Phlebotomy
Course Guide

PhlebotomyCourse

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A phlebotomist is much more than a person who draws blood, they are an important part of a healthcare team.

1. Introduction

What does a phlebotomist do? The simple answer: phlebotomists draw blood. In reality, phlebotomists are an important part of a medical team designed to take care of people. Every medical test requires a sample, and the most common sample used is blood. Somehow, a sample of blood has to be removed from the patient and taken to the lab, and that's not as easy as it sounds. Many things have to be done right, and many things can go wrong. That sample – and all of the information a doctor may get from it – depends upon the phlebotomist. From making sure it is the right patient to making sure it is the right type of specimen, the phlebotomists' role is absolutely critical.

It's very easy to think of a phlebotomist as a person who draws blood. But in this modern world, everything we do is very specialized, and the days where a single person could do it all are gone. We can accomplish much more working as a team of specialists, each one mastering a specific skill. As a doctor, I am completely dependent on phlebotomists, nurses, lab techs, and all of the other essential parts of the machine that allow me to do my job. None of us can do it all alone. A skilled phlebotomist in a hospital setting makes a difference in the lives of dozens of people, every day.

In order to function as a part of a healthcare team, phlebotomists must follow the procedures of the system in which they work, every time.

2. How It All Works

Phlebotomists are an essential part of laboratory medicine: using tests to try to figure out if something is wrong with someone, and if so, what. Laboratories are a part of the healthcare system. Understanding how it all fits together is very important.

Doctors use labs in many ways. The most important use for lab tests is to try to figure out what might be wrong with someone who doesn't feel well. But sometimes tests are used to be sure nothing is being missed, and sometimes tests are used to figure out if someone is at risk for developing a disease later on. In any case, getting the right answer is essential; getting it wrong means we – as a team – will do the wrong thing for that patient.

In the United States, everything related to healthcare is regulated by laws and rules that are intended to protect patients and assure that they get the best care. This includes all laboratories, no matter how big or small. Sometimes, these laws and rules can seem picky or unnecessary, but they all have important reasons behind them. Patients come to us in order to stay healthy or to get better; it is our duty to treat them all as we would our own family members, and try our best to prevent errors.

We are all human, and humans make mistakes. People making mistakes is the number one cause of error in the healthcare field, and laboratories are no exception. Some mistakes are small – like misspelling a name – and may just be minor annoyances. Some mistakes are big – like labeling a sample with the wrong patient's name – and can literally be *deadly*. Every year, people in the US die from being transfused the wrong type of blood, and the most common reason is a clerical error.

The best way to prevent errors is to have a process, and follow it carefully, every time. Errors usually happen when we rush or skip steps, steps that are put in place deliberately to prevent errors. All of us involved have to do the same thing, every time. Each patient deserves the same level of care. Sometimes, particularly in a large hospital when things may be hectic, cutting a corner to be able to go faster may seem like a good idea, but it never is. Every step, every time.

We call these steps a *procedure*, and all laboratories are required to have them for everything they do.

Phlebotomists may be part of the laboratory staff, but they are also part of a patient's healthcare team.

3. People

The most important parts of any medical office or hospital are the people that work there. No matter how expensive or fancy the building or equipment, nothing works without people. In the United States, the care of any patient is ultimately the responsibility of a licensed medical doctor (MD) or a Doctor of Osteopathic Medicine (DO). Nurse practitioners or physicians assistants may see and even treat patients independently, but they always have a supervising physician that is ultimately responsible for what happens to that patient.

Laboratories are no different. Every lab must have a laboratory director, and that director has to either be a medical doctor, or in some cases (typically large university hospitals or reference labs) a doctorate level degree, such as a PhD. In outpatient offices, the medical director is often one of the physicians who has chosen to oversee the lab. In hospitals, the medical director is usually a *pathologist*. Pathologists are medical doctors that are trained specifically in laboratory medicine (not to be confused with a forensic pathologist, as is popular on TV; forensic pathologists are trained in the laboratory science relating to the courts and criminal law).

If you are beginning work as a phlebotomist, find out who the medical director is, and meet them. In the eyes of the law, they are your boss, but it is also their responsibility to know who you are, and to be aware of what you are doing. Remember that the patient's care is their responsibility, so if there is something that is not right, they can be held accountable. This doesn't mean that they are responsible if you make a mistake; they are responsible for making sure you have everything you need to do your job properly. For example, if there are not enough phlebotomists in a hospital to be able to do the work that is asked of them while following all of the steps in the procedure, the laboratory director needs to know. If at any time you have questions about something in the procedure, it is important to ask why things are that way; sometimes the reason is not obvious. Sometimes, there is a better way.

Don't be afraid. Meet them. Ask questions. You are part of a team!

Phlebotomists must always be familiar with and strictly follow the procedures in the procedure manual for their laboratory and care center.

4. Procedures and Procedure Manuals

It doesn't matter if the tests will be performed in a small lab in a family practice office, in a large hospital lab, or if the samples will be sent to a state-of-the-art reference lab; every patient and every test should be treated with the same care. Every step is planned out, and each has a reason why things are done that way. We call this a ***procedure***.

The steps for drawing blood may vary from place to place, and each place has a ***procedure manual*** that describes these steps in detail, as well as all of the other things that happen in that lab. This manual is supposed to be so detailed that a person can walk into the lab for the first time, read through the steps, and be able to properly do any task that is done at that location.

Before working in any new setting, a phlebotomist should read through the procedure manual and get familiar with the way things are done at that lab.

Don't be afraid, ask questions. You are part of a team!

Every lab and everyone working in a lab that takes care of human patients in the US must follow all applicable government regulations.

All labs must be inspected to ensure they are following all of the appropriate rules, every time.

5. Inspections

Every laboratory, whether in a small office or a major academic hospital, has to be inspected. These inspections are designed to assure that patients are receiving quality care. During an inspection, a person or team will go through the policies and procedures of a lab and all of its services (including phlebotomy) to see if there are any problems with the way things are done. Labs are given the expectations, such as how patient specimens are identified, or what documentation needs to be performed and at what interval. During an inspection, a phlebotomist may be asked to explain the various procedures that are to be followed in doing their job. An inspector may ask to observe the phlebotomist at work to be certain that they are actually doing things the way the procedure manual says they are supposed to be done.

The Center for Medicare and Medicaid Services (CMS) regulates all laboratory testing performed on humans in the United States through the Clinical Laboratory Improvement Amendments, or CLIA, a federal law that was originally passed in 1988. The law extends to all lab tests performed on people in any setting. Some states have additional regulations that are stricter than the CLIA regulations.

Many labs are inspected by the College of American Pathologists or CAP. Other important agencies that oversee laboratories or workplaces in general include the Clinical Laboratory and Standards Institute (CLSI), the Joint Commission (TJC), the Occupational Safety and Health Administration (OSHA) and the Center for Disease Control (CDC).

Always treat every patient with kindness and respect.

6. Caring for the patient

Always treat a patient the way you would want to be treated. Sick patients usually don't feel well. People that don't feel well may not be in a very good mood (and it seems some people are never in a good mood). Despite the fact that the phlebotomist needs to get a sample for the lab, they are still caregivers. Sometimes it's not easy to be in a cheerful and caring mood, especially when your patient is angry. But the importance of that interaction shouldn't be ignored: think how you would feel if someone woke you up in the middle of the night to stick you with a needle when you are tired and sick and in pain. But the labs need to be done, and a calming, caring person with the skill to do so quickly, properly, and with minimal discomfort goes a long way to helping that person get better.

Human interaction is extremely important, almost as important as water or food or shelter. The phlebotomist is often the only member of the laboratory staff that interacts with patients. The reality of overburdened healthcare systems often means that the staff has little spare time for simple communication. This is beginning to change: we are recognizing the tremendous benefit of caregivers connecting with their patients. We now consider the act of engaging patients and their family members or caregivers as an important part of a phlebotomists job. Patients need to know that the healthcare team genuinely cares about them, and the phlebotomist plays a critical role in this understanding.

Phlebotomy In Room

Phlebotomy In The ER

Phlebotomy In Draw Room

Always respect every patient's privacy, no matter how trivial it seems.

7. Patient Privacy

When you are sick, you are not at your best, and patients deserve to keep this difficult time to themselves. Maintaining patient privacy is absolutely essential, and it is also required by law. The Health Insurance Portability and Accountability Act of 1996, HIPAA or "hip-a" as it is said, set new standards for the protection of patient privacy. For example, someone who knowingly acquires or discloses individually identifiable patient information could be subject to a year in prison and a fine of up to $50,000. In other words, patient privacy is very important! It is both unethical and illegal to look up information about a patient when it is not required to care for them, or to tell someone else something about a patient. As a member of the healthcare team, you will see people you know. You absolutely must keep *all* information about them – no matter how trivial it seems – confidential. You cannot even reveal that you saw them at the hospital or an office; *everything related to a person going to the doctor must remain completely private*.

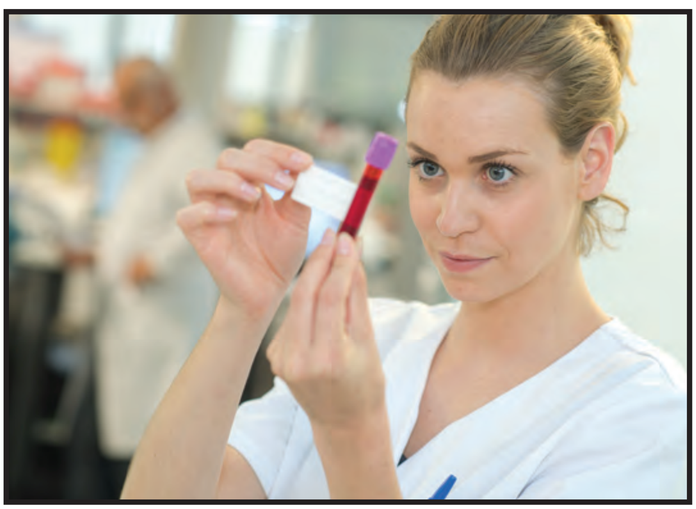
8. Patient Identification

Making sure that we know who is who is absolutely critical, and this is without doubt the most common source of serious or even deadly mistakes. Patient identification is the most important thing we do, and preventing mistakes requires absolutely continuous effort. We are all human, therefore it cannot be overstressed that we do the same things, every step, every time.

Patient samples must be labeled at the time they are drawn, *but not before*. Labeling tubes prior to arriving at the bedside may seem like a good idea, especially if you are the type of person who likes to plan ahead and be prepared. But grabbing the wrong pre-labeled tubes is possibly the most common way people make serious errors in patient identification. I have personally seen this lead to horrible, irreversible mistakes. I have seen techs, nurses, and doctors make this error. If patient identity is confused with blood bank samples (which are used to figure out what type of blood to give to a patient) the error can be fatal.

A patient's name usually seems unique; what are the chances two patients with the same name are being seen at the same time? You would probably be surprised! It is not uncommon for family members to go to the doctor together. A big hospital will have thousands of patients in their medical records. For this reason, it is important to use ***two*** identifiers: the full name and some other identifying information, usually a birthdate or medical record number. Two separate identifiers is typically required by the lab or the specimen will be rejected. Having a specimen rejected when it is submitted by someone who is not from the lab and may not have been taught the importance of patient identification is not uncommon; phlebotomists should know better!

Always label every tube at the bedside with two identifiers, carefully, every time. And double check – ask the patient again to state their name. Yes, it seems silly, but it is a sign of quality, of going the extra mile to be sure you are giving the patient the best care possible. It is the way *you* would want to be treated!



9. Medical terminology

The human body is very complex, and that means we have a lot of complex terms to be able to communicate about all of the systems and processes that we are working on. When I first began practicing medicine, I was very nervous and even embarrassed if I didn't understand what someone was talking about. I felt like asking a question meant I had missed something in school, or maybe I just wasn't very smart. No one knows it all. The first thing I did when I started working on this course was go to phlebotomists and ask them questions, because they know much more about phlebotomy than I do! Never be afraid to ask someone to explain what they meant or said. The most important part of any healthcare team is communication.

Many medical words came from Latin, the idea being that we needed to be able to communicate about disease all over the world. But unless you happen to speak Latin, most of these terms will literally be a foreign language. To make things worse, there are many trade names of drugs or equipment that get mixed in, and then there are numerous abbreviations.

Trying to provide a complete vocabulary list here is pointless; there is no way to predict the terms you will need to learn as you go forward. Instead, adopt a strategy that will work, no matter what: when you read or hear a word you don't understand, ask, or look it up. At the beginning, you are going to ask a lot of questions and look up a lot of stuff. But over time, this will happen less and less, though it should never stop. The best never stop learning!

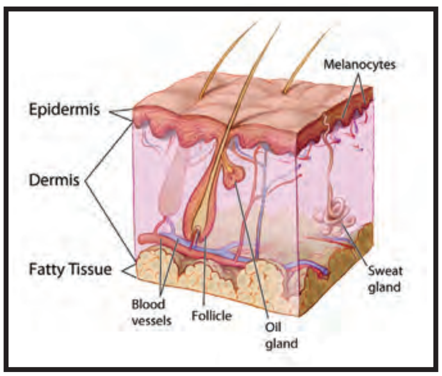
10. Important terms and concepts

Cell
the body is made up of cells. Each cell is a specialized, “living” thing with a particular function. The cells work together in a coordinated fashion. We are all multicellular beings.

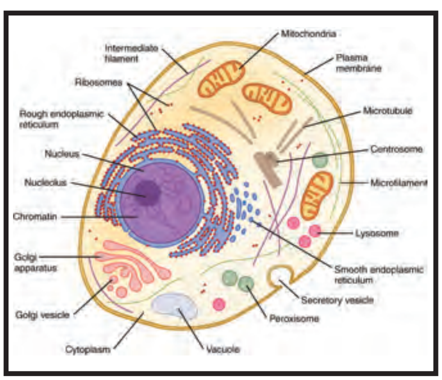
Tissue
a collection of the same types of cells. For example, muscle is a tissue; muscle is made up of a collection *myocytes*, or muscle cells. Fat is a tissue called *adipose* tissue. It is a collection of fat cells.

Organ
an organ is a group of cells and tissues that put together and work together in a way that serves a special function. They are organized to do a job. For example, the heart is made of special muscle cells and fibrous connective tissue and nerve fibers and blood vessels, all put together in a special way and working together in a special way in order to pump blood around your body.

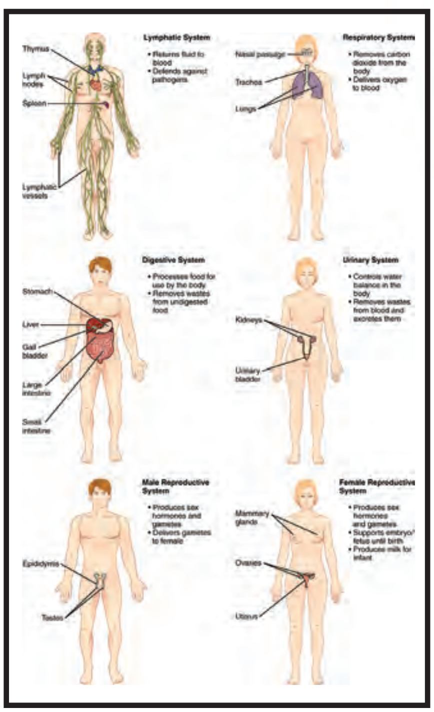
System
a collection of organs that work together.



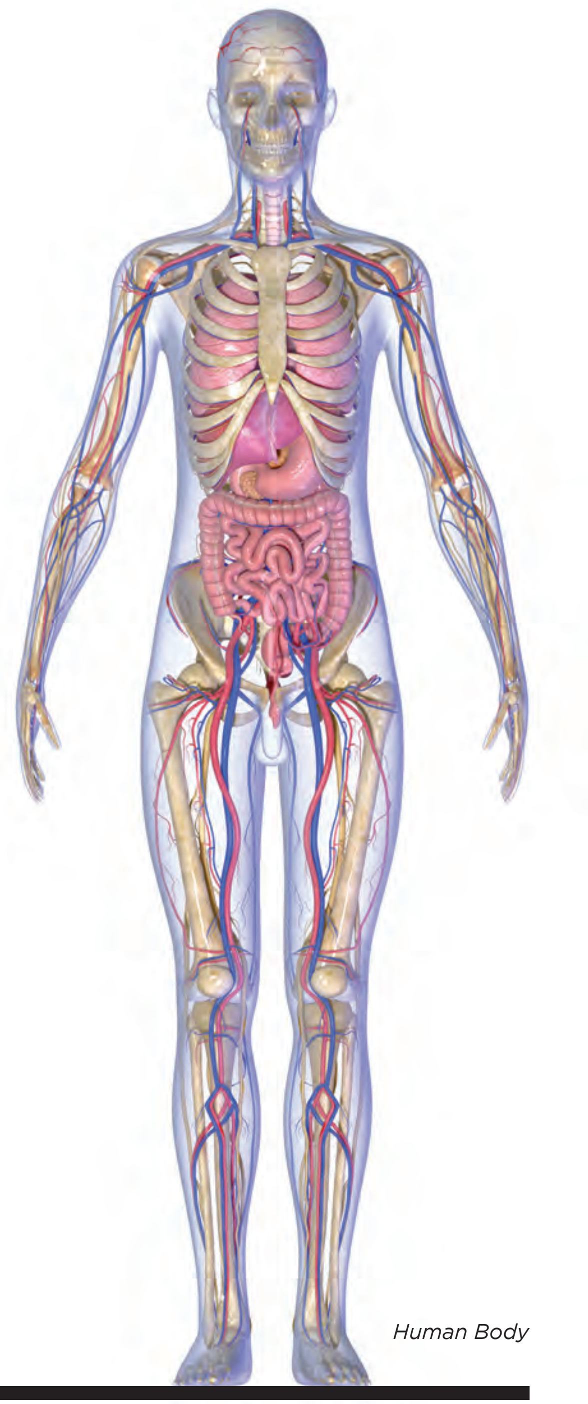
Tissue



Cell



Organs



Human Body

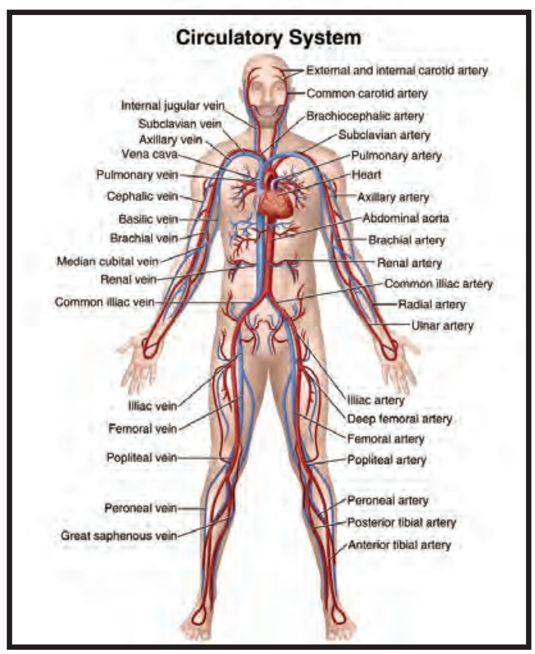
11. Circulatory system

Consisting of the heart and all of the blood vessels, this is the system that moves blood around your body. Blood is pumped by the heart. Blood flows to the lungs to get oxygen and release carbon dioxide. It is then pumped to the body to deliver the oxygen to those cells. The circulatory system has many other functions, and is the primary way our systems are all connected together.

Lungs
provide oxygen to the blood. Oxygen is bound to a special protein called hemoglobin in red blood cells, which can then be taken all over the body. Blood also allows the removal of carbon dioxide. (*Pulmonary* means related to the lungs)

Heart
pumps blood first through the lungs (pulmonary circulation) then to the body.

- **Arteries**
  blood vessels going away from the heart; the first and largest artery is the aorta. The aorta splits into smaller and smaller arteries – arterioles – taking blood all over the body in smaller and smaller tubes until these tubes are so small, the red blood cells can only fit through one at a time (capillaries).
    - Arteries carry oxygenated blood (which is bright red).
    - Because arteries are closer to the pump (the heart), the blood is under higher pressure; bleeding from arteries is more severe than bleeding from veins.
- **Capillaries**
  These tiny blood vessels are the smallest in your body, so small that only a single red blood cell can fit through at one time. This is where your red blood cells deliver oxygen to the body's cells and exchange it for carbon dioxide.
- **Veins**
  blood vessels taking blood way from the cells and tissues of the body, and back to the heart.
    - Veins carry deoxygenated blood (which is darker, reddish brown).
    - Veins have lower pressure than arteries.
    - Because the pressure is lower, *veins have valves to keep the blood flowing in the correct direction*. This is important for a phlebotomist to know, since those valves can be a problem when trying to draw blood.



Liver
large organ in right upper quadrant of the abdomen; "detoxifies" the blood by breaking down or metabolizing many compounds including medicines (and alcohol) into "metabolites" that can be removed from the blood.

Kidneys
a pair of organs located in the back of the abdomen on the right and left sides; these filter the blood and remove waste products from cell metabolism. After the liver breaks down things like medicines, the kidneys can filter these things out of the blood. This filtered waste is urine.

12. Blood

The complex fluid that is inside your circulatory system; the main purpose of blood is to move things (especially oxygen) to the all of the cells of the body, and to remove all the waste that is made. For example, inhaled oxygen is moved from the lungs to the cells, and carbon dioxide is moved from the cells back to the lungs to be exhaled.

Red blood cells
specialized cells in the blood that carry oxygen from the lungs to the cells and carbon dioxide from the cells to the lungs. Red blood cells contain hemoglobin.

- **Hemoglobin**
  a protein found inside red blood cells that can bind oxygen or carbon dioxide. This is the protein that gives blood its red color. When oxygen is bound, the molecule is bright red. When there is no oxygen bound, the molecule is a darker, brownish red.

Hematocrit
the percentage of the blood made up of red blood cells.

Plasma
the fluid part of blood after removal of the blood cells; this is what the red cells "float" in. Plasma contains many different proteins, including those responsible for making the blood clots when a blood vessel is damaged: clotting factors.

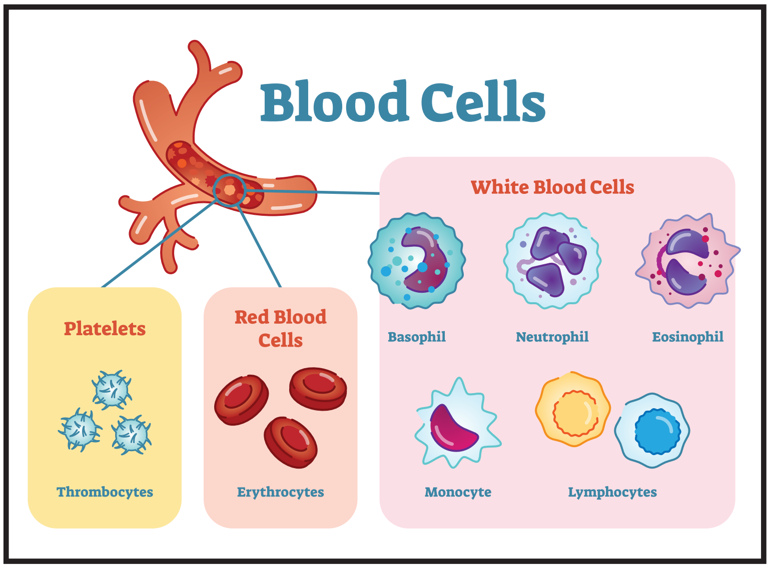
- **Clotting factors**
  specialized proteins that make blood "clots" or coagulate to stop you from bleeding if a blood vessel is damaged. These clotting factors are turned on or "activated" when they come in contact with things that aren't usually in the blood vessels – like the metal or plastic of needles or tubing that a phlebotomist uses to draw blood.

- **Anticoagulants**
  chemicals that prevent the activation of clotting factors to keep blood in a fluid form.

Serum
this is the fluid part of blood after removal of the cells, and after the plasma proteins have completely clotted and also been "separated" from the fluid.

White blood cells
specialized cells in the blood that fight infection.

Platelets
specialized cells in the blood that coordinate the formation of blood clots. When you get a cut, platelets are "turned on" or "activated" and start the process of coagulation by plasma clotting factors. The clotting factors become like mortar and the platelets themselves act like bricks, holding together a temporary plug in the blood vessel wall to minimize bleeding.



13. Metabolism

The complex chemical reactions that living organisms use to make energy.

Aerobic metabolism
a process of chemical reactions to make energy that require oxygen. The process breaks down or “burns” carbohydrates and releases carbon dioxide.

Anaerobic metabolism
a process of chemical reactions that makes energy without using oxygen. Typically, an acid such as lactic acid is made. In an organism that usually uses aerobic metabolism (like you), this acid buildup limits the use of this type of metabolism.

14. Hemolysis

Hemolysis is the damage or rupture of red blood cells, allowing the contents of the red cells to spill out into the fluid portion of the blood, including the hemoglobin molecules and other chemicals such as potassium. Some diseases cause hemolysis inside the patient, but hemolysis can also occur during the phlebotomy procedure or after the sample is drawn. Because hemoglobin has a reddish-brown color, the plasma from a hemolyzed will appear reddish-brown, depending on how much hemolysis has occurred.

The presence of hemolysis in a sample can interfere with some laboratory tests. There are many diseases that can cause hemolysis, including problems with transfusions. Also, hemolysis can occur with poor phlebotomy technique, potentially leading to confusing laboratory results. Proper phlebotomy procedure is designed to prevent hemolysis, which is another reason we must do all of the same things, every time.

15. Laboratory medicine

Medical tests are used to try to determine if a patient is healthy or not, and if not, what might be wrong. There are literally hundreds of medical tests available. Deciding when to do what tests – if any – is one of the more difficult parts of healthcare. Despite the variety of tests, there are some basic principles that apply to all of them:

- **Normal or "reference" range**
  this is the expected result in a normal person. Sometimes there are differences with age or sex. Normal ranges are determined by performing the test on a large number of "normal" patients. Sometimes this is done by the manufacturer of the test equipment (the "manufacturer's" reference range") and sometimes it is determined locally by the lab running the test. A result that is outside this normal range is considered an "abnormal" result, but this does not guarantee the patient has a disease; there are possible errors from every type of test. The results of laboratory tests must always be correlated to the patient's condition. If they don't make sense, they should be questioned and possibly repeated.
- **Types of errors**
  understanding how things can go wrong with lab tests is important to try to minimize these errors:
  - **"Pre-analytic" errors**
    these are errors that occur before the test is run. These are the errors that careful phlebotomy procedures are designed to prevent. The importance of following these procedures cannot be overstated: laboratory errors – particularly identification and labelling errors – can lead to misdiagnosis, mistreatment, or even death of the patient.
    - **Patient identification**
      drawing blood from the wrong patient. Always ask the patient to tell you their name and birthdate before every draw. If the patient is in a hospital or unable to communicate, double check the information on the patient's hospital ID bracelet.
    - **Specimen labelling**
      blood is drawn from the correct patient, but the wrong patient name and identifying information is put on the tube(s). Never pre-label tubes.
      - Always use first and last names, plus another identifier such as a birthdate or medical record number.
      - Write legibly; sloppy handwriting can be misread.
      - When applying a printed label, do not cover any hand-written information with the label.
    - **Improper technique.**
      - Drawing the wrong type of tubes needed for testing.
      - Drawing the tubes in the wrong order.
      - Poor cleaning of the puncture site.
      - Poor venipuncture technique.
      - Improper handling of the specimen after draw
        - Failure to properly mix the sample (depends on the type of sample).
        - Stored in the wrong manner or temperature.
        - Delay in specimen reaching the lab.

- **Analytic errors**
  these are errors that happen during the actual testing of the sample. It is the responsibility of the lab to assure that all of its policies and procedures for the testing process are followed.
- **Post-analytic errors**
  these are errors that happen in the reporting of the results back to the medical team.
  - **False positives**
    if a test result is abnormal (out of the reference range) but the patient does not have a disease, this is called a "false positive" result. For example, a specimen in which the red blood cells are damaged or "hemolyzed," potassium from inside the cells is released, causing an increase in the measured level of potassium in the sample. The lab test is abnormal – elevated potassium – but the patient does not actually have this condition.
  - **False negative**
    if a test result is normal but the patient actually has a disease that the test is intending to identify. For example, someone is infected with a virus, but the test for that virus is negative because there is too little virus to detect, or the patient's immune system is not responding to it a normal fashion.

Today, we typically want everything now, but some tests and some situations are more critical than others. The time it takes to perform a laboratory test is referred to as the "turnaround time", or TAT. When results are needed urgently, a "short turnaround time" or STAT test may be requested. Regardless, our policies and procedures should never be compromised, or we risk the safety of our patients. We are all more likely to make mistakes if we are rushing.

Medical laboratories are broken down into four main areas: chemistry, hematology, microbiology, and the blood bank.

16. Chemistry

Blood chemistry tests are useful for telling us about many of the processes going on in your body. Routine chemistry tests assess a patient's basic metabolism. They can be used to tell if a patient is dehydrated or if certain organs or systems are working as they should.

The most common chemistry tests are made up of a small group or panel of tests called a *basic metabolic panel*. This panel contains measurements of the most important electrolytes in the blood.

The electrolytes (and their chemical abbreviations) are:

- Sodium (Na+)
- Potassium (K+)
- Chloride (Cl-)
- Bicarbonate (HCO3- or CO2).

These are indicators of a patient's metabolic status, and it is useful to have them all together. Changes in one often go along with changes in the others, depending on the underlying problem. Other common tests that are routinely included in the initial evaluation or a patient are:

- Glucose
- Blood Urea Nitrogen (BUN)
- Creatinine

Different institutions will sometime have different "panels" and jargon they call them, but "CHEM7" or sometimes a "CHEM6" (leaving off the creatinine) is fairly common.

Beyond these basic tests are literally hundreds of other chemistry tests that can be performed in a lab, including numerous specific proteins or hormones that are intended to help figure out the huge variety of things that can go wrong in the human body. Learning what they all are is not necessary, but here is a list of a few worth mentioning:

- **T4, TSH (thyroxine; thyroid stimulating hormone)**
  these look at thyroid function. The thyroid is responsible for regulating your body's metabolism.
- **Hemoglobin A1c**
  this is used to tell how well the blood sugar of a patient with diabetes is controlled.
- **AST, ALT, ALP (aspartate aminotransferase; alanine transaminase; alkaline phosphatase)**
  these are commonly used as liver function tests. They are used by the liver to break down toxins, and they are increased in the blood when there is damage to the liver cells.
- **Troponin**
  this is an important test for doctors because it is very useful in helping to tell if a patient is having a heart attack (reduced blood flow to the heart muscle). Troponin is a special protein that is only found in heart muscle, so finding it in increased amounts in the blood strongly suggests that there has been damage to those cells. Getting the results of this test quickly can literally be life and death.

17. Hematology

The hematology lab performs tests that look at the cells in the blood:

- **Red blood cells**
  carry oxygen
    - Contain hemoglobin, the protein that binds the oxygen.
- **White blood cells**
  fight infection
    - **Granulocytes**
        - **Neutrophil**
          fight bacteria
        - **Eosinophils**
          involved in allergic reactions and certain infections
        - **Basophils**
          also involved in allergic reactions
    - **Lymphocytes**
      often associated with viral infections
- **Platelets**
  blood clotting

The most common tests are those for hemoglobin and hematocrit, sometimes referred to as an "H and H." Elevated white blood cell levels may be seen with infections or inflammatory conditions, but they can also be seen in neoplastic conditions. Neoplasm or "new growth", is a term that is often used to indicate cancer. Cancers of white blood cells include leukemia and lymphoma.

Hematology tests can help diagnose very serious diseases with very different treatments, so getting the right answers is extremely important.

18. Microbiology

The role of the microbiology lab is to identify microorganisms – "germs" – that may cause disease. The most common way to do this is to culture or grow the organism in the lab. A major problem is that there are microorganisms literally everywhere around us, including on and inside all of us. So, culturing the right ones can be a challenge. Organisms that are normally present are called "normal flora." Some normal organisms can cause disease in certain settings, such as a patient with a weakened immune system. Some organisms are never considered normal; we say these are "pathogenic" because finding them always suggests the patient has an infectious disease.

Common organisms seen in the microbiology lab include:

- **Bacteria**
    - Staphylococcus species; "Staph" infections
    - Streptococcus species; "Strep throat"
    - Salmonella
      infectious or "pathogenic" bacteria that affects the gastrointestinal tract.
- **Fungi or fungal infections**
    - Candida species
      common normal flora, can cause "yeast" infections
    - Aspergillus
      pathogenic fungus that can cause pneumonia

Not everything that can be infectious is easy to culture, and cultures take time to grow. Bacteria and fungi can grow and reproduce on their own in the right conditions. Viruses reproduce by hijacking your own cells and using different systems inside to make copies of itself. They cannot grow alone, making them very difficult to culture. We often diagnose viral infections by looking for the body's response to the virus.

When we are exposed to something foreign like a virus, our white blood cells make antibodies to that virus. An antibody is a special protein that is designed to bind to a very specific thing, like a key in a lock. It then stimulates the white blood cells to eliminate the threat. Testing a patient's blood for antibodies that bind to a specific virus can help determine if a patient has a particular infection. We can do this for a number of infections that are difficult to culture, like tuberculosis or human immunodeficiency virus (HIV).

The newest and fastest growing way to look for infectious organisms is to look for the genetic material or DNA specific to that organism. We can even look for the genes that make a microorganism resistant to different treatment, such as "methicillin-resistant Staph aureus" or MRSA. MRSA is a type of bacteria that is commonly found in the environment but has acquired a method to make it immune to many antibiotics. It is therefore very difficult to treat. Finding these troublesome organisms early is important both in treating the affected patients and in preventing spread.

When a microorganism is identified, additional testing can be done to help doctors know what drugs to use to fight that infection. Antibiotics are drugs that kill bacteria, and antibiotic susceptibility testing determine if a bacteria is susceptible or can be killed be stopped by particular medicines.

19. Blood bank

The blood bank represents the one area where the laboratory is directly involved in treating patients: we give components of blood to patients when they need them. Giving these products always has some risks, and it is our job to try to minimize these risks. For example, if a person loses too much blood – especially the oxygen-carrying red blood cells – they can die. But giving a patient incompatible red blood cells can also kill them. Doing our jobs right in the blood bank is literally life or death, and that job begins with phlebotomy.

There are two critical tests drawn by phlebotomists that are used by the blood bank: the type and screen, and the crossmatch. In both of these (as in all of laboratory testing), patient identification and specimen labelling are critical.

- **Type and screen:**
  this sample is used to tell what blood type a patient is (A, B, AB, or O), and to screen their serum for unusual antibodies that could cause the patient to react with red cells in an unexpected way.
- **Crossmatch:**
  before red blood cells are infused into a patient, the patient's serum is mixed with a small sample of those red blood cells to be sure they are compatible.

Thus far, we have been unable to synthesize components of blood such as red blood cells. So, blood products come from companies like the American Red Cross who coordinate people to donate blood, and then separate the whole blood into its different parts. These products are:

- **Red blood cells**
  carry oxygen
- **Plasma**
  contains all of the important proteins in the blood, including those used to make blood clots: clotting factors.
- **Platelets**
  small cells that coordinate the formation of blood clots.

20. Putting it together

There is some biology that is helpful for a phlebotomist to understand. Most likely, you already learned these things in school, but sometimes learning things in a classroom is not the same as using them in real life (which is why you will have to actually stick needles into people to master phlebotomy!) Understanding these basics will help you see why we might do things a certain way.

Because the body is very complex, we have a bunch of very complex names that we have given to all of the different stuff that makes you up. We are not going to use them here; knowing terms like "stratum corneum" is not going to make you a better phlebotomist. We are going to talk about what is going on in plain English.

Before a needle can go into a person's vein, it has to pass through the skin and the tissue underneath. Your skin is made of layers, and it is designed to protect you from the outside world. The tissue underneath is called "connective tissue" and is a support network that "connects" everything together.

That connective tissue is different in different people. Young people have very supple or "elastic" connective tissue, but this tissue tends to become stiffer and also more fragile as we get older. Some people have more fat under their skin than others. This also affects how the tissue feels, and how deep veins may be below the surface of the skin. The deeper the veins are beneath the skin, the harder they are to see and feel. That feel is very important to a phlebotomist, because sometimes our eyes can deceive us.

The skin itself is made of three layers: a basal layer at the bottom (or base), a living layer of cells in the middle, and a layer of dead cells on the top; the technical terms for these layers are not important to know. Your skin is constantly growing, slowly replacing itself from bottom to top as the surface gets worn away during day to day life. It takes about two weeks to completely replace your layer of skin.

The bottom layer is where the skin cells divide to make the new skin cells. In the middle layer, the cells stick together with water-tight bonds. As they continue to move upward, they eventually die and form a protective seal over your entire body. This is the part of your skin that has no feeling – you can slip a needle under this surface part without it hurting. This is also the part of your skin that makes up the top of a blister; continuous rubbing can split the top of the skin free from the layers below, and fluid collects under the water-tight surface. The top of the blister doesn't hurt, but if the covering pops, the deeper skin is raw and painful.

No matter how clean we happen to be, our skin has bacteria living on it. These bacteria can't get into the deeper tissue, so long as that protective skin layer stays intact. But by taking a needle and putting it into the skin, it is possible to push bacteria into the connective tissue below. This is why we clean the skin prior to drawing blood. For a healthy person with a normal immune system to fight infection, this is not a big risk. But for a sick patient that may be too weak to fight off the bacteria, it can be very dangerous, and you may not be able to tell who is at risk. Cleaning the area where the needle will go through the skin is very important to prevent harm to your patient.

Cleaning the skin is important to prevent infection, but there is one test where it is absolutely critical: drawing blood cultures. A culture is test that we use to see if bacteria or some other microorganism is causing an infection. *A blood culture* is used to see if there is a microorganism growing in a person's blood, a condition that is very, very serious. A healthy person has sterile blood – nothing is living or growing there. By culturing the blood, we can try to see if something is living in there, and if so what is it and how can we treat it. *If a patient's skin is not properly cleaned before drawing a blood culture, bacteria from the skin will contaminate the culture, making it look as if they are coming from the blood itself*. This is called a "false positive" – the test is positive (bacteria grows in the culture) but the patient doesn't really have a disease.

Because bacteria in the blood is such a dangerous condition, doctors react very seriously to anything that says this might be the case. Also, it may be very difficult to sort out what is wrong with a very sick patient. A false positives blood culture can lead to a patient getting powerful drugs that they don't need, drugs

21. Safety - Infections

Some patients are seen when they are completely healthy, such as at a routine checkup. But many patients are ill, and infectious diseases (like influenza) are common. An important aspect of any healthcare provider's job is to prevent the spread of infection, whether that is from patient to patient, from patient to healthcare worker, or even from the healthcare worker to a patient. But it is equally important for healthcare workers to be protected against contracting an infection from a patient. Understanding possible routes of transmission is important for preventing spread for everyone involved.

- **Contact transmission**
    - **Direct physical contact**
      This can be skin (handshake) or require exchange of body fluids (kissing, sexual intercourse).
    - **Indirect physical contact**
      This involves an intermediate object; a door knob, a pen, a telephone. An infected individual touches the object, which is then touched by another.
- **Droplet transmission**
  infected droplets, usually secretions from the upper airway or mouth, are spread a short distance through a sneeze or cough, and are then inhaled or come in contact with a mucous membrane such as nose, eyes, or mouth.
- **Airborne transmission**
  some infections can be spread in very tiny particles that stay suspended in the air and can travel long distances such as across a room. Special room ventilation is required in some infections (such as tuberculosis) to prevent airborne spread.
- **Other forms of transmission**
  Infections can also be transmitted in food or water, devices or equipment. Some infections can be transmitted by a vector such as a mosquito (malaria) or tick (Lyme disease).

22. Safety - Isolation procedures

Isolation procedures or precautions are various levels of restrictions placed on the type of contact allowed with patients to prevent the spread of infection. The Center for Disease Control (CDC) publishes a manual called "Isolation techniques for use in hospitals" to detail these procedures. There are seven categories which are applied depending on the risk of transmission and the type of infection or spread.

- **Strict isolation**
  Highly contagious diseases. All personnel must wear gloves, mask, and gowns. All items going into the room must be left in the room, including disposal of items directly into biohazard containers.
- **Contact isolation**
  Highly contagious diseases spread by direct contact. Personnel must wear gloves, mask, and gown.
- **Respiratory isolation**
  Infections that can be spread by droplet transmission. Personnel must wear masks. All supplies must be disposed of within the patient's room (biohazard container).
- **AFB isolation**
  For patients with infectious tuberculosis (or acid fast bacillus). Personnel must use special masks – high-efficiency particular air (HEPA) masks – with gowns and gloves. All supplies must be disposed of within the patient's room in a biohazard container.
- **Drainage or secretion isolation**
  For patients with open wounds, skin infections, or burns. Personnel should wear gowns and gloves at all times.
- **Enteric isolation**
  Enteric pathogens infect your gastrointestinal track, typically cause diarrhea, and are transmitted by ingestion (through the mouth). Personnel are required to wear gloves, mask, and gown. The patient's bathroom facilities should not be used by anyone other than the patient. All supplies should be disposed of in the room.

23. Safety – Standard precautions

During the 1980s, the CDC developed a set of precautions designed to help prevent the transmission of infections such as HIV and viral hepatitis to healthcare providers. All workers were to assume that any patient could be a source of infection and treat each encounter with the same careful procedures. These became known as universal precautions.

Because there was confusion relating to these universal precautions and the body substance isolation procedures, the systems were combined into a single set of precautions to be used with all patients: standard precautions.

Precautions apply to:

- Blood.
- Body fluids and secretions (except sweat).
- Non-intact skin.
- Mucous membranes (i.e. mouth, nose).

There is now a second tier of precautions that are used when it is known (or suspected) that a patient has a highly-transmissible infection like HIV: transmission based precautions.

24. PPE: Personal protective equipment.

This is safety gear worn by a worker to prevent the risk of infection. PPE includes gloves, masks, gowns or aprons, eye or face shields, etc. There will be some variation on the location and style of PPE at each different hospital or office, so it is important to familiarize yourself with what is used and how to use it effectively (such as, which side of the mask goes against your nose and mouth, and which side out).

- **Gloves:**
  gloves are worn in specific circumstances to prevent the risk of infection from coming into contact with blood or body fluids. They also reduce the risk of a healthcare worker transmitting an infection to a patient.

Hand washing:
Washing the hands is one of the easiest and most effective ways to keep from spreading infections. To be effective, it is not a quick splash and dry as may be done at home. There is a proper technique for carefully washing all of the different surfaces of each finger and the entire palm and back of each hand, similar to the process a surgeon uses when preparing to operate. Despite the use of soap, it is the friction of rubbing the hands together (or with a special sponge or brush) that does the work. This process should be reviewed during the practical portion of your training.

Hands should be washed before and after every patient contact.

Fresh gloves are also used with every new patient contact.

Masks are worn in all isolation situations, with HEPA masks if there is any possibility of tuberculosis.

25. Getting ready.

To obtain a sample, a phlebotomist needs to:

- Identify the patient and introduce themselves.
- Explain to the patient what they are intending to do.
- Decide on the best method and equipment to use to get the needed sample.
- Find an optimum site to draw the sample.
- Prepare the site.
- Draw the sample properly.
- Label all tubes properly.
- Dispose of all used equipment properly.
- Clean up and secure samples for transportation.
- Any final communication with patient.

Most people do not like being stuck with needles. This is often particularly true for patients who have had a bad prior experience, or who are "tough sticks" – those who for one reason or another are difficult to draw blood from. The way in which a phlebotomist greets a patient can make the difference between a positive, successful experience and failure to get a sample from an upset patient.

26. Introduction and patient identification.

Whether in an office or in a hospital setting, it is important to introduce yourself, greet the patient in a friendly manner, and briefly explain what you are there to do. This may not be as easy as it sounds; it may be late, the patient may be tired or asleep, they may be irritated or angry, and you may be very busy and/or equally tired. It may not seem like it, but *projecting a warm, friendly attitude may be one of the most important and helpful skills a phlebotomist can master. When someone is not feeling well, just being surrounded by caring people can go a long way.* It is also much easier to get a sample from a cooperative patient.

Patient identification

making sure you are seeing who you are supposed to be seeing – is of utmost importance. Confusing one patient for another can be deadly. Ask the patient to repeat their full name and birth date. If they are in a hospital setting, verify this information against their identification bracelet.

27. Different methods of drawing blood.

There are two primary methods of obtaining blood for testing: *capillary puncture* and venipuncture. (We will not focus on arterial blood draws).

Capillary puncture
involves using a lancet or spring-loaded puncture device to pierce the skin and the tiny, superficial blood vessels underneath. Blood from this puncture site can then be drawn into a thin tube for testing.

Benefits of capillary puncture are:

- Easily performed on patients with tiny or fragile veins (infants, elderly).
- Results in very small amount of blood loss.

Limitations of capillary puncture:

- Very small sample volume limits type and amount of tests that can be performed.
- Blood passes through the skin affecting some test results and increasing the risk for contamination.

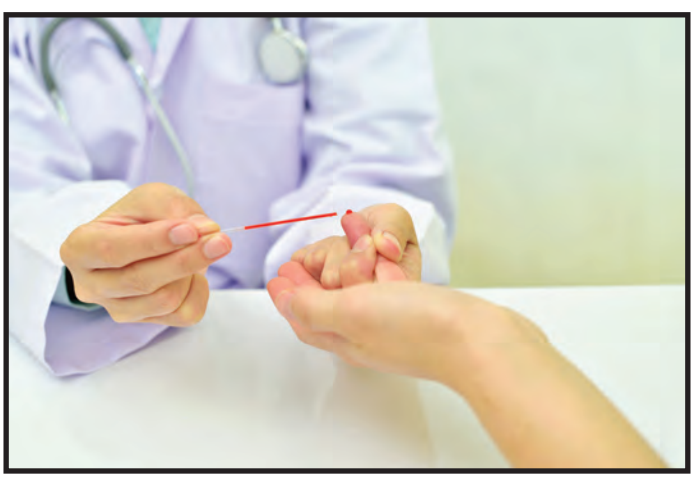
Venipuncture
refers to drawing blood directly from a vein through a needle into a sample container. This is the most accurate method for testing.

When properly performed, the benefits of venipuncture include:

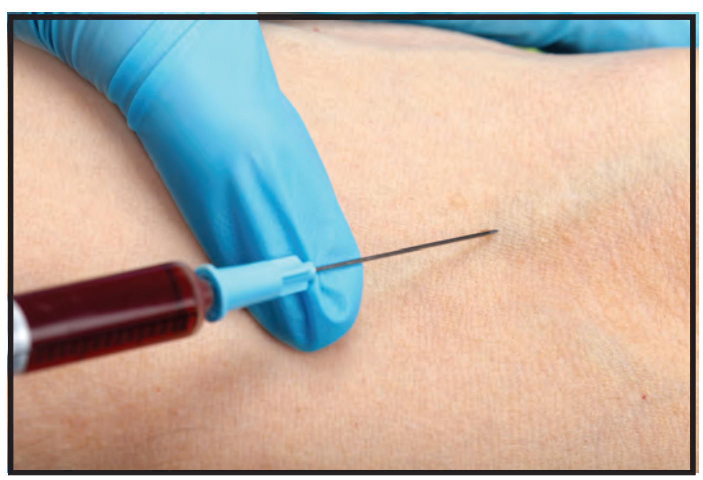
- Consistent samples useful for literally hundreds of different medical tests.
- Ability to identify infectious organisms living within a patient's blood (blood culture).

Difficulties with venipuncture include:

- Requires technical proficiency (phlebotomist).
- Some patient's veins are very difficult or impossible to access (infants, elderly, obese).
- Increased risk of bruising or bleeding.
- Improper technique can result in pain, infection, or even (potentially) nerve damage.



Capillary Puncture



Venipuncture

28. Capillary puncture.

Everyone is familiar with having a finger stick. This is the easiest method used to draw blood. It can even be done on oneself; the vast majority of finger sticks are performed on type 1 diabetics. In an office or hospital setting, a finger stick or heel stick can be used to get a sample for some tests when a venipuncture is either very difficult (infants and elderly) or unnecessary (checking sugar level).

Though the method is easier, the process is the same:

- Introduction / patient identification.
- Chose equipment.
- Pick site.
- Wash hands.
- Put on gloves.
- Clean site.
- Perform stick.
- Collect sample.
- Dispose of equipment / clean up.
- Label sample.
- Dispose of gloves.
- Wash hands.
- Thank patient / transport to lab.

Capillary puncture is typically performed on the side of the tip of the 3rd or 4th fingers. The 5th finger ("pinky") has thinner skin and is often more painful. The first finger or thumb can be used, but the skin is thicker and may be more difficult to puncture.

With infants less than a year old, the sides of the heel are preferred sites. The lancet should be appropriately sized to prevent hitting the underlying bone, which is not only very painful, but increases risk for infection of the bone itself (osteomyelitis). Ear lobes can be used

Capillary punctures are performed using a lancet or a spring-loaded puncture device. Either produces a puncture to a specified depth.

Wash hands and put on clean gloves.

The site of puncture should be cleaned with an alcohol prep pad. Iodine preps should not be used – the residual iodine can interfere with some test results. The site is cleaned with a circular motion starting at the intended puncture site and spiraling outward. Allow the alcohol to dry; the drying process helps to sterilize the area, and wet alcohol is more painful.

Perform the puncture and immediately dispose of the lancet or device in a biohazards / sharps container.

Apply gentle pressure to the finger (or heel).

Wipe away the first drop of blood using a sterile 2 x 2 gauze pad (this initial drop can have interstitial fluid that dilutes the sample).

28. Capillary puncture. *(continued)*

Collect sample into the appropriate capillary tubes in the appropriate order:

- EDTA additive (hematology) tubes.
- Other additives.
- Serum tubes.

Invert any tubes with additives to ensure proper mixing.

When finished, place a clean, dry, sterile 2 x 2 gauze pad over the puncture site and apply gentle but firm direct pressure to stop further bleeding.

Label the samples appropriately, always using at least 2 identifiers and writing clearly.

Remove gloves and wash hands.

Transport specimens to lab.

Capillary Puncture

29. Venipuncture: overview.

Collecting blood from a vein is a more challenging task. The basic steps are the same, but a phlebotomist must practice to develop the skill needed to find an appropriate vein and be able to guide a needle into the vein in order to successfully draw the sample. Understanding where veins are, what they are like, what different needles are like, and how best to draw the blood into a syringe without damaging the vein are all needed to successfully draw samples from a variety of patients smoothly and with minimal discomfort. This is an essential component of a medical care team, and your patients will thank you for your hard-earned ability!

Learn on patients that are “easy sticks”: patients with large, easy to see veins. Learn from good phlebotomists. Listen to their hints and tips, watch what they do, and practice practice practice! Developing a skill that few others in medicine possess – even surgeons – is extremely rewarding!

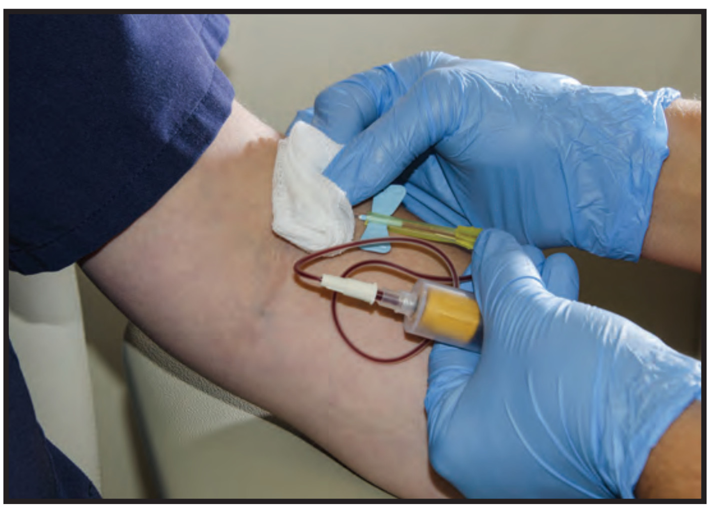
30. Venipuncture: needles.

Needles used for venipuncture are hollow-bore with a beveled tip. The hollow tube allows the blood to be drawn through the center of the needle. The larger the bore, the more easily and quickly blood can be drawn, but the needle itself is also larger. The diameter of the needle is described as the gauge, with larger numbers referring to smaller diameter. 20- or 21 gauge is the most common; smaller diameters (25 gauge) typically result in lysis or rupture of the red blood cells because they physically don't fit well through the hollow section of the needle.

The most common type of needle is a multisample needle which allows the filling of multiple sample tubes from a single stick. There are different manufacturers, but the other side of the needle has a hub and protected puncture device that allows penetration of the caps of the sample tubes. This system is typically attached directly to the needle hub, but it can be separated from the needles by a length of plastic tubing, a so-called "butterfly" needle, because of the plastic wings that allow the phlebotomist to direct the needle.

The butterfly assembly has advantages. The needle is easier to manipulate, and it is easier for the phlebotomist to keep the needle tip still and in the vein while exchanging multiple sample tubes on the hub. However, the smaller needle gauge (typically 23 gauge) and the length of plastic tubing both increase the risk of hemolysis – lysis or rupture of the red blood cells – which affects some lab tests.

From a technical standpoint, the fixed 20-21 gauge needle directly attached to a vacuum tube sample hub is preferred. Nevertheless, there are times when patient factors (children, patients with difficult or fragile veins) will necessitate the use of a butterfly assembly. A good phlebotomist will develop the judgement to know what equipment is best for that situation.



Butterfly Needle

Multisample Needle

31. Venipuncture: finding a vein.

The superficial veins of the arm are preferred sites for venipuncture. Sometimes, the veins of the back of the wrist or hand may be used. The palm-side of the wrist should not be used: there are tendons and nerves that can be damaged in this area.

Though in many people veins can be easily seen, *veins are better located and evaluated through feel*.

Gentle probing or "palpation" with a finger-tip allows the phlebotomist to find veins that cannot be seen. Regular practice will make this process easier; remember to practice with gloves on! Veins can be felt compressing and bouncing back (the blood is lower pressure). Arteries will have a pulse. Having the patient gently squeeze their fist can help expand veins to make them easier to find.

Some veins will have a tendency to "roll," which will make them more difficult to penetrate properly with the needle. Patients that have been stuck many times may have scarring or sclerosis of veins, which can be felt as firm nodules or bumps. These should be avoided.

Have a skilled phlebotomist assist with learning to find and evaluate different veins, including their size and depth. Have them pass on the "tricks of the trade," such as anchoring the vein with gentle downward pressure to straighten the path of the needle and help prevent rolling.

32. Venipuncture: cleaning the site.

The puncture site must be cleaned as thoroughly as possible. This is particularly true if blood cultures are to be drawn. For routine draws, an alcohol wipe is used. For blood cultures or when drawing labs that will include an alcohol level, a special chloroprep or iodine solution may be used.

A spiral motion is used starting at the intended puncture site and moving outwards.

Be careful to not touch the puncture site after cleaning with a non-sterile glove or other item, as this will contaminate the area. If this happens, repeat the cleaning process.

The necessity for carefully following the cleaning procedure when drawing blood cultures cannot be understated. There is no way to truly sterilize the skin and eliminate false positives (cultures that grow bacteria when the patient is not truly infected). But a positive blood culture in a sick patient may result in a longer hospital stay or administration of powerful antibiotics that can have very severe side effects.

33. Venipuncture: using a tourniquet.

The use of a rubber tourniquet helps to increase the pressure inside the vein, making it a larger target and increasing the flow into the needle. The same increased pressure will make the vein bleed more rapidly through the puncture site, either from a poorly performed stick, or after the needle is withdrawn. For this reason, the length of time the tourniquet is applied should be minimized, and it should be removed immediately if a problem is noted (such as a “blown” vein) or as soon as the sample tubes are filled, *prior* to removing the needle from the vein. Use of the tourniquet should be limited to a minute, so find a suitable vein and have everything ready to go before putting it on.

The tourniquet is applied 3-4 inches above the intended puncture site.

Practice tying the tourniquet to get the appropriate compression: it should be snug enough to increase pressure in the veins, but not so tight as to completely cut off flow or cause discomfort to the patient. When tying, tuck the tip of the second end under so that it stays in place but can be quickly removed with a simple tug (picture).

34. Venipuncture: performing the stick.

The technique of actually putting a needle into a patient's vein and drawing a sample is a bit like riding a bike: you are going to have to get the "feel" of it with practice.

Gently pulling the skin towards you helps anchor the vein and makes it easier to pierce both the skin and the vein.

The bevel of the needle should be up. Pass the needle through the skin at a 15-30 degree angle: not too shallow, not too steep.

Feel the needle penetrate the wall of the vein. You will see a "flash" of blood in the hub. Advance the needle only until the entire bevel is within the vein; avoid pushing the needle too far, or you risk pushing the needle all the way through and out the other side of the vein.

Once the needle is properly positioned, anchor the needle and drawing assembly to prevent it from moving as you attach and remove successive sample tubes.

Once you have obtained all of the necessary samples or as the last tube is filling, remove the tourniquet. Simultaneously place a 2 x 2 sterile gauze pad on the skin puncture site, as you withdraw the needle. Do NOT put pressure on the needle site until the needle is removed, as you do not want to risk sticking your hand with the now "dirty" needle. If the needle is a "safety" needle, activate the safety device to protect personnel from accidental sticks. Immediately dispose of the needle into a sharps disposal container.

Maintain direct pressure on the puncture site for a few minutes with the gauze pad to stop any bleeding.

All patients are considered infectious. Always follow procedure and be cautious to avoid the possibility of being stuck with a sharp object such as a needle. When a patient does have an potentially transmissible disease, being stuck with a dirty needle is very effective way of transmitting that disease. Your safety is of utmost importance, and it begins with you.

Luckily, needle sticks are very uncommon. But accidents do happen.

IF YOU ARE STUCK FOR ANY REASON, IMMEDIATELY REPORT THE INCIDENT TO APPROPRIATE STAFF AT THE OFFICE OR HOSPITAL IN WHICH YOU ARE WORKING. There will be a procedure for how to deal with employee exposures, and you will want to immediately begin that process.

35. Venipuncture: syringe vs. tubes.

Blood samples for medical laboratory testing are drawn into specially made tubes. There are a variety of tubes, some of different sizes, and some with different additives, and each test requires blood to be drawn in a specific tube. The tops of the tubes are color-coded to prevent confusion. Understanding what is going on with each is helpful, but at first you will hear things like "I need a green top," or "that test requires a purple top."

The special tubes are made with a vacuum inside that pulls the correct amount of blood into the tube. For tubes with an additive, it is important to have the right ratio of blood to additive, so it is important to let the tube fill completely before removing it from the hub assembly.

The vacuum in the tubes is fairly strong. In most cases, this works well to help draw the blood into the tube. However, thin or fragile veins such as those of an elderly patient may collapse under the strong vacuum. In these cases, it may be necessary to draw the blood using a syringe so that the vacuum can be controlled carefully by the phlebotomist.

The barrel of the syringe should be cycled to make sure it moves smoothly. The process of insertion of the needle is the same as with a vacutainer assembly, but once the "flash" is seen, the needle is anchored and the barrel is gently pulled back in order to maintain a constant flow of blood without allowing it to stop and potentially clot in the needle, and without collapsing the vein.

Once the syringe is filled, the tourniquet is removed. The needle is removed in the same manner, and the blood is transferred to the sample tubes using a safety hub device.

36. Venipuncture: order of draw.

Because different tubes have different additives, drawing the samples in a certain order prevents the contents of one tube from interfering with the sample in another tube. For example, it is important to draw sterile samples such as a blood cultures first, to minimize contamination of the sample, possibly causing a false positive blood culture. This can lead to a patient receiving unnecessary antibiotic treatment. Tubes for anticoagulation studies should be next because the anticoagulants such as heparin that are present in some of the other tubes can interfere with the test results.

Order of draw (with additive):

- Sterile containers; blood cultures; yellow tops.
- Light blue (sodium citrate for blood clotting studies).
- Red top (no additive).
- Red-grey or mustard (gel barrier “serum separator tube” or SST)
- Green (heparin)
- Lavender (EDTA)
- Gray (various anticoagulants).
- Other tubes.

37. Venipuncture: labelling tubes.

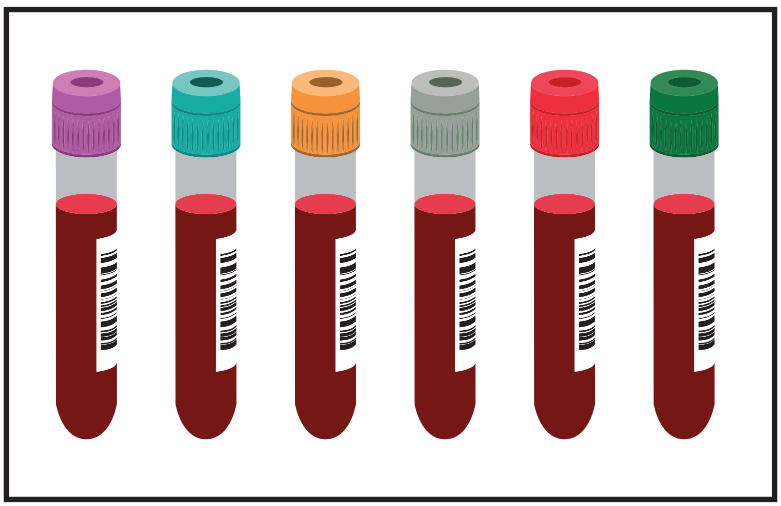
Once the samples are properly drawn and inverted, any needles or sharps have been disposed of, the samples should be labelled.

Never pre-label specimen containers of any kind. Though it may seem that pre-labelling tubes is an efficient way to "plan ahead," it may be one of the most dangerous mistakes a healthcare worker can make. Pre-labelled tubes can be inadvertently used with the wrong patient. Always carefully label specimens immediately *after* taking them.

Each separate tube must be properly labelled. It is not sufficient to label a bag or container and then put the unlabeled tubes within; once the contents are withdrawn, they are then "unlabeled" and will not be usable.

Label each tube with two identifiers:
the *patient's full name* and *birthdate or medical record number*. Also label with the time and date, and your initials.

Print clearly
illegible writing is a potential source for error.



Labelling Tubes

38. Transportation.

The purpose of drawing blood is to be able to use it for testing in the laboratory. These tests cannot be completed until the samples are delivered. How and when that is done will depend upon where you are working and the situation. In small offices, this can be as simple as walking down the hall to the lab. In large hospitals, specimens may be taken from multiple patients on “morning draw”, or STAT tests may be taken directly to the lab for rapid results. As always, following the proper procedure is of utmost importance.

39. Wrapping it all up.

You now have a good idea of the important role that a phlebotomist plays in the healthcare team, and the tremendous responsibility that they undertake. Working as a phlebotomist in any setting is challenging, and there will be very difficult days. But there are few areas in healthcare – and none in lab medicine – that provide such an opportunity for rewarding interaction with patients. No one likes to be stuck with a needle, and the ability to turn a difficult situation into a pleasant and effective interaction is deeply gratifying.

But developing this ability is going to take lots of practice and hands-on experience. The information in this course has been put together to give you the knowledge you need to begin your journey.

How far will you go?

PhlebotomyCourse