is unsuccessful, ask another phlebotomist to take over. Unsuccessful venipuncture attempts are frustrating to the patient and the phlebotomist. Should the second phlebotomist be unsuccessful after two attempts, it is a good idea to give the patient a rest if the request is not stat or timed and try again at a later time.

CAUTION According to CLSI, arterial puncture should not be used as an alternative to venipuncture on difficult veins. If it appears to be the only choice, the patient's physician should be consulted first.

There are times when a phlebotomist is not able to collect a specimen from a patient even before attempting venipuncture. Occasionally, a patient will refuse to have blood drawn. Other times, the patient may be unavailable because he or she has gone to surgery or for another test, as in radiology. Whatever the reason, if the specimen cannot be obtained, notify the patient's nurse or physician. You may be required to fill out a form stating that the specimen was not obtained and the reason why. The original form is placed in the patient's chart and the laboratory retains a copy. The following are the most common and generally accepted reasons for inability to obtain a specimen:

- Phlebotomist attempted but was unable to draw blood.
- Patient refused to have blood drawn.
- Patient was unavailable.

Pediatric Venipuncture

Collecting blood by venipuncture from infants and children may be necessary for tests that require large

amounts of blood (i.e., cross-matching and blood cultures) and tests that cannot normally be performed by skin puncture (i.e., ammonia levels and most coagulation studies). Venipuncture in children under the age of 2 should be limited to superficial veins and not deep, hard-to-find veins. Normally, the most accessible veins of infants and toddlers are the veins of the AC fossa and forearm. Other potential venipuncture sites include the medial back side of the wrist, the dorsum of the foot, the scalp, and the medial ankle. Venipuncture of these alternate sites, however, requires special training and the permission of the patient's physician.

CHALLENGES

Capillary collection is normally recommended for pediatric patients, especially newborns and infants up to 12 months, because their veins are small and not well developed and there is a considerable risk of permanent damage. There are, however, times when capillary collection is not feasible or possible owing to type or volume requirements of tests ordered; in such instances a venipuncture is necessary. Performing venipuncture on pediatric patients presents special challenges and requires the expertise and skill of an experienced phlebotomist. In addition, every attempt should be made to collect the minimum amount of blood required for testing, because infants and young children have much smaller blood volumes than older children and adults. Removal of large quantities of blood at once or even small quantities on a regular basis, as is often the case when an infant or child is in intensive care, can lead to anemia. Removing more than 10% of an infant's blood volume at one time can lead to shock and cardiac arrest. Consequently, most facilities have limits on the amount of blood that can be removed per draw and for various time periods from 24 hours up to a month. For example, many facilities do not allow more than 3% of a child's blood volume to be collected at any one time and allow no more than 10% in an entire month. See Table 8-2 for recommended blood draw volumes for pediatric patients.

The CLSI recommends that procedures be in place to monitor amounts of blood drawn from pediatric, geriatric, and other vulnerable patients to avoid phlebotomy-induced anemia.

No one would intentionally put a patient's life at risk by drawing too much blood. However, a phlebotomist who fails to keep track of amounts of blood collected or who is unable to judge how much blood can be collected safely could do just that. Consequently, for safe practice, a competent phlebotomist should be able to calculate blood volume. The formula for calculating blood volume is shown in Appendix B.

Table 8.2: Recommended Blood Draw Volumes for Pediatric Patients

Weight (kg)	Maximum Volume for a Single Blood Draw (mL)	Weight (kg)	Maximum Volume for a Single Blood Draw (mL)
2	4	30	60
4	8	32.5	65
6	12	35	70
8	16	37.5	75
10	20	40	80
12.5	25	42.5	85
15	30	45	90
17.5	35	47.5	95
20	40	50	100
22.5	45	52.5	105
25	50	55	110
27.5	55		

Courtesy of Dr. David Friedman, Children's Hospital of Philadelphia, Philadelphia, PA.
Reprinted with permission from Bishop ML, Fody EP, Schoeff LE. *Clinical Chemistry, Principles, Techniques, and Correlations.* 7th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2013:722.

DEALING WITH PARENTS OR GUARDIANS

Parents or guardians may give the best prediction of how cooperative the child will be. Anxiety on the part of a parent can negatively influence the child's coping mechanisms. If parents or guardians are present, it is important for the phlebotomist to earn their trust before attempting venipuncture. A phlebotomist who behaves in a warm and friendly manner and displays a calm, confident, and caring attitude will more easily earn that trust and limit his or her own anxiety as well. Ask the parent or guardian about the child's past experiences with blood collection so as to gain insight into how the child may behave and approaches that might work. Give them the option of staying in the room during the procedure or waiting outside until you are finished. Their presence and involvement should be encouraged, however, as studies show that this reduces a child's anxiety and has a positive effect on the child's behavior.

DEALING WITH THE CHILD

Venipuncture in children that results in a traumatic experience can have lasting negative consequences, including increased sensitivity to pain, a decreased capacity to cope with it, and a lifelong fear of needles. The best strategy to reduce the child's anxiety should be employed.

With older children, it is as important as with adults to gain their trust. However, children typically have a wider zone of comfort, which means that you cannot get as close to them as you can to an adult without making them feel threatened. Approach them slowly and determine their degree of anxiety or fear before handling equipment or touching their arms to look for a vein. An adult towering over a child is intimidating. Physically lower yourself to the patient's level. Explain what you are going to do in terms that the child can understand and answer questions honestly.

Key Point *Never* tell a child that it won't hurt. Instead, say that it may hurt just a little bit, but it will be over quickly.

Help the child to understand the importance of remaining still. Give the child a job to do such as holding the gauze or adhesive bandage. Studies have demonstrated that age-appropriate distractions such as videos, movies, games, counting and singing can minimize the stress and anxiety of potentially painful procedures such as venipuncture. Offer the child a reward for being brave. However, *do not* put conditions on receiving the reward, such as "you can have a sticker if you don't cry." Some crying is to be anticipated, and it is important to let the child know that it is all right to cry.

Key Point Calm a crying child as soon as possible, because the stress of crying and struggling can alter blood components and lead to erroneous test results.

PAIN INTERVENTIONS

Interventions to minimize pain transmission or ease the pain of venipuncture include the use of cold or vibration, **EMLA**, a **eutectic** (easily melted) **mixture of local anesthetics** for newborns through adults, and oral sucrose and pacifiers for infants and toddlers.

EMLA is a topical anesthetic–containing lidocaine and prilocaine. It is available in a cream that must be covered with a clear dressing or a patch after application. It takes approximately 1 hour (a major drawback to its use) for it to anesthetize the area to a depth of approximately 5 mm. It cannot be used on patients who are allergic to local anesthetics. It can only be applied to intact skin, and must be applied by a licensed healthcare practitioner following strict dosage, amount of area covered, and application times based on the child's age and weight to prevent toxicity from absorption through the skin. It cannot be used on patients who are allergic to local anesthetics, infants with a gestational age of less than 37 weeks, or infants under 12 months of age who are receiving treatment with methemoglobin-inducing agents.

Use of a 12% to 24% solution of oral sucrose has been shown to reduce the pain of procedures such as heel puncture and venipuncture in infants up to 6 months of age. A 24% solution of sucrose (prepared by mixing 4 teaspoons of water with 1 teaspoon of sugar) can be administered by dropper, nipple, oral syringe, or on a pacifier provided that it will not interfere with the tests to be collected or diet restrictions. Sucrose nipples or pacifiers are available commercially. The sucrose must be given to the infant 2 minutes before the procedure, and its pain-relieving benefits last for approximately 5 minutes. Studies have shown that infants given sucrose or even a regular pacifier by itself cry for a shorter time and are more alert and less fussy after the procedure.

SELECTING A METHOD OF RESTRAINT

Immobilization of the patient is a critical aspect in obtaining an adequate specimen from infants and children while ensuring their safety. A newborn or young infant can be wrapped in a blanket, but physical restraint is often required for older infants, toddlers, and younger children. Older children may be able to sit by themselves in the blood-drawing chair, but a parent or another phlebotomist should help steady the child's arm.

Toddlers are most easily restrained by having them sit upright on a parent's lap (Fig. 8-17). The arm to be used for venipuncture is extended to the front and downward. The parent places an arm around the toddler and over the arm that is not being used. The other arm supports the venipuncture arm from behind, at the bend of the elbow. This helps steady the child's arm and prevents the child from twisting the arm during the draw. It is also helpful if the parent's legs are wrapped around the toddler's legs to prevent kicking.

If the child is lying down, the parent or another phlebotomist typically leans over the child from the opposite side of the bed. One arm reaches around and holds the venipuncture arm from behind, the other reaches across the child's body, holding the child's other arm secure against his or her torso.

EQUIPMENT SELECTION

Venipuncture of an AC vein is most easily accomplished using a 23-gauge butterfly needle attached to an evacuated tube holder or syringe. The tubing of the butterfly allows flexibility if the child struggles or twists during the draw. Use of an evacuated-tube holder and butterfly needle is preferred because it minimizes chances of producing clotted specimens and inadequately filled tubes. However, the smallest tubes available should be used

Figure 8-17 A seated adult restraining a toddler.

to reduce the risk of creating too much vacuum draw on the vein and causing it to collapse. In difficult-draw situations, a small amount of blood can be drawn into a syringe and the blood placed in microcollection tubes (microtubes or "bullets") rather than ETS tubes.

CAUTION Laboratory personnel will assume that blood in microtubes is capillary blood. If venous blood is placed in a microtube, it is important to label the specimen as venous blood because reference ranges for some tests differ depending on the source of the specimen.

PROCEDURES

Regardless of the collection method, every attempt should be made to collect the minimum amount of blood required for testing because of the small blood volume of the patient. In addition to reducing the risk of iatrogenic anemia, minimizing the volume of blood drawn shortens the duration of the draw and the time the patient is under stress. Follow strict identification requirements and venipuncture procedures outlined earlier in the chapter. You may be required to wear a mask, gown, and gloves in the newborn nursery or neonatal ICU.

Geriatric Venipuncture

Geriatric means relating to old age. According to the National Institute on Aging (NIA), life expectancy has doubled over the last century, and there are now over 35 million Americans of age 65 or older. This segment of the population is expected to grow by 137% over the next 50 years and to become the major focus of health care. Already a major portion of laboratory testing is performed on the elderly. (See Table 8-3 for a list of tests commonly ordered on geriatric patients.)

Matching 8-3 in the WORKBOOK tests knowledge of geriatric tests and indications for ordering them.

Although aging is a normal process, it involves physical, psychological, and social changes leading to conditions, behaviors, and habits that may seem unusual to those unaccustomed to working with elderly patients. To feel comfortable working with them one must understand the aging process and be familiar with the physical limitations, diseases, and illnesses associated with it. It is also important to remember that elderly patients are unique individuals with special needs who deserve as with all patients, to be treated with compassion, kindness, patience, and respect.

CHALLENGES

Physical effects of aging, such as skin changes, hearing and vision problems, mobility issues—often related to arthritis and osteoporosis, diseases such as diabetes, and mental and emotional conditions often present challenges not only to the patient but to a phlebotomist's technical expertise and interpersonal skills as well.

Skin Changes

Skin changes include loss of collagen and subcutaneous fat, resulting in wrinkled, sagging, thin skin with a decreased ability to stay adequately hydrated. Lack of hydration along with impaired peripheral circulation caused by age-related narrowing of blood vessels makes it harder to obtain adequate blood flow, especially during skin puncture. In addition, aging skin cells are replaced more slowly, causing the skin to lose elasticity and increasing the likelihood of injury. Blood vessels also lose elasticity, becoming more fragile and more likely to collapse, resulting in an increased chance of bruising and the failure to obtain blood.

Key Point Skin changes make veins in the elderly easier to see; however, sagging skin combined with loss of muscle tone may make it harder to anchor veins and keep them from rolling.

Table 8-3: Tests Commonly Ordered on Geriatric Patients

Test	Typical Indications for Ordering
ANA, RA, or RF	Diagnose lupus and rheumatoid arthritis, which can affect nervous system function
CBC	Determine hemoglobin levels, detect infection, and identify blood disorders
BUN/creatinine	Diagnose kidney function disorders that may be responsible for problems such as confusion, coma, seizures, and tremors
Calcium/magnesium	Identify abnormal levels associated with seizures and muscle problems
Electrolytes	Determine sodium and potassium levels, critical to proper nervous system function
ESR	Detect inflammation; identify collagen vascular (i.e., connective tissue) diseases
Glucose	Detect and monitor diabetes; abnormal levels can cause confusion, seizures, or coma or lead to peripheral neuropathy
PT/PTT	Monitor blood-thinning medications; important in heart conditions, coagulation problems, and stroke management
SPEP, IPEP	Identify protein or immune globulin disorders that lead to nerve damage
VDRL/FTA	Diagnose or rule out syphilis, which can cause nerve damage and dementia

Hearing Impairment

Effects of aging include loss of auditory hair cells, resulting in a hearing loss in upper frequencies and trouble distinguishing sounds such as ch, s, sh, and z. Hearing-impaired patients may strain to hear and have difficulty answering questions and understanding instructions. If you know or have reason to suspect that a patient has a hearing impairment, move closer and face the patient when you speak. Speak clearly and distinctly, but use your normal tone of voice. Never shout; shouting raises the pitch of your voice and makes it harder to understand. Allow the patient enough time to answer questions, and confirm patient responses to avoid misunderstanding. Repeat information if necessary. Watch for nonverbal verification that the patient understands. Be mindful of nonverbal messages you may be sending inadvertently. Use pencil and paper to communicate if necessary. A relative or attendant often accompanies a patient with a hearing impairment or other communication problem. If this person is included in the conversation, do not speak to him or her directly as if the patient were not present.

Key Point Although hearing loss is common in the elderly, never assume that an elderly person is hard of hearing.

Visual Impairment

Effects of aging on the eyes include a diminished ability of the lens to adjust, causing farsightedness; clouding of the lens or cataract formation resulting in dim vision; and other changes that lead to light intolerance and poor night vision. The phlebotomy area should have adequate lighting without glare. Be aware that you may need to guide elderly patients to the drawing chair or escort them to the restroom if a urine specimen is requested. Provide written instructions in large print, avoid using gestures when speaking, and use a normal tone of voice.

Key Point A common mistake and one that is irritating to the visually impaired is to raise your voice when you are speaking to them.

Mental Impairment

Slower nerve conduction associated with aging leads to slower learning, slower reaction times, and a diminished perception of pain, which, in turn, can lead to an increase in injuries. Reduced cerebral circulation can lead to loss of balance and frequent falls. The effects of some medications can make problems worse. Speak clearly and slowly and give the patient plenty of time to respond. You may need to repeat your statement or question more than once. Be especially careful in obtaining patient identification information and verifying compliance with diet instructions. If a relative or attendant is with the patient, verify information with him or her.

Alzheimer disease and other forms of dementia can render a patient unable to communicate meaningfully, requiring you to communicate through a relative or other caregiver. Some Alzheimer patients will act absolutely normal and others will exhibit anger and hostility, which should not be taken personally. Always approach patients in a calm, professional manner. Use short, simple statements and explain things slowly. You may require assistance to keep the patient's arm in place during the draw.

Key Point Although mental confusion and dementia are common in elderly patients, always assume that an elderly person is of sound mind unless you have information to the contrary.

Effects of Disease

Although most elderly persons are generally healthy, many are not. Some of the diseases that affect the elderly and the challenges they present to the patient and the phlebotomist include the following:

Arthritis

The two basic types of arthritis are osteoarthritis and rheumatoid arthritis. Osteoarthritis occurs with aging and also results from joint injury. The hips and knees are most commonly affected; this can cause difficulty getting in and out of a blood-drawing chair. Rheumatoid arthritis affects connective tissue throughout the body and can occur at any age. It primarily affects the joints, but connective tissue in the heart, lungs, eyes, kidneys, and skin may also be affected. Inflammation associated with both types of arthritis may leave joints swollen and painful and cause the patient to restrict movement. It may result in the patient being unable or unwilling to straighten an arm or open a hand. Use the other arm if it is unaffected. If that is not an option, let the patient decide what position is comfortable. A butterfly needle with 12-inch tubing helps provide the flexibility needed to access veins from awkward angles.

CAUTION Never use force to extend a patient's arm or open a hand, as this can cause pain and injury.

Coagulation Problems

Patients who have coagulation disorders or who take blood-thinning medications as a result of heart problems or strokes are at risk of hematoma formation or uncontrolled bleeding at the blood-collection site. Make certain that adequate pressure is held over the site until bleeding is stopped. You must hold pressure if the patient is unable to do so. However, do not hold pressure so tightly that the patient is injured or bruised, and do not apply a pressure bandage in lieu of holding pressure. If bleeding persists, notify the patient's physician or follow your facility's policy.

Diabetes

Many elderly patients have diabetes. Diabetes affects circulation and healing, particularly in the lower extremities, and generally makes venipuncture of leg, ankle, and foot veins off limits. Peripheral circulation problems and scarring from numerous skin punctures to check glucose can make skin puncture collections difficult. Warming the site before blood collection can help encourage blood flow.

Parkinson Disease and Stroke

Stroke and Parkinson disease can affect speech. The frustration this can cause to both the patient and the phlebotomist can present a barrier to effective communication. Allow these patients time to speak and do not try to finish their sentences. Keep in mind that difficulty in speaking does not imply problems in comprehension. Tremors and movement of the hands of Parkinson patients can make blood collection difficult; such patients may require help to hold still.

Pulmonary Function Problems

The effects of colds and influenza are more severe in the elderly. Age-related changes in pulmonary function reduce the elasticity of airway tissues and decrease the effectiveness of respiratory defense systems. Weakened chest muscles reduce the ability to clear secretions and increase the chance of developing pneumonia. If you have a cold, refrain from drawing blood from elderly patients if possible or wear a mask.

Other Problems

Disease and loss of immune function in the elderly increase the chance of infection. Lack of appetite due to disease or a decreased sense of smell and taste can result in emaciation. Poor nutrition can intensify the effects of aging on the skin, affect clotting ability, and contribute to anemia.

SAFETY ISSUES

Although all patients require an unencumbered traffic pattern, geriatric patients may need wider open areas to accommodate wheelchairs and walkers. Some patients tend to shuffle when they walk, so floors should have nonslip surfaces and be free of clutter. Dispose of equipment packaging properly and look out for items inadvertently dropped on the floor. Floor mats should stay snug against the floor so that they do not become a tripping hazard for any patient or employee as well.

PATIENTS IN WHEELCHAIRS

Many geriatric patients are wheelchair-bound or are so weak that they are transported to the laboratory in wheelchairs. Be careful in moving wheelchair patients (Fig. 8-18) from the waiting room to the blood-drawing room. Remember to lock wheels when drawing blood from patients in wheelchairs, assisting them to and from the drawing chair, or after returning them to waiting areas. Never attempt to lift patients to transfer them from a wheelchair to a drawing chair. Attempting to do so can result in injury to the patient, the phlebotomist, or both.

Figure 8-18 An elderly patient in a wheelchair.

Key Point It is generally safest and easiest to draw blood with the patient in the wheelchair, supporting the arm on a pillow or on a special padded board placed across the arms of the chair.

BLOOD-COLLECTION PROCEDURES

Although the venipuncture steps are basically the same for all patients, extra care must be taken in the following areas when drawing from elderly patients.

Patient Identification

Be extra careful in identifying patients with mental or hearing impairments. Never rely on nods of agreement or other nonverbal responses. Verify patient information with a relative or attendant if possible.

Equipment Selection

It is often best to use butterfly needles and pediatric or short-draw tubes for venipuncture on the elderly. Although the veins may appear prominent, they are apt to roll or collapse easily, making blood collection difficult. It is best to select equipment after you have selected the venipuncture site so that you can choose the best equipment for the size, condition, and location of the vein. If the veins are extremely fragile, you may have to collect the specimen by syringe or finger puncture.

Tourniquet Application

Apply the tourniquet snugly but loose enough to avoid damaging the patient's skin. A tourniquet that is too tight can cause the vein to collapse when it is released or the tube is engaged. It can also distend the vein so much that it "blows" or splits open on needle entry, resulting in hematoma formation. It is acceptable to apply the tourniquet over the patient's sleeve or a clean dry washcloth wrapped around the arm.

Key Point Geriatric patients in their 90s and 100s are seen more often lately, and their veins are very sensitive to tourniquet pressure.

Site Selection

Elderly patients, especially inpatients, often have bruising in the AC area from previous blood draws. Venipuncture in a bruised site should be avoided, as it can be painful to the patient and the hemostatic process occurring in the area can lead to erroneous test results. If both AC areas are bruised, select a needle entry point below the bruising. Be aware that some elderly patients may not be able to make a fist because of muscle weakness.

If no suitable vein can be found, gently massage the arm from wrist to elbow to force blood into the area or wrap a warm, wet towel around the arm or hand for a few minutes to increase blood flow. Avoid heavy manipulation of the arm, as this can cause bruising and affect test results. Have the patient hold the arm down at his or her side for a few minutes to let gravity help back up blood flow. When a suitable vein has been selected, release the tourniquet to allow blood flow to return to normal while you clean the site and ready your equipment.

Cleaning the Site

Clean the site in the same manner as in routine venipuncture, being careful not to rub too vigorously, as that may abrade or otherwise damage the skin. The site may have to be cleaned a second time on some elderly patients who are unable to bathe regularly.

Performing the Venipuncture

Although actually quite fragile, an elderly patient's veins often feel tough and have a tendency to roll. Anchoring them firmly and entering quickly increases the chance of successful venipuncture. If the skin is loose and the vein poorly fixed in the tissue, it sometimes helps to wrap your hand around the arm from behind and pull the skin taut from both sides rather than anchoring with your thumb. Because veins in the elderly tend to be close to the surface of the skin, a shallow angle of needle insertion may be required.

Holding Pressure

As discussed earlier under "Coagulation Problems," it may take longer for bleeding in elderly patients to stop, especially if they are on anticoagulant therapy. Bleeding must have stopped before the bandage is applied. If

bleeding is excessively prolonged, the patient's nurse or physician must be notified and laboratory facility procedures followed.

Dialysis Patients

Dialysis is a procedure in which patients whose kidneys do not function adequately have their blood artificially filtered to remove waste products. The most common reason for dialysis is end-stage renal disease (ESRD), a serious condition in which the kidneys have so deteriorated that they fail to function. The most common cause of ESRD is diabetes. The second most common cause is high blood pressure. Patients with ESRD require ongoing dialysis treatments or a kidney transplant.

In one type of dialysis, called hemodialysis, the patient's blood is filtered through a special machine often referred to as an artificial kidney. Access for hemodialysis is commonly provided by permanently fusing an artery and vein in the forearm, creating an arteriovenous (AV) shunt or fistula (see Chapter 9). During dialysis a special needle and tubing set is inserted into the fistula to provide blood flow to the dialysis machine. A typical AV fistula appears as a large bulging vein in the forearm above the wrist and causes a buzzing sensation called a "thrill" when palpated. The fistula arm must not be used to take blood pressures or perform venipuncture.

Key Point A phlebotomist must be able to recognize a fistula to avoid damaging it, as it is the dialysis patient's lifeline.

Long-Term Care Patients

Long-term care includes a variety of healthcare and social services required by certain patients with functional disabilities who cannot care for themselves but do not require hospitalization. Although long-term care serves the needs of patients of all ages, primary recipients are the elderly. Long-term care is delivered in adult daycare facilities, nursing homes, assisted living facilities, rehabilitation facilities (Fig. 8-19), and even private homes.

Home Care Patients

Care for the sick at home plays an important role in today's healthcare delivery system. Many individuals who in the past would have been confined to a healthcare institution are now able to remain at home, where numerous studies show they are happier and get better sooner or survive longer. Home care services are provided through numerous agencies and include professional nursing; home health aid; physical, occupational, and respiratory therapy; and laboratory services. Laboratory services are often provided by mobile phlebotomists who go to

Figure 8-19 A phlebotomist making a visit to a rehabilitation center.

the patient's home to collect specimens and then deliver them to the laboratory for testing. A home care phlebotomist must have exceptional phlebotomy, interpersonal, and organizational skills; be able to function independently; and be comfortable working in varied situations and under unusual circumstances. Mobile phlebotomists must carry with them all necessary phlebotomy supplies including sharps containers and biohazard bags for disposal of contaminated items and containers for properly protecting specimens during transportation, typically in their own vehicles (Fig. 8-20).

Hospice Patients

Hospice is a type of care for patients who are terminally ill. Hospice care allows them to spend their last days in a peaceful, supportive atmosphere that emphasizes pain management to help keep them comfortable. Some individuals are uncomfortable with the subject of death or being around patients who are dying and react with indifference out of ignorance. Phlebotomists who deal with hospice patients must understand the situation and be able to approach them with care, kindness, and respect.

Figure 8-20 A traveling phlebotomist getting supplies from the back of her vehicle.

Study and Review Questions

See the EXAM REVIEW for more study questions.

1. **NPO means:**
   a. new patient orders.
   b. needed postoperative.
   c. nothing by mouth.
   d. nutrition postoperative.

2. **Which of the following is required requisition information?**
   a. Ordering physician's name
   b. Patient's first and last names
   c. Type of test to be performed
   d. All of the above

3. **The following test orders for different patients have been received at the same time. Which test would you collect first?**
   a. Fasting glucose
   b. STAT glucose in the ER
   c. STAT hemoglobin in ICU
   d. ASAP CBC in ICU

4. **A member of the clergy is with the patient when you arrive to collect a routine specimen. What should you do?**
   a. Ask the patient's nurse what you should do.
   b. Come back after the clergy person has gone.
   c. Fill out a form saying you were unable to collect the specimen.
   d. Say "Excuse me, I need to collect a specimen from this patient."

5. **You are asked to collect a blood specimen from an inpatient. The patient is not wearing an ID band. What is the best thing to do?**
   a. Ask the patient's name and collect the specimen if it matches the requisition.
   b. Ask the patient's nurse to put an ID band on the patient before you draw the specimen.
   c. Identify the patient by the name card on the door.
   d. Refuse to draw the specimen and cancel the request.

6. **If a patient adamantly refuses to have blood drawn, you should**
   a. convince the patient to be cooperative.
   b. notify the patient's nurse or physician.
   c. restrain the patient and draw the blood.
   d. write a note to the patient's physician.

7. **An inpatient is eating breakfast when you arrive to collect a fasting glucose. What is the best thing to do?**
   a. Consult with the patient's nurse to see if the specimen should be collected.
   b. Draw the specimen quickly before the patient finishes eating.
   c. Draw the specimen and write "nonfasting" on the requisition.
   d. Fill out a form stating the patient had eaten so the specimen was not drawn.

8. **After cleaning the venipuncture site with alcohol, the phlebotomist should**
   a. allow the alcohol to dry completely.
   b. fan the site to help the alcohol dry.
   c. dry the site with a clean gauze pad or cotton ball.
   d. insert the needle quickly before the alcohol dries.

9. **The tourniquet should be released**
   a. as soon as blood flow is established.
   b. before needle removal from the arm.
   c. within 1 minute of its application.
   d. all of the above.

10. **What is the recommended angle of needle insertion when performing venipuncture on an arm vein and on a hand vein, respectively?**
    a. 20 degrees or less, 20 degrees or less.
    b. 25 degrees or less, 15 degrees or less
    c. 30 degrees or less, 10 degrees or less
    d. 45 degrees or less, 20 degrees or less.

11. **After inserting a butterfly needle, the phlebotomist must "seat" it, meaning:**
    a. have the patient make a fist to keep it in place.
    b. keep the skin taut during the entire procedure.
    c. push the bevel against the back wall of the vein.
    d. slightly thread it within the lumen of the vein.

12. **Blood collection tubes are labeled**
    a. as soon as the test order is received.
    b. before the specimen is even collected.
    c. immediately after specimen collection.
    d. whenever it is the most convenient.

13. What is the best approach to use on an 8-year-old child who needs to have blood drawn?

a. Explain the draw in simple terms and ask for the child's cooperation.
b. Have someone restrain the child and collect the specimen.
c. Offer the child a treat or a toy if he or she does not cry.
d. Tell the child it won't hurt and will only take a few seconds.

14. Which type of patient is most likely to have an arteriovenous fistula or graft?

a. Arthritic
b. Dialysis
c. Hospice
d. Wheelchair-bound

15. Which of the following is proper procedure when dealing with an elderly patient?

a. Address your questions to an attendant if the patient has a hearing problem.
b. Make certain to hold adequate pressure after the draw until bleeding stops.
c. Speak extra loud in order to be certain that the patient can hear you.
d. Tie the tourniquet extra tight to make the veins more prominent.

16. Where is the tourniquet applied when drawing a hand vein?

a. A tourniquet is not required.
b. Above the antecubital fossa.
c. Just distal to the wrist bone.
d. Proximal to the wrist bone.

17. Specimen hemolysis can result from

a. filling tubes with a transfer device at an angle.
b. leaving the tourniquet on until the last tube.
c. mixing anticoagulant tubes several extra times.
d. using a large-volume tube with a 23-gauge needle.

18. Which of the following is the *least* effective way to immobilize a pediatric patient before a blood draw?

a. Allowing the child to sit with one arm bracing the other.
b. Cradling the child close to the chest of the immobilizer.
c. Grasping the child's wrist firmly in a palm-up position.
d. Using two people: an immobilizer and a blood drawer.

19. Criteria used to decide which needle gauge to use for venipuncture include

a. how deep the selected vein is.
b. the size and condition of the vein.
c. the type of test being collected.
d. your personal preference.

20. Which of the following is proper procedure when dealing with an elderly adult patient?

a. Address all questions to a relative or attendant if the patient is hard of hearing.
b. Apply a pressure bandage in case the patient does not hold adequate pressure.
c. Raise the pitch of your voice sharply to make certain you are heard properly.
d. Refrain from drawing older adult patients if you have a cold, or else wear a mask.

Case Studies

See the WORKBOOK for more case studies.

Case Study 8-1: Patient Identification

Jenny works with several other phlebotomists in a busy outpatient lab. This day has been particularly hectic, with many patients filling the waiting room. Jenny is working as fast as she can. Toward the end of the day, after Jenny has finished drawing blood from what seems like the millionth patient, she mentions to a coworker how extra busy it has been. The coworker says, "Yes it has, but it looks like there is only one patient left." Jenny grabs the paperwork and heads for the door of the waiting room. As her coworker has said, there is only one patient, an elderly woman, sitting there reading a book. The paperwork is for a patient named Jane Rogers. "You must be Jane," she says, glancing at the name on the paperwork. The patient looks up and smiles. "Have you been waiting long?" Jenny asks. The patient replies, "Not really," and Jenny escorts her to a drawing chair. The patient is a difficult draw, and Jenny makes two attempts to collect the specimen. The second one is successful. Jenny places the labels on the tubes, dates and initials them, bandages the patient, and sends her on her way. About 5 minutes later a somewhat younger woman appears at the reception window and says, "My name is Jane Rogers. I just stepped outside to make a phone call and was wondering if you called my name while I was gone." The receptionist notices that the patient's name is checked off the registration log. The receptionist turns around and asks if anyone had called a patient

named Jane Rogers. "I already drew her," Jenny says as she walks over to the receptionist window. The woman at the window is not the one Jenny just drew; however, her information matches information on the requisition used to draw that patient.

QUESTIONS

1. What error did Jenny make in identifying the patient?
2. What assumptions did Jenny make that contributed to her drawing blood from the wrong patient?
3. Who might the other patient from whom Jenny mistakenly drew blood have been?
4. How can the error be corrected?

Case Study 8-2: Blood Draw Refusal

Two phlebotomists went to a pediatric ward to collect a blood specimen from a young boy they had drawn many times before. The child told them to go away and that he was not supposed to have any more blood tests. The boy's parents were not present, but in the past they had always given permission for blood draws over the child's objections. The phlebotomists ignored the child, and one of them collected the specimen while the other restrained him. It was later determined that the boy's parents had earlier filed a written request that the child was to have no more blood drawn.

QUESTIONS

1. What error did the phlebotomists make in drawing blood from the child?
2. What assumptions were made in deciding to draw blood from the child over his objections?
3. What might be the consequences of the phlebotomists' actions?

Bibliography and Suggested Readings

BD™ Blood Transfer Device product literature. BD Vacutainer Systems. Franklin Lakes, NJ:

Bishop ML, Fody EP, Schoeff LE. *Clinical Chemistry: Principles, Procedures, Correlations.* 7th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2013.

Clinical and Laboratory Standards Institute, GP33-A. *Accuracy in Patient and Sample Identification.* Wayne, PA: CLSI; 2010.

Clinical and Laboratory Standards Institute, GP41-A6. *Procedures for the Collection of Diagnostic Blood Specimens by Venipuncture.* 6th ed. Wayne, PA: CLSI; 2007.

College of American Pathologists (CAP) Publications Committee, Phlebotomy Subgroup. *So You're Going to Collect a Blood Specimen: An Introduction to Phlebotomy.* 14th ed. Northfield, IL: CAP; 2013.

Ernst DJ. *Applied Phlebotomy.* Baltimore, MD: Lippincott Williams & Wilkins; 2005.

Ernst DJ. *Blood Specimen Collection FAQs.* Corydon, IN: Center for Phlebotomy Education; 2008.

Food and Drug Administration (FDA). Allergic reactions to latex-containing medical devices. *FDA Med Alert.* 1991.

Graden M, Eriksson M, Holmqvist G, Holstein A, Schollin J. Pain reduction at venipuncture in newborns: Oral glucose compared with local anesthetic cream. *Pediatrics.* 2002;110:1053–1057.

Kronberger J, Woodson D. *Clinical Medical Assisting.* 4th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2012.

Lindh V, Wiklund U, Hakanssom S. Assessment of the effect of EMLA during venipuncture in newborn by analysis of heart rate variability. *Pain.* 2000;86:247–254.

Mitchell A, Waltman PA. Oral sucrose and pain relief for preterm infants. *Pain Manag Nurs.* 2003;4(2):62–69.

MEDIA MENU

Online Ancillaries (at http://thepoint.lww.com/McCall6e)

- Videos:
  - Blood Collection from a Hand Vein Using a Butterfly and ETS Holder
  - Collecting a Blood Specimen by Venipuncture Using the Evacuated Tube System
  - Collecting Blood from an Antecubital Vein Using a Needle and Syringe
  - Hand Washing/Hand Antisepsis
  - Introductory and Identification Processes Required Prior to Blood Specimen Collection
  - Poor and Good Workplace Ergonomics for Phlebotomy
  - Proper Tourniquet Application for Venipuncture
  - Specimen Labeling and Venipuncture Follow-up Procedures
  - Transferring Blood from a Syringe into ETS Tubes
- Interactive exercises and games, including Look and Label, Word Building, Body Building, Roboterms, Crossword Puzzles, Quiz Show, and Concentration
- Audio flash cards and flash card generator
- Audio glossary

Internet Resources

- Advance magazine for medical laboratory personnel: http://laboratorian.advanceweb.com/
- American Academy of Pediatrics: http://www.aap.org
- Center for Phlebotomy Education: http://www.phlebotomy.com
- National Institute for Safety and Health: http://www.cdc.gov/niosh

Other Resources

- McCall R, Tankersley *C. Student Workbook for Phlebotomy Essentials,* 6th ed. (available for separate purchase)
- McCall R, Tankersley *C. Phlebotomy Exam Review,* 6th ed. (available for separate purchase)