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VENIPUNCTURE

CORE CONCEPTS

- Describe the purpose for obtaining a blood specimen.
- Select a vein (site) for the collection of a blood specimen.
- Use equipment in the collection of a blood specimen.

INTRODUCTION

Venipuncture is the technique used to gain vascular access, usually to obtain a blood specimen or initiate an intravenous infusion. This chapter focuses on venipuncture, specifically for drawing blood samples for laboratory analysis. Information from the laboratory analysis is used in diagnosing and treating diseases and disorders. Critical tasks include selecting an appropriate venipuncture site; preparing to obtain a specimen; and following procedures for inserting the needle, collecting the specimen, and removing the needle. The initial steps of performing venipuncture for blood collection are the same as those used for acquiring vascular access to administer medications and fluids.

PURPOSE OF VENIPUNCTURE

Venipuncture gives the medical provider the ability to obtain a blood specimen. Usually, a specimen is taken to assess the blood's cells and other components and to determine the presence of abnormalities or disease. The number and shape of the red blood cells give information about disease states such as sickle cell anemia. The number and characteristics of the white blood cells give information about infection or disease states such as leukemia. Your role is to collect the blood specimen so that it can be analyzed at the laboratory and interpreted by a medical officer.

SELECTING THE APPROPRIATE VEIN

The **antecubital fossa** is the recommended site for conducting venipuncture (Figure 6-1). The veins in this area are near the surface of the skin and are easy to see

and feel. The **median cubital vein** is the first choice; it is well supported and least apt to roll. The **cephalic vein** is the second choice; it is located along the lateral aspect of the elbow. The third choice, the **basilic vein**, may be the most prominent vein. However, this vein tends to roll easily, making venipuncture difficult. Avoid veins that are infected or irritated or have an intravenous (IV) line running **distal** to the proposed venipuncture site. Do not attempt to draw blood from small or fragile veins; this can cause the vein to collapse.

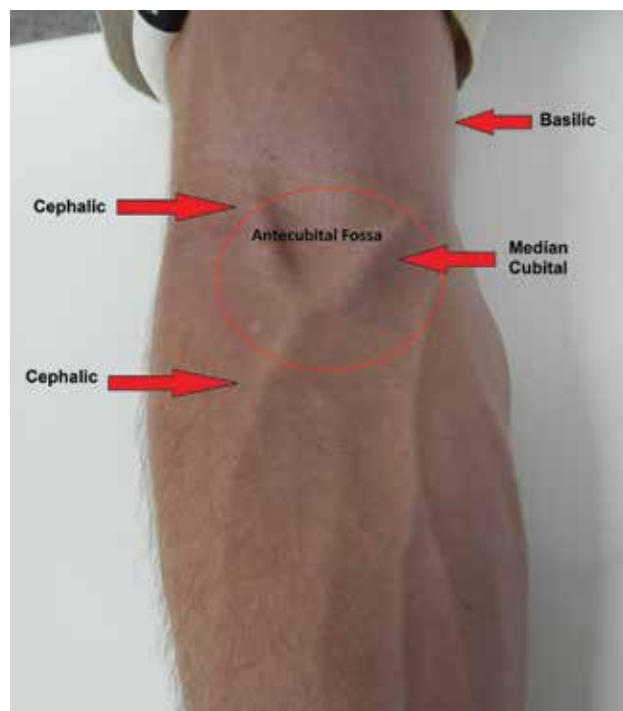


Figure 6-1. Antecubital fossa area showing the median cubital, cephalic, and basilic veins.

PREPARATION FOR VENIPUNCTURE

Before performing venipuncture, the combat medic should conduct specific preparations to ensure a smooth procedure. These may include reviewing the procedure and gathering the required supplies. Use the following items to obtain a blood specimen via venipuncture (Figure 6-2):

- sharps container
- gloves
- eye protection
- constricting band
- alcohol or povidone iodine wipes
- protective pad (chux)
- sterile 2 inch × 2 inch (2 × 2) gauze pads (sponges)
- evacuated blood collection tube needle assembly
- evacuated blood collection tube sleeve (holder)
- blood specimen tubes
- patient identification label

The evacuated blood collection tube and needle assembly consists of a sterile, disposable, double-ended needle and an evacuated blood collection tube sleeve (holder). The needle may consist of a single-specimen needle or a multiple-specimen needle. A multiple-specimen needle has a rubber sheath that covers the shaft of the needle and is pushed up when a blood tube (eg, Vacutainer [BD, Franklin Lakes, NJ] or Vacurette [Greiner Bio-One North America, Inc, Monroe, NC]) is inserted. It then slips back over the needle to prevent blood leakage while the tubes are being changed.

Be careful when selecting blood specimen tubes. The type of blood tube needed depends on the specific test to be performed. The rubber stoppers of the tubes are color coded for different tests. For example, whole blood for a complete blood count (CBC) is collected in a lavender-top tube, while a drug monitoring test is collected in a plain red-top tube. For some tests, **anticoagulants** or other additives may be present in the tube. All specimen tubes are manufactured with decreased pressure inside the tube, creating a vacuum. Ideally, the vacuum will be replaced with blood during the specimen collection.



Figure 6-2. Selected equipment used to perform venipuncture and obtain a blood specimen.

Meticulous use of patient identification labels is critically important to ensure there are no mislabeled specimens. Stamp each label with the patient’s addressograph plate. If there is no plate, write the patient’s name, organization, Social Security number, prefix code, ward or clinic, facility, and date on a label. Apply labels to each specimen tube drawn.

Check on Learning

1. List the veins in order of preference for obtaining a blood specimen.
2. What are the parts of the evacuated blood collection tube needle assembly?

OBTAIN THE SPECIMEN

Once the equipment has been gathered, inspected, and assembled, the specimen collection process is ready to begin. Before starting, verify that the information on the identification label is correct and that the appropriate blood specimen tubes have been selected for the tests requested by the medical officer. Take appropriate standard precautions to protect both yourself and your patient.

Note: Standard precautions for this task include hand washing, gloves, and goggles or eye shields.

Caution: Combat medics must strictly adhere to the local sharps policy and use sharps containers when performing venipuncture.

Venipuncture Preparation

1. Gather and inspect the equipment.
 - a. Check the local laboratory standard operating procedure (SOP) for tube selection.
 - b. Select and label the proper blood specimen tubes for the tests to be performed.

Note: Always inspect the needle for nicks and barbs before use and replace the needle if it is flawed.

2. Perform a patient care hand wash and don personal protective equipment. See Chapter 2, Infection, Asepsis, and Sterile Technique, to review these tasks.

3. Prepare the equipment.
 - a. Prepare the evacuated blood collection tube needle assembly by inserting the shortened end of the needle into the threaded hole in the evacuated blood collection tube sleeve (holder) and screw it in tightly using a clockwise motion.
 - b. Ready the evacuated blood collection tube needle assembly by inserting the rubber stoppered end of the specimen tube into the evacuated blood collection tube sleeve (holder) and advance the tube until it is even with the guideline.
 - c. Prepare gauze pads (sponges) for use.
 - i. Open the povidone iodine or alcohol wipes and 2 × 2 gauze pad packages.
 - ii. Place them within easy reach.
4. Identify the patient and prepare them for the procedure.
 - a. Verbally identify the patient by name and at least two additional patient identifiers and compare this information to the name and additional identifiers on the laboratory request.
 - b. Explain the procedure and purpose of the specimen to the patient.
 - c. Position the patient either sitting or lying down.

Caution: Never attempt to draw blood from a standing patient.

- d. Extend the patient’s arm with the palm up; stabilize it using a pillow, table, or other flat surface. Position a protective pad (chux) under the patient’s extended elbow and forearm.
 - e. Expose the area to be used to conduct the venipuncture and select a vein.
5. Apply the constricting band.

Apply the constricting band with enough pressure to stop venous return without stopping the arterial flow. A radial pulse should be felt. Wrap the constricting band around the limb approximately 2 inches above the venipuncture site. Stretch the tubing slightly and hold it with one end longer than the other. Loop the longer end and draw it under the shorter end so that the tails are away from the site.

Note: If a commercial band is used, wrap it around the limb and secure it by overlapping the hook and loop ends.

- 6. Select and cleanse the venipuncture site.
 - a. Instruct the patient to clench and unclench their fist several times and then hold the fist clenched. This traps blood in the veins and causes them to distend.
 - b. Palpate along the length of the vein with your index finger 1 to 2 inches from the selected site in both directions to determine the size and track of the vein. The vein should feel like a spongy tube.
 - c. Cleanse the site with an alcohol or povidone iodine pad to prevent infection. Wipe in a circular motion, moving outward from the venipuncture site.

Caution: Always ask the patient if he or she has an allergy to povidone iodine before use. If the patient is allergic to povidone iodine, use alcohol to clean the site.

Caution: Do not palpate the vein again after cleansing the skin.

Use Venipuncture to Gather a Blood Sample

- 7. Remove the protective cover from the needle.
- 8. Position the needle in line with the vein and grasp the patient’s arm below the entry point with your free hand.
- 9. Place your thumb one inch below the entry site and pull the skin taut.
- 10. Puncture the vein.
 - a. Align the needle, bevel up, in line with the vein, and pierce the skin at a 15 to 30 degree angle.
 - b. Decrease the angle until almost parallel to the skin surface, then pierce the vein wall.
 - c. A faint “give” will be felt when the needle enters the vein, and blood will appear in the needle.
 - d. If you do not feel the give and blood does not appear, the venipuncture is unsuccessful. Pull the needle back slightly (not above the skin surface), redirect the needle toward the vein, and try again.

Caution: If the needle is withdrawn above the skin surface, do not attempt venipuncture again with the same needle.

- e. If still unsuccessful:
 - i. Release the constricting band.
 - ii. Place a 2 × 2 gauze pad over the site.
 - iii. Quickly withdraw the needle. Instruct the patient to slightly elevate the arm, keeping it fully extended while simultaneously applying pressure to the site for 2 to 3 minutes.
 - iv. Notify your supervisor before attempting another venipuncture.
- 11. Collect the specimen.
 - a. Hold the evacuated blood collection tube sleeve (holder) and needle assembly steady with your dominant hand, ensuring that the collection tube is positioned against, but not through, the needle.
 - b. Place the index and middle fingers of your nondominant hand behind the flange of the evacuated blood collection tube sleeve (holder).
 - c. Push the specimen tube as far forward as possible with the thumb of your non-dominant hand without causing excessive movement.
 - d. Instruct the patient to relax and unclench their fist after blood has started flowing into the tube.
 - e. When the specimen tube is two-thirds full or blood stops flowing, remove it, leaving the needle and evacuated blood collection tube sleeve (holder) in place. Do not dislodge the needle from the vein.
 - f. If a single specimen is all that is needed, go to step 12.
 - g. If multiple specimens are needed, insert a second tube into the evacuated blood collection tube sleeve (holder). Push the blood specimen tube as far forward as possible without causing excessive movement.
 - h. Repeat these procedures until the desired number of tubes are filled or blood stops flowing.

Note: If the tube was pushed beyond the guideline, the vacuum may release and blood will not be pulled into the tube.

- 12. After the last specimen tube is approximately two-thirds full of blood or blood stops flowing, release the constricting band by pulling on the long end of looped tubing or releasing the hook and loop fastener with your nondominant hand and remove the blood specimen tube from the evacuated blood collection tube sleeve/holder.

Caution: Remember to remove the blood specimen tube from the evacuated blood collection tube needle assembly **AND** release the constricting band **BEFORE** removing the needle from the vein.

- 13. Withdraw the needle smoothly and quickly. Immediately apply pressure to the site with a 2 × 2 gauze pad, keeping the patient’s arm fully extended.
- 14. Place the evacuated blood collection tube sleeve (holder) and needle assembly into a sharps container.

Note: If the specimen tube contains an anticoagulant or other additive, gently invert the tube several times to mix with the blood.

- 15. Instruct the patient to elevate their arm slightly, keep it fully extended, and apply firm manual pressure with a folded 2 × 2 gauze pad for 2 to 3 minutes. This prevents or reduces hematoma formation by reducing the amount of bleeding out of the vein into the **interstitial** space of the arm. If the patient is unable to do this, you must complete this task for them.
- 16. Secure the 2 × 2 gauze pad or adhesive bandage in place and instruct the patient that this dressing can be removed in approximately 30 minutes.

Post-Venipuncture Actions

- 1. Remove the protective chux pad.
- 2. Dispose of all single-use supplies in an appropriate manner; dispose of the needle in accordance with the local SOP.

Caution: Discard the needle into a sharps container as soon as possible or in accordance with local protocol. **DO NOT** unscrew the needle from the sleeve with your hands. **DO NOT** recap the needle.

- 3. Remove all of the venipuncture equipment from the area.
- 4. Store reusable equipment in accordance with the local SOP.
- 5. Remove your gloves and wash your hands.
- 6. Complete administrative duties.
 - a. Check and complete the laboratory form in accordance with the local SOP.
 - b. Apply prepared labels to specimen tubes.
 - c. Document the procedure in accordance with the local SOP.

Check on Learning

- 3. Put the following steps in the correct order:
 - a. Remove the needle from the vein.
 - b. Remove the specimen tube from the evacuated blood collection tube needle assembly.
 - c. Release the constricting band.
- 4. At what angle should the needle pierce the skin?
- 5. What is the purpose of obtaining a blood specimen?
- 6. What veins should be avoided when collecting a blood specimen?

SUMMARY

All combat medics must be proficient and confident in performing venipuncture to obtain blood samples. This is a common procedure in the clinical setting; however, blood samples are not collected in a tactical setting. The information obtained from blood specimens will be used by the medical team to diagnose and treat patients.

VENIPUNCTURE



STEP 1: Gather and inspect the equipment.



STEP 2: Perform a patient care hand wash and don personal protective equipment.



STEP 3: Prepare the equipment. Screw the needle assembly into the evacuated blood collection tube sleeve (holder), ready the evacuated blood collection tube needle assembly, and prepare alcohol or povidone wipes. This is a Vacuette blood collection tube (Greiner Bio-One North America, Inc, Monroe, NC; used with permission).



STEP 4: Identify and prepare the patient for the procedure.



STEP 5: Apply the constricting band.



STEP 6: Select and cleanse the venipuncture site.

VENIPUNCTURE, CONT.



STEP 7: Remove the protective cover from the needle.



STEP 8: Position the needle in line with the vein and grasp the patient's arm below the entry point with your free hand.



STEP 9: Place the thumb of your free hand 1 inch below the entry site and pull the skin taut.



STEP 10: Puncture the vein. Align the needle, bevel up, in line with the vein, and pierce the skin at a 15 to 30 degree angle. Decrease the angle until almost parallel with the skin surface, then pierce the vein wall.



STEP 11a: Collect the specimen. Hold the evacuated blood collection tube sleeve (holder) and needle assembly steady with your dominant hand and place the index and middle fingers of your nondominant hand behind the flange on the evacuated blood collection tube sleeve (holder).



STEP 11b: Push the specimen tube as far forward as possible with the thumb of your nondominant hand and instruct the patient to relax and unclench their fist once blood starts to flow in the specimen tube.

VENIPUNCTURE, CONT.



STEP 11c: When the specimen tube is two-thirds full or blood stops flowing, remove the specimen tube without dislodging the needle from the vein. Leave the needle and evacuated blood collection tube sleeve (holder) in place. Repeat until the desired number of specimen tubes are full. If a single specimen is all that is needed, proceed to step 12.



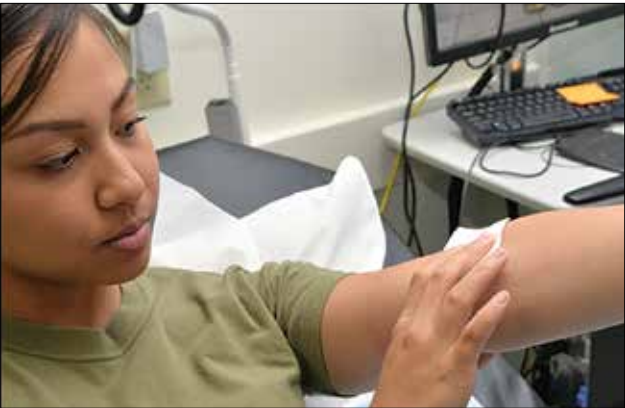
STEP 12: After the last specimen tube is two-thirds full or blood stops flowing, release the constricting band with your nondominant hand. (For this photograph, a second specimen had been obtained.)



STEP 13: Withdraw the needle smoothly and quickly.



STEP 14: Place the evacuated blood collection tube sleeve and needle assembly into the sharps container.



STEP 15: Instruct the patient to elevate their arm slightly, keep it fully extended, and apply firm pressure with a folded 2 × 2 gauze pad for 2 to 3 minutes.



STEP 16: Secure the 2 × 2 gauze in place and instruct the patient that the dressing can be removed in approximately 30 minutes.

KEY TERMS

- Antecubital fossa.** The hollow or depressed area at the bend of the elbow.
- Anticoagulants.** Substances that prevent or delay clotting of the blood.
- Basilic vein.** The third vein choice. It may be prominent, but it tends to roll easily, making venipuncture difficult.
- Cephalic vein.** The second vein choice. It is located along the lateral aspect of the elbow.
- Distal.** Farthest from the center, from a medial line, or from the trunk.
- Interstitial.** Pertaining to the interstices or spaces within an organ or tissue.
- Median cubital vein.** The first vein choice. It is well supported and the least apt to roll.
- Venipuncture.** The transcutaneous puncture of a vein to withdraw a specimen of blood, provide fluids, or administer a medication.

CHECK ON LEARNING ANSWERS

1. List the veins in order of preference for obtaining a blood specimen.
Median cubital vein, first choice; cephalic vein, second choice; and basilic vein, third choice.
2. What are the parts of the evacuated blood collection tube needle assembly?
Sterile, disposable, double-ended needle; blood specimen tubes; and evacuated blood collection tube sleeve (holder).
3. Put the following steps in the correct order:
 - a. Remove the needle from the vein.
 - b. Remove the specimen tube from the evacuated blood collection tube needle assembly.
 - c. Release the constricting band.*Release the constricting band, remove the specimen tube from the evacuated blood collection tube needle assembly, and remove the needle from the vein.*
4. At what angle should the needle pierce the skin?
15 to 30 degrees.
5. What is the purpose of obtaining a blood specimen?
Usually a specimen is taken to assess the blood's cells and other components as well as to determine the presence of abnormalities or disease. The number and shape of the red blood cells give information about anemia and other disease states. The number and characteristics of the white blood cells give information about infection.
6. What veins must be avoided when collecting a blood specimen?
Veins that are infected, irritated, or injured, or have an IV running distal to the venipuncture site.

SOURCES

Lippincott's Visual Encyclopedia of Clinical Skills. 1st ed. Wolters Kluwer Health/Lippincott Williams & Wilkins; 2008.

Rosdahl CB, Kowalski MT. *Textbook of Basic Nursing*. 11th ed. Wolters Kluwer Health/Lippincott Williams & Wilkins; 2017.