**FREQUENTLY ASKED QUESTIONS ABOUT PHLEBOTOMY**

Many healthcare professionals view the collection of blood as a simple procedure. However, phlebotomy is a detailed procedure that, if not performed correctly, can affect the accuracy of laboratory test results and can even cause permanent disability in the patient. Phlebotomy is also an evolving profession. What was the standard of practice five years ago is perhaps now no longer the standard of practice. This CE module answers questions asked by practicing professionals about a wide range of topics including safe needle devices, wearing gloves, order of draw, difficult patients, volume requirements, and more.

***QUESTION: I have worked at three different places and the order of draw was different at each place. How do I know what is the right order of draw?***

**Answer:** There is only one **recommended** order of draw. The recommended order of draw is found in the most current edition of the Clinical and Laboratory Standards Institute *Procedures for the Collection of Diagnostic Blood Specimens by Venipuncture*, H3-A6. This document originated in 1977 and updates are prepared as needed. The latest edition is H3-A6, published in October 2007.

The Clinical and Laboratory Standards Institute (CLSI), formerly known as the National Commission on Clinical Laboratory Standards (NCCLS), is an international, nonprofit organization that develops standards and guidelines for patient testing and related healthcare issues. Healthcare professionals voluntarily participate in CLSI projects. Individuals involved in the phlebotomy standards include experts in the profession of phlebotomy and experts employed by the makers of venipuncture equipment.

The purpose of the order of draw is to avoid possible test result error due to cross contamination from tube additives. While it might seem impossible for the very small amounts of additives in tubes to cause inaccurate test results, extensive research has been performed that indicates this is quite possible. For example, if a:

lavender closure tube is collected before a red or green closure tube: the potassium becomes falsely increased and the calcium becomes falsely decreased.

gray closure tube is collected before a lavender closure tube: the microscopic morphology of blood cells becomes distorted leading to inaccurate red and white blood cell evaluations.

The recommended order of draw follows. It should be used for both glass and plastic venous blood collection tubes. The same order of draw is also used for collections using a syringe or an evacuated (collection tube & tube holder) system. The order of draw is changed when new research indicates a probable interference or inaccuracy in test results.

|  |  |  |
| --- | --- | --- |
| **Order** | **Tube** | **Closure Color** |
| 1 | Blood culture, i.e., sterile specimens | Blood culture bottles, yellow closure with sodium polyanethol sulfonate (SPS)  |
| 2 | Coagulation tube (sodium citrate) | Blue closure  |
| 3 | Serum tube with or without clot activator, with or without gel | Red/gold/speckled red and black closure  |
| 4 | Heparin tube (lithium or sodium) with or without gel plasma separator | Green closure  |
| 5 | EDTA | Lavender closure (also called purple); pink closure  |
| 6 | Glycolytic inhibitor | Gray closure   |
| 7 | ACD solution | Yellow closure (not the same tube as SPS) |
| 8 | All other tubes in no particular order unless otherwise directed  |

***QUESTION: How can I remember the order of collection?***

**Answer:** A way to remember the order of collection is to remember the following sentence:

**S**ally = **s**terile

**B**rings = **b**lue

**R**eally = **r**ed

**Go**od = **go**ld

**Gre**ase = **gre**en

And

**L**eaves = **l**avender

The

**Gra**vy = **gra**y

***QUESTION: What is the order of collection for skin puncture?***

**Answer:** CLSI also recommends that skin puncture specimens be collected in a certain order. This is to assure that specimens requiring anticoagulation are collected first. This lessens the likelihood that clots will appear in these specimens.

1. Lavender top (EDTA)
2. Plasma additive tubes such as blue, green, gray
3. Serum tubes such as red, gold, yellow

***QUESTION: What will happen if a tourniquet is not removed in the recommended time?***

**Answer:** Inaccurate laboratory test results may occur if a tourniquet is not removed within one minute. When a tourniquet is applied, the local blood flow is stopped. This leads to concentration of the blood and blood entering the surrounding tissue. This may result in falsely high values for all protein-based analytes, increased packed cell volume, and changes in other cellular elements.

The most current edition of the CLSI *Procedures for the Collection of Diagnostic Blood Specimens by Venipuncture*, H3-A6, states that the tourniquet application for preliminary vein selection should not exceed one minute.

For most patients, it is easy to release the tourniquet within the one-minute period. Most veins are easily located and the venipuncture procedure can be completed quickly. Following is an alternative procedure that can minimize the amount of time the tourniquet is on a patient. This process is also useful if you are not sure what type of venipuncture equipment you will actually be using to collect the specimen.

1. Confirm the identity of the patient.

2. Cleanse hands.

3. Place the tourniquet on the arm.

4. Locate the vein to be punctured.

5. Identify the actual site to perform the puncture by noting a “landmark” such as a freckle, hair, scar, etc.

6. Release the tourniquet.

7. Put on gloves.

8. Cleanse the arm with 70% isopropyl alcohol or other appropriate antiseptic.

9. Assemble the venipuncture equipment.

10. Assure the antiseptic has dried on the arm.

11. Retie the tourniquet. Do NOT repalpate the site.

12. Locate the “landmark” and perform the venipuncture.

13. Release the tourniquet as soon as possible\* after blood has been obtained.

14. Complete all other specimen collection steps.

If you are having difficulty locating a venipuncture site, release the tourniquet and wait at least two minutes to allow the blood to return to “normal” before retying it.

\*When should the tourniquet be released? While it is important to minimize the length of time a tourniquet is tied in place during the actual collection, it is also important to maximize your chances of obtaining all of the blood needed for patient testing. If collecting only one tube, it is recommended to release the tourniquet as soon as blood begins to flow into the tube. If several tubes are needed, the tourniquet may need to stay in place until blood begins to flow into the last tube being filled. Always use your best judgment to assure sufficient specimens are collected while minimizing the amount of time the tourniquet is in place.

***QUESTION: I don’t like to wear gloves when drawing blood. What will happen if I don’t wear them?***

**Answer:** Failure to wear gloves during blood collection procedures increases the healthcare worker’s risk of exposure to bloodborne pathogens including, but not limited to, the Human Immunodeficiency Virus, Hepatitis B virus, and the Hepatitis C virus. Obviously, examination gloves will not stop a needle from puncturing the skin. However, if an accidental needlestick occurs when wearing gloves, the gloves will greatly reduce the amount of blood entering the skin of the healthcare worker.

Twenty-five years ago, the Occupational Safety and Health Administration (OSHA) released the Occupational Exposure to Bloodborne Pathogens, Final Rule, 29 CFR 1910.1030. This is a United States federal law that states, "Gloves shall be worn... when performing vascular access procedures....” The standard goes on to state gloves must be worn "when it can be reasonably anticipated that the employee may have hand contact with blood, other potentially infectious materials, mucous membranes, and non-intact skin....” Venipuncture and skin puncture are vascular access procedures.

The Bloodborne Pathogen Rule requires employers to provide gloves in appropriate sizes and accessible locations at no cost to employees. Employers must provide alternatives for those who have allergies to the gloves normally provided. Employers who fail to comply with or enforce the Bloodborne Pathogen Rule are subject to severe monetary fines.

The Bloodborne Pathogen Rule does not state exactly when during the phlebotomy procedure gloves need to be donned. However, the CLSI *Procedures for the Collection of Diagnostic Blood Specimens by Venipuncture*, H3-A6 states that gloves should be put on after site selection and just before site preparation. This allows vein palpation to occur without gloves.

***QUESTION: How do I deal with a patient who has poor veins?***

**Answer:** A patient with poor veins must be approached with thoughtfulness when it comes to blood specimen collection. Venipuncture techniques may need to be altered, an alternative site chosen, or the performance of a skin puncture may be required to obtain specimens.

There are both physical and clinical reasons that may make a patient difficult to draw. Some practices can improve the chance of obtaining blood via venipuncture.

Physical Difficulties

o The vein rolls: Rolling veins are often found in older men and women. The movement of the vein is due to the lack of supportive, subcutaneous fatty tissue. To improve the chances of obtaining a specimen:

Use the thumb to anchor the vein below the venipuncture site, slightly stretching out the vein so that it cannot roll.

Position the arm so that the area to be drawn is extended as flat as possible.

Insert the needle quickly.

o **The vein collapses:** Veins may collapse when blood is removed too rapidly or forcibly. Although this can happen with any vein, this is most common with small veins and/or the veins of the elderly.

To avoid this occurrence, use the smaller sizes of vacuum tubes when collecting blood from fragile and/or veins of the elderly.

If the vein collapses, leave the needle in and apply pressure above the puncture site on the vein with the flat end of the free index finger, then release pressure. This will allow the vein to fill up and blood to flow.

o **The vein is completely missed:**

Draw the needle straight back until only the bevel is beneath the skin. Reposition the needle, anchor the vein, and quickly pierce the vein.

If the needle has gone completely through the vein, a hematoma may rapidly develop. If this occurs, release the tourniquet, remove the needle, and apply pressure.

Always palpate beyond the needle’s position in the skin or to the side.

When a small quantity of blood leaks into the venipuncture site, the needle may only be partially inserted into the vein. Slightly push the needle in a little farther.

o **The veins are small, fragile, or superficial**:

Be prepared to collect small volumes of blood. Know what tests can be grouped together and the minimum volume of blood needed.

Use a winged infusion set with a syringe. Small fragile veins my collapse when evacuated tubes are used to collect blood.

Allow syringe to fill slowly so as not to collapse the vein or hemolyze the sample.

**o There are no good veins available:**

Clinical conditions

o Burns: Burn sites are unacceptable for phlebotomy. Areas free of burns must be inspected for possible venipuncture sites. If only small quantities of blood are required, skin puncture may be necessary.

o Breast cancer surgery patients: Blood samples should not be collected from the arm on the side a patient has had breast cancer surgery (a mastectomy or a lumpectomy with lymph node removal). The presence of lymph fluid dilutes the blood in this area, giving erroneous patient test results. The lymph fluid may also make the patient’s arm swollen thus making tourniquet application painful. Additionally, skin puncture should not be performed on the side of breast cancer surgery. In addition to altering test results, the performance of venipuncture, skin puncture, injections, etc. on breast cancer surgery patients may lead to the development of a bacterial infection.

o Obese patients: The obese patient presents problems for venipuncture because the veins are much further from the surface and may be more difficult to feel.

Conventional tourniquets may be too short to fit around the arm without rolling and twisting. Extra long tourniquets can be purchased. A long length of Penrose drain tubing or a long Velcro closure strap often works better than a conventional tourniquet. A blood pressure cuff can also be used.

Palpate the area thoroughly, pressing to feel deep veins. Rotate the arm to better feel a vein. The cephalic vein may be more easily palpated by doing this.

If the patient has a double crease in the antecubital area, the median cubital vein may be palpable in between the two creases.

Never attempt to draw blood when a vein cannot be palpated.

o IV fluids: Blood samples must never be drawn from above an IV site. The IV fluid entering the vein will dilute the blood sample, giving erroneous patient results. If no other site is available to draw blood, a skin puncture should be considered. If this is not a possibility, the next best solution is to draw from a vein distal to the IV (first choice) or proximal to the IV (second choice). The IV must be discontinued for a minimum of two (2) minutes before the blood specimens can be collected. Always indicate on the specimen tube label that the specimen was collected from an arm with an IV. Indicate the type of IV fluid on the label. Some facilities have policies that recommend the first 5 mL of blood collected be discarded as this blood may still be contaminated with IV fluid.

o Hematoma: A venipuncture should not be made in the area of a hematoma. Stasis of blood flow in this area may lead to inaccurate patient test results. If no other site is available, it is acceptable to perform the venipuncture distal to the hematoma.

Edema: Edema impairs circulation and may disrupt the exchange of oxygen and nutrients between the blood and tissue. Consequently, drawing blood specimens from edematous areas may result in inaccurate patient test results. Edematous tissue may also be fragile and damaged by tourniquet application and antiseptic application.

o Scar tissue/thrombosed veins: It is difficult to obtain blood from thrombosed veins or veins with scar tissue. In these situations, other sites should be selected or skin puncture should be considered.

o Indwelling lines (vascular access device, heparin lock, central venous catheter, cannula, fistula): Only trained personnel can obtain blood samples using these sites. Because lines are routinely flushed with heparin, a minimum of five (5) mL of blood must be collected and discarded before obtaining blood for laboratory tests.

***QUESTION: Why is it wrong to put needles into tube holders before seeing patient’s?***

**Answer:** Opening the sterile seal on the needle and inserting the needle into a tube holder any time before the actual venipuncture increases the chance that the needle will become contaminated with microorganisms. Venipuncture is an invasive procedure that must be performed in an environment that is as sterile as possible. Failure to maintain asepsis may lead to infections in patients. Needles should be opened and placed into holders at the patient’s bedside.

***QUESTION: What can happen if I do not identify the patient correctly?***

**Answer:** If a patient is not positively identified and blood is collected and labeled with the wrong patient identification, the laboratory test results will not represent the status of the intended patient. Serious consequences may arise if the patient is treated based on the lab results. For example, under doses and/or overdoses of medications such as insulin and Coumadin® could be given to a patient. The worst-case scenario is a patient dying because of an incompatible blood transfusion.

Each patient should be identified with two unique identifiers. These identifiers include patient first/last name, medical record number, birth date, Social Security number, address, or unique number generated by a computer system. The patient should only have blood drawn if the two unique identifiers match exactly.

Failure of a phlebotomist to follow the facility’s procedure for patient identification may result in termination and a lawsuit if the patient experiences permanent and/or serious consequences.

***QUESTION: What happens if I accidentally hit a nerve while drawing blood?***

**Answer:** Permanent disability due to nerve damage may result if a nerve is punctured or nicked during a venipuncture procedure. Several nerves lay among the muscles, veins, and arteries of the arm. The nerves include the axillary, radial, median, ulnar, and basilic. The median nerve is the nerve most likely to be punctured or nicked during a venipuncture in the antecubital space. When this occurs, the patient will exhibit severe shooting “electric” pains in the arm. The venipuncture should immediately be discontinued and direct pressure applied to the site until any bleeding has stopped. A supervisor should be notified about the incident so the proper documentation and patient evaluation by a physician can occur.

If the venipuncture continues when the patient experiences severe pain associated with nerve puncture/nick, permanent nerve damage may occur. Life-long disability may occur. Only a physician can evaluate if nerve damage has occurred. Nerve damage resulting from venipuncture has led to lawsuits against the phlebotomist.

***QUESTION: What should I do if the patient starts to develop a hematoma?***

**Answer:** If a hematoma begins forming at a fast rate, the venipuncture should be discontinued and pressure held on the puncture site with the patient’s arm raised above his/her heart. If the hematoma is small, the venipuncture can be continued with caution.

A hematoma is a localized leakage of blood into the tissues. In phlebotomy, hematomas may form when the vein is punctured. The blood then clots and the hematoma appears as a dark blue-purple-red discoloration (a bruise) on the skin. Depending on the amount of blood that has leaked from the vein, the area containing the hematoma may be swollen and painful.

Blood may leak from a vein when the vein is punctured slowly allowing blood to flow out of the bevel of the needle or when the needle completely goes through the vein. While a hematoma can form on any patient type, elderly patients and patients taking anticoagulant drugs are more prone to form them.

A pressure bandage made out of Coban or folded gauze and tape should be placed on the venipuncture site with instructions for the patient to keep the bandage on for at least four hours. If the patient is taking anticoagulants, the healthcare worker should hold pressure on the venipuncture site until the site stops bleeding. A pressure bandage should then be applied.

A venipuncture should not be made in the area of a hematoma. Stasis of blood flow in this area may lead to inaccurate patient test results. If no other site is available, it is acceptable to perform the venipuncture distal to the hematoma.

Following are recommendations to prevent the formation of a hematoma.

Make sure the needle fully penetrates the top wall of the vein as partial penetration may allow blood to leak from the partially inserted needle bevel.

Release the tourniquet before removing the needle.

Use only the major superficial veins for venipuncture.

Hold the venipuncture equipment as still as possible when collecting blood.

Before placing a bandage on the patient, assure the puncture site has stopped bleeding.

Apply a pressure bandage by folding a small gauze pad on top of the site and covering with a bandage or Coban.

***QUESTION: I was taught to clean the venipuncture site with alcohol and then wipe the alcohol off with a cotton ball so it doesn’t sting when the needle goes in. Why is this now considered wrong?***

**Answer:** All antiseptics must be allowed to dry in order to provide proper antisepsis.

Antiseptics are substances or solutions used to prevent sepsis, a disease state resulting from the presence of microorganisms or their toxic products in the bloodstream. If the skin is not properly cleansed, bacteria from the skin may enter the blood system at the time of venipuncture. Wet antiseptics should never be wiped dry for the purposes of speeding up the venipuncture procedure.

70% isopropyl alcohol in the form of individually wrapped prep pads is the most common antiseptic used for routine blood collection. Other antiseptics include povidone iodine in several forms (prep pads for blood gas collection and sponge pads for blood culture collection). Chlorhexidine gluconate can be used for those allergic to iodine. Specialized procedures are necessary to cleanse the skin prior to the collection of blood cultures.

***QUESTION: Why shouldn’t I use the veins on the inside of the wrist?***

**Answer:** Small bones, nerves, arteries, and veins are closely placed in the wrist area.

Puncturing or nicking a nerve could cause temporary or permanent nerve damage that could lead to a disability.

The latest version of CLSI *Procedures for the Collection of Diagnostic Blood Specimens by Venipuncture*, H3-A6 states that the veins on the palm-side of the wrist should not be used for venipuncture.

***QUESTION: I have been told that when I am having problems getting enough blood for a set of blood cultures, it is OK to draw only the aerobic bottle. Why shouldn’t we do this all of the time?***

**Answer:** To assure the best chance of culturing microorganisms from the blood, the specific blood volume requirements of the blood culture bottle manufacturer must be followed. This is to make sure there are actually enough bacteria in the blood to grow in the culture medium. The volume requirements vary considerably among manufacturers. Only on rare occasions should just one bottle be collected.

***QUESTION: Why do I have to use a discard tube when drawing a blue closure using a winged infusion set?***

**Answer:** When using a winged infusion set to collect blood for coagulation testing (PT, aPTT, and other coagulation tests), a small volume of blood must first be collected into a discard tube. If this is not done, the volume of blood collected into the blue closure tube will be incomplete due to the displacement volume in the winged infusion set tubing.

Displacement volume in winged infusion set tubing

***QUESTION: I see that there is a new tube with a pink closure. What is it used for?* Answer:** Tube manufacturers have developed a new evacuated tube with a pink closure. The tube contains spray-dried potassium EDTA and it is designed for whole blood hematology testing and blood bank testing. The tube has a special label for patient information that is required to meet the American Association of Blood Banks (AABB) requirements. Except for the special label, the pink closure tube is the same as the lavender closure tube.

The pink tube should be inverted eight (8) times to prevent clotting.

***QUESTION*: *What tests require that blood specimens be cooled immediately following venipuncture?***

**Answer:** Chilling of blood specimens ( 2 to 8 ºC) immediately following venipuncture is needed for gastrin, ammonia, lactic acid, catecholamines, pH/blood gas, and parathyroid hormone (PTH) lab tests. Chilling the specimen slows down metabolic processes which can alter these test results.

NOTE: Other lab tests may require chilling. Follow your laboratory’s policies.

Blood specimens are chilled by placing the tubes immediately in either crushed ice or a mixture of ice and water. The ice or ice/water mixture must cover all of the blood in the tube. Large cubes of ice are not acceptable because the temperature is inconsistent and areas of the blood may not be sufficiently chilled.

***QUESTION: What tests should be kept warm immediately following venipuncture?***

**Answer:** Specimens that must be kept at body temperature (37 ºC) from the time of collection to testing include cold agglutinins and cryofibrinogen. A heat block for

transportation is required. NOTE: Other lab tests may require maintenance at body temperature. Follow your laboratory’s policies.

***QUESTION: I had a patient continue to bleed for about 10 minutes. Did I do something wrong?***

**Answer:** Excessive bleeding following a venipuncture is almost always the result of medication being taken by the patient (anticoagulant drugs) or the patient having a coagulation disorder such as hemophilia. The phlebotomist should observe for excessivebleeding. If bleeding continues for more than five minutes, the patient’s nurse or doctor should be notified. Pressure, applied with a gauze pad, must continue at the site as long as necessary to stop the bleeding. Once bleeding has stopped, a pressure bandage made with a folded gauze square and tape, adhesive bandage, or Coban wrap should be tightly wound around the arm and left in place for at least 15 more minutes.

***QUESTION: What is a blood transfer device?***

**Answer:** OSHA requires that safety needle devices be used to collect blood specimens. Safety needles must be activated while still in the patient’s arm or immediately after removal from the vein. Therefore, it is impossible to insert the needle that is attached to a syringe through the closure to get blood into vacuum tubes. This requirement has led to the development of blood transfer devices. Most transfer devices resemble a tube holder with a preattached multiple sample female luer adapter.

The syringe is attached to the luer adapter on the outside portion of the transfer device. The evacuated tube is pushed on to the multiple sample needle inside of the transfer device. Tubes are allowed to fill completely until all blood has been transferred to the appropriate tube. Thus, blood can be transferred from the syringe to tubes without risk of needlestick.

Transfer device placed on a syringe



Evacuated tube placed on needle inside transfer device

***QUESTION: I think it is very wasteful to throw away a tube holder after using it only once. Why can’t I reuse them?***

**Answer:** Tube holders are **single-use only** disposable devices. Effective June 12, 2002, OSHA policy amended the Bloodborne Pathogen Rule to require that the tube holder and needle must be discarded as a unit into a sharps container immediately after the activation of the safe needle device.

Reasons for this policy include the potential for a needlestick injury when removing the needle and the potential presence of blood in the tube holder. While some individuals believe that using alcohol to wipe out the inside of the tube holder between phlebotomies is sufficient, OSHA states that this practice is not acceptable.

***QUESTION: How do I know if I have enough blood in the tube?***

**Answer**: Some patients are very hard to draw. No matter what amount of blood you obtain, always take it to (or call) the laboratory to see if the testing can be performed. The chart on the following page identifies the recommended acceptable draw volumes as well as effects of overfilling and underfilling tubes.

|  |  |  |  |
| --- | --- | --- | --- |
| **CLOSURE****COLOR** | **OVERFILL EFFECTS** | **UNDERFILL EFFECTS** | **MINIMUM ACCEPTABLE DRAW VOLUMES\*** |
| Red/Gold/ Speckled  | None  | QNS (Quantity Not Sufficient) to analyze  | 50% of capacity  |
| Lavender/pink  | Insufficient EDTA to completely inactivate clotting; results in clots within the specimen, rendering it useless for testing  | dilution effect; erroneously low cell counts & hematocrits; RBC morphology changes; staining changes; QNS  | 50% of capacity  |
| Blue  | insufficient sodium citrate to completely inactivate clotting; results in coagulation of the specimen, rendering it useless for testing  | prolongation of both PT and aPTT test results | **100% capacity**  |
| Green  | insufficient heparin to completely inactivate clotting; results in clotting of the specimen, rendering it useless for testing  | dilution effect; excess heparin may cause erroneously low test results | 50% of capacity  |
| Gray  | insufficient additive to completely inactivate clotting; results in clotting of the specimen, rendering it useless for testing  | dilution effect; excess additive may cause erroneously low test results  | 50% of capacity  |
| Yellow for blood culture  | insufficient additive to completely inactivate clotting; results in bacteria trapped in clot and decreased chance of growth of microorganism *in vitro*  | decreased blood volume collection decreases the incidence of pathogen recovery  | **100% of capacity**  |

\*Maximum volume of draw for each size of tube is generally indicated by a line (the same color as the rubber closure) found at the top of the label when holding the tube upright.

***QUESTION: Why would I use a butterfly needle and how do I use it?***

**Answer:** “Butterfly” is the informal name for a winged infusion set, which is also called a scalp needle set. It consists of a needle and tubing with plastic wings on either side of the needle and a luer adapter on the end of the tubing.

**Note: The collection set pictured below is attached to a tube holder.**

The needle is shorter than a routine venipuncture needle and the wings are grasped to assist with insertion and removal of the needle. A syringe or tube adapter is attached to the luer adapter at the end of the tubing. The needle sizes are 21-, 23-, and 25-gauge. Because nothing is directly attached to the needle, the angle of insertion can be very low. This is useful when collecting blood from superficial veins. Therefore, a butterfly with a 23- or 25-gauge needle is helpful when collecting blood from infants, children, elderly individuals, hand veins, and foot veins.

There are two disadvantages to the use of butterfly needles: 1) drawing blood through a smaller gauge needle and the tubing increases the chance of hemolysis; and

2) studies have shown that butterfly needles account for the highest percentage of needlestick injuries. Therefore, extreme care must be used to avoid these issues when using a butterfly.

***QUESTION: What do I do if a patient faints? What other things can happen to a patient when his blood is drawn?***

**Answer:** Every facility that collects blood specimens must have a plan of action in place in the event a patient has an adverse reaction. It is always necessary to have someone help you when a patient has an adverse reaction.

When fainting occurs from blood collection, the reason is almost always vasovagal syncope. Syncope is the medical term for fainting. The vagus nerve runs from the brain to the colon and when it is overstimulated it causes the body's blood vessels to dilate and the heart to slow down. This anti-adrenaline effect decreases the ability of the heart to pump blood upward to the brain against gravity. Without blood flow, the brain turns off and fainting occurs.

Signs that a patient might faint include sweating, pallor, dilated pupils, and shaking. The patient may state he/she is feeling light-headed and is seeing “spots in front of his/her eyes”. At this time, you should call for assistance.

If a seated patient feels faint, the needle should be removed from the arm and the patient’s head placed between his/her knees. Tight clothing should be loosened. If the patient loses consciousness, you and another individual should try to move the patient to the floor. Once the patient becomes conscious, he/she should stay in the collection area for at least 15 minutes. A wet towel applied to the patient’s forehead and a glass of juice or water can help the patient feel better.

Rare adverse reactions to blood collection include vomiting, seizure, and loss of bladder control. The healthcare facility should have procedures in place to handle all patient adverse reactions.

***QUESTION: What is the correct positioning of an arm for blood drawing?***

**Answer:** If possible, the patient’s arm should be in a downward position to prevent backflow of blood from the tube into the vein.

***QUESTION*: *What are preanalytical errors?***

**Answer:** The collection and analysis of blood specimens are subject to errors of many kinds, some of which are avoidable, others are not. It is the responsibility of the laboratory to minimize and take into account as many of these errors as possible. Errors are divided into three types: preanalytical, analytical, and post-analytical. Preanalytical errors are those errors that present themselves from the time of laboratory test order to the analysis of the specimen. The table on the following pages summarizes preanalytical errors related to specimen collection.

***QUESTION: If a patient needs to have fasted for 12 hours before blood is drawn, does it matter if the fasting is during the night or during the day?***

**Answer:** For most routine tests, including lipids, no. However, there are some tests where the substances in the blood may vary at different times during the day. These include iron and various hormones.

***QUESTION*** : ***What specimens need to be protected from light and why?***

***Answer:*** There are certain substances in the blood that break down when exposed to light. Therefore, if the specimen is exposed to light, test results will be falsely decreased. Examples of tests requiring protection from light include bilirubin, vitamin A, vitamin B6, beta-carotene, and porphyrins.

***QUESTION: How many times can I stick a patient after an unsuccessful venipuncture?***

**Answer**: You must follow your healthcare facility’s policies. Most facilities limit a phlebotomist to two attempts.

***QUESTION: How do I collect microsamples?***

**Answer**: Microsamples are collected by fingerstick (adult/child) or heelstick (infant). Capillary blood is collected into capillary tubes or micro-collection containers. At least one manufacturer makes a combination capillary tube and micro-collection container.

Site Selection

*Finger*

For patients older than one year, the palmer surface of the middle or ring finger is the preferred site. It is not recommended to use the:

 the thumb as it has a pulse,

 the index finger as it may be more sensitive or callused, and the

 fifith (little) finger, as it has insufficient tissue depth to prevent bone injury.

The puncture must be made on the palmer surface and not on the side or tip of the finger. The tissue on the side and tip of the finger is about half as thick as the tissue in the center of the finger. The puncture should be made across the fingerprints and not parallel to them as demonstrated in the following graphic.

**HEEL**

 For infants less than one year of age, puncture to the lateral or medial plantar surface of the heel is generally used. The puncture must be made on the plantar surface medial to a line drawn posterior from the middle of the great toe to the heel, or lateral to a line drawn posterior from between the fourth and fifth toes to the heel (see below). Puncturing in areas other than these locations can damage the bones in the infant’s heel.

**References**

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