Medical Education Training Centers

Phlebotomy Home Study

24 Hours (16 hours homestudy / 8 hours classroom)

FBN Number 50-12426
CE Broker # 287742

Clinical Solutions - CEU: 24.00
Phlebotomy

Duration: 24 hours
Prerequisites: Medical Background

Goals and Purpose:

This program was designed to provide, through didactic instruction and clinical instruction, training in venipuncture. Didactic lectures cover the theory, anatomy and terminology pertaining to the cardiovascular system. Clinical instruction provides hands-on training in venipuncture technique with procedures verified through a skills check-off system. The students work in teams, drawing on simulation manikins. The learner will only be deemed as meeting a skill, as true competency is done at the bedside under direct observation with actual ‘LIVE STICKS’.

Objectives:

After successful completion of this course the student will be able to:

1. Describe proper bedside manner and how to prepare the patient for venipuncture collection.
2. Identify locations on the human body appropriate for venipuncture collection.
3. Demonstrate the venipuncture collection procedure using butterfly, vacutainer and a syringe and how to dispense blood into tubes following syringe collection.
4. Demonstrate the proper procedure for collecting skin puncture specimens.
5. Explain basic anatomy and physiology of the cardiovascular system.
6. Use proper precautions with relation to handling blood and body fluids.
7. Demonstrate venipuncture collection procedures according to accepted guidelines.

Instructional Strategies:

Laboratory Techniques

1. Lecture
2. Demonstration
3. 1 on 1 Instruction
4. Group Discussions
5. Handouts
6. Multimedia

Evaluation:

1. Completion of all pre-course quizzes (to be reviewed in class)
2. Successful completion of at least 80% on written exam
3. Successful completion of three manikin blood draws

** The learner may only take (one time) the written exam if skills are successfully completed.
**Infection Control**

**What is infection control?**

Infection control is a set of guidelines designed for monitoring, reporting, isolating, educating, and managing any community acquired and or healthcare related infection.

**What is OSHA?**

OSHA is an abbreviation for the Occupational Safety and Health Act. This is the governing and controlling body for safe working conditions. Their overall goal is to keep everyone free from exposures.

**What is Standard Precautions?**

Standard precautions are recommendations from the Center for Disease Control guidelines which are directed at all body fluids, secretions (except sweat) and excretions, regardless if there is blood present. This would also entail contact with non-intact skin and or mucous membranes.

**What is Universal Precautions?**

Universal precautions is an older term (some facilities have replaced standard precautions) it is the OSHA regulation for preventing any exposure to HIV, HBV, and HCV in the workplace. Its basis suggests that any person could be potentially infected with the above and proper use of PPE is advised.

**What is PPE?**

Personal protective equipment or PPE are materials used to protect yourself from any blood or body exposures, splashes, and or contaminates. Examples of PPE are scrubs, gloves, goggles, surgical gown, surgical booties, lab coat, etc.

**What is nosocomial Infection?**

Nosocomial infections are those infections which a patient receives after being in a hospital. They are generated usually by the environment and or employees within. To prevent these it is essential that you:

- Report any illnesses to employees health
- Follow the recommended policies. Many institutions will have signs posted to inform you of the need for PPE.
- WASH your hands, WASH your hands, WASH your hands!
Accidents

What if you stick yourself with a needle?

1. Remove your gloves and dispose of them properly
2. Squeeze puncture site to promote bleeding.
3. Wash area well with water and soap.
4. Record the patient’s name and identification number.
5. Report the incident to your supervisor and follow your institution’s guidelines regarding treatment and follow-up.

What if you splash blood on your skin or into your eyes?

1. Wash the area with generous quantities of water or follow policy and procedure of your facility on exposures. Do not use bleach on eyes or open mucous membranes.
2. Once stable, wipe up any spilled blood/bodily fluid with paper towels, using proper standard precautions. This should be done with hospital approved cleaning agent.
3. Discard used paper towels in an appropriate biohazard waste container.
4. Record the patient’s name and identification number.
5. Report the incident to your supervisor and follow your institution’s guidelines regarding treatment and follow-up.

Common Reasons Why Phlebotomist get Injured

1. Speeding, rushing, or hurrying to complete tasks
2. Not being mindful of surrounding environment/ equipment
3. Not foreseeing patients actions by looking for cues of anxiety/fear
4. Improper body mechanics
5. Improper PPE
6. Improper disposal techniques
7. Not following guidelines and/or policies
Communicating and Interacting with a Customer/Patient

Most people do not like having their blood drawn because of the discomfort. Professionalism and interpersonal skills are critical attributes. Having a well-groomed and professional appearance demonstrates to others a sense of pride in oneself, the workplace, and one’s overall profession.

It is believed that anxiety interferes with a person’s ability to communicate adequately. Customers experience anxiety due to questions that arise due to illness or pain. There are basic verbal communication skills that the phlebotomist might use to relieve the anxiety.

- **Giving recognition** - This means acknowledging the customer and greeting him/her by name, which inspires feelings of being respected.
- **Giving information** - This means making necessary facts available. The customer needs clear concise information about the procedure. This builds trust and gives customer knowledge of what is to be done.
- **Listening** - We often hear what people are saying, but frequently we don’t listen. Listening requires concentrating on what is being said and getting the message clearly, distinctly and without error. This will avoid frustration to the customer and the phlebotomist. If the phlebotomist responds in a way that shows the customer that he/she is heard and understood, it will decrease anxiety and increase willingness to participate in the procedure.
- **Demonstrate empathy & patience**
- **Be able to cope & interact with different types of customers’ or patients’**:
  1. The excessively quiet customer or patient
  2. The hostile customer or patient
  3. The confused or disoriented customer or patient
  4. The questioning customer or patient
  5. The demanding customer or patient
  6. The overly friendly or seductive customer or patient
  7. The patient or customer that wants your opinion customer or patient
  8. The customer or patient that is a personal friend
  9. The scared customer or patient
  10. The grieving customer or patient
  11. The frustrated customer or patient

*Learn to listen not only to verbal communication, but to non-verbal communication as well.*
Positive Non Verbal Communication

Patients receive not only the spoken message but also the nonverbal cues sent by a phlebotomist. Nonverbal communication begins with attire and includes overall mannerisms or behaviors.

<table>
<thead>
<tr>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good body posture</td>
<td>Drooping shoulders with head held low</td>
</tr>
<tr>
<td>Eye Contact</td>
<td>Looking down or away</td>
</tr>
<tr>
<td>Neat, well groomed</td>
<td>Wrinkled lab coat; too much makeup</td>
</tr>
<tr>
<td>Respect personal space</td>
<td>Immediately approaching patient</td>
</tr>
<tr>
<td>Space before greeting</td>
<td></td>
</tr>
</tbody>
</table>
Verifying Information on a Patient's ID Bracelet

If a patient does not have an ID bracelet on their wrist, take the following steps to correct the situation.

- Inform the RN of the need for an ID bracelet, as no specimen will be collected until the ID bracelet is on the patient. Document the nurses’ name.

- If there is any reason why the nurse cannot place the bracelet on the patient's wrist:
  1. Obtain the name of the nurse and document it on the requisition form
  2. Notify the laboratory and follow hospital/lab policy
  3. Deliver requisition to the lab for supervisor review.
  4. Proceed to the next patient.

- If only the patient’s name is present, request that the MR# be entered on the bracelet.
  1. Document the nurse’s name.

- If the patient has a different MR# & the number can’t be changed
  1. Follow your institution's policy.

ALWAYS DOCUMENT
What if a patient will not cooperate?

1. If an awake, alert and oriented patient refuses blood to be drawn:
   a. Thank the patient for their time and walk out of the room (first wash hands)
   b. Inform the nurse
   c. Follow policy and procedure with proper documentation

2. If the patient is combative:
   a. Contact the RN and obtain adequate nursing assistance prior to attempting the draw.
   b. If the patient requests that you stop the venipuncture, remove the needle from the patient’s arm, apply pressure to the site and apply dressing. Notify the nurse of the problem.

Note:
- Always keep an exposed needle away from yourself, if the situation cannot be controlled, a code or assistance may need to be activated.
- If the patient is restrained, contact the nurse prior to the venipuncture and request the nurse to reposition the restraint in order to expose the vein.
- Make sure to return any side rails to their original position.
- If the patient has a cardiac arrest while you are drawing blood, follow institutions protocol. Yell for assistance and use the call button if available.

What if the specimen cannot be obtained?

If you should fail to collect the specimen do not keep sticking the patient. Most facilities will allow you up to two attempts (follow institution policy).

   a. Give the missed lab slip to a second phlebotomist after giving notification to the nurse.
   b. Note the lab slip with the name of the nurse notified and your initials.
   c. Notify the second phlebotomist or supervisor on duty.

What if the patient is in a location other than his or her room (x-ray, physical therapy, etc.)?

   a. Go to the location of the patient
   b. Ask the person in charge whether the venipuncture can be performed.
   c. If the venipuncture can’t be performed, record the name of the person in charge and state the reason.
   d. Request the nurse to notify the laboratory once the patient has returned to the floor.

What if a patient was discharged?

   a. Write on the lab slip “patient discharged”- Initial and record the name of person in charge.
Venipuncture

The skin is the first barrier to a successful venipuncture. The skin acts as a barrier between the outside environment and internal organs. When the barrier is broken, the risk for infection increases. An infusion access device perforates the skin, interrupts the integrity of the barrier and increases the risk for infection. Any infection in this tissue can spread throughout the body. Strict aseptic technique for venipuncture, care and maintenance of the site is mandatory.

The skin serves multiple functions:

- Acts as a mechanical barrier to organisms
- Sensory and temperature regulation
- Aids in fluid and electrolyte balance

The skin consists of two layers:

- Epidermis: Composed of squamous cells that are less sensitive than the underlying structures, the epidermis is the first line of defense against infection.

- Dermis: Much thicker than and directly below the epidermis, the dermis layer consists of blood vessels, hair follicles, sweat glands, sebaceous glands, collagen and nerves. The dermis reacts quickly to painful stimuli as well as to temperature changes and pressure sensation. This is the most painful layer during a venipuncture.

To decrease pain during venipuncture, penetrate the epidermis and dermis quickly.

The fascia lies below the dermis and epidermis and provides a covering for blood.
Products of the blood

1. Liquid

   a) **Plasma** - The liquid part of the blood, which makes up about half of its volume. Plasma is liquid blood with the cells removed and unlike serum has not clotted. It is easily separated from whole blood, since the formed elements (RBC, WBC, Platelets) are denser and sink quickly to the bottom of a specimen tube during centrifugation (rapid spinning). Plasma is 90% water. Blood plasma contains antibodies, proteins, amino acid, enzymes, lipids (fats), carbohydrates (glucose), and minerals (Ca, P, Na, K).

   b) **Serum** - Serum is the clear yellowish fluid portion of the blood, which separates from a blood clot after coagulation. Serum is plasma with the clotting proteins removed. It contains proteins, amino acids, antibodies, enzymes, lipids, carbohydrates (glucose) minerals (Ca, P, Na, K).

2. Formed Elements (Solids) - cells and cell products

   a) **RBC - Red Blood Cells** (erythrocytes)
      Small disk shaped bodies, 120 day life span, hemoglobin transports oxygen from the lungs to the tissues, and carbon dioxide from the tissues to the lungs.
      A. Hemoglobin
      B. Hematocrit
         Normal value=4.5-5.0 million

   b) **WBC - White Blood Cells** (leukocytes)
      Their function is to destroy pathogens by phagocytosis which is the ingestion and destruction of particles by cells.
      Normal value=5,000-10,000
      A. Granulocytes
         • Eosinophils
         • Basophils
         • Neutrophils
      B. Agranulocytes:
         • Lymphocyte: T-Cells (T-4 & t-8)
         • Monocytes: B-Cells (Immunoglobulins)

   c) **Platelets** - (thrombocytes)
      Fragments of cells, essential for coagulation (clotting)
      Normal value=150,000-400,000
The Vascular System

The vascular system is made up of blood vessels, which include arteries, arterioles, capillaries and veins. These vessels vary in size and function.

- **Arteries** carry oxygenated blood away from the heart. The aorta is the largest artery, emanating from the heart. Arteries branch off the aorta. As they branch off the aorta, they decrease in size and become arterioles. Arterioles subdivide into capillaries.
- **Capillaries** provide nutrients to the tissue and take waste away. Capillaries connect with venules, which are the smallest veins. The venules connect the larger veins, eventually leading to the vena cava, which is the largest vein and connects directly to the heart.
- **Veins** carry deoxygenated blood back to the heart. The deoxygenated venous blood is carried to the right atrium through the superior vena cava (SVC). The blood enters the right ventricle, exiting through the pulmonary artery to the lungs, where it is oxygenated and carried to the left atrium through the pulmonary veins.

The vein, the second barrier to successful venipuncture, consists of three layers:

- **Tunica adventitia** – outer coat, made of connective tissue, which helps support.
- **Tunica media** – muscle and elastic tissues which causes contraction and dilation
- **Tunica intima** – endothelial lining of the vein; a single layer of smooth flat cells lying along the length of the vein, allowing for smooth blood flow; disruption of this layer exposes the basement membrane and the clotting process is immediately begun.

Also in the tunica intima layer are the semi-lunar valves, which are directed toward the heart and prevent blood from flowing toward the extremities. Therefore, the direction of the IV needle should always be toward the heart with the flow of circulation.

Systematic veins are in two sets: deep and superficial. Deep veins accompany the corresponding arteries and are called venae comities or venae comitantes. The superficial veins commence as a network of small veins just under the skin. Superficial veins in the hand and forearm are generally utilized for the initiation of IV therapy; however, upper arm veins can be and frequently are accessed as venipuncture sites.
There are only four sites that phlebotomists are allowed to use for venipuncture, except for very special circumstances.

- **Dorsal Hand**: Lateral and dorsal segments of fingers; Small veins
- **Cephalic**: Continuation of metacarpal vein of thumb; Continues into the antecubital fossa
- **Median Cubital**: Travels along ulnar side of inner forearm; Easily visualized
- **Basilic**: Travels along ulnar path on underside of forearm; Last choice because of its proximity to underlying nerves & the brachial artery
Locating a Vein to perform Venipuncture

To locate a vein, a tourniquet is placed 1-2 inches above the intended venipuncture site. This is used to constrict blood flow so venous pressure is increased. This makes it easier to see, feel & puncture a vein. If the skin appears blanched above and below the tourniquet it is too tight. If a finger can be inserted between the tourniquet and the skin, it is too loose.

After applying the tourniquet you can choose a vein. A phlebotomist wants to use the large veins in the forearm which are the median cubital, cephalic or basilic veins. These veins are ideal due to their large size and the fact that most are well anchored in the tissue and will not “roll”.

To determine where a vein is located we use the fingertips to *palpate* for a vein. *Palpate* means to examine or explore by touch. When you palpate you are feeling for bounce, depth, and direction of a vein. Do not choose veins that are hard (sclerosed). Blood is not easily collected from veins that are scarred or hardened from repeated use, and may be difficult since they may not permit blood flow through them.
Proper Customer or Patient Identification

Identification of the customer is the single most important aspect of phlebotomy. A blood sample representing the wrong customer can be fatal. At the least, it may cause the customer misdiagnosis and unnecessary treatment.

It is uncommon to have two customers with the same name in the same hospital, floor, or room. There have been cases where two patients not only have the same name, but the same date of birth. Patients may switch beds within the same room. Patients may be removed to a different room. Be sure to check the ID wristband very carefully.

Identification Procedure

1. Verify the identity of the patient by getting three verbal identifiers- Ask the patient to state their full name, how to spell their name, and their date of birth. So not ask, “Are you Mr Smith?” “Is your birthdate 10/12/56?” If the patient is unconscious, mentally incompetent, or speaks another language, you must confirm the identification with a nurse or caretaker. Document the nurse or caretaker name.
2. Verify the information on the ID wristband- All hospital patients must have a correct ID bracelet or wristband with the correct information before you can proceed with any blood work. Verify that the name and birthdate match the two verbal identifiers from the patient. If a patient does not have the correct information have a nurse or caretaker place a new ID bracelet or wristband on the patient, before drawing blood. Document the name of the nurse or caretaker that placed the new ID on the patient.
3. Verify that the requisition form and labels have the correct information with the ID wristband. Verify that the sex, doctor’s name, MR#- medical record number or processing number, and BN#- billing number match. Make sure that you have the correct number of labels and that the information on the labels is also correct.

The Three verbal, ID Wristband, requisition and labels MUST all have the correct information before the phlebotomist can draw blood
Understanding The Requisition Form

The requisition is a written request or order from a patient’s physician for specific tests to be performed. Some of these tests will require a laboratory specimen to be collected according to the procedures outlined by the hospital laboratory.

The computer usually generates the labels for the individual test ordered. It is very important to make sure all of the labels are on the correct patient. It is possible for a different patient’s set of labels to be printed in the middle of another patient. By checking all the labels very carefully, you will avoid a misidentification of your patient.

If the computer is down, it will be necessary for you to use the laboratory Down Time Form and Lab Miscellaneous Form, for ordering and chart labels to identify the specimens.

Label Format:

The different types of computer labels are:

- **Comment Label** – This label displays the ordering number, customer name, age, sex, MR# (medical record number), BN# (billing number), diagnosis, and order comment (example: specific directions and transportation). This label can be used if an extra label is needed. Sometimes there is an additional comment or instruction label that prints out above the specimen label. It is very important to read this label before you draw the specimen. This label will provide you with information required, method of collection technique or processing, amount of specimen required, method of transportation, and other helpful hints and reminders.

- **Specimen Label** – This label displays the ordering number, tube type extension, date to be collected, time to be collected, location or room number, patient’s name, age, sex, MR# (medical record number), BN# (billing number), DOB (date of birth), bar-code, tests, specimen tube/container code, priority (routine, timed or stat), hospital and/or lab department.

- **Patient Label**

Complete the required information on the requisition by documenting the date, time (be specific, a.m. and p.m. alone are not considered valid times) and identification used to identify the phlebotomist. Document other information as needed such as special comments noted by the staff performing the phlebotomy procedure that may impact the result (intravenous site, unusual circumstances surrounding the draw, time of medication dosing if relevant to test requested, etc)
Labeling the Specimens

In most hospital and lab settings, computer generated labels will accompany the requisition form. In other settings you may need to write out the information on the label. Before drawing blood, check to make sure all the requisitions are for the same customer. Each customer will have his/her own biohazard bag with the specimens. NEVER label tubes before the blood is drawn. If the phlebotomist is unsuccessful in drawing or if the customer is not in the room, prelabeled tubes might be inadvertently used for the next customer. ALWAYS label the tubes at the bedside, after the blood has been drawn!

If you do not have labels, you will need to handwrite the customer’s information on the label. In either situation you must always write the date, time, and your initials on the label.

Labeling Procedure

1. Hospital customers
   Attach computer label to tubes (after blood is drawn & at bedside), ensure that the correct color code on the requisition is on the correct color tube.

   Place the label on the tube directly over the manufacturer’s label already on the tube. The pink or yellow band on the label is placed at the top.

   Print your initials, the date, and the time of day (using military time) on the specimen label.

   If you have any comments regarding the blood drawing procedure, print them under the color code of the tube on the specimen label. These are comments from you to the lab.

   *The phlebotomist who performed the ENTIRE phlebotomy procedure MUST label the blood specimen.*

2. Outpatient or Clinic customers
   Customer’s full name
   Phlebotomist initials
   Date and time the specimen was drawn
Components of the Tube System
Vacutainers

Vacutainers are tubes that are used to collect a blood specimen. The tubes have a premeasured vacuum. These tubes are designed to contain a measured amount of blood. Some tubes have less vacuum and anticoagulant in them because they draw a smaller volume of blood. Most tubes indicate the volume of blood the tube will hold, and may have a line where the blood level should be. The vacuum in the tube will automatically fill the tube to the correct level. A short draw may affect lab results and the blood may have to be redrawn. A short draw, which is a common problem, usually occurs when the phlebotomist removes the tube from the needle before the vacuum is finished filling the tube. Too little blood in relationship to the anticoagulant in the tube actually dilutes the blood sample. WAIT until blood flow in the tube stops. Do not remove or pierce the stoppers prior to using these tubes, or the vacuum will be lost.

**Vacutainer Tube Identification**

Vacutainer tubes are color coded according to the different type of anticoagulant (clot inhibitors) they contain.

<table>
<thead>
<tr>
<th>Stopper Color:</th>
<th>Red</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code on Specimen Label:</td>
<td><em>RED</em></td>
</tr>
<tr>
<td>Additive:</td>
<td>No anticoagulant</td>
</tr>
<tr>
<td></td>
<td>Clot activator (silica)</td>
</tr>
<tr>
<td>Specimen Type:</td>
<td>Clotted blood/serum</td>
</tr>
<tr>
<td>Example of use:</td>
<td>Chemistry/Blood Bank</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stopper Color:</th>
<th>Lavender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code on Specimen Tube:</td>
<td><em>LAV</em></td>
</tr>
<tr>
<td>Additive:</td>
<td>EDTA</td>
</tr>
</tbody>
</table>
Specimen Type: Whole blood/plasma
Example of use: Hematology

Stopper Color: Pink
Code on Specimen Label: *PNK*
Additive: EDTA

Specimen Type: Whole blood/plasma
Example of Use: Blood Bank

_______________________________________________________________________

Stopper Color: Green
Code on Specimen Label: *GPT* – Lithium Heparin/ no gel
*GLT* - Lithium Heparin/Gel
*GST* - Sodium Heparin/No Gel
Additive: Heparin
Some tubes have separator gel PST(Plasma Separator Gel)
Specimen Type: Whole Blood/plasma
Example of Use: Special Chemistry/Critical Panel

Startpper Color: Blue
Code on Specimen Label: BLU or BUE (PFA test only)
Additive: Sodium Citrate
Specimen type: Whole blood/plasma
Example of Use: Coagulation
<table>
<thead>
<tr>
<th><strong>Stopper Color:</strong></th>
<th>Gray</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code on Specimen Label</td>
<td><em>GYT</em></td>
</tr>
</tbody>
</table>
| Additive: | Potassium Oxalate  
Sodium Fluoride(preservatives) |
| Specimen Type: | Whole Blood/plasma |
| Example of Use: | Glucose |

<table>
<thead>
<tr>
<th><strong>Stopper Color:</strong></th>
<th>Yellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code on Specimen Label:</td>
<td><em>YEL</em></td>
</tr>
</tbody>
</table>
| Additive: | ACD (acid citrate dextrose)  
Preservation of RBC |
| Specimen Type: | Whole Blood |
| Example of Use: | Special cellular studies |

| **Stopper Color:** | Gold (smaller volume Tiger Red)  
Red/Gray (Tiger Red) |
|-------------------|---------------------|
| Code on Specimen Label: | SST(Serum Separator Tube)  
TIG or GDT for Troponin  
SST, TIG and GDT are the same tube- Gold or Tiger Red |
| Additive: | No anticoagulant  
Serum separator gel  
Clot activator |
| Specimen Type: | Clotted blood/serum |
| Example of Use: | Chemistry |
The recommended order of draw is as follows:

1. Yellow  Blood Cultures
2. Light Blue  (Citrate)/Coagulation
3. Black  Buffered Sodium Citrate
4. Red  Chemistry
5. Gold (Red Tiger)  (SST) Chemistry
6. Light Green (Tiger Green)  Chemistry
7. Dark Green  (PST) Chemistry
8. Lavender  (EDTA) Hematology
9. Tan  (K2EDTA) Hematology
10. Pink  EDTA Hematology
11. Pearl  (gel EDTA) Hematology
12. Gray  (NA Fluoride) Hematology
13. Yellow  (ACD solution A)
14. Dark Blue  (FDP); Soy Trypsin or Soy

Dark Blue: No additive Red strip label draw as #4

Ne Heparin- Green strip label draw as #7

EDTA- Purple strip on label draw as #8
Blood Cultures

This test is done to detect and identify bacteria and yeasts in the blood. Infections of the bloodstream are commonly caused by bacteria. If a person’s immune system cannot contain an infection at its source, such as the bladder or kidneys the infection can spread into the bloodstream and be carried throughout the body, infecting other organs and causing serious and sometimes life-threatening infection.

Blood samples for cultures are drawn into vials that contain nutrients that will support the growth and allow the detection of microorganisms that prefer oxygen (aerobes) or that thrive in a reduced-oxygen environment (anaerobes). Multiple samples are usually collected at timed intervals or from different veins. This is done to aid in the detection of microorganisms that may be present in small numbers and may be released into the bloodstream intermittently. It is also done to help ensure that any microorganisms detected are the ones causing the infection. Blood cultures are incubated for several days.

When a blood culture is positive, the specific microorganism causing the infection is identified and a test is done to tell the doctor which antibiotics are most likely to be effective for treatment.

Blood Culture Equipment

Set of two bottles:

- Aerobic - always drawn 1st - used to detect microorganisms that prefer oxygen
- Anaerobic - always drawn 2nd - used to detect microorganisms that thrive in a reduced oxygen environment

Tourniquet

Specimen Tube Holder (without needle)

Butterfly or Winged Infusion Set

Povidone iodine & alcohol

Gauze, tape or band-aid

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Skin Puncture

Capillary Blood Collection

Some circumstances demand the use of skin puncture to obtain a blood specimen. Customers with extensive burns, customers who have scar tissue due to excessive venipuncture, geriatric customers with hard to find veins, and customers whose veins may be needed for intravenous medication or feeding may be among those who require an alternative method to venipuncture.

Infants, fewer than 12 months old, especially premature newborns, may be very small and the quantity of blood drawn becomes an important consideration. Blood is drawn from the sides of an infant’s heel. Quantity may also be important when drawing from young children over 12 months old, so it is necessary to use a skin puncture technique using a finger. Depending on the age, blood may be obtained from the heel or the finger.

Blood is collected in microtainers or hematocrit tubes. A retractable puncture device or a lancet is used to make the puncture. The third or fourth finger is used. The puncture is made perpendicular to the fingerprint; this allows the blood to flow more easily.

Label specimens from skin punctures as “Capillary blood”.

Source of Blood

1. Skin puncture blood is a mixture of blood from arterioles, venules, and capillaries and contains interstitial and intracellular fluids.

2. The composition of skin-puncture blood is affected by several factors:
   a. The blood flow to the skin at the time of specimen collection.
   b. The proportionality between arterial and venous blood. The proportion of arterial blood is greater than that of venous blood because the pressure in arterioles and the arterial limb of the capillaries is much greater than the pressure in the venules and the venous limb of the capillaries.
   c. The composition of venous blood in the skin. Venous blood in the skin more closely resembles arterial blood than the venous.

Order of Draw for Skin Punctures

Lavender
Tubes with additives
Tubes without additives
Criteria for Specimen Rejection

Accurate lab results depend on the phlebotomist. Proper sample collection, preservation and proper transportation of the specimen are essential.

1. **Inadequate Specimen Identification** – A tube may not be labeled or may be mislabeled.

2. **Inadequate Volume of Blood Collected into an Additive Tube** – The amount of additive placed in a tube is intended for a certain volume of blood. If less blood than required is drawn, the excess amount of additive may interfere with the accuracy of the test result. Use a smaller specimen volume tube when possible for hard sticks.

3. **Using the wrong Collection Tube** – It is important to recognize method-specific specimen requirements. The tubes are color coded. Tubes with additives should not be used unless specified on the specimen label. An additive can interfere with the analyte to be determined. An analyte is a substance undergoing analysis. Some tests are performed only on serum, plasma, or whole blood so it is important to use the proper color tube.

4. **Hemolysis** – Excessive hemolysis can result from a difficult venipuncture or improper handling of the collected specimen. Certain tests should not be performed on a visually hemolyzed specimen. Some examples of tests that will have inaccurate results from hemolysis are; potassium (K), lactic dehydrogenase (LD), complete blood count (CBC), and plasma hemoglobin.

5. **Improper Transportation** – If a specimen which should have been chilled is received unchilled, the specimen will be rejected. If a specimen was supposed to be transported to the lab “STAT”, and the lab receives it an hour later the specimen will be rejected. Rejected specimens will need to be redrawn.

6. **Clotted Specimens** – If a specimen collected in anticoagulant is not inverted between 6 and 8 times immediately after collection there may be micro-clots in the blood. If specimens drawn with a syringe are not transferred to a collection tube with an anticoagulant immediately, there may be micro-clots in the blood. These specimens will need to be redrawn.
Timed Tests:

1. **Fasting** – Some blood tests can only be performed correctly if the customer has fasted for a period of time. Fasting means no food to eat or liquid to drink, (sometimes water is allowed) for 12 hours. If the blood is drawn after the customer has eaten, substances from the food will interfere with the test results.

2. **Post-Prandial** – Indicates after meals. The most common lab test in this category is the 2 hr. p.p., which means 2 hours after a meal. Noting the exact time the blood was drawn on the specimen label is crucial.

3. **Glucose Tolerance Test -GTT**

4. **Therapeutic Drug Monitoring Test-TDM**

**Glucose Tolerance Test (GTT) Routine**

**Note:** If the patient is pregnant, this test should be ordered as a Glucose Tolerance Test Pregnancy Routine.

**PRINCIPLE:**

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Type II diabetes, the most prevalent form of the disease, is often asymptomatic in its early stages. The fasting glucose test and oral glucose tolerance test are both suitable tests for establishing the diagnosis of diabetes. The oral glucose tolerance test is most commonly used to diagnose type II diabetes in non-pregnant adults or gestational diabetes in pregnant women (Order Pregnancy Glucose Tolerance Test). A physician order for a Glucose Tolerance test is an indication that Glucola will be administered unless otherwise indicated.

**MATERIALS:**

75g Glucose Solution

**PROCEDURE:**

1. The patient should be on a full, well balanced diet (containing at least 150g carbohydrates) for 3 days prior to the test.
2. On the day of the test, the patient should be fasting (no food or beverage except water) for at least 8 – 12 hours. Patient should not be active during testing, nor should they smoke, eat or drink caffeine-containing beverages. For adults, one glass of water two hours after the glucose is ingested may be offered.
3. A fasting blood specimen (gray top, SST or Red/black tiger top) is obtained from the patient. The laboratory or glucose meter will analyze the specimen. **If the glucose value of the fasting glucose is 150 mg/dL or greater, the glucose tolerance test will be canceled and only the fasting glucose value will be reported.** This policy will prevent the unnecessary administration of an oral glucose load to a non-fasting or an overtly diabetic patient. If the glucose value is less than the above cutoff value, the appropriate dose of glucose will be given.
4. If the glucose has been determined to be within acceptable range, the patient then consumes the entire quantity of glucose solution within 5 minutes. Adult dose = 75 grams/dl = 300ml.

5. Unless the physician requests alternative times (i.e., 3 to 6 hours GTT), draw specimens at 1 and 2 hours after the glucose load. Record the exact time of collection on the tube. Specify if the specimen is fasting, 1hr, 2hr, 3hr, etc. Labels indicate the time the specimen was drawn.

6. Record all serum/plasma glucose results in the computer.

Glucose Tolerance for Children:

1. Calculate amount of glucola to be given based on child’s weight
2. Obtain a bottle of glucola.
3. Draw 5ml clotted sample and label “FASTING”.
4. Pour correct amount of glucola into a cup and have the patient drink within 5 minutes. **Note time.**
5. At ½ hour, 1 hour and 3 hour intervals - draw 5ml-clotted samples and label accordingly.
6. Children may be given water freely throughout the test.

**SPECIMEN TRANSPORT:**
Transport at room temperature.

**IN-LAB PROCESSING:**
Separate serum from cells as soon as possible unless gray top is drawn.

**EXPECTED VALUES/RESULTS:**
Reference Range for routine GTT

- **Fasting:** Less than 110 mg/dL
- **1hr:** Less than 200 mg/dL
- **2hr:** Less than 140 mg/dL

The level of glucose in the bloodstream will reach a maximum value after 30 to 60 minutes from the ingestion of the glucose solution. The blood glucose will then begin to decrease.

After 1.5 to 3 hours the level will return to the normal level.

1. The value of the different hours may fit a typical diabetic curve, hypoglycemic curve or normal curve. Other factors may influence the curves, such as abnormal thyroid function, etc., so the interpretation is left up to the physician.
2. Very low results on specimens (critical level) should be reported to the physician immediately. If the patient is feeling chills, sweats, nausea, dizziness, etc., notify the doctor and, if necessary, the Emergency Room Physician. The test may be stopped for these conditions.
Glucose Tolerance Test Pregnancy Routine

MATERIALS:
100g of glucose solution for a 2-, 3-, 4-or 5 hour- unless the physician requests alternative times.

Follow the Glucose Tolerance Test Routine procedure on previous pages.

If the glucose value of the fasting glucose is 140 mg/dL or greater, the glucose tolerance test will be cancelled and only the fasting glucose value will be reported.

EXPECTED VALUES/RESULTS:

1. Reference Range for Pregnancy GTT (100g of glucose solution)

<table>
<thead>
<tr>
<th>Timing</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>Less than 95mg/dL</td>
</tr>
<tr>
<td>1hr</td>
<td>Less than 180mg/dL</td>
</tr>
<tr>
<td>2hr</td>
<td>Less than 155mg/dL</td>
</tr>
<tr>
<td>3hr</td>
<td>Less than 140mg/dL</td>
</tr>
</tbody>
</table>

REJECTION CRITERIA:
Samples, in which serum/plasma has not been separated from the cells within 1 hour of collection, unless using a gray top tube, will NOT be tested.

Notes:
1. Timing of glucose administration and blood sampling must be accurate. The same source of blood (venous or capillary) must be used throughout the test and the same analytical method applied to each specimen.
2. Reference range is reported. The physician must interpret the test results. Many variables (i.e. age, other diseases, clinical symptoms, etc.) must be considered in making diagnosis.
Therapeutic Drug Monitoring (TDM)

These are blood tests that are drawn for determining the concentration of a particular drug at times when the medication is at the highest (peak), lowest (trough), and random concentration.

Make sure you check the exact time of collection on the requisition. The time will be in between the date and room on the top line of the specimen label. Collect blood in the correct color coded tube.

For many drugs, collecting the random level blood sample immediately prior to the next dose should be adequate for monitoring purposes. The level obtained that is the trough level would reflect the lowest concentration achieved during each dosage interval. Not all trough levels are drawn immediately prior to the next dose, so be careful to check the time the specimen is to be drawn on the specimen label. The time depends on the drug and method of administration (IV, intramuscular, or oral). Measurement of the highest drug level or peak level during a steady state phase may be warranted for certain therapeutic agents with significant potential toxicity, such as gentamicin and tobramycin.

Therapeutic drug levels should not be drawn from any type of line, because of the possible interference from residual amounts of the medication being tested for or residuals of other medications given in the line.

Pharmacy personnel will schedule peak and trough levels. Check with the RN no earlier than 15 minutes prior to drawing the drug level to make sure that the scheduled time of collection is still appropriate. You must confirm that the drug was given at the correct time. Peak and trough levels must be collected +/ - 10 minutes of the requested collection time. Document on the specimen label if the RN has changed the time.
Special situations that may be encountered during phlebotomy

There are some cases that an arm may not be used for venipuncture:

- A mastectomy was performed on that side of the body
- The arm could have or will be used for a dialysis shunt
- The arm or hand has a shunt for IV medications
- One arm may have an IV set up

Lymph nodes are removed during a mastectomy. Problems with lymphatic drainage may result in arm swelling and an increased risk for infection from trauma to the arm. In addition, there is an increased risk for blood clots in the veins of the armpit because of surgical trauma in the area.

If a vein is available below the IV site, blood may be drawn from it. Do not apply a tourniquet, since it could obstruct the IV fluid flow resulting in the rupture of the vein due to too much fluid pressure. If you notice a central line access device, check with the RN first, as many times blood can be collected from the line, preventing the patient from a needle stick. If this is the case, the RN should sign, date and initial the specimens.

Normally a sign will be posted alerting you as to which arm should be utilized. If at all possible, blood should not be drawn from above an IV site. If blood must be drawn from above an IV site follow the steps below or your institutions policy.

- Have a nurse turn the IV off
- Wait two minutes before drawing specimens
- Draw specimens:
  - The 1st specimen drawn should be labeled & marked with an “X”
  - The following specimens drawn can be labeled as usual
- After drawing the specimens have the nurse turn the IV back on
- Document the nurses name
Common Legal Issues

- **Failure to identify the patient properly:**
  - All information must match.
    - Two – Three Verbals
    - ID Bracelet
    - Requisition Form

- **Label the specimens correctly:**
  - Date
  - Time
  - Initials

- **Infections:**
  - Failure to wash hands
  - Lack of technique
  - Improper dressing

- **Failure to protect the patient from injury:**
  - Injury to vein
  - Scarring
  - Nerve compromise

*If you fail to report, then you are as guilty as the person who actually causes the issue.*
Legal & Ethical Considerations

Match:

Code of Ethics
Consent
Implied Consent
Informed Consent
Liability
Assault
Battery
Neglect
Abuse
Slander

Match the definitions with the words above.

A. The granting of permission by the patient for another to perform an act
B. Injurious, pathological, or malignant treatment of a person or living thing
C. The unlawful touching of another without consent
D. A system of moral principles or standards governing conduct
E. A voluntary agreement made by a well-advised and mentally competent patient
F. Health care providers responsibility, even if not at fault, for any harm or injury to the patient
G. The threat of unlawful touching of another
H. Verbal untruths
I. Nonverbal consent suggested by the actions of a patient
J. Failure to adhere to one of the following: duty to act, causation, and damages

Always report any deviations of the above to your immediate supervisor and follow the chain of command if your supervisor fails to act.
Safe Quality Customer Service

1. Review lab request paperwork / prescription
2. Be knowledgeable regarding requests
3. Match patient name and ID numbers with requisition form / Prescription
4. Collect equipment needed (check expiration date)
5. Know the order the tubes should be collected (Order of Draw)
6. Double check the lab labels have the correct name and ID numbers
7. Wash hands
8. Greet with a smile
9. Introduce yourself: “Hello my name is ........”
10. State your position:” I’m a phlebotomist and I’m here to draw your blood”
11. Get permission: “Do I have your permission? “
12. Check ID bracelet: “May I see your ID band?”
13. Answer any questions
14. Allow time for patient questions
15. Actively LISTEN- use eye contact
16. If patient agrees- use PPE
17. Follow your institutions policy on phlebotomy
18. Assure proper dressing of punctures site & control bleeding
19. Apply lab labels to each specimen tube
20. Label each specimen with Date, Time, and Initials
21. Close with patient: “Thank you. Have a nice day”
22. Wash hands
23. Send lab work to laboratory for processing
24. Document ( if required)
What is the first step of an actual blood draw?

_The first step is to know your equipment. This should be done prior to any patient contact. Know how to use the safety features._

1. **Vacutainer holder** – Push the tubes into the holder. When the tube is pushed into the holder the inside needle pierces the colored stopper.

2. **Syringe** – When the syringe is taken out of the sterile envelope pull back on the plunger and then push out the air. This breaks the vacuum seal. To collect the specimen pull back on the plunger and collect as much as necessary.

3. **Butterfly** – This needle could be applied to a vacutainer or a syringe. Once the needle is inserted into the vein the flaps or wings should rest on the patient’s skin. Blood is then collected.

**Notes:**

- If drawing with a syringe blood needs to be transferred into a vacutainer. Insert the needle into the tubes to be collected with anticoagulant first and allow the vacuum of the tube to draw the blood. Tubes should be collected in a specific order.
- Do not hold the tubes while you are trying to insert the needle. Tubes with additives need to be inverted six to eight times immediately, so that the additive gets mixed with blood.
- Use the safety device immediately after removing the needle from the patient’s vein.
- Always dispose of the needle into a sharps container.
Assessment

- Determine the patient's level of understanding of procedure
- Determine if special conditions are needed prior to collection
- Determine any risks of venipuncture
- Determine patient's ability to cooperate
- Identify any contraindication of venipuncture
- Review physician’s orders for types of tests

Planning

- Identify expected outcomes
- Explain procedure to the patient

Implementation

**Syringe Method**

- Prepare syringe with needle securely attached
- Clean the site with hospital approved agent
- Remove needle cover and explain expected sensation
- Pull skin taut with thumb or forefinger 1 inch below the site
- Hold syringe and needle at 15-30 degree angle and slowly insert needle into the vein
- Hold securely and pull back on the plunger, watching for blood return
- Obtain desired amount of blood

**Vacutainer/ Butterfly Method**

- Attach double ended needle to vacuum tube
- Places blood specimen tube in vacutainer, without puncturing the rubber stopper
- Follow procedure for syringe method for venipuncture
- Hold vacutainer securely and advance specimen tube into the needle in the vacutainer
- Note blood flow
Implementation Continued.....

- Remove specimen tube after filled; insert additional tubes (if necessary)
  - Release tourniquet after sample blood is obtain
  - Apply gauze over the site and withdraw needle, using safety device
  - Apply pressure on the site after needle removal
  - Discard needle without recapping
  - Transfer specimens obtained (with syringe method only) to tubes
  - Invert all blood tubes containing additives
  - Inspect puncture site for bleeding; applying additional pressure if needed
  - Clean outside of specimen tubes with antiseptic if necessary
  - Assists patient in comfortable position
  - Labels each specimen tube and affixes requisition
  - Disposes all equipment properly
  - Place specimen in bag to be sent to the lab
  - Remove gloves and wash hands

- Collecting specimens for blood culture
  - Clean site with hospital approved agent
  - Clean tips of vacuum tubes or culture bottles
  - Collect 10-15 ml venous blood by venipuncture
  - Discard needle from syringe
  - Attach new needle for transfer of blood to specimen tubes/bottles
  - Inoculate aerobic specimen first, then collect anaerobic specimen
  - Invert specimen gently
  - Apply pressure over venipuncture site and cover with gauze/bandage

Evaluation
- Reinspects venipuncture site
- Determine if patient remained anxious
- Check lab processing
- Asks client to explain purpose of test
- Identify expected outcome

Recording/Reporting
- Records procedure
- Describe venipuncture site and client response
- Reports “STAT” test to laboratory
Phlebotomy Exam

1. Which one of the following methods is the best way to confirm your patient’s identity?
   - Look at the sign on the patients’ door or above the patient’s bed.
   - Get three verbal, check the patient’s identification bracelet, and compare all this information to the requisition.
   - Ask the patient to state their name and compare this to the requisition form.
   - First collect the blood specimen, then establish patient identity, and then label with the correct preprinted computer label.

2. Which one of the following statements about blood cultures is incorrect?
   - Volume of blood collected is important. Short draws will reduce the likelihood of successfully growing out bacteria.
   - If two separate sets of blood cultures are requested, do not draw them both from the same site at the same time.
   - Be sure to allow the iodine prep to dry on the patient’s skin prior to performing the blood culture.
   - Since latex gloves are sterile, you may use your gloved finger without further preparation to feel the vein on a prepped arm before making the stick.

3. In therapeutic drug monitoring (TDM) determining the concentration of a particular drug is done by collecting two tests.
   - True
   - False

4. The angle of the needle should be inserted at an angle of between 15 and
   - 35 degrees
   - 30 degrees
   - 40 degrees

5. Which one of the following statements about heelstick is incorrect?
   - You may collect blood from any part of the heel.
   - Do not milk the heel excessively as this may cause hemolysis.
   - Do not apply an adhesive bandage to a neonate’s heel.
   - Wipe away the first drop of blood obtained to eliminate tissue contamination.
6. Name three sense of touch when palpating for a vein.
   - Depth, spring, direction
   - Bounce, depth, direction
   - Bounce, distance, depth
   - Bounce, direction, firmness

7. Hemolysis may be caused by all of the following except:
   - Applying vigorous suction when drawing blood into the syringe.
   - Inverting a blood tube too vigorously (shaking) when mixing anticoagulant with the blood to prevent clotting.
   - Forcefully expelling blood from a syringe into a collection tube.
   - Failing to invert the blood tube after collecting to mix it with anticoagulant

8. When drawing blood above an IV line you must: (Put the steps in order)
   - ____ Document the nurses name
   - ____ Mark 1st sample with an “X”
   - ____ Have the nurse turn IV off
   - ____ Have the nurse turn the IV back on
   - ____ Wait 2 minutes

9. Blood collection tubes have a premeasured __________________ that automatically draws blood into the specimen tube.
   - Additive
   - Vacuum

10. Unsatisfactory specimens may be caused by:
    - Insufficient blood volume
    - Improper labeling
    - Hemolysis
    - All of the above

11. Anticoagulants are added to some blood collection tubes to prevent ________________.

12. Which one of the following statements about fingersticks is correct?
    - Make the incision parallel, not perpendicular to the fingerprint.
    - Choose a site in the middle of the fingertip.
    - You may use the index finger or thumb of the patient’s non dominant hand.
    - Use the middle or fourth finger.
13. On an infant blood is drawn from the  ___________________.

14. What is PPE?
   - protective devices on needles
   - equipment that protects you from any blood or body exposures

15. If a patient refuses to cooperate:
   - Seek help from the nursing staff
   - Argue with patient, warning him that he is compromising his medical care.
   - Draw the blood anyhow.

16. If an ID bracelet is not on a patient’s wrist you must inform the nurse after you draw the blood.
   - True
   - False

17. Which one of the following veins is not used for routine phlebotomy?
   - Median Cubital Vein
   - Cephalic Vein
   - Dorsal veins of the hand
   - Femoral Vein

18. Clotting may be caused by:
   - Hemolysis
   - Failure to invert the vacutainer with an additive after collection.
   - Delay in expelling blood from a syringe into a vacutainer.
   - B and C

19. How many times are you allowed to stick a patient after the second attempt?
   - Two
   - Zero
   - Three

20. A shorted draw may affect the results of a test and could also be a specimen rejection.
   - True
   - False
Bibliography


