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HEALTHLAB GUIDE TO PHLEBOTOMY AND SPECIMEN COLLECTION

Introduction

The purpose of this guide is to ensure:

- Safety for both patients and those collecting specimens
- The quality of collected specimens
- Accurate patient results

This guide is designed to help you follow safe, effective specimen collection and handling procedures. You'll find information on everything from supplies to selecting veins to specimen labeling and safety. For additional information or answers to your questions, visit HealthLabtesting.com. If you can't resolve the issue, call HealthLab Client Services at 630-933-2633.

YOUR ROLE

The phlebotomist is an essential link between patients and their doctors. Physicians rely on laboratory results for 70 percent of the objective information they receive on their patients' well-being. That's why it is so important that specimen collection and handling is done properly to ensure that these results are accurate. Your knowledge, skill and expert handling through the specimen-collection and handling process are critical.

Before you begin

It's not only important to learn safe and effective specimen-collection skills, you also need to make sure you know:

- How to identify patients
 - The supplies you need
 - Special collection requirements and restrictions
 - What hemoconcentration is and how to avoid it
 - How to label, process, package and store specimens
 - Safety precautions
-

PATIENT IDENTIFICATION

Studies show that up to 56 percent of laboratory errors occur during the pre-analytic phase of testing. Many of these errors are due to improper patient identification, which can result in patients being treated, diagnosed, medicated and managed according to another patient's health status. Misidentification also can be potentially fatal, so this step is critical.

All HealthLab personnel who collect specimens are responsible for properly identifying the patient before the specimen is collected.

To ensure proper patient identification, after you've greeted the patient and identified yourself, *ask the patient* to tell you his or her:

Name, address, birth date (and/or unique identification number).

If the patient is unable to give you this information, ask a family member, friend or caregiver.

Compare that information with the chart, requisitions or forms the patient brings to the draw station. It is your job to verify the patient's identity—and it's very important that you do so.

DO NOT ASK "Are you 'Jane Doe'?" to confirm the patient's name. Patients who may be hard of hearing or have language difficulties might misunderstand and simply nod. You can only be certain you have the right patient if you *ask* the patient to tell you his or her name, or ask a family member or caregiver to verify the name and other identifying information. All specimens must be labeled at the patient's side, having the patient visually verify each specimen collected. If the patient is visually impaired, then compare each specimen to the order or test reacquisition.

SUPPLIES—AND TIPS FOR PROPER USE

Make sure you have gathered the supplies you need for the patient's specific test(s) before you begin specimen collection and check the expiration dates.

These supplies include:

- **Gloves.** Unaltered gloves must be worn for all phlebotomy procedures. Do not rip off finger tips in order to palpate veins. Keep in mind that some patients are allergic to substances in antiseptic, glue in bandages, latex in the gloves or tourniquet. *If your patient is allergic to these substances you must use alternate equipment.*
- **Tourniquets.** Make sure that the tourniquet is applied 3-4 inches above the site selected. Make sure the tourniquet is not kept on longer than one minute. Do not place the tourniquet on so tight that it restricts both venous and arterial flow. For infection control purposes, it is recommended that tourniquets should be used once and thrown away.
- **Gauze, paper tape, bandages**
- **Needles.** All HealthLab needles are single-patient-use safety needles and include: BC Vacutainer® Eclipse™ 21 gauge (green cap) and 22 gauge (black cap) 1-inch-long needles, and Vacutainer® Safety-Lok™ 23 gauge ¾-inch safety-winged blood collection set (also known as the butterfly).
- **Holders/adapters.**
The multi-sample tube holder is a single-use item. It holds tubes as they fill. The needle is *never* removed from the holder. The tube holder has ledges/wings on the bottom to aid in tube insertion and removal, and to help prevent excessive movement.
- **Syringes.** 3ml, 6ml, 12ml and 20ml syringes are sterile and for single use. Syringes have three parts: the *hub* is where you connect the butterfly needle. The *plunger* obtains the blood sample when it is slowly pulled back. The *barrel* fills with the blood and is labeled with ml marks for amounts needed. Keep in mind: If you have more than 1ml of air space in the syringe, you are pulling back too hard, which could cause the red blood cells (RBCs) to become hemolyzed. Never attach non-safety needles to the syringe. Always use the appropriate blood transfer device to transfer blood from the syringe.
- **Blood transfer device.**
This single-use device is used to transfer the blood collected in the syringe into the evacuated tubes. When the device is attached to the hub of the syringe, blood flows into the tubes. NEVER force the blood from the syringe or you will cause hemolysis to the RBCs.
- **Sharps container.** Use this for needles, syringes and blood transfer devices. DO NOT use the sharps container to dispose of gloves, gauze, needle caps or alcohol wipes. When a sharps container is ¾ full, lock it and put it in the designated area for pick up.
- **Skin antiseptics solution.** Isopropyl alcohol and/or chlorhexidine gluconate (Chloroscrub Swabstick) as needed.
- **Capillary lancets.**
Heel lancet: BD Microtainer Quickheel lancet.
Finger lancet: BD Genie lancet (green for adult patients, pink for children 8 years of age or younger).



SPECIAL COLLECTION REQUIREMENTS AND RESTRICTIONS

Before you get ready to perform a venipuncture make sure you know if there are any special requirements for the test or site issues that may affect your location and vein choice.

These considerations are very important not only for accurate results, but also for patient health and safety. Special requirements and restrictions may include:

Fasting: If fasting is required before the blood test, you may collect the specimen **ONLY AFTER** 10 to 12 hours of complete dietary restriction of everything except water and medications.

IV infusion: Intravenous fluid infusions threaten the accuracy of test results so **AVOID** draws from an arm with an active IV unless absolutely necessary. If collecting a specimen from the arm is unavoidable:

1. Have the nurse or appropriate caregiver turn off the IV for two minutes
2. Apply the tourniquet **BELOW** the infusion site
3. Draw the specimen **BELOW** the tourniquet

If an IV was previously active on the arm where you are planning a draw, make sure the IV has been discontinued for longer than 24-48 hours or you risk analyte contamination and erroneous results.

Mastectomy: **DO NOT** perform venipuncture or skin punctures on the same side where a patient has had a mastectomy. You risk both erroneous results and causing a painful condition for the patient called lymphedema. If this side must be used, you must have a written order from a physician.

Fistula: **NEVER** perform venipuncture or skin punctures on the same side as a fistula, which is a surgically connected vein and artery used for dialysis.

Damaged skin: **AVOID** sites where the skin appears infiltrated, infected, edematous or burned. This protects the patient from additional complications and reduces the chance of erroneous results.

Arterial draw: **DO NOT** use an arterial specimen as a substitute for venous blood when veins are difficult to locate.

Hemoconcentration:

WHAT IT IS, WHY IT'S BAD, HOW TO AVOID IT

Hemoconcentration is an abnormally high concentration of blood that occurs when the proportion of cells to liquid in the bloodstream increases.

If a specimen is hemoconcentrated, the accuracy of test results will be affected. After you've collected the specimen you won't know whether the patient's blood has experienced hemoconcentration, but it is your job to avoid conditions that lead to it, including:

- Patient posture
- Prolonged tourniquet application
- Fist pumping

Follow these guidelines for avoiding hemoconcentration:

Patient posture. *When the patient goes from lying down to sitting upright, the physiology of the blood changes. That is because the body senses the change in posture and knows that change requires some extra effort to keep the brain supplied with blood. So the body responds by releasing hormones into the bloodstream that increase blood pressure.*

At the same time, water and smaller compounds migrate through the patient's capillary beds into the tissue in a natural attempt to lower the blood pressure. The sudden porosity of the capillary beds acts as a fishnet, trapping only the larger blood components in the veins. Not only do red blood cells and other cells remain in the circulatory system in a higher concentration temporarily, but so do large substances like proteins and compounds attached to protein that

can't pass through the capillary walls because of their molecular size. As a result, they too remain in the bloodstream in temporarily higher concentrations.

Most of the time the change is temporary, but for some patients the change can be significant, leading the laboratory to report a higher test result.

Conversely, *when a patient goes from sitting upright to lying down, the blood is subject to a dilutional effect due to water moving from the tissue into the circulatory system. In this situation, cholesterol levels can be reported as 10 percent higher and triglycerides 12 percent lower.*

CHANGES IN POSTURE CAN AFFECT THESE ANALYTES:

Albumin	Anti-diuretic hormone	Drugs
Aldosterone	Bilirubin	Renin
Alkaline phosphatase	Calcium	Total protein
ALT	Catecholamines	triglycerides
angiotensin	cholesterol	

In order to draw posture-sensitive analytes appropriately, you must be aware BEFORE blood collection whether the ordered tests specify that the patient be lying down.

Prolonged tourniquet application. When a tourniquet is left on the patient's arm longer than one minute, the specimen will likely be affected by hemoconcentration. So if it takes longer than one minute to find and access a vein, you risk hemoconcentration and potentially inaccurate test results. Solution: *Don't leave tourniquets on for longer than one minute.*

It can be difficult to minimize the time a tourniquet is in place when the patient's veins are difficult to find. While you shouldn't rush the vein-selection process, if it's taking longer than one minute release the tourniquet for at least two minutes before puncturing the vein so that any hemoconcentration occurring below the tourniquet can disperse.

NOTE: Before releasing the tourniquet, make a mental note of where the vein is located in relation to certain skin "markers" (e.g., freckles, skin creases or contours, etc.). This will help you reduce the time it takes to relocate the vein so you can perform venipuncture in less than one minute while the tourniquet is in place.

Release the tourniquet as soon as the vein is accessed in order to minimize the effects of hemoconcentration. But sometimes releasing constriction may interrupt the flow of blood prematurely. So use your judgment regarding tourniquet release, balancing the knowledge that premature release may interrupt blood flow and waiting too long may cause hemoconcentration.

Fist pumping. Having the patient pump his fist to help you find a suitable vein may actually contribute to inaccurate results. Exercising the muscles when constricted by a tourniquet results in hemoconcentration and elevates test results on potassium as well as ionized calcium. Because so many patients have been told to pump their fist (erroneously), be alert to what the patient is doing and tell him that the practice may affect results.

When you're ready to begin venipuncture

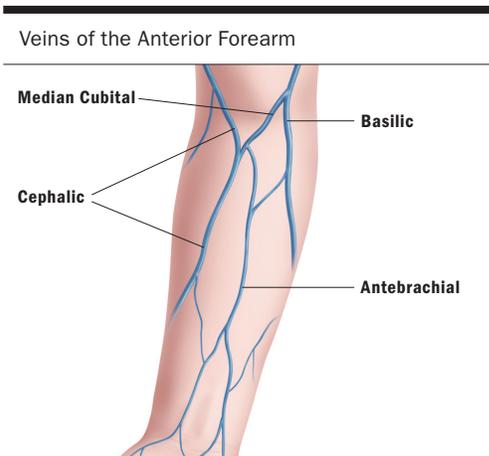
SELECTING AN ACCEPTABLE VEIN

Refer to the diagram(s) below to help you find an appropriate vein for venipuncture.

First, wash your hands and put on gloves. *If you have trouble feeling the vein, remove your glove, locate the vein and mark the area using an alcohol swipe pointing in the direction of the vein. Reapply a clean glove before you insert the needle.*

FIRST CHOICE:	MEDIAN CUBITAL
SECOND CHOICE:	CEPHALIC
THIRD CHOICE:	DORSAL HAND
AVOID:	BASILIC
NEED WRITTEN PERMISSION:	DORSAL FOOT/ANKLE

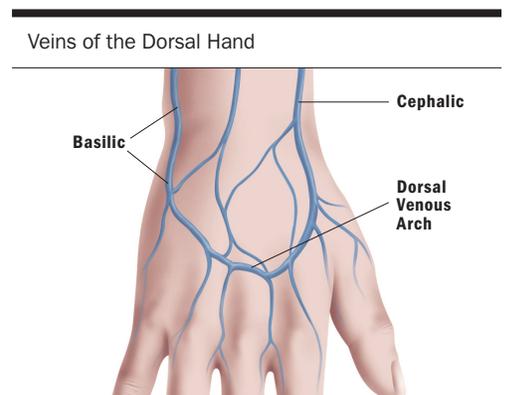
Your choices for a vein in the antecubital fossa area include:



1. Median cubital. This vein is usually closest to the surface, is the most stationary, is the least painful for the patient and is least likely to cause injury if the venipuncture is not performed correctly. If you are unable to locate this vein, check the other arm.

2. Cephalic. This vein is your second choice if neither arm has a suitable median cubital vein. The cephalic vein is located on the outer radial (thumb) side of the antecubital area. If you use this vein, keep in mind that it has a tendency to bruise easily.

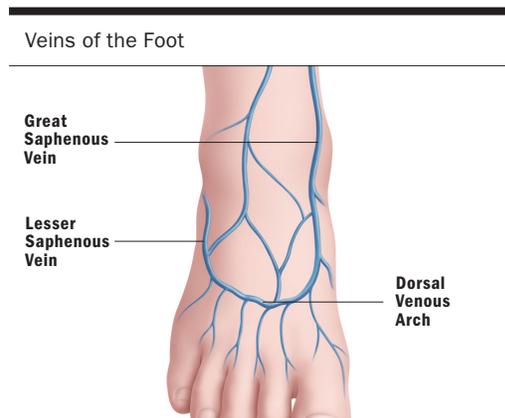
Alternatives if a suitable antecubital vein is not available:



1. Dorsal hand. Use this vein if you are unable to locate the median cubital or cephalic vein. *Never use veins on the under side of the hand or wrist.*

2. Basilic. This vein is on the ulna (pinky finger) side of the antecubital area. *Avoid this vein whenever other options are available.* Use extreme caution because of the proximity of the brachial artery under the basilic vein and the many surrounding nerves. Injury to this site can lead to permanent nerve or arterial damage!

3. Dorsal foot, ankle area. Veins in this area are options when nothing else is available but *you must have a written doctor's order* to perform venipuncture on an adult patient's foot.



PREPARING THE SITE

Once you've selected an appropriate vein, prepare the site/arm for venipuncture following these procedures:

1. Gather your supplies (needle choice, extra tubes, antiseptic solution, gauze and tourniquet) and place them close to you on your dominant side.
2. Apply the tourniquet tight enough to restrict venous flow but not tight enough to obstruct arterial circulation. The patient's pulse should be palpable below the level of the tourniquet. If the patient has very thin skin, you can use a blood pressure cuff as a tourniquet. Inflate the cuff up to 40 mm Hg and *never exceed the patient's diastolic pressure*.

3. Select and palpate the appropriate vein in the antecubital area with the tip of your finger. Feel for the direction the vein is running. Veins can "bounce." If using a dorsal hand vein, select and palpate it the same way. *Never attempt venipuncture in a vein you have not palpated.*

DO NOT slap or tap the patient's arm in order to find and/or distend the vein. This action doesn't work and can alter the specimen quality. It may also open you up to charges of abuse.

DO (alternatives)

- Apply a warm compress to the site for two to three minutes to dilate the veins.
- Lower the patient's arm relative to the heart so blood fills the arm and distends the veins.
- Ask the patient to squeeze — but not pump — the fist to bring more blood into the muscles and veins.

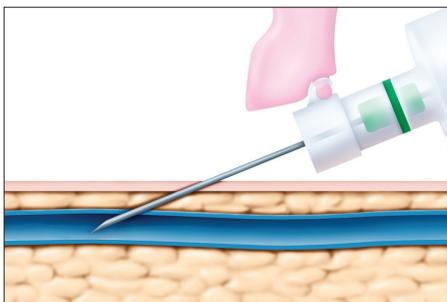
Next . . .

4. Release the tourniquet, remembering not to leave the tourniquet on longer than one minute.
5. Clean the site meticulously to reduce contamination. For *routine venipuncture*, wipe 70 percent isopropyl alcohol in a circular motion to cleanse the site and allow it to air dry. For *blood cultures*, clean the selected area with a two-minute friction scrub and allow to air dry for 90 seconds. For patients older than two months of age, use chlorhexidine gluconate (Chloroscrub Swabstick). For infants younger than 2 months use iodine.
6. Reapply tourniquet and begin venipuncture.

Inserting the needle

Angle of insertion

One of the most dangerous errors phlebotomists make is entering the vein at a high angle of insertion. *For veins in the antecubital area, the proper angle of insertion is 30 degrees or less, with the needle bevel facing up.* Remember, veins are not very large in diameter. If you enter the skin at an excessive angle, the needle is much more likely to go through the vein and into the underlying structures.



A lower angle provides a greater margin of error in the depth of penetration and gives you some “leeway” before you insert the needle through the other side of the vein. So the lower the angle of insertion, the greater the chance that you’ll place the needle correctly.

Veins in the dorsal hand or foot/ankle area should be entered at a 10 degree angle or less, using a butterfly needle.

How to insert Vacutainer needles

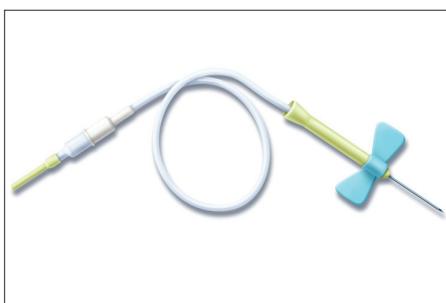
BD Vacutainer® Eclipse™ needles (21 gauge/green cap or 22 gauge/black cap) provide the quickest, safest, easiest way to collect a blood sample.

1. Place index and middle finger under the tube holder and place thumb on top. This will give you a secure hold for entering the vein and changing tubes.
2. Anchor the vein below the site using your non-dominant thumb, pulling the skin taut.
3. Insert the needle at the proper angle for the choice of needle, positioning the bevel up.
4. Insert tubes into holder. Hold onto the edges to help minimize movement. Pull back slowly if using a syringe method. Make sure you follow the order of draw (see section on order of draw on Page 14).
5. Blood should be entering the tube. Release the tourniquet once blood flow is established and *before one minute has passed*. After one minute of restricted blood flow, hemoconcentration of the blood will produce erroneous results (see section on hemoconcentration, Page 6).
6. Mix each tube five to ten times immediately after you remove it.
7. When you have collected the specimen, remove all tubes before removing the needle. Then remove the needle smoothly and activate the safety. If you are using a butterfly needle, activate the safety device **BEFORE** removing it. Engage the pink safety shield with the *thumb pad only*.



How to insert Safety-Lok butterfly needles

Vacutainer® Brand Safety-Lok™ blood collection set is 23 gauge ¾-inch-long with safety wings (aka the butterfly). Exercise both patience and extreme care when using the Butterfly. This collection set has 12 inches of tubing that contains .06ml of air space and the tubing is connected to an appropriate size syringe. You must *pull back very slowly* to avoid hemolysis or attach the multi-sample holder.



1. Anchor the vein below the site using your non-dominant thumb to pull the skin taut.
2. Insert the butterfly needle into the selected vein at the lowest possible angle.
3. Hold a wing at all times to maintain the proper angle and so the needle doesn't fall out of the vein and injure you or the patient.
4. Release the tourniquet once blood flow is established and *before one minute has passed*. After one minute of restricted blood flow, hemoconcentration of the blood will produce erroneous results (see section on hemoconcentration, Page 6).
5. When you have collected your specimen, activate the safety *before* you remove the needle from the site. Firmly hold the very end of the yellow body and pull sharply on the tubing.
6. Using the proper transfer device, transfer the blood from the syringe into the evacuated tubes. *Never insert the collection needle directly into the tubes/culture bottles.*

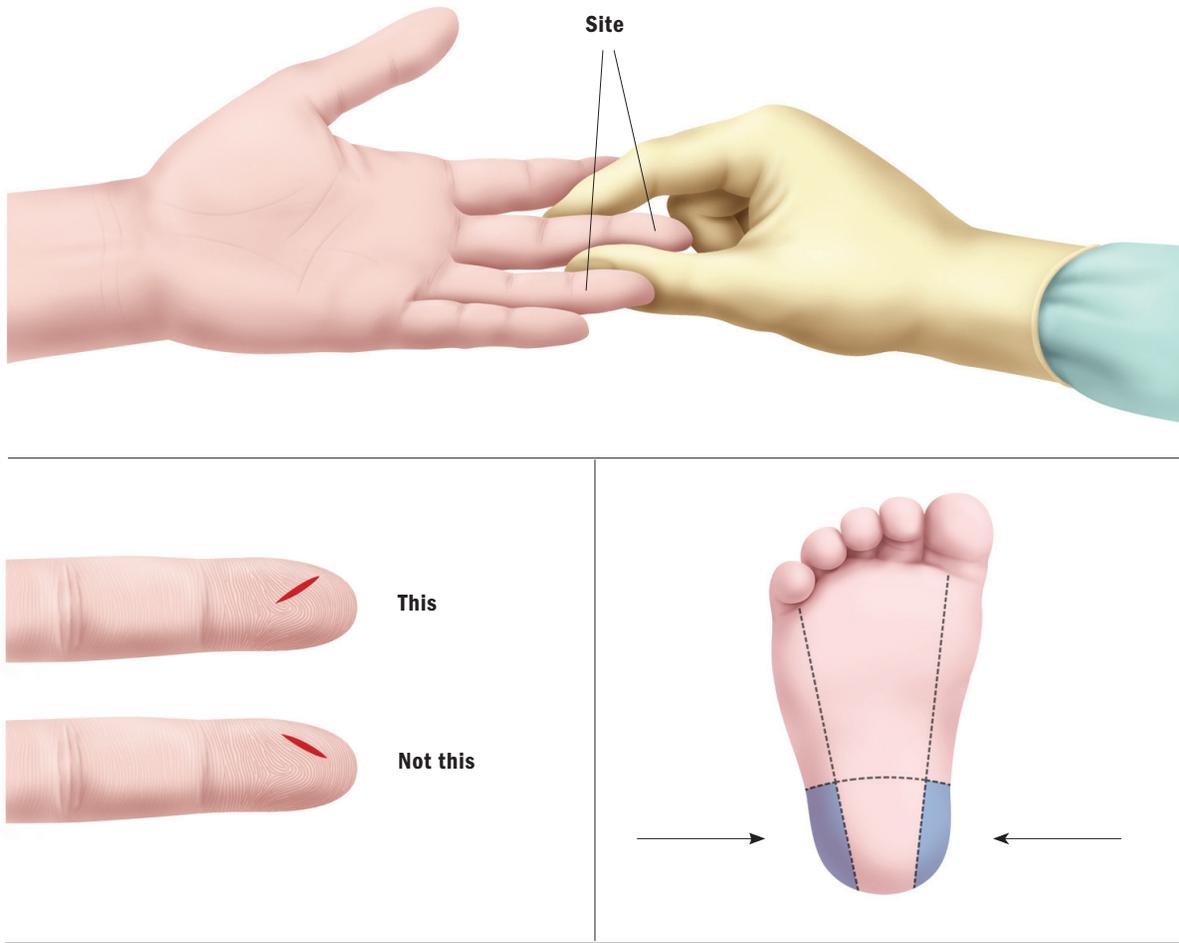
Tips for proper needle position

One of the main reasons for failing to obtain blood is improper needle position. If blood does not begin to flow after you've removed the tourniquet, try one of these suggestions:

- Needle may be up against the wall of the vein. *Try rotating needle slightly.*
- Needle may be too deep and/or has penetrated through the vein. *Try pulling the needle back slightly.*
- Needle is not completely inserted into the vein. *Try pushing needle in slightly.*
- Needle slipped beside vein because it wasn't anchored well. *Try withdrawing the needle until just the bevel is under the skin, then redirect the needle into the vein.*
- Needle position can't be determined. You may want to *use your finger to relocate the vein by feeling above needle entry and then redirecting vein.*
- *Do not probe!*
- Vein collapsed, disappearing as soon as the needle penetrated it. This can sometimes be caused by vacuum from the tube or if you remove the tourniquet before all tubes have filled. *Try to tighten the tourniquet to reestablish blood flow. Grab the ends of the tourniquet and twist them together or use your finger to apply pressure. Try a smaller tube with less vacuum or pull slower on syringe plunger.*
- Tube vacuum is exhausted. You may have a bad tube. *Always have extra tubes within arm's reach!*

Remember, you are only allowed to make two attempts to obtain a specimen. After two attempts, get help!

Tips for doing a capillary collection



When you are collecting capillary specimens, proper positioning of the patient's finger or heel will enhance blood flow. Warming the puncture site for three to five minutes also helps to increase blood supply.

To minimize the risks of tissue contamination or hemolysis, wipe away the first formed drop of blood and avoid exerting excessive pressure on the surrounding tissue.

Use only the ring or middle fingers on the patient for capillary collection. Make the

incision across the fingerprint. Use teal safety lancets for adults, pink safety lancets for children.

When drawing a capillary specimen from an infant's heel (only children younger than 1 who are not walking or standing on their feet), make the incision only on the medial or lateral areas of the plantar surface—NEVER in the curvature of the heel because it is close to the calcaneus bone. Also AVOID the arch of the foot.

Use the BD Microtainer Quickheel safety lancet for infant heels.

HEMATOMAS

Eighty-five percent of all hematomas are caused by bad phlebotomy technique.

Possible causes:

- Vein too fragile or too small for the needle
- Needle penetrates through the vein
- Needle only partially inserted into the vein
- Excessive or blind probing
- Needle removed while the tourniquet is still on
- Pressure not adequately applied following venipuncture
- Bending the arm after removing the needle

Tips for avoiding hematomas:

- Sometimes it's necessary to relocate a needle that has penetrated too far into the vein, but before you try that, pull the needle back a bit
- If the needle hasn't penetrated far enough, advance it farther into the vein
- Lateral needle relocation should never be attempted in an effort to access the basilic vein since nerves and the brachial artery are in close proximity

Manipulation beyond these techniques is considered probing and is not recommended. It is also irresponsible and risky.

Whenever attempting to relocate a needle, be aware of the risks involved before deciding it's necessary. You must have a high degree of confidence that the vein can be accessed safely and successfully before proceeding, so your knowledge of the standards and anatomy of the antecubital area should be certain.

It is often a better idea to discontinue the procedure and experience a delay while you attempt a different vein, rather than trying to salvage the puncture.

Order of draw

Venipuncture tubes must be collected according to the following order of draw in order *to prevent additive carryover*. Additive carryover cannot be detected by the laboratory, which means the results may be altered—and medical decisions based on flawed diagnostic information.

All additive tubes must be filled in the proper order and adequately mixed according to the tube manufacturer's instructions, regardless of the collection method used. Collection tubes are available in a variety of sizes to ensure minimum fill requirements are met, especially when you are presented with difficult or pediatric draws.

Refer to the test tube directory on Pages 39-48 for detailed information about:

- Vacutainer tubes: descriptions, sizes, mixing instructions and common tests
- Microbiology/immunology studies: descriptions, common tests, supplies
- Cytology/histology supplies: descriptions and common tests

ORDER OF DRAW	
	<p>1. Blood-culture tubes Always fill the anaerobic bottle first when using the syringe for collection.</p>
	<p>2. Sodium-citrate tubes (blue stopper) Must be full 1:9 ratio. Under-filled tubes will be rejected.</p>
	<p>3. Serum tubes with or without clot activator, with or without gel separator (red, gold stopper)</p>
	<p>4. Heparin tubes with or without gel (green stopper)</p>
	<p>5. EDTA tubes (lavender/pink stopper)</p>
	<p>6. Glycolytic inhibitor tubes (gray stopper)</p>

Tips for working with additive tubes

Under-filling additive tubes alters the desired blood-to-anticoagulant ratio and, in the case of EDTA tubes, causes red blood cell shrinkage. An under-filled sodium-citrate tube will produce a falsely lengthened aPPT result. *Avoid filling additive tubes manually.*

Evacuated blood collection tubes and blood culture bottles fill automatically because of the pre-set vacuum in them. Each tube needs to be gently inverted five to 10 times immediately after it has been filled with blood.

When using a winged blood-collection set, a discard tube (another blue tube) must be used to prime the tubing when a coagulation (blue) tube is the first or only tube drawn. In any case, improperly filled additive tubes and culture bottles may result in specimen rejection or, if tested, yield inaccurate results that jeopardize patient care.

Micro-collection order of draw and tips

When more than one micro-collection tube is required, follow this order of draw for capillary collections:

1. Tubes containing EDTA first to prevent formation of platelet clumps
2. Other additive tubes (green cap, gray cap)
3. Non-additive tubes (gold cap, red cap)

Once the approximate volume of blood has been obtained, gently invert each tube 10 times to mix well.

All microtainers must be filled past the bottom line. Always fill to the top line—never going over or specimens will be rejected.



Labeling specimens

LABEL INFORMATION AND CONFIRMATION

It is your job to label all patient specimens immediately after collection and in the presence of the patient. Each specimen tube or container must have a legible label and never place the label on the container lid or loose in the biohazard bag. If you do, the specimen will be rejected.

Each label must include:

- Patient's full legal name (last name first, as it appears on medical record)
- Date of birth
- Collection time
- Collection date
- Your initials (clearly *printed* in block letters)
- Location of patient

Show each labeled specimen to the patient and have him verify the correct spelling of the name and date of birth. If the patient is unable to speak or otherwise verify the information, compare the label to the information in the medical chart or HealthLab requisition.

Apply the label directly over the manufacturer label and vertical to the bar code on the bottle.

For all microtainer tubes, add:

- C, to indicate capillary blood
- V, to indicate venous blood
- A, to indicate arterial blood

Sample label application



HEALTHLAB REQUISITIONS

When using the HealthLab requisition, legibly print the patient's name and DOB on each specimen label provided on the requisition if not included on Atlas label. Legibly print the complete information (patient's name, DOB, collection date and time, and your initials) on the requisition. (The location of the collection is already entered on the requisition.)

Blood bank specimen collection procedures

Patients who need blood transfusions because of surgery or treatment for injuries depend on your knowledge and expertise in handling blood bank specimens. The most common cause of a fatal transfusion reaction is a clerical error. Remember, the safety of the patient comes first. The blood bank patient information form must be returned to the blood bank with all preop specimens.

NOTE: The blood bank specimen should not be drawn more than three days prior to the intended date of transfusion or if the patient has been pregnant or transfused within the preceding three months.

PATIENT IDENTIFICATION

You must *obtain proper patient identification prior to collecting the blood bank specimen*. Ask the patient to state his name and DOB, then compare that information to what is on the chart or requisition. Once you've collected the blood sample, the specimen label you printed will be compared to the name and DOB on the test requisition or verified by the patient.

A blood bank bracelet is *not required for the following tests*:

- Rh immune globulin
- Direct Coombs
- Type and Rh

BLOOD BANK SPECIMEN LABELING

All blood bank specimens must be in a 6 ml pink tube and labeled with the following information hand written on the blood bank band:

- Date of collection
- Time of collection
- Room number or location where the draw was performed
- Medical record number or for outpatients, date of birth for clients
- Initials of person collecting blood sample
- Name of patient as it appears on medical record

NOTE: The lab specimen label or Atlas label will be placed into the outside pocket of the biohazard bag. This label is generated once the electronic order is completed. Add the DOB and blood bank ID 3 alpha/4 numeric along with your initials and time of draw. If any of the information on a blood bank specimen is illegible, misspelled, missing or incorrect, a blood bank technologist will determine if the specimen must be redrawn according to American Association of Blood Banks standards.

These *same six label items will also appear on a preop patient's blood bank ID wristband*. The blood bank ID works along with the patient ID. It is your job to fill out this blood bank ID with the information about the patient and blood collection. Press hard, write legibly and use only a ballpoint pen.

Specimen label

THOMPSON, LISA
Pat ID: A2000000030
Temp: refrigerated
Client: your office site here
07/15/2009 15:09
6.0 Lavender
WLN 7290
12.27.60

LMS
1515

Label portion of blood bank ID

PT: THOMPSON, LISA 11/14/07 1100
ID# 12.27.60 OP LAB PB: ABC

WLN
7290

Once all the information is clearly written on the blood bank ID wristband, show it to the patient to verify the correct spelling of the name and the correct DOB.

Then you can collect the sample. The “label” portion of the blood bank ID band will be attached to the 6 ml EDTA tube after you’ve collected the sample.

All blood bank specimens drawn must be labeled, identified and banded at the time the specimen is drawn—in the presence of the patient. If this procedure has not been followed, the specimen must be redrawn according to standard protocol.

Cadence Health preop patients will be given their blood bank ID band in an envelope, which they bring with them on the day of surgery. The admitting RN will verify the band and attach it to the patient.

After collecting the specimen

POST-COLLECTION CHECKLIST

1.	Apply gauze to site and apply pressure.
2.	Check to make sure bleeding has stopped.
3.	Apply bandage when appropriate.
4.	Collect and dispose of all equipment into proper containers.
5.	Thank the patient.
6.	Remove gloves and wash hands.
7.	Process specimen appropriately.
8.	Place each patient's specimen into biohazard bag for pick up.

PREVENTING EXCESSIVE BLEEDING

After you've removed the venipuncture needle, put gauze on the site and hold it with firm pressure for three to five minutes. You may need to keep pressure on the puncture site longer if the patient is on blood thinners.

Most patients will stop bleeding after a couple of minutes, but don't assume the bleeding has stopped, especially because you might not know

if a patient is on blood thinners or is taking aspirin. Those medications reduce platelet activity and can prevent punctures from sealing as quickly as on non-medicated patients. *Assume all your patients will take longer than normal for bleeding to stop.*

You can ask a cooperative patient to apply pressure after the needle has been removed, but remember, it is up to you to make sure adequate pressure is being applied. If the patient isn't doing it well, do it yourself.

It is your responsibility to check that the bleeding has ceased, as well as observe the site for hematoma formation, before applying a bandage. Look not only for superficial bleeding, but also for raising or mounding of the tissue that indicates the skin has sealed but the vein has not. If you see this, apply additional pressure. If you do observe bleeding or hematoma formation, apply additional pressure and wait longer before checking the site again. Keep the bandage in place for at least 15 minutes then remove it to prevent skin damage.

Watch for excessive bleeding long enough to be really sure the vein won't continue oozing blood after you've left the patient. Don't rely on a tightly applied bandage to keep pressure on the site. Watch for at least 10 seconds to see what happens when pressure is removed.

Venipuncture complications

There are a number of negative outcomes that can arise during or after you've collected a specimen. You should be aware of these potential problems and know how to react/respond. If certain complications occur, you may need to call for help and/or document the incident.

- **Allergies.** Some patients are allergic to substances in the antiseptic, glue in the bandages or latex in the gloves or tourniquet. *If your patient is allergic, you must use alternate supplies.*
- **Excessive bleeding.** Normal bleeding should stop within a few minutes unless the patient is on blood thinners. *Don't leave the patient until the bleeding has stopped. Tell the patient not to lift any heavy objects for one hour after the draw.*
- **Fainting (syncope).** Up to 5 percent of patients may pass out during or after a routine venipuncture procedure. It is the responsibility of the collector to be prepared for such an incident. DO NOT use ammonia inhalants because they are linked to the onset of asthma in some patients. If the patient has fainted, *remove the tourniquet, withdraw the needle, talk to the patient and have him lower his head and breathe deeply. If possible, have the patient lie down and raise his feet. Loosen the patient's collar or tie, apply cold compress to the patient's forehead and neck. Call for help and do not let the patient leave until the patient is ok—a minimum of 15 minutes. Tell the patient not to drive for 30 minutes after fainting.* DOCUMENT THE INCIDENT.
- **Hematoma.** A bruise caused by blood leaking into surrounding tissue; there may be swelling at the site and it may be painful. If a hematoma starts to develop, *immediately release tourniquet, withdraw the needle and hold pressure on the site* (see section on hematomas for more information – Page 13).
- **Inadvertent arterial puncture.** If you mistakenly puncture an artery, *remove the tourniquet, then remove the needle and apply pressure for at least five minutes or until bleeding stops. Check the patient's pulse. If it is weak, call for help.* DOCUMENT THE INCIDENT.
- **Infection.** An infection is rare if you are following proper aseptic technique.
- **Nausea/vomiting.** If the patient looks like he or she are going to be sick or tells you he or she is, *use an emesis basin.*
- **Iatrogenic blood loss.** This condition results when too much blood has been drawn for testing. *Exsanguination* refers to blood loss that may cause death. Removing more than 10 percent of a patient's blood volume at one time or over a short period of time can cause serious problems (for additional information, refer to pediatric blood volume chart on Page 33).
- **Nerve damage.** Excessive or blind probing can lead to arterial puncture or injury to main nerves, possibly causing permanent damage and resulting in a lawsuit.
- **Pain.** Don't tell the patient it will not hurt. There is a small amount of discomfort even in routine venipuncture. Excessive, deep or blind probing can be very painful and is not recommended.

- **Petechia.** These are small, non-raised red dots that appear on a patient's skin when a tourniquet is applied. Petechia may be caused by a defect in the capillary walls or platelets. The appearance of petechia does not indicate incorrect procedure. You may continue specimen collection but look for excessive bleeding when you finish.
- **Reflux.** During specimen collection blood may flow back into a patient's veins from the collecting tube. This can occur when the contents of the collection tube are in contact with the stopper while being collected. To prevent reflux *keep the patient's arm in a downward position so the tube remains lower than the site and fills from the bottom up.*
- **Seizures.** In the event of a seizure remove the needle quickly and hold pressure over the site without restricting the patient's movements. Follow these guidelines: Call for help. The patient should be lying on the floor, away from objects that can cause injury. Cushion the patient's head but do not restrain him in any way. *DO NOT put anything into the patient's mouth.* After the seizure, put the patient in recovery position and make sure someone stays with him until full recovery. A patient who has had a seizure may become confused, and sometimes that confusion can mimic aggression. If the patient seems aggressive or confused, DO NOT restrain the patient but try to gently coax the patient to relax and remain calm. *If the seizure lasts longer than five minutes or if he has repeated seizures without regaining consciousness, call an ambulance (if you are off-site).*
- **Vein collapse.** A vein may collapse if there is too great a vacuum for the size of the vein, or if the tourniquet is tied too tightly or too close to the site. Veins in elderly patients are just too fragile and may collapse during puncture.
- **Vein damage.** Numerous punctures in the same area over a period of time will cause scar tissue to build, which increases the difficulty in performing future venipuncture.

Specimen processing and handling

Once a specimen has been properly collected, it is your responsibility to follow HealthLab guidelines for processing, storage and transport in order to ensure specimen quality and testing accuracy.

Depending upon the tests that have been ordered, a specimen may need to be processed before it is analyzed. Most routine laboratory tests are performed on either plasma or serum. Follow these procedures for handling whole blood, plasma or serum specimens.

WHOLE BLOOD

Whole blood is drawn directly from a person's vein into a blood collection tube during a routine venipuncture.

- After the tube is filled, invert it at least eight to 10 times to ensure adequate mixing and prevent coagulation.
- The entire tube must be submitted for testing, so don't split specimens.
- Be sure to distinguish between yellow top tubes used for genetic testing and those for microbiology, because they are not interchangeable. There are also several types of heparin tubes that may also contain sodium, lithium or a gel separator
- Navy blue EDTA tubes should not be confused with navy blue top tubes that contain no additives.
- Sodium citrate tubes (blue tops) used primarily for coagulation testing must be filled to the required volume of the tube in order to maintain the appropriate concentration of the citrate coagulant in the plasma being tested.
- Occasionally a red top tube is required for a whole blood specimen. In these cases do not use tubes containing gels or serum separators.

Always consult our reference manual or online test catalog at healthlabtesting.com when in doubt of what type of tube is required for testing. You may also refer to the test tube directory on Pages 39-48.

PLASMA

Specimens to obtain plasma are drawn into tubes that contain anticoagulant. Then the whole blood specimen is centrifuged to separate the plasma.

- After drawing the specified tube, invert five to six times to ensure adequate mixing and prevent coagulation.
- Some specimens may require immediate centrifugation, separation and freezing. Others may need to be double centrifuged to completely remove platelets.
- Centrifuge for 10 minutes at 3,000 rpm.
- Transfer the plasma into a plastic transport tube. Clearly label specimens "plasma" when the plasma has been separated prior to transport. It is important to distinguish between plasma and serum because plasma contains clotting factors.

Consult our reference manual or visit healthlabtesting.com for more information or refer to the test tube directory on Pages 39-48.

SERUM

Specimens to obtain serum are drawn into tubes that contain no additives or coagulants.

- Draw the blood into a red top or serum separator top and allow it to completely clot (takes up to 60 minutes depending on the patient).
- Centrifuge to separate the serum. Centrifuge for 10 minutes at 3,000 rpm.
- Transfer the serum into a plastic transport tube. Do not use gel or serum separator tubes for drug level testing because the drug may be absorbed into the gel.
- Hemolyzed, lipemic or icteric specimens may cause erroneous results. Consult our manual or visit healthlabtesting.com before sending these specimens.
- Never respin the sample in the same tube. If any threads of blood remain, pour off the serum into an aliquot tube before respinning it.

CENTRIFUGING

A centrifuge is laboratory equipment used to spin blood to separate the liquid portion of blood from the cellular portion.



When you're using a centrifuge:

- Balance the specimens you place in the centrifuge with other specimens or with water-filled tubes of equal volume.
- Lock the lid securely before starting.
- Start the centrifuge. The timer is pre-set.
- When the process is complete, remove the tubes. Tubes with gels will not remix. Non-gel tubes need to be removed carefully so remixing doesn't occur.
- Never centrifuge blood specimens more than once.

Packaging and storage procedures

SPECIMEN PACKAGING

Every specimen must be placed inside a secondary container for transport. The secondary container is a securely sealed zip-lock plastic bag labeled with the biohazard symbol. HealthLab sends you these biohazard plastic bags.



Paper lab requisitions, if used, should be placed in the external sleeve of the bag or attached to the outside of the bag.

Make sure that all specimens are processed and stored correctly according to HealthLab specimen requirements. Please utilize the HealthLab Test directory at healthlabtesting.com.

HealthLab will not accept or process specimens with exposed needles or sheathed needles attached. The lab will not accept urine or fluids in paper containers.

STORAGE REQUIREMENTS

REQUIRED STORAGE TEMPERATURES	
Storage Method	Centigrade (Celsius) temperature range
Refrigerated	2 – 8° C
Frozen	Less than or equal to -20° C (placed in freezer transport block just before placing in lock box)
Room/Ambient	18 – 24° C

STORAGE REQUIREMENTS: HEMATOLOGY SPECIMENS

Test	Length of time specimen remains stable
CBC/H&H/DIFF/PLATELET	Room temperature up to 5 hrs. 2-8° C up to 24 hrs.
Sed Rate	Room temperature up to 5 hrs. 2-8° C up to 24 hrs.
Retic	Room temperature up to 5 hrs. 2-8° C up to 24 hrs
Sickle Cell Screen	2-8° C up to 2 weeks.
Malaria Prep	2-8° C up to 24 hrs.
LAPA Stain	Room temperature up to 8 hrs.
Kleihauer-Betke	2-8° C up to 24 hrs.
Post-Vasectomy Sperm Count	Per doctor's instructions. If not available, deliver within 1 hr. Keep at body temperature. Satellites – Keep at room temp.
Semen Analysis for Fertility	Deliver within 1 hr. Keep at body temperature.
Cell CT & Diff – Body Fluid	Room temperature up to 1 hr. 2-8° C up to 6 hrs.
Cell CT & Diff – CSF	Room temperature up to 1 hr.
Cell CT & Diff – Synovial Fluid	Room temperature up to 1 hr. 2-8° C up to 6 hrs.
Crystal Exam – Synovial Fluid	Room temperature up to 2 days. 2-8° C up to 2 days.
Bone Marrow In B5	Deliver to hematology within 1 hr. Room temperature.
In Formalin	Deliver same day to hematology. Room temperature.
In Heparin	Deliver same day to hematology. Room temperature up to 8 hrs.
Eosinophil Smear Nasal	Room temperature up to 8 hrs.
Urine	Room temperature up to 1 hr. 2-8° C up to 24 hrs.

STORAGE REQUIREMENTS: COAGULATION SPECIMENS

Test	Length of time specimen remains stable
Protime	Opened or unopened, centrifuged or uncentrifuged, up to 24 hrs at 18-24° C. Plasma may be frozen and stored for up to two weeks at -20° C. A frost-free freezer should not be used. Visually determine hematocrit after centrifugation. If > 55%, redraw specimen with adjusted volume of Na citrate. Call hematology for details.
aPTT	Outpatients – Unopened, centrifuged or uncentrifuged, up to 24 hrs. at room temperature (18-24° C). Plasma can be stored 24 hrs. at 2-8° C. (Spin in centrifuge calibrated to produce plasma with a platelet count of <10,000/cmm. Remove plasma carefully, without disturbing the buffy coat/RBC layers, with a plastic pipette. Place plasma in a labeled plastic aliquot tube and cap with a plastic cap). Inpatients – Centrifuged within an hour of collection and tested within 2 hrs. of collection. Plasma may be frozen and stored for up to two weeks at -20° C. A frost-free freezer should not be used. Visually determine hematocrit after centrifugation. If >55%, redraw specimen with adjusted volume of Na citrate. Call hematology for details.
Fibrinogen	Unopened and uncentrifuged, up to 24 hrs. at 2-8° C. Plasma may be frozen and stored for up to two weeks at -20° C. A frost-free freezer should not be used. Visually determine hematocrit after centrifugation. If > 55%, redraw specimen with adjusted volume of Na citrate. Call hematology for details.
D-Dimer	Plasma may be frozen and stored at -20° C for 1 month or for 8 hrs. at room temperature. Heparin centrifuge within 1 hr. collection. Test within 2 hrs. post-separation red anti-Xa cells. Otherwise, freeze up to 1 month at -20° C. Do not draw at satellite labs. Send patient to outpatient lab.

STORAGE REQUIREMENTS: URINALYSIS SPECIMENS

Test	Length of time urine specimen remains stable
Urine for Urinalysis	Room temperature for up to 1 hr. 2-8° C for up to 24 hrs.
Urine for Pregnancy Tests	Room temperature for up to 8 hrs. 2-8° C for up to 72 hrs.

Unacceptable specimens

You are responsible for determining the acceptability of each specimen and must contact the patient or caregiver (patient's nurse, charge nurse or physician) if a specimen is being rejected.

Laboratory personnel are responsible for test cancellation in the LIS/HIS, if necessary. Proper documentation is required as to why the specimen is being rejected.

The hospital staff/department or laboratory section that initiated the original order in the HIS/ATLAS is responsible for reordering the test(s) if the specimen needs to be re-collected.

WHAT MAKES A SPECIMEN UNACCEPTABLE

A specimen is considered unacceptable and cannot be tested if:

- Patient identity does not comply with HealthLab policy titled "Specimen ID/ Labeling Requirements." The policy is located on healthlabtesting.com under "specimen collection" and then click "specimen requirements."
- Specimen has not been obtained, handled, preserved or stored according to HealthLab test requirements.
- Source of specimen is unknown (body fluids, tissues).
- Quantity is not sufficient (QNS).
- Hemolysis (see also information on hemolysis on Page 27).
- Clots in anticoagulation tubes.
- Specimens received in inappropriate container/ tube. NEVER send blood in a syringe.

Unacceptable specimens should not be destroyed, but quarantined and held separate from all other specimens for a minimum of seven days.

WHEN AN UNACCEPTABLE SPECIMEN CAN BE TESTED

Tests may only be performed on unacceptable specimens if ALL of the following apply:

- It is difficult or impossible to obtain another specimen.
- The ordering physician approves testing.
- The ordering physician is informed of the documentation that will be attached to the results.
- A pathologist has signed the deviation from standard protocol form.
- A result level comment stating the unacceptable nature of the specimen is entered in the LIS for all specimens with the exception of cytology and pathology specimens. These specimen labeling issues are recorded in the APIS under specimen deficiency.
- A hospital unusual occurrence report is completed.

For proper documentation of pathologist approval, refer to the HealthLab policy titled "Deviations from Standard Protocol."

Tests results are NOT to be given to a patient in which identification is in question.

If a patient calls for results and a disclaimer is in the LIS, inform the patient that he/she must contact their physician regarding information on this particular test.

Ensuring specimen quality

The quality of the specimen is critical for accurate results. As a phlebotomist, you can do a lot to ensure the quality of specimens through proper drawing, storing and handling procedures.

Here are some common reasons why specimen quality may be compromised—and what you can do about it. Deviations in quality are reasons for specimen rejection.

HEMOLYSIS

Hemolysis is defined as red blood cell breakdown and the release of hemoglobin and intracellular contents into the plasma. It results in a higher rate of rejected specimens. Hemolyzed specimens are not suitable for hematologic and coagulation testing. Analytes such as glucose, potassium, LDH, cholesterol, creatinine, iron, phosphorus, calcium and most enzymes are affected by hemolysis and/or prolonged contact with the clot. Hemolysis can be recognized in the lab by a visual inspection of the plasma or serum sample, which appears rosy to bright red in color.

To prevent hemolysis, serum tubes should be centrifuged and separated promptly.

WHAT CAUSES HEMOLYSIS

Sometimes patient factors can cause hemolysis, including:

- Metabolic disorders: liver disease, sickle cell anemia, autoimmune hemolytic anemia
- Chemical agents: lead, sulfonamides, anti-malarial drugs, analgesics
- Physical agents: mechanical heart valve, third degree burns

HOW TO AVOID HEMOLYSIS—AND SUBSEQUENT SPECIMEN REJECTION

Because hemolysis also can be caused by improper venipuncture and processing procedures, make sure you follow these tips:

- Using a small-bore needle that results in a large vacuum force being applied to the blood may cause shear stress on the RBCs, causing them to rupture. *For routine collections, use a 21- to 22-gauge needle.* If a 23-gauge needle is necessary, for example, with elderly or pediatric patients who have small or difficult veins, use a syringe and pull back slowly.
- *Do not leave the tourniquet on for more than one minute* because it can affect water balance in cells and also rupture RBCs.
- *Limit the number of times you readjust the needle within the patient's arm.*
- *Never exceed a needle angle of 30 degrees.* Vein trauma can cause hemolysis.
- *Do not apply too much force to the plunger during syringe collection* because the blood may begin to clot or hemolyze. Forceful transfer of blood from the syringe may also hemolyze the blood.
- *Make sure the needle bevel is in the lumen (center) of the vein.* If it isn't, the blood may flow too slowly and initiate RBC shearing.
- Tube vacuum may cause the blood to enter the tube forcefully and cause cell rupture. Depending on the condition of the patient's veins, *choose a tube with an appropriate vacuum. Use partial draw tubes.*

- *Avoid drawing blood from an existing hematoma.*
- *Do not vigorously mix your tubes. Instead, gently invert them five to 10 times.*
- *Replace the vacuum tube if there is air leakage around the needle or a loss of vacuum in the tube.*
- *Collect blood in room temperature containers unless the specimen requirement dictates otherwise.*
- *When there is difficulty accessing a vein or when a vacuum tube fills too slowly due to a difficult venipuncture, damage to the red blood cells may result. Collect a fresh tube when blood flow is established or select another puncture site and, using sterile/unused equipment, collect a second specimen.*
- *Do not remove the needle from the vein with the vacuum tube engaged. This applies to both the last tube collected during a routine venipuncture and to tubes collected during a difficult procedure.*
- *Removing tubes prematurely causes a rush of air to enter the tube, which may damage the red blood cells.*
- *Allow the collection site to air dry after cleaning. Alcohol used to clean the puncture site may cause contamination in a tube and cause hemolysis.*
- *Allow specimens in SST/red tops to clot completely (30-60 minutes) before centrifuging.*
- *Promptly centrifuge and separate serum tubes.*
- *Do not centrifuge the specimen for a prolonged period of time.*
- *Never respin a serum specimen in the same tube. Aliquot the specimens, then respin.*

Inadequate draw: QNS (quantity not sufficient). Hematology and coagulation tests require a full tube of blood. The ratio of anticoagulant is specific for the volume of specimen. Coagulation tests will not be performed on short draws because they result in RBC crenation, reduced MCV and hematocrit, and possible changes in WWBC morphology, platelet and total WBC count.

Clotted specimens. All hematology and coagulation testing uses anti-coagulated blood. Clots, large or small, lead to erroneous results. *To prevent clotted specimens, invert all tubes immediately after collection.*

Light sensitive test. Some analytes are broken down in the presence of light, causing falsely decreased values. The most common of these is bilirubin; other light sensitive analytes include vitamins C, B1, B2, B6, porphyrins and carotene. *Wrap these specimens in foil to protect them or aliquot the serum into an amber tube.*

Lipemia. Lipemia is the presence of an abnormally high concentration of lipid in the blood. It can falsely elevate SGPT and SGOT. It can also affect the results for CBCs. *Be sure a patient has fasted adequately prior to collection, if necessary.*

Poor preservation/old specimens. Hematology specimens need to be tested within 24 hours because old specimens will yield unreliable cell counts and distorted cell morphology. *Centrifuge, separate and appropriately store coagulation plasma until testing can be performed.*

Aliquoting (dividing or separating the specimen into separate containers). Each container must be labeled with all the correct patient information; always verify patient name and DOB to original labeled specimen before placing the label on aliquoted samples.



Microbiology tests, codes and turnaround times

Routine cultures are set up throughout the day from 6 am until 10 pm Monday through Friday except for urine and blood cultures that are done 24/7. See the chart to the right for information about cultures, sources, test codes and turnaround times.

HealthLab has had many requests to automatically perform sensitivities on group B strep screens when a patient is allergic to penicillin. If sensitivities are required, please order test code 2138983 - "Group B strep, reflex susceptibilities."

SPECIMEN SOURCE	CULTURE TEST AND CODE	INCUBATION TIME	TURNAROUND TIME
Blood	Blood culture, 2137740	5 days	Positives phoned as soon as detected
CSF, pleural fluid, synovial fluid, peritoneal fluid, ascetic fluid	Body fluid culture, 2137709	3 days	Gram stain and prelim culture result within 24 hours
Cervix, urethral, mouth, anus (if looking only for N. gonorrhoeae)	GC screen culture, 2137081	3 days	Prelim result within 24 hours
Vaginal, cervix, urethral	Genital culture, 2137723 (this test checks for pathogens such as Staph aureus, Gardnerella vaginalis, yeast and gonorrhoeae)	3 days	Gram stain and prelim culture result within 24 hours
Vaginal/anal swab (use for pregnant patients only)	Group B strep screen, 2137084	3 days	Prelim result within 24 hours
Sputum, bronchial wash, tracheal aspirate, mouth. For nose, nasal, nostril, nasopharynx, see * below	Respiratory culture, 2137719	2 days	Gram stain and prelim culture result within 24 hours
Stool	Stool culture, 2137745	2 days	Prelim result within 24 hours
Throat	Throat culture, 2137071 (this test checks for group A strep and arcanobacterium. If looking for gonorrhoeae or yeast, see other cultures.)	2 days	Prelim result within 24 hours
Urine	Urine culture, 2137086	2 days	Prelim result within 24 hours
Mouth, vaginal	Yeast screen culture, 2137085 (order this if looking only for yeast)	2 days	Prelim result within 24 hours
All other specimen sources	Aerobic culture, 2137770	2-3 days	Gram stain and prelim culture result within 24 hours
All other specimen sources (cannot do anaerobic cultures on respiratory, urine, stool or genital specimens)	Aerobic/anaerobic culture, 2137775	4 days	Gram stain and prelim culture result within 24 hours

*Nose cultures: if only looking for presence of MRSA, order MRSA screen culture, 2137096.
If abscess on or near the nose, OR if MRSA MIC is needed, order aerobic culture.

BLOOD CULTURES: HANDLING BOTTLES, BLOOD VOLUMES

If you have collected both aerobic and anaerobic blood culture specimens from the patient, add to each label:

- The series number (e.g., 1 of 2, 2 of 2) to indicate how many sets the doctor wants
- The location of the draw (R arm, L hand, line draw A)
- The volume in each bottle (this should be equal)

Site preparation: Use Chlorhexidine Swabstick in a back and forth vigorous scrub for two minutes and allow the site to dry for 90 seconds.

Handling culture bottles

To avoid contamination, it is important to use effective skin antisepsis at the time of venipuncture (see section on site preparation on Page 9), as well as to handle culture bottles appropriately. *Wipe the tops of culture bottles with alcohol and allow them to air dry prior to filling.*

Anaerobic: Red cap bottle—broth. The anaerobic culture bottle is *always filled first* when a syringe method is used, with equal parts of blood, to prevent air from entering the bottle.

Aerobic: Silver cap bottle. *Fill this bottle second* with equal parts of blood.

The volume of blood collected is the single most important parameter that determines the success of isolating the organisms. Under-filled cultures have been shown to produce inaccurate results. Follow this chart to collect adequate blood culture volumes.

BLOOD CULTURE VOLUMES

AGE/SIZE	SPECIMEN REQUIREMENTS		TOTAL BLOOD VOLUME
	Anaerobic (red bottle)	Aerobic (purple bottle)	
Adults over 81 lbs.	10 ml	10 ml	20 ml
13 – 37 kg (28.6 – 81 lbs.)	8 – 10 ml	8 – 10 ml	16 – 20 ml
2.2 – 13 kg (4.4 – 28.6 lbs.)	1 – 3.5 ml	1 – 3.5 ml	2 – 7 ml
1 – 2 kg (2.2 – 4.4 lbs.)	1 – 2 ml	1 – 2 ml	2 – 4 ml
Children < 1 kg (2.2lbs.)	N/A – aerobic bottle only	.5 – 1 ml	
			Less than 1 ml only use the aerobic bottle

Pediatric patients

Phlebotomy for a child can be a very frightening experience. Special considerations must always be taken when performing pediatric phlebotomy. The patient's comfort should be the primary importance. If a child is uncomfortable with specimen collection, please consider the directions below.

DIFFERENCES

Collecting specimens from pediatric patients involves attention to different issues and using alternative procedures to obtain samples safely and with sensitivity. Here are a few of the procedures to follow with pediatric patients.

Site selection

- For children younger than 2, limit your choice of site to superficial veins—those not deep or hard to find.
- Venipuncture takes less time than a finger stick and usually produces a better specimen.
- For children younger than 1 and who are not walking or standing on their feet, a heel puncture can be performed.

Volume

Be careful to draw the minimum. Drawing more than 10 percent of a pediatric patient's blood can lead to cardiac arrest. Refer to this HealthLab chart for safe pediatric blood volumes.

MAXIMUM BLOOD VOLUME TO BE DRAWN FROM INFANT AND PEDIATRIC PATIENTS WITHIN 24 HOURS

Patient's weight (lbs.)	Patient's weight (kg.)	Maximum amount to be drawn at any one time within 24 hours (mL)
<2.2	<1	Discretion of the clinician
2.2	1	2.5
4.4	2	4.5
6.6	3	6
8.8	4	8
11	5	10
13.2	6	12
15.4	7	14
17.6	8	16
19.8	9	18
22	10	20
24.2-33	11-15	22-30
35.2-44	16-20	32-40
46.2-55	21-25	42-50
57.2-66	26-30	52-60
68.2-77	31-35	62-70
79.2-88	36-40	72-80
90.2-99	41-45	82-90
101.2-110	46-50	92-100
>110	>50	100

* For pediatric patients weighing less than 6 pounds, consult physician.

Parents and guardians

- Earn their trust. You must be calm, confident and caring.
- Offer the option to stay in the room or wait outside while you perform the draw. Some parents do not handle very well seeing their child get stuck, so they might be better off staying away from the draw area.

Older children: <10 years of age

- Gain their trust by being patient and friendly. Never tell them the stick won't hurt.
- Explain the importance of holding still. It may be helpful to give the child a job, such as holding the gauze or bandage.
- Offer a reward for being as brave as they can.

Restraining a child

- *Don't ever think you won't need someone to help with a child.*
- *Be prepared for anything. Children can be very strong and may hit, kick, scream, bite and pinch if they don't want to have blood drawn.*
- Ask a parent to help you hold the child.

Equipment for pediatric patients

- Use small needles and small tubes for children.
- Capillary draws are best for patients younger than 2.
- Butterfly needles are a good choice because the tubing allows for flexibility if the patient is struggling.

Geriatric patients

Like pediatric patients, older patients present different challenges because of the physical changes associated with aging.

Pay attention to:

SKIN CHANGES

Be alert to these factors while performing venipuncture:

- Less collagen
- Subcutaneous fat
- Skin wrinkles and sags
- Decreased ability to stay hydrated
- Circulation may be impaired because blood vessels narrow with age
- Skin becomes less elastic, which leads to increased chance of bruising
- Blood vessels lose elasticity and are more likely to collapse

HEARING ISSUES

Because older people may have hearing loss, follow these tips:

- Move closer to the patient and speak slowly and loudly, but do not yell.
- Don't rush the patient; allow the patient time to ask questions.
- Make sure the patient understands what you are about to do.

DIMINISHED VISION

Because older patients may experience diminished vision, follow these tips:

- Help the patient to and from the draw area.
- Make sure the patient can see what you are doing.

MENTAL IMPAIRMENT

Slower nerve conduction in older patients can lead to difficulty learning, as well as slower reaction times and diminished pain response. If you are performing venipuncture on an older patient, be alert to signs of mental impairment and follow these tips:

- Be respectful and speak slowly and carefully.
- Make sure the patient understands, as best he can, what you are doing.

SPECIAL CONSIDERATIONS

- Take special care to identify the patient. Be alert to mental impairment or hearing issues that may make identification challenging.
- Anchor the vein well because it will roll more easily. Pull gently below the venipuncture site to anchor the vein.
- Apply the tourniquet over clothing so you don't damage the skin. Make sure you don't pull the skin into the tourniquet knot.
- You may use a manual BP cuff as a tourniquet, but inflate it only to 40.
- You may have to massage the area to bring blood to the surface. Massage from wrist to elbow.
- If the patient has a hematoma and you have no other site options, draw below the hematoma.
- Use a butterfly needle or syringes. They are least likely to collapse the vein or cause a hematoma.

DISEASES/CONDITIONS THAT MAY AFFECT HOW YOU PERFORM A VENIPUNCTURE

These diseases and conditions are common among geriatric patients. Keep in mind that your patient may experience one or more of them and you may need to adjust your collection techniques accordingly.

Coagulation problems

- Many older patients are on blood thinners due to an increased chance of blood clots.
- Older patients are at higher risk of hematoma, and may be at risk for stroke or heart problems.
- Make sure you put adequate pressure on the draw site and do not leave the patient until bleeding stops.

Joint problems

- Arthritis, osteoarthritis and rheumatoid arthritis are conditions common among geriatric patients. These conditions can make joints, especially in hands, fingers, hips and knees, swollen and painful.
- Ask patients to alert you to what is a comfortable—or uncomfortable—position.

Diabetes

Both type I and type II diabetes affect the healing process. *Never do a foot/ankle draw on a diabetic patient.* Wounds of any type on a diabetic patient's foot are to be avoided at all costs.

Parkinson's disease

Parkinson's disease affects the nerve cells that control muscle movement. These patients may tremble or have muscle rigidity, balance problems and difficulty walking.

- *These patients may experience tremors while you are drawing.* They cannot help it or control the tremors.

Stroke

Someone who has experienced a stroke may have difficulty walking, moving and speaking. *These patients need to be allowed enough time to say what they want to say.*

Dialysis

- Be aware of shunts or fistulas used for dialysis. *Do not use them for phlebotomy.* A dialysis tech or nurse may help you collect specimens from dialysis patients

Safety

Any time human blood, saliva or other bodily fluids are involved, there is a safety risk to phlebotomists, as well as other lab personnel, healthcare workers, physicians, janitors and waste handlers.

Blood-borne pathogens are microorganisms in contaminated blood or fluids that can cause illness and disease in people. These microorganisms are transmitted through contact with these specimens. When blood-borne diseases are mentioned, most people think of AIDS, but actually, the hepatitis B virus, or HBV, is much more common. Hepatitis C (HCV) is also a possibility when exposed to contaminated blood.

MEANS OF TRANSMISSION

Blood-borne pathogens are transmitted when contaminated blood or other body fluids enter the body of another person, most often through an accidental puncture by a sharp object that has been contaminated with the pathogen. These sharp objects include needles, scalpels, broken glass and razor blades. In fact, 600,000 to 800,000 needle-stick and other sharps injuries occur each year. Transmission of disease due to contaminated body fluids may also occur through sexual contact or if fluids come in contact with open cuts or skin abrasions. For HBV, indirect transmission can also occur if dried or caked-on contaminated blood is touched, then the person touches his eyes, mouth, nose or an open cut.

You should be aware that blood-borne pathogens that cause AIDS or HBV are NOT transmitted by touching an infected person, through coughing or sneezing, or by using the same equipment, materials, toilets, water fountains or showers as an infected person.

OSHA REGULATIONS

To address the issue of potential exposure to blood-borne pathogens in the healthcare workplace, Occupational Safety and Health Administration (OSHA) requires each workplace to have a written exposure control plan, safety training requirements and record-keeping guidelines. Compliance with the blood-borne pathogens requirements has significantly reduced the risk that workers will contract a blood-borne disease at work.

Employers must provide training to all personnel who may be exposed to infectious materials. The subjects must include what blood-borne pathogens are and how they spread, the exposure control plan for that workplace, what to do in case of exposure, as well as signs and labels that are designed to alert personnel of potential exposure danger.

It is your job to follow all safety procedures regarding blood-borne pathogens. If you have questions or concerns, make sure you contact your lab supervisor or training officer.

There are a number of education resources that are available to help with training or provide information regarding blood-borne pathogens and AIDS:

CDC National AIDS Hotline	800-232-4636
In Spanish	800-344-7432
CDC's Business Responds to AIDS Resource Center for Business	800-458-5231
American Red Cross	800-733-2767

MINIMIZING EXPOSURE

It is your responsibility to follow all OSHA and workplace guidelines for minimizing the risk of exposure. These include following universal precautions for handling body fluids and blood in the workplace. For your protection, you should consider all body fluids and blood as if they were contaminated and handle them accordingly.

Work practice controls

Follow these good work practices:

- Use autoclaves to sterilize all equipment and to treat infectious waste.
- Use puncture-resistant, labeled sharps containers to dispose of needles, razor blades, etc.
- Do not break, bend or recap needles. Place them directly in the sharps container.
- Do not pick up broken glass with your hands. Sweep it up with a broom and dustpan.
- Wash hands immediately after removing gloves and after any hand contact with blood-contaminated surfaces.
- Do not keep food or drinks in areas where blood is being drawn, handled or stored.
- Do not eat, drink, smoke or apply makeup in areas where blood is being drawn, handled or stored.
- Minimize splashing infectious materials.
- Never pipette by mouth.
- If you have skin abrasions or an open wound, protect it from infectious materials.

Personal protective equipment

The level of protective equipment needed will depend on the task at hand. But in general:

- Make sure you have been trained in the proper use of personal protective equipment (PPE) and wear it when the possibility of exposure to blood or infectious materials exists.
- Check the equipment for damage before using it.
- Replace disposable gloves if they become torn or punctured.

- Wear eye protection if there is a chance that a splash may occur.
- After using PPE, remove it carefully to avoid self-contamination.
- Dispose of contaminated personal protective equipment correctly in leak-proof containers.
- Wash thoroughly after removing PPE.

Housekeeping issues

- Clean up all blood or body fluids and spills immediately.
- Clean and decontaminate thoroughly all surfaces and equipment that have been in contact with blood.
- Handle contaminated laundry with extreme caution and using minimal contact.

Hepatitis B vaccine

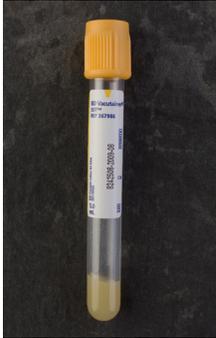
The vaccine against HBV is very effective, so get vaccinated according to your lab's policies.

What to do if you are exposed

Know what to do in case there has been an on-the-job exposure. Stay calm and arrange for an immediate medical evaluation that includes the following:

- Document what happened.
- Wash exposed skin immediately with soap and water.
- Flush exposed eyes, nose or mouth quickly and thoroughly with water.
- Cover open cuts.
- If possible, identify and test the individual who was the source of the contaminated blood.
- Test the exposed person's blood.
- If consent is obtained, provide counseling and evaluate any reported illness.

Vacutainer tubes



SST (GOLD)

Description:

Clot activator tube, with gel barrier. Equivalent to conventional tiger top (red/black) with conventional stopper. Primary uses include serum determinations in chemistry and immunology. For optimum specimen quality, gently invert tube five times after collection to mix clot activator with blood and allow blood to clot upright for 30 minutes before centrifuging for 15 minutes.

Size:

5.0 mL

Common tests include:

ANA, apolipoproteins, ASO screen, basic metabolic panel (BMP), CA 15-3, CA 19-9, CA27-29, CEA, CMV, C-reactive protein, C-reactive protein (high sensitivity/cardio), comprehensive metabolic panel (CMP), digoxin (Phenytoin), electrolytes (Na⁺, K⁺, Cl, CO₂), HIV, hormones (estradiol, FSH, LH, BHCG, progesterone), immunocap allergens, individual hepatitis testing, CK, CK-MB, troponin, myoglobin, lipid panel, hepatic function panel, lithium, microsomal antibody, mononucleosis screening, PSA, renal function panel and thyroid testing (TSH, Free T3, T4, Free T4).



PLAIN RED (NO ADDITIVE)

Description:

Clot activator tube for serum determinations in chemistry testing. Tube inversions ensure mixing of clot activator with blood and clotting within 60 minutes. For optimum specimen quality, gently invert tube five times after collection to mix clot activator with blood and allow blood to clot upright for 30 minutes before centrifuging for 15 minutes. Serum must be removed after spinning.

Size:

4.0 mL

Common tests include:

Drug levels: amikacin, amiodarone, amitriptyline, imipramine and nortriptyline levels.



SODIUM FLUORIDE (GRAY)

Description:

Sodium fluoride is the antiglycolytic agent that will produce plasma samples most commonly used for glucose testing. Tube inversions ensure proper mixing of additive and blood. For optimum specimen quality, gently invert tube five times after collection to mix anticoagulant with blood. Check test listing for processing instructions.

Size:

4.0 mL

Common tests include:

Glucose screening with glucola (GTTs), fasting glucose.



EDTA (DARK BLUE)

Description:

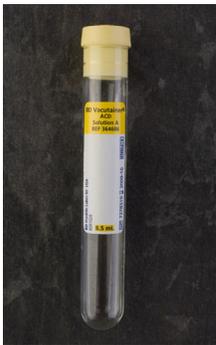
This tube produces a plasma specimen when centrifuged. Used primarily for trace-element, toxicology and nutritional chemistry determinations. For optimum specimen quality, gently invert tube five times after collection to mix anticoagulant with blood. Check test listing for processing instructions.

Size:

6.0 mL

Common tests include:

Adult lead levels, arsenic, heavy metals, mercury and zinc.



ACD (YELLOW)

Description:

There are two solutions for ACD tubes, solution A and solution B, which differ based upon the solution concentrations. For optimum specimen quality, gently invert tube five times after collection to mix anticoagulant with blood. This tube produces a plasma specimen when centrifuged. Check your test listing for which solution and proper specimen processing instructions. The most common tests require whole blood.

Size:

Solution A, 8.5 mL, and solution B, 2.6 mL

Common tests Include:

CD4 cells, HLA phenotyping and natural killer cells.



PPT (IVORY)

Description:

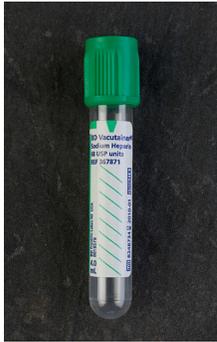
This is a plasma preparation tube that contains K_2EDTA as an anticoagulant allowing for an undiluted plasma sample that is separated from the red cells by a gel barrier. For optimum specimen quality, gently invert tube five times after collection to mix anticoagulant before centrifuging for 15 minutes. Viral loads cannot be submitted frozen in the original tube.

Size:

5.0 mL

Common Tests Include:

HIV viral load and molecular diagnostic test methods (such as, but not limited to, polymerase chain reaction and/or branched DNA amplification techniques).



SODIUM HEPARIN (GREEN)

Description:

This tube also can be used for plasma collections when centrifuged and separated from the cells. For optimal specimen quality, gently invert seven to eight times after collection.

Size: 4.0 mL

Common tests include:

Chromosome analysis.



2.7 mL 1.8 mL

SODIUM CITRATE (BLUE)

Description:

This tube produces a plasma when centrifuged. For optimal specimen quality, gently invert seven to eight times after collection. Specimens are generally centrifuged to produce a plasma specimen. Check test listing for processing instructions. This tube must be full.

Size:

2.7 mL (also available in 1.8 mL draw)

Common tests include:

Used commonly for coagulation determinations. Activated clotting time (ACT), anti-thrombin III, ACP resistance, D-dimer, factor assays, fibrinogen, lupus anti-coagulation evaluation, partial prothrombin time (PTT) and prothrombin time (PT).



3.0 mL 4.0 mL 6.0 mL

EDTA (LAVENDER/PINK)

Description:

This tube produces whole blood or plasma. For optimal specimen quality, gently invert seven to eight times after collection.

Size:

4.0 mL (also available in 3.0 mL for non-blood bank testing) or 6.0 mL

Common tests include (4.0 mL):

Complete blood count (CBC), eosinophil count, erythrocyte sedimentation rate (ESR), glycohemoglobin, hemoglobin, hemoglobin A1C, hematocrit, reticulocyte count and sickle cell screen.

Common tests include (6.0 mL pink):

ABO grouping, Rh typing and antibody screening, BNP and glycohemoglobin.

Microbiology/Immunology Studies



APTIMA GEN PROBE UNISEX SWAB:

Description:

To detect the presence of *C. trachomatis* and *N. gonorrhoea* in endocervical and male urethral specimens. A unisex swab is used for both male and female specimens. Cleaning swab cannot be used for specimen testing. Swab specimens must be transported to the laboratory in the swab specimen transport medium and tube.

Common tests include:

Chlamydia trachomatis (by NAT) and *neisseria gonorrhoeae* (by NAT).



APTIMA GEN PROBE URINE COLLECTION:

Description:

To detect the presence of *C. trachomatis* and *N. gonorrhoea* in male and female urine specimens. The specimen volume must be between the black lines. Overfill or underfill specimens are a cause for rejection.

Common tests include:

Chlamydia trachomatis (by NAT) and *neisseria gonorrhoeae* (by NAT).



E-SWAB COLLECTION KITS:

Description:

Specimen collection kit for microbiology culture specimens.

Common tests include:

Culture aerobic, anaerobic and fastidious bacteria.



BBL CULTURE SWAB COLLECTION AND TRANSPORT SYSTEM (LIQUID AMIES):

Description:

Specimen collection kit for microbiology culture specimens.

Common tests include:

Culture: aerobic, genital, group B strep screen, throat and upper respiratory.



BBL CULTURE SWAB COLLECTION AND TRANSPORT SYSTEM (MINI-TIP LIQUID AMIES):

Description:

Specimen collection kit for nasopharyngeal culture specimens.

Common tests include:

Nasopharyngeal culture



BBL CULTURE SWAB COLLECTION AND TRANSPORT SYSTEM (DOUBLE TIP SWAB IN AMIES):

Description:

This swab is used to collect nasal specimens for MRSA surveillance.

Common tests include:

MRSA culture (by NAT), and Group B Strep (NAT).



BLOOD CULTURE COLLECTION BOTTLES (VERSATREK SYSTEM):

Description:

Specimen collection bottles for aerobic (purple cap) and anaerobic (red cap) infections of the blood stream. A mycobacterial culture also can be collected and processed on the VersaTREK system.

Common tests include:

Blood cultures (which screen for bacteria, fungus and mycobacteria).



STERILE SPECIMEN CUP:

Description:

Sterile specimen cup without any preservative.

Common tests include:

C. diff, urinalysis, urine culture, post-vasectomy, semen analysis, kidney stone analysis and random urine testing.



URINE COLLECTION KIT:

Description:

This kit contains a sterile specimen cup, UA tube and urine culture tube for the collection and testing of clean-catch urine. The cup has a built-in transfer device to transfer urine into the tube and the urine culture tube. Send transfer tubes to the lab for specimen testing.

Common tests include:

Urine culture and urinalysis.



BD VACUTAINER URINE TRANSFER STRAW KIT WITH C&S PRESERVATIVE TUBE:

Description:

Use a sterile specimen cup to collect urine midstream and transfer into culture tube. For optimal specimen quality, gently invert seven to eight times after collection.

Common tests include:

Urine culture.



BD VACUTAINER URINE TRANSFER STRAW KIT WITH UA PRESERVATIVE TUBE:

Description:

Use a sterile specimen cup to collect urine midstream and transfer into UA tube. For optimal specimen quality, gently invert seven to eight times after collection.

Common tests include:

Urinalysis with microscopic only.



M4 (UTM-UNIVERSAL TRANSPORT MEDIA) VIRAL MEDIA:

Description:

Used for the detection of viral organisms.

Common tests include:

Culture: herpes, viral, mycoplasma and urea plasma.



OVA AND PARASITE TRANSPORT:

Description

Protifix solution used to determine the presence of ova (eggs) and/or parasites in stool associated with intestinal infection.

Common tests include:

Ova and parasite exam and stool for the detection of neutrophils.



STOOL CULTURE:

Description:

Non-nutritive stool transport solution for enteric pathogens to identify bacteria or viruses that may be causing infection.

Common tests include:

Stool culture, GI panel.



OCCULT BLOOD CARD (SERACULT CARD):

Description:

For use in diagnosing GI bleeds using stool specimen applied to the card.

Common tests include:

Fecal occult blood.



AFFIRM COLLECTION KIT:

Description:

For specimen collection use only the Affirm VPIII Ambient Temperature Transport System (ATTS) and the swab provided in the Affirm VPIII Microbial Identification Test Kit. This kit detects the presence of yeast, gardnerella vaginalis and trichomonas vaginalis.

Common tests include:

Vaginitis/vaginosis and DNA probe.

Cytology/Histology



PARAPAK PAP KIT:

Description:

Each kit contains all the necessary materials for specimen collection, smear preparation, fixation and transportation to the laboratory.

Common tests include:

Conventional Pap smear.



SUREPATH PAP KIT:

Description:

Liquid-based solution for gynecological specimens. Testing is performed by an FDA-approved thin-layer cell preparation process, with or without guided screening by FocalPoint. Brooms, brushes and spatulas for specimen collection are available upon request.

Common tests include:

SurePath Pap and SurePath Pap with guided screening.



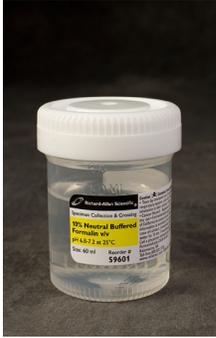
THINPREP PAP KIT:

Description:

PreservCyt liquid-based solution for gynecological specimens. Pap smear testing is performed by an FDA approved thin-layer cell preparation process, with or without the use of the imager technology. ThinPrep is also FDA approved for HPV and gonorrhea/chlamydia testing from the vial. Brooms, brushes and spatulas for specimen collection are available upon request.

Common tests include:

ThinPrep Pap, ThinPrep Pap with imager, HPV (high risk) and gonorrhea/chlamydia testing by DNA probe.



FORMALIN CONTAINER:

Description:

Ten percent formalin containers for the safe collection, preservation, transportation and storage of tissue specimens.

Common tests include:

Surgical biopsies and tissue pathology.



THINPREP CYTOLYTE SOLUTION:

Description:

Non-gynecological cytology specimens placed in CytoLyt or PreservCyt solution including, but not limited to, FNA (fine needle aspirates), urines, effusions, sputa, respiratory tract and gastrointestinal tract.

Common tests include:

Fine needle aspirations, urine cytology and non-gynecological specimens.
