COVER

Well, hello there!

Welcome aboard Stick It's EKG Technician training program and CONGRATULATIONS on your investment in **YOU** and your future!

Let's get after it.

To get started all students will need to create an NHA profile to access the online study materials. Once your course material appears you can begin navigating your way through the lessons. This is A LOT of material so take your time, pause, rewind and really process what is being said on the screen. Be sure to take look for these icons to take advantage of the study resources included with most modules.

The following pages of this hand book include detailed instructions as to how to navigate the NHA website and your online study guide. For more information including video tutorials visit our website at www.stickitphlebotomy.com

Questions that are not addressed in this handbook or on the website can be directed to sherry@stickitphlebotomy.com Please include your full name and what course you are enrolled in with ALL correspondences.

Once you have completed the online course work you will need to schedule your in-person skills lab through the stickitphlebotomy.com website.

We strive to make our classes as enjoyable and stress free as possible. Remember to have fun!

Questions are bound to come up while you are working through the modules, so we suggest using the note section to write down the questions you would like to ask during skill lab. If you are confused about a portion of your course work and it is preventing you from moving forward, please EMAIL us at sherry@stickitphlebotomy.com and allow us 24-48 hours to respond.

**Please only use our personal phone numbers for issues that cannot wait for email responses. **

YOUR INSTRUCTOR

Sherry Hinton, LPN, CPI

sherry@stickitphlebotomy.com

318.259.0144

"Please no calls or texts before 9 AM or after 9 PM!!"

YOUR I.T. SUPER-HERO

Karl Hinton, CPhT

318.225.0039

"If it's text-able… don't call me" lol 😉

Stick It Phlebotomy, Inc
4693 Quitman Hwy
Hodge, La 71247
Office 318-259-0101
Fax 318-259-0110

Date _____ ***High School/GED Competition is the only requirement to become a CPT*** SS# _____

Name _____ Age _____ Date of Birth _____ Phone _____

Address _____ City _____ State _____ Zip _____email _____

Name of Program Phlebotomy Training_____ Length (Hours) 66 AM/ PM Classes

In consideration of my acceptance as a student for the Phlebotomy Training program as of the above date, I hereby enroll and obligate myself to pay to the order of Stick It Phlebotomy, $950 dollars to be paid as follows: $ 300 with the signing of this enrollment agreement, $300 mid way throughout the course (see calendar for exact date) $100 for the National Board Exam and the balance of $250 to be paid before last day of class (see calendar for exact date). I can also pay total amount upon registration. I understand I cannot attend Clinical training or graduation ceremony until tuition is paid in full.

Three –Business- Day Cancellation: All monies paid by a student shall be refunded if requested within three business days after signing an enrollment agreement and making an initial payment. After three business days the cancellation period of enrollment/registration fee will be retained by the school.

Stick It Phlebotomy Refund Policy:

- After a student has completed less than 15% of the program, the institution shall refund at least 80% of the tuition, less the registration fee, thereafter;
- After a student has completed less than one fourth of the program, the institution shall refund at least 70% of the tuition, less the registration fee, thereafter;
- After a student has completed one fourth, but less than one half of the program, the institution shall refund at least 45% of the tuition, less the registration fee, thereafter;
- After a student has completed one half of the program, the institution may retain 100% of the stated course price.

Stick It Phlebotomy Training Program, has provided a copy of all syllabus, classroom rules, attendance and payment policy to me. I have read all classroom rules, syllabus and course description and had the opportunity to question any portions of this agreement. I fully comprehend what is expected of me and agree to the terms and all ramification of this policy.

Charges:

Enrollment Fee $ 150 Enrollment date: _____
Tuition $700
National Board Exam $100
TOTAL COST TO STUDENT: $950

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Use of Textbook Yes_____ or No ☑ Textbook # Online Student -Not applicable
** Stick It will provide text book(s) on a loan basis to each student. Students will be held liable for any damages (other than normal wear) to the text book (s) while in their possession. A charge of $59.95 will occur if the book(s) is returned damaged beyond normal wear, missing or not returned by the end of the course.

Additional Fees: (Approximately $79):

1. State Background check $26 online (if required per clinical site)
2. TB skin test $15 (if test was preformed within a year of this date, this institution will accept documentation and waive this fee).
3. Drug screen (prior to clinical) $18 performed at approved clinical site (if indicated)
4. Solid colored scrubs $20 (to be worn on clinical site)

** Items listed under "Additional Fees" are not covered in the total cost of tuition. The student is responsible for purchase of these items.

Student's Signature _____ Date _____

School Official ___ _____ Date _____

Stick It Phlebotomy, LLC
4693 Quitman Hwy
Hodge, LA 71247
office 318-259-0101
fax number 318-259-0110

STUDENT AGREEMENT

_____

Clinical site

I, _____ (*typed or printed name),* a student at Stick It Phlebotomy, LLC, School understands that _____ (clinical site) has entered into an agreement with the School in connection with a rotation program designed as a learning experience for the me in the Phlebotomy Training Program. In connection with that contract and in consideration of the clinical site providing a learning experience, I agree with the following:

_____ 1. I am responsible for complying with all applicable federal, state and local laws and regulations including, but not limited to, any applicable provisions of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) regarding the Protected Health Information he/she may encounter during the term of his/her activities at the hospital or facility.

_____ 2. I will comply with all administrative policies, quality assurance guidelines, standards and practices of the clinical site to include, but not limited to, random drug testing, and acknowledge that I may be removed with notice for violation of any of these rules, regulations, or policies and procedures.

_____ 3. I will hold all proprietary information concerning the operation of the clinical site or its patients in confidence.

_____ 4. I am responsible for providing the necessary and appropriate uniforms, and adhering to the proper dress code required by the clinical site and school. These include: a set of solid scrubs without tears or holes, clean & wrinkle free; badges must be worn at all times while on campus; no artificial nails or bright fingernail polish; and hair must be clean and neat; and no shades or hats are allowed.

_____ 5. I am responsible for reporting to clinical site punctually and will conform to the standards and practices established by the school while at clinical site.

Student Clinical Site Agreement

_____ 6. I will not allow any use of cell phones while at clinical site unless, in appropriate clinical site break room. I understand that I am never allowed to have cell phones out in front of patients.

_____ 7. I will agree that this is a learning experience and will not be paid any salary from school or clinical site.

_____ 8. I will behave in a professional manner at all times which includes showing proper respect to the staff members, clients, family members, physicians, and other visitors of the agency and conduct myself in harmony with them.

_____ 9. I will not be allowed to sleep/nap at any times while in the clinical rotation.

_____ 10 I understand the patient has the right to refuse care rendered by students.

_____ 11. I will not discuss private health information, in general or in detail, in public areas under any circumstances, including hallways, cafeterias, elevators, or any other area where unauthorized people or those who do not have a need to know may overhear.

By signing this document, I _____ agree and understand if any of the above policies or anything the instructor/supervisor seems inappropriate of the school or clinical site is broken I will be asked to leave the clinical site and will be immediately terminated from program.

_____ _____

Student Signature Date

_____ _____

Instructor Signature Date

_____ _____

School Official Date

Stick It Phlebotomy, LLC
4693 Quitman Hwy
Quitman, LA 71247
318-259-0144

Agreement and Acknowledgement

of

Policy for Minor Subjects

I _____, acknowledge that I have been instructed **NOT** to perform venipuncture or skin punctures on any subject under the age of 17 even with their permission, unless in the presences of Instructor or phlebotomy supervisor. This is a violation of the rules and protocol of Stick It Phlebotomy, LLC. I understand that I will be expelled from the program and social services may be informed.

Student Signature Date

Instructor Date

Stick It Phlebotomy, LLC
Student Acknowledge
of
Syllabus/Catalog

I _____, student of Stick It Phlebotomy, LLC hereby knowledge that I have read the syllabus and was explained the entire content. I understand that I must follow the rules and guidelines set by school or I can be terminated / expelled.

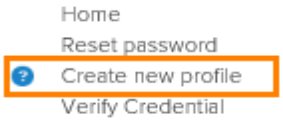
_____ _____
Student Name Date

_____ _____
Instructor/ School Official Date

How to Create an NHA Account

Step 1: From the home page, **NHANOW.com**, click on **Login or Create Account**.

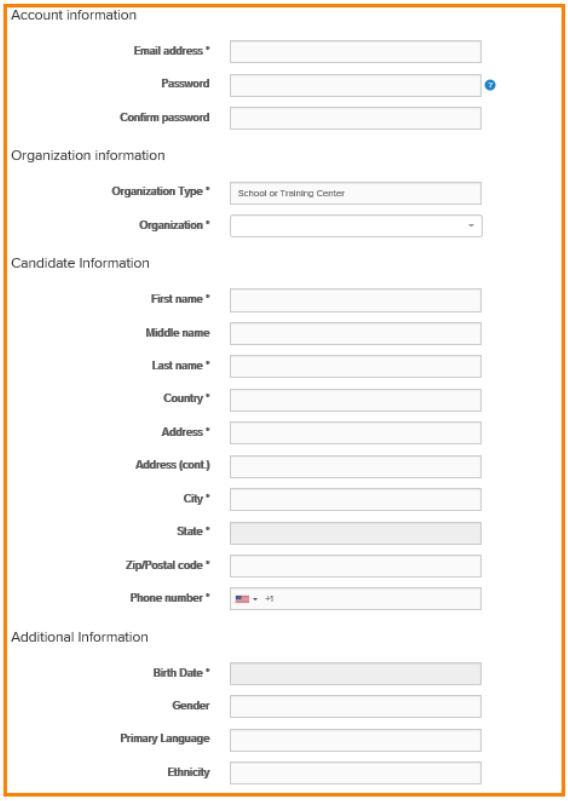
Step 2: Click **Create new profile** on the left side of the screen.



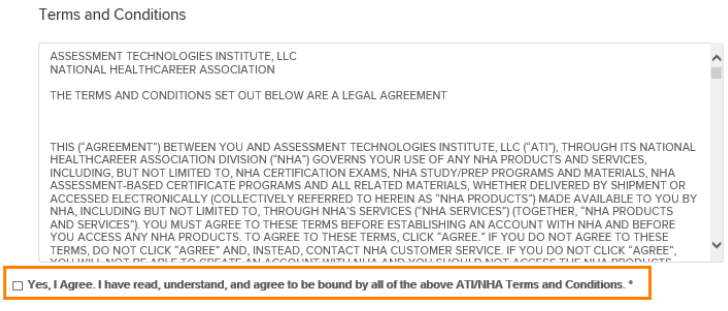
Step 3: Complete all required fields, which are marked with an asterisk (*)

- Account information
- Organization Information
  (Make sure to choose the correct organization type – Registering individually/School or Training/Employer)
- Candidate Information
- Additional Information

***Important:** Do not create multiple accounts.



Step 4: Read carefully and agree to **NHA's Terms and Conditions**.



Step 7: Click on **Register** to create your new account.

For additional questions, please contact us via **Live Chat** at nhanow.com.

NHA USERNAME: _____

NHA PASSWORD: _____

SKILLS LAB DATE: _____
(see website and back of this handbook for dates)

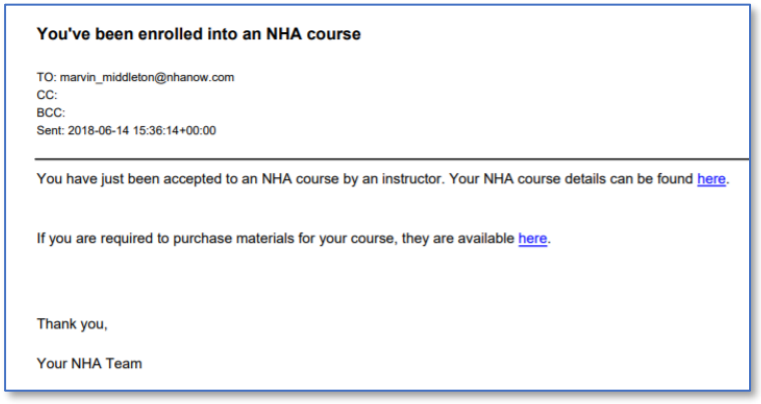
EXAM DATE: _____
(see website and back of this handbook for dates)

RECERT. DATE: _____

How to Access Online Study Guide and Practice Exams through a Course

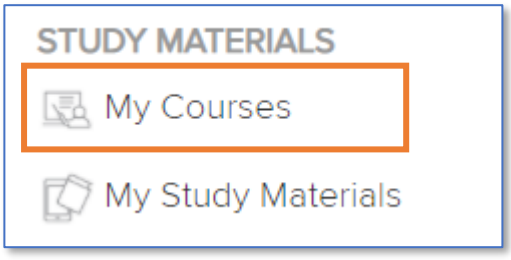
Step 1: If you are receiving materials through an institution, wait to receive a **confirmation email** of your Course Enrollment.

If you haven't yet, follow the steps in this email to set up your Individual Candidate account, or reference How to Create a Candidate Account

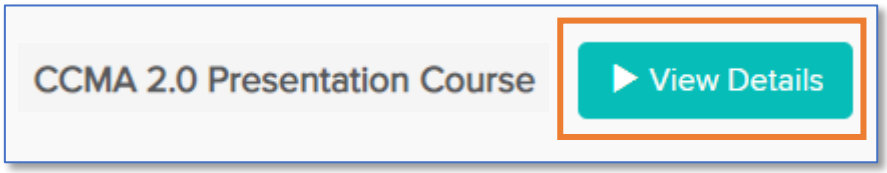


Step 2: Log into your Candidate account at **NHANOW.com**.

Step 3: Under Study Materials on the left-hand side select **My Courses**

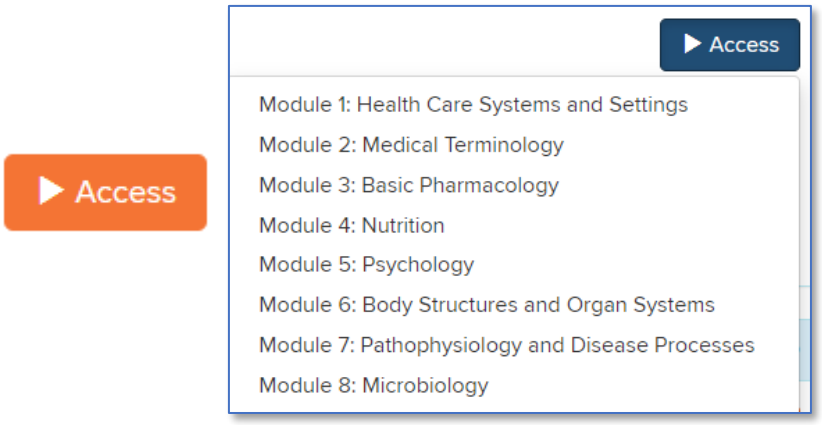


Step 4: Locate the course title for the course you are enrolled in and select **View Details**



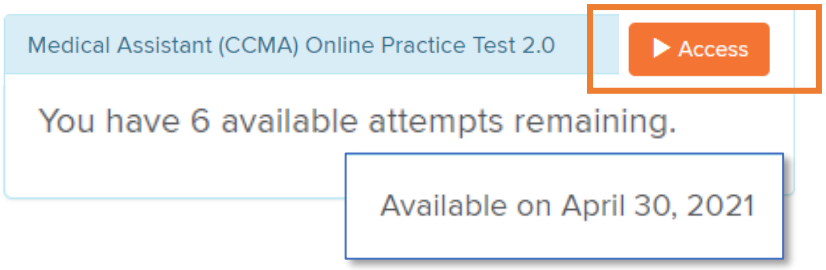
Step 5: To access your Study Guide, select **Access** on the right-hand side.

- If you have modules available to open, select the appropriate module
- Your instructor may have locked specific modules until you are supposed to access them.



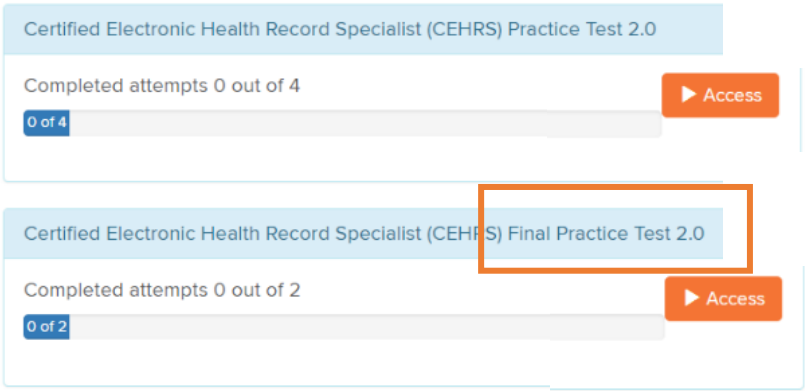
Step 6: To access your 6 Practice Tests scroll down and select **Access** on the right-hand side

- If your instructor has locked the practice tests, the availability date will be visible
- You may also have a required wait period between attempts



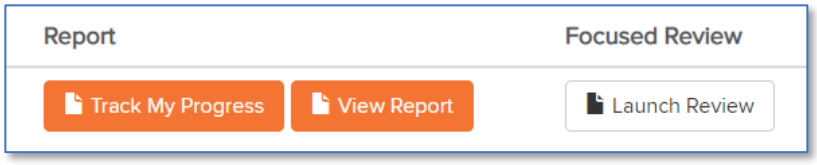
Step 7: If your options include a **Final Practice Test**, please refer to your instructor when you should take that exam.

*NHA recommends that between each practice test attempt, for you to review your scores and launch your **Focused Review**. For more on that see How to use your Focused Review



Step 8: Reports for your time logged, quizzes completed, and practice test outcomes will be available to you through your orange **Reports** buttons

- If you see Track My Progress please refer to the how-to for How to use Track My Progress



For additional questions, contact us via **Live Chat** at nhanow.com.

PHLEBOTOMYY TECHNICIAN

STUDENT NOTES

Module 1: Phlebotomy Fundamentals

- The professional phlebotomist
- Cardiovascular anatomy physiology
- Communication
- Infection Control

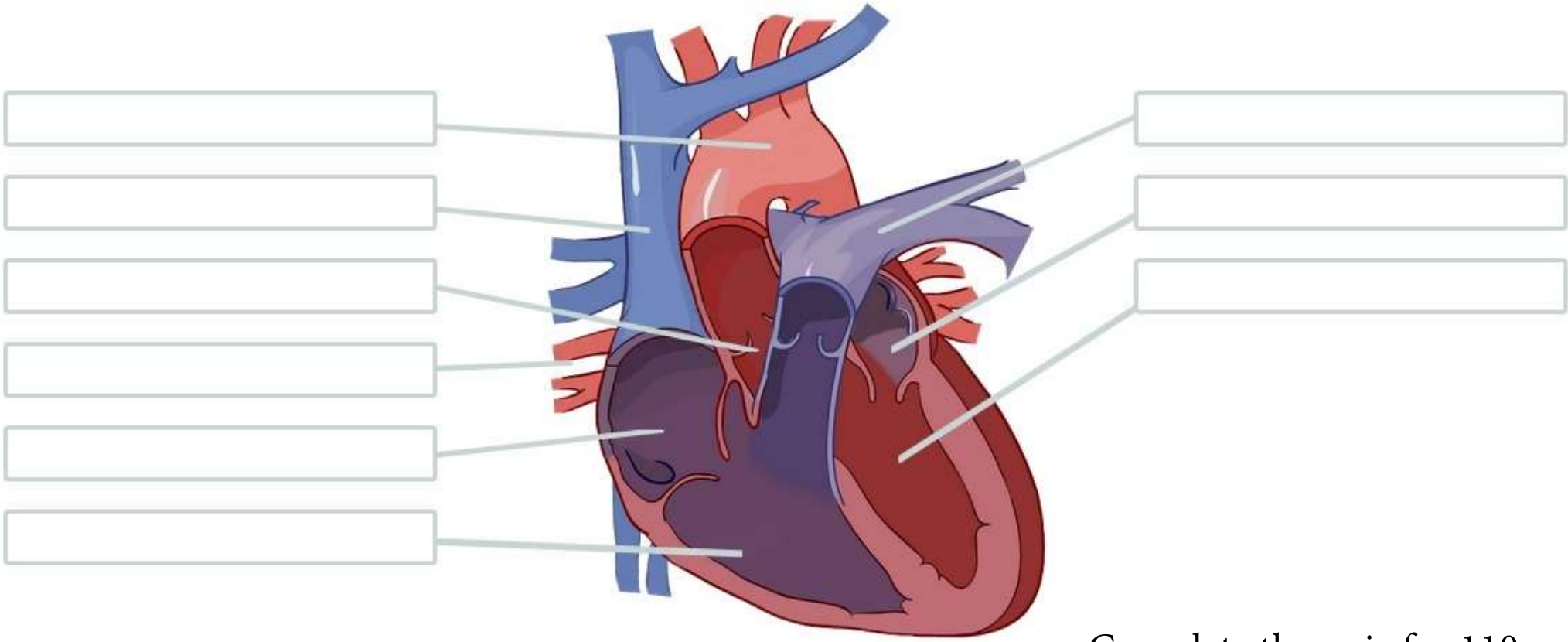
STUDENT NOTES

CARDIOVASCULAR ANATOMY PHYSIOLOGY NOTES:

STUDENT NOTES

Label the heart

Aorta | Right ventricle | Pulmonary vein | Vena cava | Semilunar valve | Left atrium | Left ventricle | Pulmonary artery | Right atrium



Complete the quiz for 110 points.

Quiz Score: _____

COMMUNICATION NOTES:

STUDENT NOTES

INFECTION CONROL NOTES:

END OF MODULE 1

NO QUIZ

Summary Notes

Ready to move on?

Use all the resources?

MODULE 2: SAFETY AND COMPLIANCE

- Regulations that affect lab personnel
- Quality Control
- Patient and employee safety

REGULATIONS THAT AFFECT LABORATORY PERSONNEL

Workplace safety

OSHA has established regulations and guidelines to direct phlebotomists to work at the highest level of safety possible. OSHA strictly regulates workplace safety—including exposure to ***biologic hazards*** and hazardous chemicals—and requires that employers and employees adhere to these regulations. The Bloodborne Pathogens Standard protects phlebotomists and other health care professionals from exposure to body fluids. The Bloodborne Pathogens Standard requires implementation of work practices and engineering controls to prevent exposure incidents. It provides guidelines for training for all employees who handle body fluids. The standard addresses use of ***personal protective equipment (PPE)*** and availability of the hepatitis B immunization for all at-risk employees. The standard also has definitions relating to engineering controls, record-keeping requirements, an ***exposure control plan***, and provisions for employees to provide input about work practice and engineering controls.

To adhere to the Bloodborne Pathogens Standard, each workplace must have an exposure control plan that determines the risk level of each employee, depending on their potential exposure to biologic hazards. Next is the implementation of guidelines to ensure employees' safety according to their level of exposure. Finally, the standard provides plans for actions to take after accidental exposure to potentially infectious agents.

biologic hazard. Also known as biohazard; any biological risk to organisms.

personal protective equipment (PPE). Items that are worn to reduce exposure to potentially infectious agents.

exposure control plan. An OSHA-compliant plan that explains ways to minimize or eliminate exposure of humans to bloodborne pathogens.

All employees in health care facilities must use standard precautions, which include treating all body fluids as potentially infectious. Hand hygiene is one of the most effective ways to keep phlebotomists and patients safe from contamination. Perform handwashing before and after direct contact with every patient. Employees who handle body fluids directly must use PPE (gloves, masks, gowns, goggles, face shields, shoe covers). The type of PPE needed depends on the potential for exposure to body fluids, and OSHA mandates it accordingly. For venipuncture and capillary puncture, wear well-fitting nitrile or vinyl gloves. Replace gloves if they tear, as well as before and after each contact with patients. If there is a splash risk, goggles and a face mask or full-face shield are essential. When a patient is in ***isolation***, use additional safety measures (mask, gown, shoe covers). When encountering patients who have tuberculosis or other airborne transmittable infections, be sure to wear an ***N95 or N99 respirator*** to reduce the risk of transmission of the pathogen.

isolation. Methods that protect people from exposure to a contagion or protect an immunocompromised individual from acquiring an infection.

N95 or N99 respirator. A mask that helps protect the wearer from airborne diseases.

2.1 Types of PPE

Another way that OSHA helps ensure safety is its mandate of engineering controls for handling used needles, lancets, and other sharps. Never recap, reuse, or bend used needles, even for the same patient. Dispose of used needles, lancets, and other sharps into a designated, OSHA-approved, puncture-proof, leakproof sharps container as soon as possible. Sharps containers are usually red, and should have a clearly visible biohazard symbol on the outside of the container. Keep sharps containers upright, do not fill them past the designated line on the container (typically no more than ¾ full), and properly lock them when they are ¾ full. Never reach into or empty a sharps container.

2.2 Sharps container

Operational standards

The Joint Commission

The Joint Commission accredits and certifies thousands of health care organizations in the U.S. As an independent, nongovernmental, nonprofit organization, its operational standards focus on continual improvement of patient safety and quality of care. The Joint Commission updates the standards regularly to reflect the rapid advances in health care and medicine. There are more than 250 hospital accreditation standards, which address areas such as patients' rights and education and operational improvement. The National Patient Safety Goals (NPSGs) program increases patient safety by setting requirements for issues including accurate identification, communication of test results, and necessary training of health care professionals. The NPSGs require validating patient identification using a two-factor method. For example, confirm identification by matching the wristband to the medical record, and asking patients for their telephone number, home address, or date of birth. Always ask patients to state their name, then compare that with the name on the wristband or laboratory requisition form. To ensure test results are reported as quickly as possible, NPSGs emphasize the need for active communication between the health care professional performing the test and the provider ordering it. Ongoing personnel training in safety and infection control through proper hand hygiene and use of ***disinfectants*** adds an additional layer of safety.

disinfectant. A substance that helps remove harmful micro-organisms from surfaces.

Centers for Disease Control and Prevention

The CDC is a government agency that helps identify and educate about infections, illnesses, and disease prevention. The CDC attempts to identify new diseases and work quickly to find ways to prevent their spread. It recommends standard precautions with any procedure that could result in an exposure to body fluids.

The CDC provides guidelines for PPE, sharps handling, and hand hygiene. Below are a few actions the CDC recommends to improve safety and reduce the transmission of disease.

- Always wear gloves when handling any body fluid.
- Activate the needle's safety mechanism immediately after use.
- Dispose of sharps immediately into an approved container.
- Wash hands with soap and water both before and after patient care. If handwashing facilities are not readily available, use an alcohol-based disinfectant (unless hands are visibly soiled).

The CDC advises phlebotomists to pay close attention to patients and procedures, especially when handling sharps. Be even more vigilant at high-risk times, such as during needle insertion and removal. Using butterfly needles or the needle and syringe method of blood collection increases the risk for accidental needlestick injuries. Needlesticks most often occur when disposing of a needle, attempting to recap a needle, or removing a needle from the adapter after use. If an accidental needlestick injury occurs, the CDC advises washing the area first with soap and water. Then notify the immediate supervisor. You will need to undergo an immediate medical examination to assess and treat the wound, determine the risk of exposure, and take appropriate measures.

Clinical and Laboratory Standards Institute

The CLSI is committed to providing high-quality care for patients by developing standards and guidelines to help laboratories achieve accreditation. To help organizations achieve the standards, the CLSI works in coordination with industry and health care professionals to ensure they have the most up-to-date information and use the safest methods of performing blood tests.

Along with accreditation for laboratories, the CLSI provides guidelines to help phlebotomists provide better patient care and achieve greater accuracy in blood testing. These guidelines cover venipuncture, dermal puncture, and phlebotomists' safety. For venipuncture, the standards detail the use of equipment such as tubes and needles. Standards include the proper level of additives in vacuum tubes and their use for the appropriate blood test to provide the most accurate results. The CLSI also established the proper order of draw for venipuncture. All phlebotomists filling multiple tubes of blood must adhere to these standards. The CLSI order of draw includes filling yellow-top tubes (sodium polyanethol sulfonate [SPS]) or blood culture bottles first, then light blue-top (sodium citrate) coagulation tubes, serum tubes with or without clot activator and with or without gel (red-speckled top), green-top (heparin) tubes with or without gel plasma separator, purple- or lavender-top (EDTA) tubes, and finally grey-top (sodium fluoride or potassium oxalate) tubes. There might be some variation in these tubes from different manufacturers.

The CLSI further details standards for venipuncture including the proper collection (e.g., angle of insertion) and the processing and handling of venous blood. For capillary procedures, guidelines include the correct locations and depth for blood collection for both infants and adults and the order of draw for microcollection tubes. The CLSI mandates the use of disposable equipment for all capillary collections (e.g., single-use lancets). It is uncommon to use microcollection tubes for blood-gas determination. But if a provider orders it, collect blood for this test first, and then follow the usual order of draw.

For phlebotomists' safety, the CLSI sets guidelines that help prevent the transmission of disease from patients to phlebotomists by all potential routes of exposure (vapor, blood, splashes, contact with potentially contaminated laboratory equipment). The CLSI also provides guidelines that address ***quality control***, patient care, risk reduction, and implementation of time-saving methods and cost-cutting measures.

quality control. A measure of how well an instrument can produce the same result over a period of time, thus ensuring precision in laboratory testing and accuracy in test results.

HIPAA regulations

It is of the upmost importance to understand and acknowledge every patient's right to protection of personal information. A patient's ***protected health information (PHI)*** is any and all information that relates to the patient's care in the medical record or electronic health record. HIPAA details what patient information is confidential as well as any authorized release of this information. Areas HIPAA's rules protect include patient demographic information and information relating to treatment, medications, and diagnostic testing. Information without any way to identify the patient it came from does not require the same protection, and researchers and those who gather public health statistics may use it.

protected health information (PHI). Any information that a health care provider creates or receives that relates to past, present, or future physical or mental health or condition of an individual, the provision of health care to an individual, or the payment for the provision of health care to an individual.

Protect all health information, whether electronic, written, or verbal. Keep this information private and protect it from other health care staff. The exception is those who have a direct need for the information and legitimate involvement in the patient's care (requesting provider, medical specialists, nurses, billing, accounting, health care insurance employees). The patient must sign a release before health care workers may share information with any other requestor. For example, a medical facility may release test results from a patient's emergency department visit with the provider the patient will see for follow-up care for the same health problem.

Patients may also sign a consent form allowing a specific family member to receive their health care information. Never assume that the family member in the room with the patient should have access to the patient's PHI. To determine who has access, ask patients to identify who may receive their health care information, and then make sure that there is a consent form on file.

Avoid discussing patients' information with colleagues in public places or with those who have no direct involvement in the patient's care or treatment. It can be easy to get into the habit of discussing patients by their diagnosis or by using other personally identifying information (name, bed number, PHI) with other professionals treating the same patient. This can become an issue if the discussion takes place in an area where others can overhear the information. When discussing patient information on the phone, identify the person calling and their need for the information. Speak at a low volume to help prevent anyone else from hearing confidential information.

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Scope of practice and ethical standards

You are responsible for the well-being of the patient before, during, and immediately after venipuncture. In addition to performing within your scope of practice, you must practice cultural competence to interact appropriately and effectively with all patients, treating everyone with respect and dignity.

Before a venipuncture, correct identification is essential. Using a two- or three-point method of identification confirms that the correct patient is receiving care. If the patient is in a hospital, it is important that an identification band is in place. Although typically on the wrist, some patients might have the identification (ID) band on their ankle. If the patient does not have an identification band, do not perform the procedure until the patient has one in place. Do not use an identification band on a bed, a tray, or any location other than the patient's body. When working in an outpatient setting, identification that includes a photo is usually required. Examples include a driver's license, military identification, state ID, or employee ID badge.

2.3 Interacting with patients

After identification, the patient must provide consent for procedures you will perform. For most venipunctures, the patient will provide implied consent, often by extending an arm or rolling up a sleeve. In addition, the patient might provide verbal consent. Understand that patients have the right to refuse any procedure, even right before it begins or after they have given consent. If a patient conveys a mixed message, such as extending an arm but then stating "I do not want you to take my blood," ask the patient whether to continue with the procedure prior to taking any additional steps. Proceed only if the patient again gives consent and is willing to have the venipuncture. Threatening to move forward with the procedure without consent can be considered ***assault***.

assault. The intentional creation of apprehension leading to a fear of harm.

Ethical treatment of patients continues even after verifying identification and consent. If a patient asks if the procedure is going to be painful, don't lie and say that it won't hurt. Pain is subjective, and the level of pain perceived varies from patient to patient. It is more ethical to tell the patient that the procedure might cause some pain, but that you will make every effort to minimize the discomfort. This will assist in gaining the patient's trust. If the patient has never had a venipuncture before, explain the procedure in terms they will easily understand.

When palpating for a vein, do not slap the patient's hand or antecubital area. This activity—once a routine phlebotomy action—could constitute ***battery***. After applying a tourniquet and not seeing a "good" vein, use other techniques for locating a vein (warming the area, wiping it with an alcohol wipe, lowering the limb below the level of the patient's heart).

battery. The intentional touching or handling of a person without permission.

Careful site location for venipuncture adds another component of safety. Avoid the inside of the wrist due to potential ulnar nerve damage or inadvertent arterial access. Likewise, avoid the legs and feet of a patient who has diabetes mellitus to help prevent possible infection. The basilic vein is a last choice if all other veins are inaccessible, because it is close to the brachial artery.

If you miss on the first venipuncture attempt, make only one additional attempt. After missing a vein, make the second attempt using a new sterile needle, even if the second area is very close to the first location. Although there is no rule about the number of attempts a phlebotomist should make to collect blood, the more important issue is knowing when to stop and seek assistance. As a general guideline, phlebotomists tend to consider two attempts the limit. This might vary with individual circumstances and the phlebotomist's confidence in obtaining the specimen with additional attempts. Regardless, the patient always has the right to refuse to have the phlebotomist perform a subsequent attempt at blood collection.

Throughout the venipuncture procedure, it is important to observe patients and respond to their needs. If a hematoma develops, stop the venipuncture. If the patient shows any difficulties, including early signs of a seizure or loss of consciousness, stop the procedure. If a patient has any unexpected issues during the procedure, do not leave them alone until the situation completely resolves. In an outpatient facility, advise patients to stay until full recovery is reasonably apparent.

QUALITY CONTROL NOTES:

QUALITY CONTROL NOTES:

COMPLETE CENTRIFUGE QUIZ FOR 40 POINTS

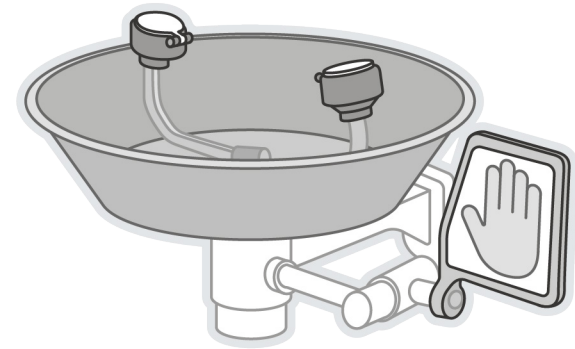
SCORE: _____

PATIENT EMPLOYEE SAFETY NOTES:

Exposure control plans in the event of occupational exposure

Each facility must have an exposure-control plan in place that includes the level to which each employee is at risk, what precautions to take, and what to do after an accidental exposure to body fluids or other hazards. To prevent accidental exposure, employees must participate in annual bloodborne pathogen training. To reduce accidental exposures, employees must implement infection-control practices, use safeties on devices, properly dispose of potentially infectious material, and obtain hepatitis B immunizations. All staff should regularly review safety practices and precautions in the workplace safety manual, including clear explanations that describe the steps to take when an incident occurs.

2.5 Eyewash station



When an accidental exposure to blood or body fluids occurs (a needlestick with a used needle; a splash into the eyes, nose, or other orifice; or a cut or puncture from a used instrument) it is important for those involved to remain calm. Following the correct steps can often minimize the effect from the exposure.

For an accidental needlestick, immediately decontaminate the puncture site with an antiseptic (such as iodine) or soap and water. Next, notify the immediate supervisor, providing information such as how the exposure occurred, the department or area where it occurred, and which equipment, PPE, and safety measures were used. Document this information in the sharps injury log and on the facility's incident report form. Have a medical examination as soon as possible from an urgent care, emergency department, or whatever health care support is available. The provider will ask which vaccines you have had and will likely test for HIV, hepatitis B, and hepatitis C.

The patient should also undergo testing for infections but would have to provide consent for blood tests. If the patient has any other infectious disease, you should undergo testing for those diseases as well. If the patient refuses testing, is unavailable for testing, or already has documentation of HIV, HCV or HBV, undergo postexposure prophylaxis. For HIV, the series of injections should begin within 2 hr of the exposure. If the patient has HBV, the provider will determine your vaccine status. If you have not had HBV immunization, the postexposure prophylaxis will include that immunization. Currently, there is no prophylaxis for HCV, but you should still have a consultation with a health care professional. After the initial evaluation, undergo follow-up examinations at the discretion of the professional who provided the initial examination.

After a splash of a body fluid or contaminated material into the eyes, nose, or mouth, immediately flush the areas with large amounts of water. An eye wash station is preferred, but you may use an accessible sink or a commercially prepared product, which is usually sterile saline solution. Report the exposure to the immediate supervisor, along with information such as how the incident occurred, the time and location of the incident, and the substance involved. Then seek an emergency medical examination to determine what further testing and treatment are necessary.

If a cut or other break in the skin occurs with a contaminated piece of equipment, flush the area with water and then wash it with soap and water. Notify the immediate supervisor, detailing how and where in the facility the cut occurred, the time and date of the incident, and what type of equipment caused the cut. You will need prompt medical assessment and treatment. You or a witness should complete an incident report as soon as possible following the exposure.

Even though most phlebotomists have reasonable concern about exposure to blood through a needlestick injury, remember that other body fluids can be contaminated. Consider any accidental encounter, splash, cut, or puncture involving body fluids a possible source of infection.

Know the location of and have a thorough understanding of the resources you might need before accidental exposure incidents occur. Regularly reviewing the facility's accidental exposure policies and procedures will help you locate necessary supplies and understand the importance of the necessary documentation so you can take the proper steps in the event of an incident.

CHALLENGE

A phlebotomist splashes blood into their eye while aliquoting. Which of the following actions should they perform first?

A. Call for help.
B. Notify their supervisor
C. Flush the eye with water.
D. Test the patient for infectious disease.

Answer: C is correct. The priority is reducing the risk for infection. The first action the phlebotomist should take is to remove any infectious material from their eye by flushing it with large amounts of water or sterile saline solution.

Which of the following items should a phlebotomist place into a sharps container?

A. Heavily soiled gauze
B. Used glass capillary tubes
C. Full plastic vacuum tubes
D. Used bandages

Answer: B is correct. Glass tubes pose a risk of breakage, and the resulting sharp edges can puncture the skin of anyone handling them. Phlebotomists should dispose of these tubes in a sharps container after use. Gauze, bandages, and plastic tubes do not pose a skin-puncture risk. But if they are contaminated with blood or body fluids, phlebotomists should dispose of them in a biohazard bag or container.

Transmission-based precautions

Follow basic ***standard precautions*** when handling potentially infectious materials (blood, urine, other body fluids). The CDC recommends considering all body fluids from all patients as infectious and to use standard precautions when handling and treating them. In addition to this precaution, standard and transmission-based precautions identify measures to take to protect health care workers when they know a body fluid is infectious. These guidelines protect phlebotomists, patients, and other people who handle contaminated materials.

Standard precautions are essential for all patient encounters and involve protection from blood, body fluids, mucous membranes, and nonintact skin. They include hand hygiene and wearing gloves, goggles, face masks, and gowns whenever necessary for protection from body fluids. Transmission-based precautions are used when interacting with and performing procedures on patients who have infections. They vary with the ***means of transmission*** (droplet, contact, airborne). Some infections (diphtheria, varicella) require more than one type of transmission-based precautions.

standard precautions. The basic level of infection-control practices health care workers must perform before, during, and after every encounter with patients to prevent the spread of infection.

means of transmission. How a pathogen moves to a host via direct or indirect contact with people.

Droplet precautions are required for patients who have infections that spread via droplets that are larger than 5 microns in diameter, including rubella, meningitis, diphtheria, mumps, pertussis (whooping cough), and influenza. This means wearing a mask when interacting with patients who have these illnesses. These infections spread via close respiratory interaction, especially when the patient coughs or sneezes. In outpatient settings or when transporting a patient who requires droplet precautions, make sure the patient wears a mask, especially when there is the possibility of encountering other patients, visitors, or staff.

droplet

Contact precautions are required for patients who have infections that spread via direct contact or contact with the environment (indirect contact). These infections include diphtheria, herpes simplex, scabies, hepatitis A, respiratory syncytial virus, and wound and skin infections, especially with pathogens such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), and *Clostridium difficile* (*C. diff*). Because patients touch many items in their room, you should wear gloves and a gown when handling any items in the patient's room. In many facilities, nursing staff post a specific procedure for entering and exiting outside the room. It is important to read any sign outside a patient's room to determine which PPE to don when entering and remove before leaving the room. *C. diff*, MRSA, and VRE are virulent bacteria and difficult to treat, so it is critical to prevent any contamination from leaving the room on clothing, shoes, or skin.

contact

Airborne precautions are required for patients who have infections that spread via droplets that are smaller than 5 microns in diameter, including varicella (chickenpox), tuberculosis, and rubeola (measles). This means wearing respiratory protection, such as a mask or an N95 or N99 respirator, when interacting with these patients. Airborne transmission is similar to droplet transmission, but airborne particles span a larger distance of potential spread and tend to have a longer time of virility. Airborne precautions also require patients to be in a negative-pressure room that restricts the airflow from the rest of the facility. Most hospitals have a respiratory isolation protocol in place that dictates patient access and exposure. These patients should also wear a mask when elsewhere in the facility.

airborne

Standard precautions regarding PPE

Standard precautions require different types of PPE, depending on the risk of exposure and the type of pathogens you might encounter. It is important to know which PPE to wear when interacting with patients or handling body fluids in the laboratory.

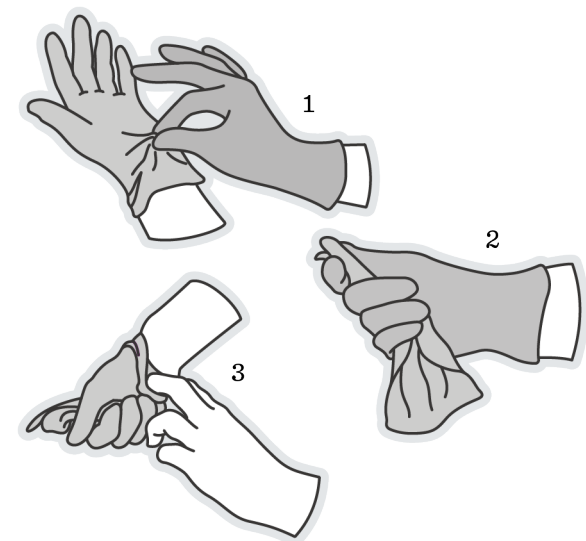
Standard precautions require the following practices regarding gloves.

- Wash hands before donning gloves and after removing them.
- Wear them when handling body fluids.
- Replace them between each patient encounter.
- Replace them when performing different procedures for the same patient, such as wound care.
- Make sure they are nitrile or vinyl and not latex, due to potential allergic reactions.
- Make sure they fit properly.
- Check them for holes or rips before performing procedures.

Wear gloves when handling specimen containers, such as vacuum tubes or urine collection containers. It is unsafe to remove the tip of the glove to palpate for a vein during a venipuncture. Wear gloves during every venipuncture, dermal puncture, and procedure that has the potential for interaction with body fluids. Also wear gloves when processing specimens, such as when loading and unloading the centrifuge or testing urine or fecal specimens. Take specific measures to avoid personal contamination by safely removing gloves after use. First grab the glove on the palm of the nondominant hand and pull the glove off by turning it inside out and transferring it in the palm of the dominant gloved hand. Then slip the nongloved hand under the cuff of the dominant hand glove, pulling the two gloves off together and turning them inside-out. Dispose of the single-glove pouch in a trash can designated for biohazardous materials.

Use eye protection while aliquoting blood specimens. At the very minimum, wear goggles or safety glasses. For better protection, wear a full-face shield. Some facilities have a standing shield that you can place between you and the specimen to prevent accidental exposure.

2.6 Safely removing gloves



Depending on the situation, you might have to wear a mask when interacting with patients who have infections. Masks should fit well and cover as much of the nose and mouth as possible. The mask should also fit tightly against the face so that it creates a seal around the nose and mouth. Use disposable masks, replace them between each patient encounter, and do not wear them from room to room. When wearing a mask to contain a possible communicable illness, replace it often or whenever it becomes wet or otherwise contaminated.

When a gown is required, make sure it fits well and covers as much of the body as possible. Replace gowns between each patient encounter. Do not wear them from room to room. Put on the gown before donning gloves, then make sure the gloves cover the opening of the sleeves completely. Remove the gown by folding the potentially infected area in and only touching the side that did not come in contact with the patient.

You might also need to wear shoe and head covers when working with patients whose infection is extremely communicable—such as those that require airborne, droplet, or contact precautions.

Hand hygiene guidelines

Hand hygiene is the most effective means of preventing infection. Perform hand hygiene when entering or leaving work areas; after contact with any body fluid (even if wearing gloves); and before and after patient procedures, eating, and using the restroom.

Infection control begins even before turning on the water by not touching any possibly contaminated sink or nearby surface. After turning on the water, make sure the water is not too cold or too hot. Either extreme of water temperatures can lead to drying and chapping of the skin. Wet the hands first, then apply an effective soap or hand cleanser. Some facilities require the use of antimicrobial soap. Scrub the hands vigorously, creating suds with the soap and paying attention to nails, nail beds, knuckles, and the skin between the fingers. The CDC recommends scrubbing hands for at least 20 seconds (usually the length of singing or humming "Happy Birthday" twice). Next, rinse the hands thoroughly, paying attention to removing all of the soap. Then dry the hands completely, using a disposable towel or an air dryer. Turn off the faucet with a paper towel and then dispose of the towel into a waste can. The combination of water and friction are the most effective means of achieving hand hygiene, or medical asepsis.

When hands are not visibly soiled, you may use an alcohol-based hand sanitizer that has at least a 60% concentration of alcohol. To use a hand sanitizer, dispense the solution into one hand and rub it over both hands, paying special attention to the nails, nail beds, knuckles, and the skin between the fingers. Rub hand sanitizer onto the hands until the hands are dry. Hand sanitizers do not remove all microbes; for example, they do not remove norovirus, *C. difficile*, or *Escherichia coli*. Many hospitals, clinics, and other facilities provide wall-mounted or stand-alone sanitizer dispensers to promote regular attention to hand hygiene.

CHALLENGE

Which of the following situations describe when a hand sanitizer is the most effective?

A. When treating a patient who has a norovirus infection
B. When hands are heavily soiled
C. Immediately after application
D. After rubbing hands with the sanitizer until dry

Answer: D is correct. Using a hand sanitizer effectively involves rubbing it onto the hands until dry. Applying it and just air drying without rubbing and dispersing it to the nail beds, knuckles, and skin between the fingers will lessen its effectiveness. Washing hands with soap and water is the recommendation when the hands are visibly soiled or contaminated with especially virulent pathogens, such as norovirus.

Which of the following is the first step a phlebotomist should take when washing their hands?

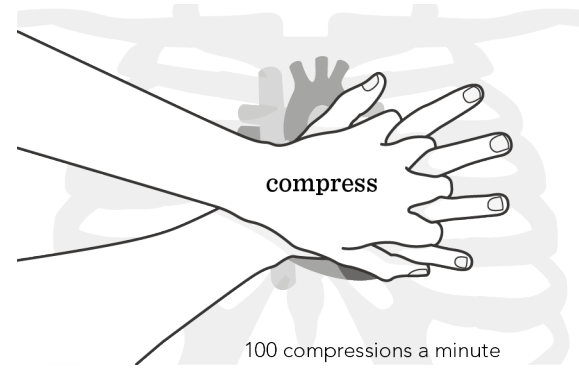
A. Wet hands.
B. Apply soap to hands.
C. Rub hands together.
D. Clean fingernails.

Answer: A is correct. Creating suds requires water, so the first step is to wet the hands. The next step is to apply the soap and then rub the hands together vigorously for at least 20 seconds. Surgical asepsis requires removing debris from underneath fingernails using a nail cleaner under running water, but this is not usually a step in routine handwashing.

For adults, follow these steps to maintain basic life support.

- Activate the emergency response system by calling 911 or the local emergency number, or have someone else do so.
- Find a defibrillator, and follow the instructions on the device. (Office defibrillators are portable and use either batteries or standard 110-volt current.)
- Begin CPR by placing the heel of one hand on the patient's sternum between the nipples and placing the other hand over the first, interlacing the fingers. Give chest compressions at a rate of 100 to 120 per minute, at least 3.8 to 5 cm (1.5 to 2 in) in depth. Allow the chest to fully recoil between compressions. After 30 compressions, provide two rescue breaths and continue until the patient regains consciousness or the EMS arrives.
- If the patient responds, place them in the recovery position (lateral recumbent or three-quarters prone), monitoring their breathing until a nursing, medical, or emergency medical services (EMS) professional takes over.

2.9 Performing CPR



Chest compressions provide adequate blood circulation to the brain. Faster compressions (of adequate depth) result in a higher survival rate than slower, shallower compressions. Compressions create an increase in intrathoracic pressure, which then results in blood flow to the brain and other organs.

The efficiency, speed, and proper application of CPR directly affect its success. For a patient who is unconscious, it is important to determine the state of ventilation and circulation quickly. Irreversible brain damage or death can result from a lack of oxygen that lasts for more than 4 to 6 min.

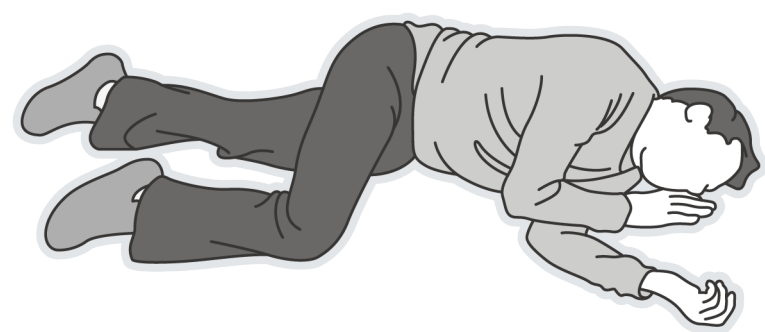
First aid and CPR

Every phlebotomist is responsible for safeguarding the well-being and welfare of the patients in their care. At times, this responsibility extends to performing basic first aid. It is important to be able to recognize potential problems with patients and know what to do in case of an emergency. In all situations, remain calm. Maintaining composure and remembering what to do in an emergency can be the most important step in keeping an emergency from becoming a disaster.

If a patient loses consciousness during a blood collection or begins to show signs of syncope (fainting), immediately stop the procedure by removing the tourniquet and needle, place pressure on the venipuncture site, and protect the patient from injury by assisting them to the floor or to a reclining position. For any loss of consciousness before, during, or after the collection, it is essential to monitor the patient's breathing by watching their chest to check for movement in and out or listening for 5 to 10 seconds.

If the patient is breathing, remove or loosen any restricting items (tie, scarf). Even if the patient is unresponsive, continue speaking to them, stating what you are doing and why. Sometimes, unresponsive patients can hear but are not able to respond. With most cases of syncope, the patient recovers quickly. Nevertheless, note how long the patient was unconscious. Never leave the patient alone until they recover fully. Do not give the patient anything to eat or drink right away, to reduce the risk of choking. You may place a cold cloth on the back of the patient's neck or wrists. If the patient is unresponsive for an extended period, call for medical help or emergency services. Stay with the patient until help has arrived.

2.8 Recovery position



When a patient in an inpatient setting is not breathing, note the exact time of collapse or when you found the patient in this condition. Immediately call for assistance from the nursing or medical staff. Do not leave the patient alone until help arrives.

If the patient is not breathing and you are unaware of the patient's wishes for resuscitation or the patient does not have a do-not-resuscitate (DNR) order, initiate first aid, including cardiopulmonary resuscitation (CPR). For adults, the American Heart Association (AHA) recommends "CAB," meaning that chest compressions are the priority, then airway assessment, and then rescue breathing.

For children or infants, the AHA recommends checking the patient for unconsciousness by tapping the patient and loudly asking "Are you all right?" When an infant or child is unresponsive, have someone call emergency services while beginning CPR. If there is no one else who can call for help, perform five sets of 30 compressions to two breaths, and then call emergency services. Steps for infant and child CPR include the following.

- Provide compressions.
  - For a child, place one hand on top of the other, interlacing the fingers and pressing down 5 cm (2 in) on the center of the child's chest 30 times, aiming for a rate of 100 to 120 compressions per minute.
  - For an infant, use two fingers to provide 30 quick compressions on the center of the chest, 3.8 cm (1.5 in) deep, aiming at 100 to 120 compressions per minute.
- Provide rescue breaths.
  - For a child, pinch the nose, cover the entire mouth with your mouth, and give two breaths.
  - For an infant, cover the nose and mouth, and give two breaths. Be careful not to overinflate.
- Follow the same sequence of compressions-to-ventilations until the patient recovers or the EMS arrives.
- When an AED arrives for a child, turn it on and follow the prompts.

Keep in mind that CPR instructions change, so it is important to keep up to date on current advances in providing this lifesaving procedure. It is important for all health care staff to keep certifications up to date when working in the health care field.

Seizures can occur with epilepsy, medication reactions, fever, unconsciousness, or for unknown reasons. When a patient begins to seize, immediately stop the blood collection and take steps to ensure the patient's safety. Call for assistance and stay with the patient until help arrives. To keep the patient from falling, gently lower them to the floor. If the patient is in a safe place, such as in a bed, leave the patient there. Do not lift or restrain the patient, because you could injure them and yourself. In addition, do not attempt to insert anything into the patient's mouth during a seizure. As with any emergency, remain with the patient until they recover fully or help arrives.

If ***petechiae*** (small red dots), appear on a patient's skin during a blood collection, you do not have to stop the procedure. The petechiae might indicate that the patient has platelet issues, so be sure to apply adequate pressure after the procedure to prevent excessive bleeding.

A seemingly healthy patient can develop complications in a matter of minutes. Therefore, it is important to observe patients before, during, and after every blood collection. Quick action can keep a bad situation from becoming worse. Remain calm and continue talking to the patient during an emergency situation. Document any unusual incident during a blood collection, including the time it occurred, what happened, and what actions were taken.

petechiae. Small hemorrhagic spots that appear under the surface of the skin.

END OF MODULE 2

NO QUIZ

Summary Notes

Ready to move on?

Use all the resources?

key take aways

MODULE 3: PATIENT PREPREATION

- REVIEW OF REQUISTION IDENTIFICATION CONSENT
- PATIENT INTERVIEW
- PATIENT PREP
- NONBLOOD SPECIMEN COLLECTION

REVIEW OF REQUISITION, IDENTIFICATION, AND CONSENT

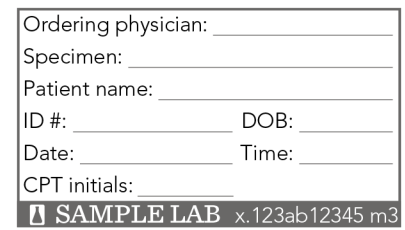
Requisition review

Physicians, physician assistants, and nurse practitioners are responsible for ordering laboratory tests. Chiropractors can also request laboratory orders in some states. Do not accept orders from any other health care professional without first determining if they are authorized to order testing. The laboratory order (requisition) form lists the specific tests the provider wants completed, along with the provider's information. It should also include the following information.

- Patient's full name
- Patient's date of birth
- Patient's sex
- Specific identification numbers (can include a medical record number)

Social Security numbers can appear on a registration form, but due to concerns about identity theft, this practice is not as common as it used to be. The requisition form can include specific precautions or concerns (latex allergy, tendency to faint, excessive bleeding, sites to avoid). In addition, the form will have a space to document the date and time of the collection, billing information, and diagnostic coding.

3.1 Specimen label



Examine the requisition form to verify the tests ordered comply with appropriate testing times. Review the requisition for discrepancies, which can include duplicate test orders or missing information. Note any specific preparations or restrictions to address prior to the collection (fasting, ***basal state***). It is also important to determine the priority of the blood collection. The terms stat, medical emergency, and as soon as possible (ASAP) indicate that the provider needs the test completed and the results relayed immediately. A routine blood collection is essential for determining a diagnosis or a baseline value, but it does not indicate urgency. If any information is missing, contact the provider for clarification before performing the blood collection.

basal state. Condition of rest and fasting, usually for at least 12 hr and typically in the morning upon waking.

You need to understand which tubes the blood will be collected in and then determine the correct order of draw. Not doing this could lead to preanalytical errors, skewed test results, and unnecessary venipunctures. If you are unfamiliar with any of the tests ordered, consult the facility's laboratory manual or ask another laboratory technician or supervisor.

Specimen labels are typically printed at the laboratory reception area and should accompany the requisition form. These electronically generated labels contain the patient's identifying information to place on the blood samples. Peel the labels off the paper to expose the adhesive side that attaches to the blood collection tubes. Depending on the facility, some labels have bar codes. If no labels are available, write the date and time of the collection, your initials, and the patient's full name, date of birth, and other specific identifiers. This is important to do immediately after collection, before the patient leaves the collection area or before you leave the patient's bedside.

With the implementation of electronic records, it is uncommon to have paper–based requisitions. However, some facilities still use them, so you should understand the requirements of a paper requisition. These forms usually have multiple parts or copies and require handwritten documentation. They usually have perforations for easy detachment of parts or copies. There might also be a handwritten blood collection log on which you must record the blood collection. Even facilities that generate requisition forms electronically might have these paper forms as a backup in case of computer failure or power outages, or as a temporary requisition in an emergency prior to electronic data entry. You must be familiar with these forms and know where to store or send the various copies.

3.2 Requisition form

Sample Lab
1234 Main Street
Example, KS 12345
800.555.1234

Laboratory Requisition ☐ Stat ☐ ASAP ☐ Routine

Ordering Physician:
Practice:
Address:
Collection date:
Collection time:
Fasting: ☐ Yes ☐ No

PATIENT INFORMATION
Name: ☐ Male ☐ Female
Address:
Record # / SSN last four: DOB:
INSURANCE INFORMATION
Primary insurance:
Policy number:

Diagnosis/ICD-10 Code:
☐ Abdominal pain ☐ Fatigue/malaise
☐ Anemia ☐ Hyperthyroidism
☐ Coronary artery disease ☐ Hypothyroidism
☐ Diabetes mellitus ☐ Upper respiratory infection
Requisition number: Date:
E-signature: Time:

PANELS & PROFILES
☐ 80048 Basic metabolic panel
☐ 80053 Comprehensive metabolic panel
☐ 80307 Drug screen, medical
☐ 80051 Electrolytes
☐ 80076 Hepatic function (liver) panel
☐ 80061 Lipid panel
☐ 80055 Prenatal profile

MICROBIOLOGY
☐ 87040 Culture, blood
☐ 87045 Culture, stool
☐ 87070 Culture, throat
☐ 87086 Culture, urine
☐ 87205 Gram stain
☐ 87340 Hepatitis B surface antigen
☐ 82274 Occult blood, stool
☐ 87177 Ova and parasites, stool
☐ 87880 Rapid strep and screen
☐ 87081 Beta strep culture
☐ 87591 GC by DNA probe
☐ 87491 Chlamydia by DNA probe
☐ 87205 Wright's stain, stool

HEMATOLOGY
☐ 85025 CBC, automated differential
☐ 85014 Hematocrit
☐ 85018 Hemoglobin
☐ 85049 Platelet count
☐ 85610 PT with INR
☐ 85045 Reticulocyte count
☐ 85651 Erythrocyte sedimentation rate

BLOOD CHEMISTRY
☐ 82105 Alpha fetoprotein, prenatal
☐ 82150 Amylase
☐ 82607 B_{12} folate
☐ 84702 Beta HCG, quantitative
☐ 82247 Bilirubin, total
☐ 82248 Bilirubin, total/direct
☐ 84520 BUN
☐ 80156 Carbamazepine
☐ 82378 CEA
☐ 82465 Cholesterol
☐ 82565 Creatinine, serum
☐ 80162 Digoxin
☐ 82728 Ferritin
☐ 82746 Folate
☐ 83001 FSH
☐ 82947 Glucose
☐ 82951 Glucose tolerance oral GTT
☐ 83036 Hemoglobin A1C
☐ 87389 HIV
☐ 83735 Magnesium
☐ 80184 Phenobarbital
☐ 80185 Phenytoin
☐ 84132 Potassium
☐ 84703 Pregnancy test, serum
☐ 81025 Pregnancy test, urine
☐ 84146 Prolactin
☐ 84153 PSA
☐ 84450 SGOT/AST
☐ 84460 SGOT/ALT
☐ 80198 Theophylline
☐ 88342 Thyroid stimulating hormone
☐ 84480 T3
☐ 84436 T4
☐ 84550 Uric acid

URINE
☐ 81001 Urinalysis
☐ 82570 Creatinine
☐ 82575 Creatinine clearance
☐ 84156 Protein

SEROLOGY
☐ 86038 Antinuclear antibody
☐ 86308 Mono spot
☐ 86431 Rheumatoid factor
☐ 86593 RPR
☐ 86762 Rubella

ADDITIONAL TESTS

LABORATORY USE ONLY

Patient identification

The phlebotomist is often the first clinical person a patient interacts with at a health care facility. Always treat patients as unique individuals, displaying a caring and compassionate demeanor. Although many patients are having routine blood testing, others are preparing for surgery or coping with a life-altering diagnosis. Treat all patients with respect, individual attention, and professionalism. Use therapeutic communication techniques to convey caring and understanding, as well as reduce patients' stress.

Before beginning a blood collection, greet the patient warmly. Tell the patient your name, that you are a phlebotomist in the laboratory department, and that you are going to collect a blood sample. Make sure your professional identification badge is always visible. Phlebotomy students should let the patient know that they are students. Follow this process with every encounter. Never assume that a patient remembers a phlebotomist.

In inpatient settings, knock discreetly on the patient's door or door frame. If the door is open, enter quietly and greet the patient prior to the procedure. Use sensitivity and consideration when adjusting room lights and speaking to patients who have been sleeping. Keep in mind that hospitalized patients are especially vulnerable, as they are often dealing with major health issues.

The Joint Commission (an agency that accredits health care facilities) mandates using two identifiers to verify each patient's identity before performing any procedure. This is crucial for making sure that you collect blood from the right patient for the right tests. Ask the patient to state at least two of the following acceptable identifiers: the patient's full name, date of birth, home address, telephone number, or Social Security number (if the medical facility policy requires it on the requisition form). Compare what the patient says to the information on the requisition form. The patient can also produce a photo identification card (driver's license, passport, student badge, employment card or badge), and you can compare it with the corresponding information on the form.

It is also important to adhere to the guidelines of the Health Insurance Portability and Accountability Act (HIPAA), which mandates maintaining the patient's privacy and confidentiality. Mandatory compliance with HIPAA's Privacy Rule ensures that patient information is confidential. It also gives patients control over their personal information and who has access to it. HIPAA originally required written consent for disclosure of all patient information, but because this sometimes delayed care, the act's revision requires that health care professionals notify patients of their privacy policy and make a reasonable effort to obtain written acknowledgment of this notification.

Because of HIPAA's Privacy Rule, you should use judgment and discretion in preventing anyone who is not involved in the patient's care from overhearing any of the patient's protected health information (PHI). For example, when calling a patient in the waiting room into the blood collection area, you should call only the patient's name. Do not mention any clinical information that others could overhear, such as, "Lester Moore for a hepatitis B test."

In inpatient settings, you can compare the information the patient says with the hospital wristband and cross-check it with the requisition form. Barcode scanners can also confirm a match from the patient's wristband to the requisition form or labels. It is also essential to compare facility identification numbers, because it is possible to have two patients who have similar names. Do not use the patient's room and bed number as an identifier.

Whenever possible, ask patients to state their personal information. If you state the information and ask for confirmation, a patient might nod in agreement but have been distracted or not fully processed the information. Some patients cannot state their name and identifying information because of diminished consciousness, cognitive deficits, sedating medications, psychological conditions, or inability to speak (due to a stroke or ***mechanical ventilation***, for example). In situations such as these, you can confirm identity by viewing the patient's wristband and asking a family member, acquaintance, or hospital staff member who knows the patient to confirm their identity. If there are language barriers, use a medical interpreter. If you are unsure about how to identify patients—including children, who are not legally able to identify themselves—follow the facility's protocol.

Next are the preliminary steps of blood collection. Issues that would stop this process include inability to identify the patient, discrepancies on the requisition form or patient wristband, or information that the patient shares verbally. Report discrepancies immediately to the supervisor. In inpatient settings, surgery centers, and rehabilitation facilities, if the patient is not wearing an identification band, do not conduct the procedure until the band is on the patient.

mechanical ventilation.
Treatment that involves a machine (respirator, ventilator) performing or assisting with breathing.

CHALLENGE

When confirming a patient's identity in an inpatient setting, which of the following questions or statements should a phlebotomist use?

A. "Please state your full name and date of birth for me."

B. "I see you are Mrs. Larson in room 215A."

C. "Are you Sylvia Larson, and is your date of birth September 8, 1950?"

Answer: A is correct. The phlebotomist should ask the patient to state their personal information while cross-checking it with the laboratory requisition form and the patient's wristband. Never state the patient's information and then wait for the patient to confirm it. Patients might nod in agreement even if they were distracted and didn't fully hear or process the information. It is unacceptable to use the patient's room and bed number as an identifier. Hospital staff often move patients to other locations, so the room and bed information on the requisition form might have changed.

Obtaining consent

Before collecting blood from a patient, it is essential to obtain consent. Without it, deliberately touching the patient might constitute battery, which is a criminal offense. Types of consent include the following.

- ***Informed consent:*** The patient has received full information about the procedure in a language with understandable terminology. An informed consent form is often required for high risk, invasive, and surgical procedures.
- ***Expressed consent:*** The patient gives explicit consent to a procedure orally or in writing on a consent form.
- ***Implied consent:*** The patient's actions indicate that they are giving consent for the procedure. This is the most common form of consent for phlebotomy. For example, a patient extends an arm to a phlebotomist for venipuncture. This form of consent is adequate for low–risk procedures (measuring vital signs, collecting blood). It can also be necessary in emergency medical situations, with the understanding that the patient would receive full information and sign an informed consent document if time and their condition allowed them to do so.
- ***Consent for minors:*** In most cases, the child's parent or guardian must give consent for phlebotomy procedures. There are some exceptions for teenagers, such as those who are married, in the military, emancipated by a court order, or otherwise self–supporting and independent.

Any patient may refuse to give consent for any reason. Whether for personal choice, cultural, religious, or other reasons, the patient has the right to refuse blood collection and does not have to offer an explanation. When a patient refuses, you usually must obtain written proof of this refusal to protect both yourself and the patient. Inform the provider of the refusal. Sometimes refusal comes from a patient not understanding what is being done and why. This can require more investigation to solve.

CHALLENGE

A phlebotomist is preparing a patient for a venipuncture. The phlebotomist mentions that there could possibly be complications, although they are rare. The patient states that they have reconsidered and don't want to have the tests. The patient gets up to leave. Which of the following responses should the phlebotomist make?

A. "Dr. LaGrange says you need these tests, so I think you'd better let me proceed."

B. "You'll have to tell me why you are refusing so I can document the reason in your chart."

C. "That is certainly within your rights, and I will let Dr. LaGrange know."

Answer: C is correct. Any patient may refuse to give consent for any reason, and they do not have to state what that reason is. When a patient refuses, the phlebotomist should respect the decision and inform the provider of the refusal.

PATIENT INTERVIEW

Patient adherence

Some tests have specific pre-collection requirements (***fasting***, medication administration, avoiding specific foods or beverages, specific time of blood collection). Depending on the work setting, you might be able to explain these testing requirements to the patient. Some patients arrive at the laboratory with instructions from the provider. It is important to know which tests have requirements so you can discuss this with the patient.

You might encounter patients who arrive for blood collection without adhering to the testing requirements. If this happens, consult with the provider. If the test needs to be rescheduled, be sensitive if the patient becomes upset or angry. Use good communication skills to de-escalate the situation. Review the testing requirements and directions, making sure to use terms the patient understands. Encourage the patient to ask questions. Having the patient repeat the directions helps verify understanding.

The following are the most common pretesting preparations.

- ***Fasting:*** Some tests require that the patient fast before a test. Often, the patient may not eat or drink anything other than water for 8 to 12 hr prior to blood collection. Unless the patient's condition or procedure expressly prohibits it, encourage the patient to drink water to facilitate hydration, which helps with finding viable venipuncture sites. Some tests allow the patient to drink black coffee or tea.
- ***Medication:*** Some tests determine the effectiveness of a medication. Patients should take the medication at a predetermined time, or write down what time they take the medication. Patients then have specific times for the collection of blood or urine. Providers decisions regarding treatment and care often rely on the accuracy of the timing. So when performing a venipuncture for these tests, it is important to collect the specimen at the correct time.
- ***Basal state:*** This is based on the patient lifestyle and overall condition. Specimens are typically collected first thing in the morning, after refraining from eating or exercising for 12 hr. This preparation is necessary when the provider wants to establish reference ranges. Exercise and food can affect test results. Be sure to determine what a fasting basal state means for each patient and adjust the time of collection appropriately. For example, if the patient works a night shift, "first thing in the morning" is when the patient leaves work, which would not be the ideal time to do a collection that requires a basal state. Clarification of the patient's lifestyle or work habits is needed to appropriately schedule appointments.

fasting. Not eating or drinking anything except water for a period of time, often 8 to 12 hr.

Patient education

Patient education is straightforward and easy to integrate into the procedure. Tell the patient what is going to happen and why. This helps lessen patient anxiety. Reviewing the specific order and tests being conducted with the patient ensures accuracy in interpreting the order or requisition form. Further conversations regarding complications depend on patient risk factors.

Patients having their first venipuncture can experience additional nervousness. Explain the procedure using terminology the patient can understand and answer questions before beginning the procedure to minimize these reactions.

If a patient has never had a venipuncture, explain the procedure by doing the following.

- Discuss the steps of the procedure: examining and preparing the site, positioning the tourniquet, inserting the needle, filling the blood tubes, and applying a bandage to the venipuncture site after obtaining the blood and removing the needle.
- Inform the patient that they will feel a slight bit of pain, like a pinprick, when the needle is inserted and possibly while the tubes fill. Never promise that the procedure will not hurt; pain is a subjective experience, and patients have varying levels of pain tolerance.
- Tell the patient to say something immediately if they have severe pain or feel sick.
- Explain the complications of venipuncture (***hematoma***, infection, prolonged bleeding, serious pain) and what to do if they occur. Be careful not to give too much information. Most of these complications are relatively rare, and there is no need to frighten patients with specifics.

hematoma. A collection of blood underneath the skin; a bruise.

PATIENT PREPARATION

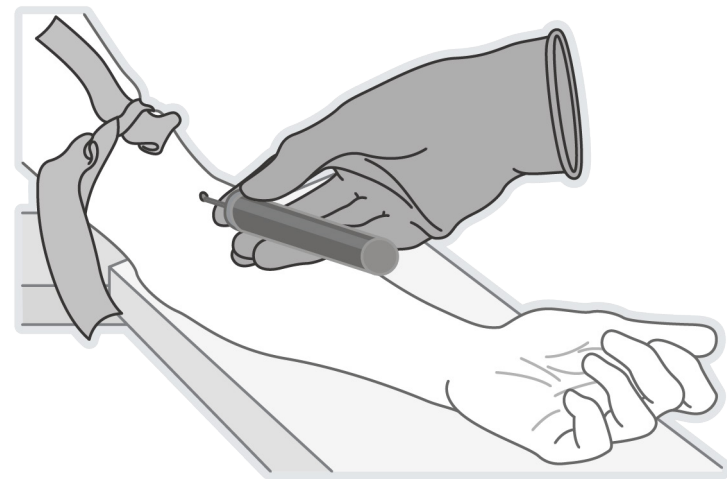
Positioning the patient

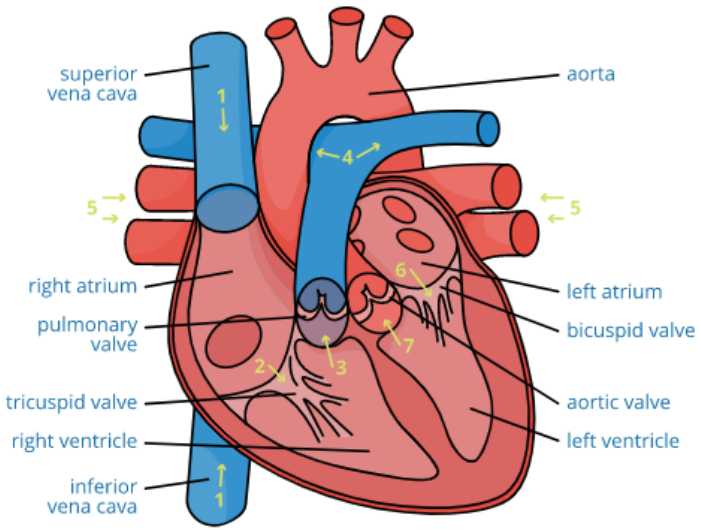
Your priorities and goals during blood collection are to keep the patient safe, provide comfort, and obtain necessary specimens efficiently and successfully. Properly positioning the patient helps achieve these goals.

In inpatient settings, you can perform the procedure with the patient in a comfortable position in bed. This adds an extra component of safety in case of fainting. In outpatient settings, have the patient sit in a venipuncture chair with comfortable, adjustable armrests and a padded locking bar to prevent falls. Chairs with adjustable height make specimen collection easier and reduce back strain. Some chairs also recline for added safety and comfort. Never perform venipunctures with patients standing or sitting on a high stool or the edge of an examination table. Some facilities provide extra-wide venipuncture chairs and wheelchair stations.

You will need to adjust arm positioning based on individual nuances of each patient. However, the optimal position is a full extension of the arm with the palm of the hand facing upward. Slight rotation of the arm can help you visualize the vein and keep it from rolling when inserting the needle. A pillow or an armrest device can improve comfort for some patients. Another technique is to have the patient support their arm under the elbow with their free hand.

3.5 Arm positioning




superior vena cava
aorta
right atrium
left atrium
pulmonary valve
bicuspid valve
tricuspid valve
aortic valve
right ventricle
left ventricle
inferior vena cava
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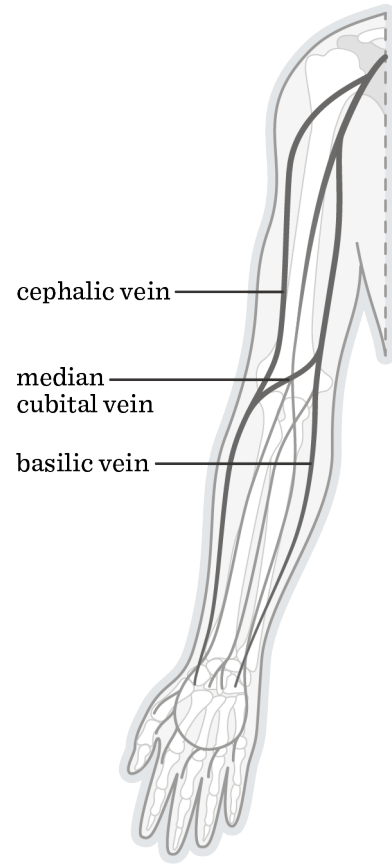
1

Specimen collection

Blood vessels consist of arteries, capillaries, and veins. When performing venipuncture, you access a vein. The three veins accessible in the ***antecubital fossa*** most often used for venipuncture are the following.

- ***Median cubital vein:*** This vein is the first choice. It lies at or near the center of the antecubital fossa. It is a large vein, and does not usually move when punctured. It is less prone to injury, and accessing it is less painful for the patient than other veins. In some patients (especially those who are obese), this vein might not be visible but can often be found with palpation.
- ***Cephalic vein:*** This vein is usually the second choice. It lies in the antecubital fossa on the ***lateral*** aspect of the forearm. It is a large vein that can be easily palpated, but it is not usually visible. It tends to roll and can be difficult to stabilize.
- ***Basilic vein:*** This vein should be the last choice when selecting a site in the antecubital fossa. It lies in the ***medial*** aspect of the forearm. It is a large vein, but it lies very close to the brachial artery. The median nerve runs very close to this vein; in some patients, the nerve crosses over the vein. If you use this site for a venipuncture and miss the target, stop the procedure and use another site instead of readjusting the needle. A readjustment can result in damage to the median nerve.



antecubital fossa. The area of the arm at the inner side or bend of the elbow; antecubital space.

lateral. Toward the side; away from the center of the body.

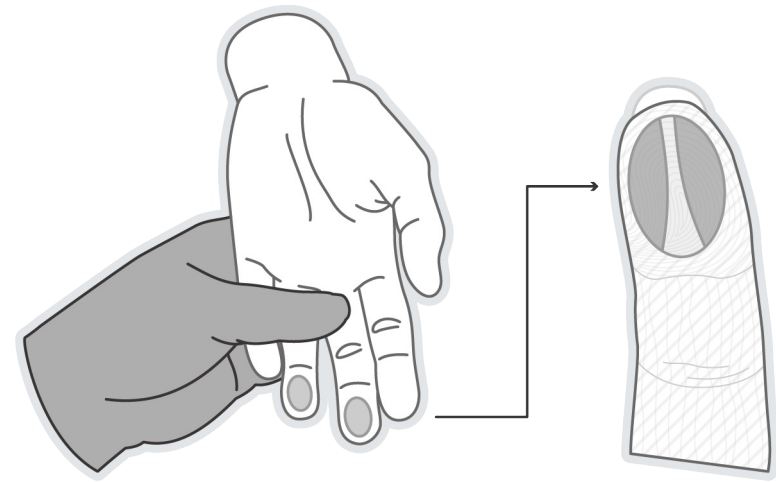
medial. Toward the middle; close to the center of the body.

Some patients have medical conditions (cellulitis or hematoma near the collection site, vascular shunt or graft) that are contraindications for venipuncture. Other patients have laboratory tests ordered where only small amounts of blood are needed, so venipuncture is not necessary. For those patients, a dermal puncture (finger or heel stick) can provide an adequate blood sample. These procedures are not considered venipunctures because blood is obtained from capillaries, not veins.

When performing a capillary puncture on an adult, use the patient's middle or ring finger as the puncture site. The little finger is too small, with the bone too close to the surface. The index finger and thumb are likely to be sensitive or have thick calluses. It is preferable to use the side of the finger for the puncture. The tip of the finger is sensitive, has fewer capillaries, and can have calluses. If the fingertip puncture site is tender afterward, the patient would continue to feel it during activities such as typing on a keyboard. Do not perform a finger stick on a finger that is cold, cyanotic (blue), scarred, swollen, or covered in a rash. You are responsible for choosing the most appropriate location and determining whether a finger is suitable for specimen collection. If in doubt, consult a laboratory supervisor or the provider.

When unsure whether to perform a capillary specimen collection, seek advice from a colleague or supervisor. If the laboratory requisition states "capillary specimen" for infants younger than 12 months, use a heel stick to obtain capillary blood. The veins of infants are too small for a standard venipuncture, and infants do not have sufficient tissue on their fingers for a finger stick.

3.6 Finger stick location



The tip (and slightly off-center) of the third or fourth finger should be used for dermal punctures.

To choose a suitable vein, it is important to know the acceptable locations on the body from which to collect blood. The preferred location for venipuncture is the antecubital fossa. It is visible when the patient extends the arm with the palm of the hand facing upward. The antecubital fossa is a good site for venipuncture because several large veins here are close to the surface and are relatively easy to see and palpate. Other veins you could use when the antecubital veins are not optimal for venipuncture are the following.

dorsal. Toward the back of the body.

- ***Hand veins:*** Veins on the ***dorsal*** side of the hand are the next choice after the antecubital fossa. However, these veins are more fragile than the veins in the antecubital fossa, often roll, and are small in circumference. Venipuncture of the veins on the dorsal side of the hand tends to be more painful than of veins in the antecubital fossa. These veins are relatively short and thin, so it is difficult to achieve a good angle for a venipuncture. It is relatively easy to push the needle completely through the vein in this area. When collecting blood from a hand vein, it is best to use a butterfly needle because it is easier to guide and the wings give you more control. Never collect blood from the wrist with the palm of the hand facing upward because tendons and nerves are close to the surface in this area.
- ***Ankle and foot veins:*** These veins should be the last choice for a venipuncture. They are difficult to access, easy to injure, and often painful. If there are no other choices, use a butterfly needle for collection. Never collect blood from the ankle or foot vein of a patient who has diabetes mellitus or peripheral vascular disease due to poor circulation in the lower extremities. The tendency to develop infection, ***phlebitis***, or hematoma is increased when drawing blood from the ankles or feet. Some facilities prohibit the use of these veins or require provider approval for venipuncture.

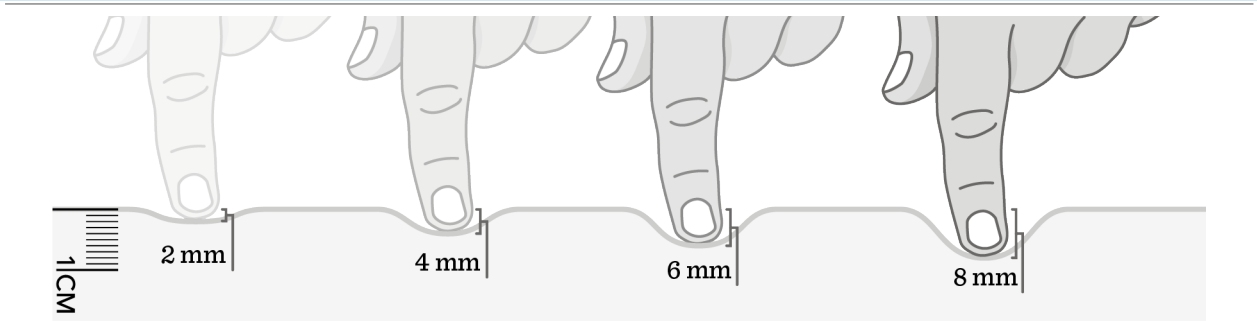
phlebitis. Inflammation of a blood vessel.

You should know the facility's policy on alternative sites for venipuncture before attempting specimen collection from a site other than an arm or hand. When in doubt, seek advice from a supervisor or provider.

Use both inspection and palpation when selecting the appropriate vein. The purpose of palpating a vein is to determine whether there is any condition that would make the vein unsuitable for a venipuncture. A vein that is suitable for venipuncture should be soft, flexible, and feel spongy or bouncy. Pulsation when palpating indicates that the vessel is an artery (not a vein) and should not be used. Once you feel the vein, you should be able to trace its path with your finger. Palpate it for depth, direction, and dimension. Knowing the depth will assist in deciding the angle of insertion. Knowing the direction of the vein will ensure that the needle will be in the lumen of the vessel and not pierce through the vein. Knowing the size of a vein assists in choosing the right needle for the venipuncture.

Sometimes you cannot visually identify or palpate a vein that seems suitable for a venipuncture. In this case, place the patient's arm below the level of the heart for several minutes to decrease the return of blood to the heart and allow the veins to fill. In addition, a warm compress dilates the veins, making them easier to palpate. Follow the facility's protocol for applying heat, and confirm with the provider or supervisor that a compress is safe. Never slap a patient's hand to make veins more accessible. This could cause injury, and the patient can perceive it as threatening or abusive.

3.7 Edema



Transilluminating and laser devices, as well as ultrasound technology, can also be used to locate veins if other attempts have been unsuccessful.

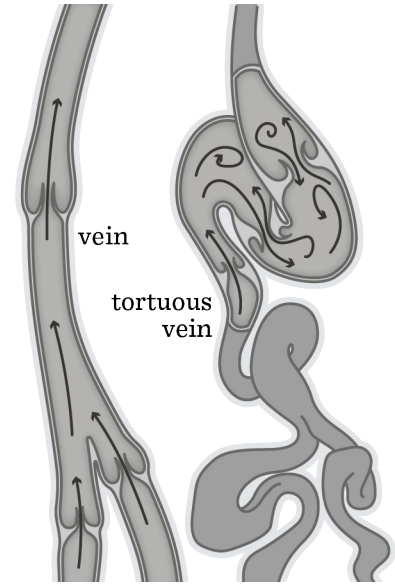
The following locations should not be used for venipuncture.

- Above an IV catheter's insertion site in an arm, because IV fluids can mix with the blood sample and affect the results.
- An arm that has an arteriovenous fistula or shunt for hemodialysis, because it can compromise the circulation in that arm and possibly damage the shunt.
- An arm that has a central venous access device, because venipuncture can damage the device.
- Antecubital fossa on the same side as a recent mastectomy, because it can cause swelling, injury, or infection.
- Site that has edema, because excess fluid that accumulates in the area can alter test results. It can also be painful for the patient.
- Site that has scarring, because blood collection is likely to be difficult and painful for the patient.
- Site that has a hematoma, because it can alter the test results. It can also be painful for the patient, increase the risk of nerve damage by making the hematoma larger, or cause permanent damage to circulation in the limb.

Some veins are large and easily visible but not good choices for venipuncture. Performing venipuncture on these veins can lead to vascular or neurological damage. Blood supply through these veins can also be poor, resulting in poor collection success rates. Examples include the following.

- ***Sclerotic veins:*** As people age, veins tend to become ***sclerotic*** (hard, inflexible, and narrow). These veins can be difficult to puncture and painful for the patient. A patient who has had repeated blood draws from one site will tend to develop sclerotic veins as well.
- ***Tortuous veins:*** Also referred to as varicose veins, ***tortuous*** veins are twisted, dilated, and lack elasticity. They do not run in a straight line, so it would be easy to push the needle completely through the wall of these veins.
- ***Thrombotic veins:*** A vein with a thrombus (blood clot) can feel hard and inflexible. The patient might report tenderness when the vein is touched.
- ***Fragile veins:*** Common in older adult, newborn, and pediatric patients, these veins are quite thin, weak, and difficult to puncture. With palpation, they collapse easily and do not refill quickly. Attempting to draw blood from these veins can be painful for the patient and often requires multiple sticks to collect enough blood for the testing.
- ***Phlebitic veins:*** These veins are tender and warm with a red area around them. Phlebitic veins also can have clots and be difficult to puncture and painful for the patient.

3.8 Tortuous veins



sclerotic. Thickened or scarred vein or vessel caused by repeated venipunctures.

tortuous. Twisted.

CHALLENGE

What is the term for a vein that is tender and warm, with a red area around it?

Answer: Phlebitic is correct. Phlebitic veins also can have clots in them. They can be difficult to puncture and painful for the patient.

What is the term for a vein that is hard, inflexible, and narrow?

Answer: Sclerotic is correct. Sclerotic veins are common in older adult patients. They can be difficult to puncture and painful for the patient.

Factors such as age and mental status can alter the patient's ability to understand the venipuncture procedure. Objectively assess the patient to determine understanding, as this can affect tolerance of the procedure. The assessment doesn't need to take long; you can perform it in less than a minute while identifying the patient. Important information can be obtained through observation and active listening.

To determine potential tolerance of the procedure, follow these guidelines.

- Ask patients whether they have had any problems during or after a venipuncture. If yes, find out what the issue was. Was there excessive pain, significant bruising, prolonged bleeding, chest pain, dizziness, fainting, nausea, or another problem?
- Look and listen. Do patients seem anxious? Is there anything about their body language or tone of voice that indicates fear? If yes, ask them directly if they are afraid and why.
- Don't make assumptions about a patient's veins, regardless of age. With children, evaluate the location and type of blood collection suitable for the child's age. Infants younger than 12 months should have blood collections from the heel. Never use a lancet that punctures deeper than 2 mm when performing an infant heel stick. Do not perform a dermal puncture on the finger of a child younger than 1 year old due to the size of the finger and the increased risk of injury.
- When performing a venipuncture on older adult patients, do not assume their veins are difficult to access. Some older adult patients have easily accessible veins. Examine and palpate the veins in the antecubital fossa in both arms to determine whether the patient has any veins suitable for blood collection. If the extremities are cool to the touch, warming the area might help locate a vein. If there are no accessible veins of the arms and hands, a dermal puncture might need to be considered. Skin changes with age, often becoming thinner and more prone to injury. Muscles diminish in size, so a shallower angle between the needle and the skin can be needed.

COMPLETE VENIPUNCTURE QUIZ FOR 30 POINTS
SCORE: _____

NONBLOOD SPECIMEN COLLECTION

Patient instructions

You might collect specimens other than blood or instruct patients how to collect them at home. Common nonblood specimens are urine, ***stool***, sputum, and semen. In general, physicians are responsible for collecting other types of specimens (***cerebrospinal fluid***, ***amniotic fluid***, material from a wound). Nurses are also responsible for collecting urine specimens for urinalysis through a ***urinary catheter***.

Urine

One of the most common of all laboratory tests is a routine urinalysis, which is an examination of a patient's urine for a variety of factors, including its appearance, color, odor, ***pH***, ***specific gravity***, and the presence or absence of many other components (protein, glucose, ***hemoglobin***). A urinalysis can be requested as random or at a specific time. If the urine specimen is to be collected upon waking in the morning, which could be another time of day if the patient is a night-shift worker, it must be done at this time. In addition, if the urine specimen is to be collected after fasting for a designated period of time (usually 6 to 12 hr), the patient should be given clear instructions on this collection detail.

Another common urine test is a culture, which consists of the laboratory technician preparing the urine for the growth and identification of micro-organisms. Often, a sensitivity test follows to determine which antibiotics effectively kill that specific pathogen. The urine specimen for these tests needs to be a clean-catch (midstream) specimen or obtained from a catheter. The clean-catch method is suitable for patients who are able to understand instructions for depositing a urine sample into a sterile container. Patient education—including written instructions—ensures that patients use the proper technique for urine cultures.

Various tests, including some for assessing the function of the renal system, require a timed urine specimen. This involves collecting urine excreted over a specific period of time (such as 2, 4, or—most commonly—24 hr).

stool. Solid waste the intestines eliminate through the anus; fecal matter.

cerebrospinal fluid. Liquid that surrounds the brain and spinal cord.

amniotic fluid. Liquid that surrounds a fetus inside the sac in the uterus.

urinary catheter. A tube inserted into the bladder to drain urine from the body.

pH. A measure of acid-base balance.

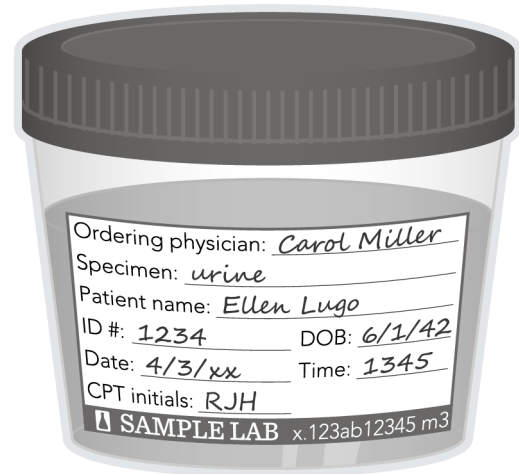
specific gravity. A measure of concentration.

hemoglobin. The red, oxygen-carrying portion of red blood cells.

Random urine specimen

When instructing a patient to collect a ***random urine*** specimen, give the patient a clean, disposable urine collection container and a label with the patient's information. The label must go on the container and not on the lid because a technician might process multiple urine cups with the lids removed. It is preferable to put the label on the specimen after collection in case urine or water accumulate on the outside of the container. There is no preparation for this type of specimen. The patient only has to urinate into the container. Generally, 30 to 60 mL is enough to evaluate the specimen. For testing accuracy, specimens collected at home should be stored in the refrigerator and brought to the laboratory as soon as possible after collection. The date and time of the collection should be noted on the label.

random urine. A urine specimen collected at any time of day for screening purposes; no preparation is required.



Fasting (first morning) urine specimen

When instructing a patient to collect the first urine of the morning or a fasting urine specimen, give the patient the same supplies and instructions as for a random specimen. Instruct the patient to urinate before going to sleep and then collect a specimen immediately after waking in the morning. Because this type of specimen is more concentrated than a random urine specimen, it is likely to be used for specific testing (pregnancy, glucose). The patient should refrigerate the specimen and get it to the laboratory as soon as possible. Urine begins to deteriorate within 30 min of collection. Refrigeration slows this deterioration.

Clean-catch (midstream) urine specimen

When instructing patients to collect a clean-catch or midstream urine specimen, give them a sterile urine container and make sure they understand not to allow anything other than urine to come in contact with the inside surface of the container and lid. This test is mainly used to detect bacteria. Instruct patients to wash their hands prior to and after specimen collection, and then use soapy water or antiseptic wipes to cleanse the urinary meatus.

Male patients. Instruct patients to clean from the meatus outward in a circular fashion. If uncircumcised, the foreskin should be retracted and then the same cleansing technique is used. The patient should start to urinate in the toilet, then collect urine in the container until it is one-fourth to half full, being careful not to allow the penis to touch the container. The final part of the stream should be deposited in the toilet.

Female patients. Instruct the patient to separate the labia around the urinary meatus and clean the area with a mild antiseptic soap and water (or antiseptic towelettes) using a front-to-back technique. Then the patient should separate the labia with one hand, begin to urinate in the toilet, urinate into the container until it is one-fourth to half full, and finish urinating into the toilet. Without touching the inner surface of the container and the lid, the patient should close the container, wash and dry it if needed, and give it to the phlebotomist. Immediately affix the completed label after receiving the urine sample. The same procedure for storage applies until the specimen can be delivered to the laboratory.

Timed urine specimen

When instructing a patient to collect a timed urine specimen, provide a container of the appropriate size, with a preservative in it if the facility requires it. These are usually rigid, light-resistant containers with about a 3,000 mL capacity, wide mouth, and leakproof screw-on cap. For a 24-hour collection, the patient should begin at a specific time, urinate into the toilet, and then record the start time. The patient should then collect all urine passed until the same time the following morning. If the patient urinates into the toilet at any time during that 24-hour period, the entire collection is invalid and must be discarded. The process will begin again. During the collection period, the specimen must be kept in the container on ice or in the refrigerator. Be sure the patient understands that nothing other than urine should go into the container. The final specimen should be collected as close as possible to the end of the 24-hour period.

Urine reagent testing

In some settings, phlebotomists perform point-of-care urine testing using reagent strips. Urine reagent testing is a CLIA-waived test. This involves placing a chemically treated strip into a urine sample. You will conduct a visual or physical observation of the specimen, noting color, clarity, and odor. Observation of the chemical components of urine involves viewing color changes on the strip at designated intervals and documenting the results. This procedure requires you to wear clean gloves, dip the reagent strip into the urine, observe the squares on the strip for color changes, and compare the strip to the key on the reagent container. Follow the manufacturer's directions. For example, with some reagent strips, the colors can change misleadingly if there is an excessive amount of urine on the strip or if you don't adhere to the time period that must elapse prior to reading the results.

Most reagent strips provide information about pH, specific gravity, white blood cells, hemoglobin, ***ketones***, ***bilirubin***, protein, nitrites, and glucose (depending on the type of strip used).

- ***pH*** can range from 4.6 to 8.0 and the normal range for a urine specimen is between 5.5 and 8.0. This is important when examining urine for bacterial growth because bacteria grow more easily in an alkaline environment than in an acidic environment. (Samples left unrefrigerated for extended periods will become more alkaline, resulting in higher and inaccurate bacteria counts.)
- ***Specific gravity*** is an indicator of the concentration of the urine. The expected range for urine specific gravity is 1.003 to 1.030, but it is usually 1.010 to 1.025. A specific gravity below 1.010 indicates diluted urine. A specific gravity above 1.010 indicates concentrated urine. Highly concentrated urine can be an indicator of dehydration.
- ***White blood cells and nitrites*** indicate infection.
- ***Hemoglobin*** can indicate bleeding, infection, cancer, kidney disease, chemical poisoning, and other pathology.
- ***Ketones*** are products of fat metabolism. Their presence in urine can result from diabetes mellitus, starvation, or vomiting.
- ***Bilirubin*** can indicate liver disease or red blood cell destruction.
- ***Protein*** can indicate inflammation, infection, kidney disease, or chemical poisoning.
- ***Glucose*** can indicate diabetes mellitus.
- All other components of the urine reagent test strip should be negative in a random urine sample.

Urine reagent test strips are screening tools. Further laboratory analysis is usually necessary to confirm any unusual findings on a urine reagent test.

ketones. Acids that form from the breakdown of fatty acids in the absence of insulin.

bilirubin. Yellow or orange product of the breakdown of hemoglobin.

CHALLENGE

What type of urine specimen collection requires the patient to first urinate into the toilet and then into the collection cup?

Answer: Clean-catch (midstream) is correct. This type of urine collection is necessary for a laboratory identification of infecting micro-organisms, so it is important that the specimen does not contain any germs from outside the urinary tract.

Stool

The most common point-of-care test on stool is the fecal occult blood test (FOBT), which identifies the presence of blood in the stool that is not visible. It helps providers diagnose gastrointestinal lesions (such as ulcers) and colorectal cancer. Laboratory technicians also test stool specimens to detect bacteria, viruses, fungi, and parasites.

If a patient is collecting stool for laboratory testing, you will provide a sterile container, usually a wide-mouth plastic container with a tight-fitting lid. This type of collection device allows the patient to defecate directly into the specimen container. Patients can also collect a specimen into a clean container and then transfer it to a smaller specimen container using a tongue depressor or a spoon-like component of some containers. Instruct the patient to avoid getting urine in the container. Urine can prevent further growth of the micro-organisms being tested. The sample also should not contain water from the toilet. Stool tests do not require a large amount of stool. Instruct the patient to secure the lid tightly on the specimen container, wash the outside of the container if necessary, and wash their hands thoroughly after the collection. Stool specimens should not be refrigerated if undergoing testing for parasites, but should be returned to the laboratory immediately. Some samples require immediate analysis at the laboratory, while others can be refrigerated and analyzed later.

For an FOBT, the patient will collect small stool specimens on specific cards. You will give the patient a kit that contains the cards, instructions for preparing them, and a mailing envelope to return the samples to the testing laboratory. There are some pretesting requirements. For example, patients should not eat some foods (red meat, citrus fruits, raw vegetables) or take some medications (vitamin C, aspirin) for 3 days before specimen collection. The patient needs to follow the manufacturer's instructions, which usually includes collecting three separate stool samples and placing them on the cards with the applicators in the kit. Samples should not be collected from toilet water. Using a collection container or obtaining a smear from toilet tissue is acceptable.

Discussing stool collection can be embarrassing for some patients. Maintain a professional, matter-of-fact demeanor while encouraging the patient to ask questions.

Sputum

Sputum is material coughed from the lungs. Providers typically order sputum testing for patients who have a respiratory infection (tuberculosis, pneumonia) to confirm which micro-organisms are causing the infection. Providers also request sputum samples to determine if a treatment being used is effective. As a result, the sputum is likely to contain infectious material. Testing of sputum specimens is most accurate when the patient collects the sputum in the morning, before having anything to eat or drink, because the sputum is more concentrated. It is not yet diluted with food or fluid it would come in contact with as the patient expectorates.

Provide a sterile sputum container. Make sure the patient understands to collect sputum first thing in the morning before using mouthwash (because it could kill some micro-organisms), eating, or drinking. Instruct the patient to take a deep breath, cough forcefully and deeply, and expectorate into the container. The patient should not spit saliva into the container. For testing, a sufficient amount of sputum is generally 1 or 2 teaspoons. The patient should then close the lid, clean the outside of the container, affix the label, and deliver the specimen to the lab as soon as possible.

CHALLENGE

At what time of day should a patient collect a sputum specimen?

Answer: First thing in the morning is correct. Testing of sputum specimens is most accurate when the patient collects the sputum in the morning, before having anything to eat or drink. The sputum is more concentrated and not yet diluted with any food or fluid it could come in contact with as the patient coughs it up.

Semen

Laboratory technicians analyze semen as part of fertility testing, assessing effectiveness of a sterilization procedure (vasectomy), or as part of a criminal investigation. Depending on the purpose of the test, there can be pretesting instructions (such as abstaining from sexual activity or alcohol for several days before collection). Provide a collection container that is clean and free of chemicals (detergents, spermicides). The patient must ejaculate, deposit semen into the container, secure the lid and label, and write the date and time of the collection. The patient must protect the specimen from extreme heat and cold. It must reach the laboratory within 1 hr after collection.

END OF MODULE 3

QUIZ

Summary Notes

Ready to move on?

Use all the resources?

key take aways

MODULE 4: ROUTINE BLOOD COLECTIONS

PREPEARING FOR VENIPUNCTURE

PHLEBOTOMY PROCEDURES

CAPILLARY PUNCTURES

LABELING AND POSTPROCEDURE CARE

PREPARING FOR VENIPUNCTURE

Equipment selection

Many factors affect equipment choices for blood collection. Among these are the facility in which you work, the types of tests that are being performed, the needs and condition of the patients, and the setting in which the blood will be collected. In an outpatient setting (doctor's office, lab collection center) you most likely will have a phlebotomy station, where supplies and equipment are kept in a cabinet close to the phlebotomy chair. Patients come into the facility, and it is your responsibility to help make sure that they are safe throughout their visit. In the inpatient setting, you can have a phlebotomy tray or cart that you take with you to the inpatient floors. In either setting, assemble the equipment before the tourniquet is placed on the patient, and set up the supplies in a manner that keeps both you and the patient safe. Before the blood collection, review the requisition to know what supplies you need to collect the specimen. Gather all supplies necessary, and double-check the requisition to make sure that you take all of the supplies with you. It gives the patient a feeling of confidence in you when all supplies are there, ready for the collection. When gathering supplies, check expiration dates and look for any manufacturer or packaging defects. Arrange equipment in a location that provides safety for the patient and for your convenience.

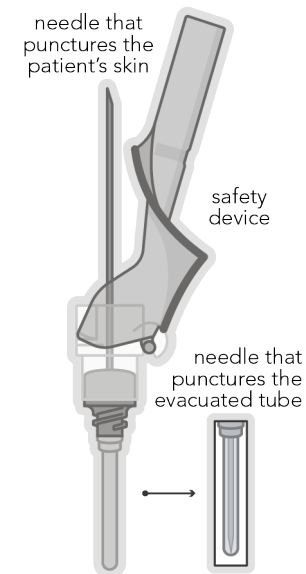
When setting up for the blood collection, place all items within easy reach to help keep you and the patient safe. Because the patient eats on the overbed table in an inpatient setting, avoid placing the phlebotomy tray on this surface. Instead use a chair or put a towel or disposable drape under the phlebotomy tray. It is also important to keep needles capped until right before the blood collection.

The evacuated tube system (ETS) is the most commonly used equipment for venipuncture. Equipment used for ETS includes the following.

- ***Gloves:*** Use a new pair of well-fitting vinyl or nitrile gloves for each patient venipuncture. The reuse of gloves is prohibited. Consult the patient's chart for potential latex allergies.
- ***Isopropyl alcohol swabs or pads:*** Use alcohol swabs or pads to cleanse the skin before inserting the needle. Discard them after each use. The reuse of swabs is prohibited.
- ***Gauze pads:*** Use disposable gauze pads to provide pressure to aid in clotting and to cover the venipuncture site. Reuse of the pads is prohibited. Do not use cotton balls, because they can leave fibers on the patient's collection site and can remove a clot when removed.

- ***Tape, self-adhering bandages, or adhesive bandages:*** Apply these to the puncture site to promote clotting.
- ***Tourniquet:*** These come in pliable straps (latex or latex-free) or hook-and-loop fastener forms. Tourniquets can be reused, but discard them if they become soiled or obviously contaminated. If a tourniquet is not available, a blood pressure cuff pumped up to 40 mm Hg can be used.
- ***Needles:*** Use 21- to 23-gauge hollow needles with a ***beveled*** edge for routine venipuncture. The needle used is 1 to 1.5 inches long. They are sterile and must be disposed of after each use. Needles must have a safety device that completely covers the needle after use. The 21-gauge needle is the most common size. Never reuse needles. ETS needles are double-sided—one side is inserted into the patient, and the other side is covered with a sheath that punctures into the evacuated tube and helps prevent the blood from dripping when tubes are changed. Before and after use, be equally careful with each side of the needle.
- ***Hub, adapter, or needle holder:*** These are attached to the needle and used to guide the tubes toward the needle to initiate blood flow into the evacuated tube.
- ***Blood collection tubes:*** Blood collection tubes used for adults are about 3 inches long and ½ to ¾ inches wide. The vacuum inside adult blood collection tubes is higher than the pressure inside the blood vessels of a child, so an adult collection tube can collapse a child's vein. Pediatric blood collection tubes are identical to adult tubes in color, but they are about half as big and have less vacuum.

4.1 Double-sided needle

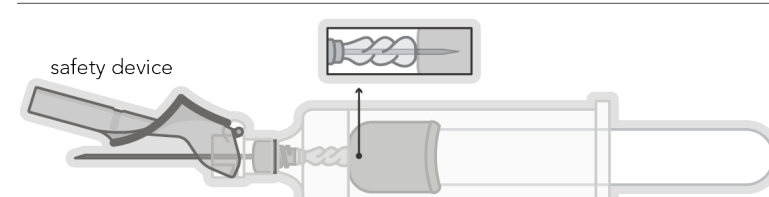


bevel. Sharpened and slanted cut edge of a needle designed to ease in the process of puncturing tissue.

Evacuated tube system method

When using the ETS method, blood is collected into glass or plastic tubes. The inside of a blood collection tube is sterile, but the outside is not. The tubes have an opening at one end that is sealed with a rubber stopper. During manufacturing, the air in the tubes is removed, and rubber stoppers are placed over the openings. The tubes have a vacuum (negative pressure) that—when the tubes are attached to a needle within a vein—aids in the flow of blood into the collection tubes. The vacuum in each type of tube is designed to collect the appropriate amount of blood required for the tests to be performed from each tube. Because of this vacuum, it is important to never remove the stopper of a tube before a blood collection.

4.2 Double-sided needle with an evacuated tube



Colored stoppers identify each tube and indicate which additive is contained inside. The label indicates which additive is in the tube, the expiration date, and the amount of blood that the tube will hold. Check the label to confirm that the additive is the correct one for the test being performed. Do not trust the color of the stopper alone. The most common additives in tubes are either anticoagulants or clot activators. The additives are chosen for each tube by how well it preserves the blood to help ensure test accuracy.

The anticoagulant tubes (also called ***plasma*** tubes) are used when the blood test requires the blood not to clot. These most commonly include blood culture, light yellow, light blue, green, purple, royal blue, and gray tubes.

plasma. Liquid portion of the blood in which blood cells are suspended.

- Blood culture tubes contain sodium polyanethole sulfonate (SPS) and are used for bacterial studies.
- Light blue tubes contain sodium citrate and are used for coagulation blood tests.
- Green tubes contain sodium, lithium, or ammonia heparin and are used to test chemical levels in the blood.
- Purple or lavender tubes contain ***ethylenediaminetetraacetic acid (EDTA)*** and are used for whole blood hematology determinations.
- Gray tubes contain potassium oxalate/sodium fluoride and are used for glucose determinations.
- Royal blue tubes contain either a clot activator or EDTA and are used for trace element testing.
- Light yellow tubes contain acid citrate dextrose (ACD) and are used for blood bank studies and DNA testing.
- ***Serum*** tubes are used for blood tests that require the blood to clot.
- Red, gold, or orange tubes are serum tubes, which can have no additives if they are glass. (The silica in the glass or silicone blown into the tubes helps the blood clot.) Plastic red and gold tubes contain a clot activator and are used for chemistry determinations of the blood. Orange tubes contain a thrombin–based clot activator and are used when the chemistry determination is for a stat blood collection.

ethylenediaminetetraacetic acid (EDTA). An additive in collection tubes used as an anticoagulant to keep blood specimens from clotting.

serum. Straw-colored liquid portion of the blood visible after the specimen has been allowed to clot and after centrifugation.

The additives are specific to blood tests, and phlebotomy technicians must know the appropriate tubes to use for each test. Using the incorrect tube can alter the test results. It can also result in the clotting of blood that should not be clotted.

Evacuated tubes can also contain a gel separator, which doesn't affect the condition or quality of the blood sample but assists in the processing of the blood after the tube is centrifuged. When the gel separator is in a serum tube, the tube is called a serum separator tube (SST). If the gel separator is contained in a plasma tube, the tube is called a plasma separator tube (PST).

Syringe method

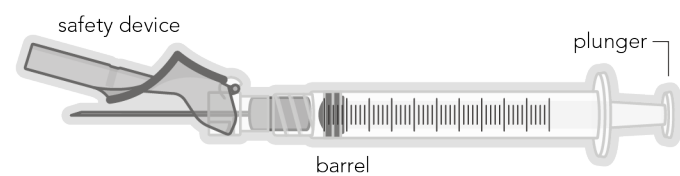
The syringe method is used for patients who have fragile veins that collapse easily. ETS tubes, which contain a vacuum, collect the blood from the patient at a rapid rate that you cannot determine or control. The syringe is different; the plunger on the barrel of the syringe allows you to manually adjust the rate that the blood is withdrawn from the patient, and therefore helps prevent the collapsing of fragile veins.

Many of the supplies used for a syringe collection are like those used in an ETS collection: gloves, alcohol, gauze pads, and bandages. Evacuated tubes are used, but not in the blood collection process itself. The blood is first collected into the syringe and then transferred into the tubes.

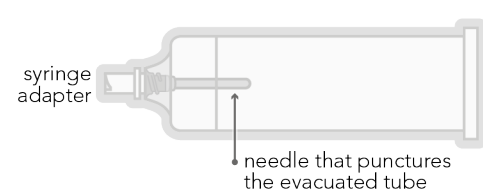
The supplies that differ from the ETS method include the following.

- ***Syringe:*** Used instead of an adapter, the syringe attaches to the needle and holds the blood during collection. The syringe has a plunger, which is used to slowly withdraw blood from the vein into the barrel of the syringe. The side of the syringe has printed numbers that indicate the amount of blood that can be collected into the barrel. Syringes can be many sizes, but 10 mL and 20 mL are most commonly used.
- ***Needles:*** Like the ETS method, needles are hollow with a beveled end. The needles range from 21– to 23–gauge and are 1 to 1½ inches long. OSHA requires a safety device that completely covers the used needle. Unlike the ETS method, the needles are single–sided.
- ***Transfer device:*** This is a plastic device, similar in appearance to an adapter/hub, containing a needle on the end and covered in a sheath. The transfer device is constructed to screw onto a syringe, where the needle was originally attached. The barrel of the transfer device is large enough to allow an evacuated tube to slide in and snap onto the needle to allow the blood to be collected into the tube by its vacuum.

4.3 Syringe needle



4.4 Transfer device

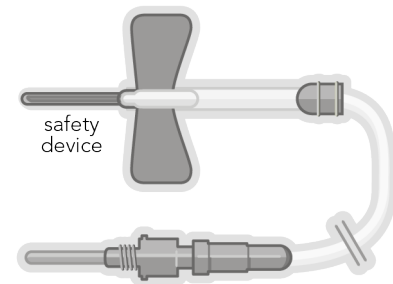


Winged infusion (butterfly) method

A winged infusion device is used when a patient has veins that are small or difficult to access. The winged infusion set is also known as a butterfly, because the holders on either side of the needle look like wings.

The supplies used to perform a venipuncture via the butterfly method are very similar to those used for the ETS method: gloves, gauze, alcohol pads, adapter/hub, and bandages. The difference is how the butterfly attaches to the adapter and how it is used to puncture the patient's skin. The winged infusion set consists of a 21- to 23-gauge, hollow, ¾-inch-long sterile needle with a beveled edge, a short length of flexible plastic tubing, and another sterile needle at the other end of the plastic tubing covered with a rubber sheath. The second needle attaches to the adapter similar to the ETS method. Instead of holding the entire device in one hand like the ETS system, one hand holds only the needle (not the adapter) during insertion. Once the first needle has been inserted into the vein, the tube is inserted into the adapter and the second needle is used to puncture the rubber collection tube. As the second needle punctures the stopper, the rubber sheath slides back, allowing the needle to pierce the tube and blood to flow from the vein into the collection tube.

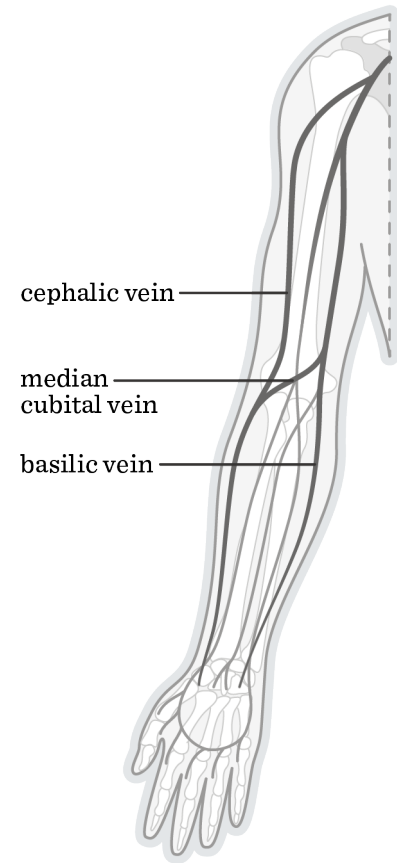
4.5 Butterfly needle



Select and prepare the site

Observe the patient's arm for any factors that can affect the blood collection (tattoos, scarring, hematoma). Many patients prefer a specific arm to be used for a collection. Some patients have a reason why one arm cannot be used. Ask the patient which arm they prefer prior to the collection preparation. Start your palpation on the arm that the patient prefers. If you cannot locate a vein on that arm, ask for permission to palpate the other arm. Both arms can be checked to find the best vein for the blood collection.

When selecting the arm to use for a blood collection, there are several factors that determine which side should be assessed first. Due to the increased risk of infection or pain to the patient, avoid using the arm on the affected side of a patient who has a history of a mastectomy. Avoid performing a collection in any area of the body covered with a tattoo. Do not obtain a specimen through a hematoma because the collected blood in the area can affect test results and could also cause more pain to the patient. If a patient has edema, avoid the area due to the possibility of the blood collected being altered with the extra fluid in that area. It can also cause increased pain to the patient because the skin becomes very tight in the areas of edema. Do not collect from an area that is scarred due to pain and potential difficulty finding a vein. Do not collect from a sclerosed vein; the scarring in the vein can be difficult to collect from and increases the risk of pain to the patient. When a patient has an IV in their arm, first try to find a vein in the other arm. If not possible, follow the facility's procedure for the blood collection. Sometimes the IV will be turned off for several minutes prior to blood collection. In all cases (IV on or off), the collection must take place below the IV to help prevent contamination of the specimen with infused fluids. It is especially important to collect from the opposite arm or below the IV when a patient is receiving a blood transfusion. Collecting above the IV could mean that the blood being tested is from the donor, which can yield inaccurate blood test results.



Tourniquet application and removal

Tourniquets can be for single or multiple use. If using a multiple-use tourniquet, check for contamination, cracks, or excessive wear before each patient. The tourniquet should be placed approximately 3 to 4 inches above the antecubital area for collections in that region, or above the wrist bone for dorsal hand collections. When the tourniquet is too far from the desired venipuncture site, the tourniquet might not provide enough tension. If the tourniquet is too close to the site, the vein can collapse.

Tourniquets should be applied gently, yet tight enough to assist with finding the vein. Too loose of a tourniquet can make it difficult to find the vein. A tourniquet that is too tight can slow or stop blood flow and can also hurt the patient. Apply the tourniquet so that the removal is quick and easy.

It is also important that the tourniquet be removed within 1 minute of being applied. After 1 minute, ***hemoconcentration*** begins. Hemoconcentration alters the blood and can yield inaccurate results. Remove the tourniquet gently, because the needle will still be in the vessel. Discard or reuse tourniquets as the facility requires.

If a tourniquet is not available, a blood pressure cuff pumped to 40 mm/Hg can be used. Release at the 1-minute point, similar to the tourniquet.

hemoconcentration.
Excessive accumulation of blood into an area of the body, usually caused by a tourniquet left on too long or a patient pumping their fist.

Observation and palpation

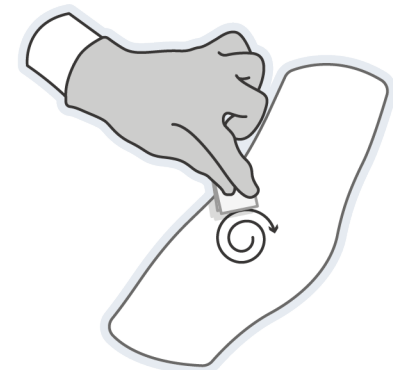
Once the tourniquet is applied, begin to palpate, starting from the middle of the antecubital region and moving toward the outside of the arm. Palpation should begin with light pressure, the finger bouncing against the skin—up and down—without leaving the surface of the skin. Veins feel spongy and bouncy. Tendons feel hard (similar to bone) and should be avoided. Also, avoid veins that feel hard because they could be sclerosed or scarred. If no veins are felt with light pressure, increase pressure but avoid hurting the patient. Only one finger should be used, preferably the index or second finger of the nondominant hand. Palpate with the very tip of the finger, which can be the most sensitive, and avoid palpating with the thumb. Do not select a vein that you can see but not feel—it can be a superficial vessel, which will not be large enough to permit the needle to be entered and blood to be collected.

Always palpate with the same finger and hand to train your brain to find veins easily. Palpating with the nondominant hand also allows you to re-palpate in the case of a miss without switching hands, which can disrupt the needle. Once a vein is found, travel your finger up and down the vessel to determine the direction. Palpate also for depth of the vein and the size of the vessel. This information will help you decide what equipment to choose and how to align the needle when entering the vein.

When a vein is difficult to find, there are a few procedures that can help the vein become more prominent. Because veins will rise to the surface to help cool the body and blood, a warm cloth or an infant heel warmer can be used on the antecubital space, the dorsal part of the hand, or the heel of an infant. Just make sure that it isn't so hot that it could burn the patient. For arm or hand collections, hang the arm below the heart to allow gravity to help fill the veins with blood. Some rubbing of the area can help circulation, but avoid too much friction, which can affect blood test results. Do not slap or smack the area of the palpated veins. Not only could this hurt the patient, it can be considered an act of battery.

Antiseptic application

Always wear gloves when cleansing a patient's skin in preparation for blood collection. To cleanse the site prior to routine venipuncture, use a new individually packaged 70% alcohol pad or swab. Open the package carefully to avoid wetting fingers and excessive touching of the pad. Start to cleanse at the center where the vein was located. Scrub the area in outward circles, making sure to cover the area that will be punctured. Use a minimum of three cleaning circles, and do not rub up-and-down or side-to-side. Using a circular motion that moves from the inside toward the outside avoids cross-contamination. Allow the alcohol to dry (preferably air-dry) so it can perform its antiseptic action. Performing the blood collection when the alcohol is wet can also cause the patient to feel a stinging sensation when the needle enters the skin. Do not blow on the site, which can contaminate the specimen. If the alcohol seems to stay wet, a sterile gauze can be used to gently dab the site to remove the excess alcohol. An alcohol swab stick can also be used in the same method as the pad. Avoid touching the area after it has been cleansed. If a re-palpation is necessary, repeat the cleansing process.



If a patient is allergic to alcohol, use the recommended alternative in your facility. Replacements include chlorhexidine gluconate and povidone-iodine.

Do not use alcohol to cleanse the site if the blood collection requested is to test for alcohol in the patient's system. Use the recommended antiseptic in the facility for these procedures.

When performing a blood culture collection, the site should have a different cleansing method. Instead of using only 70% isopropyl alcohol, the facility can require use of another antiseptic such as povidone-iodine, chlorhexidine gluconate, or an alcohol and povidone combination. The cleansing should occur for at least 30 to 60 seconds to remove as many micro-organisms from the skin as possible. Careful cleansing of the area helps ensure better blood culture results and reduce the risk of accidental contamination of the test.

When performing a dermal puncture (capillary puncture), cleansing the skin is also very important. When the location on the finger or heel has been chosen, rub the area vigorously with a new individually packaged 70% isopropyl alcohol pad or swab. The vigorous rubbing helps remove micro-organisms from the skin and increase blood flow to the area. Allow to air-dry prior to the puncture. Do not use povidone-iodine to cleanse a dermal puncture because it will have an adverse effect on the results of a bilirubin, uric acid, phosphorous, or potassium test.

COMPLETE GATHERING SUPPLIES CHALLENGE FOR 100 POINTS

SCORE: _____

COMPLETE ORDER OF DRAW CHALLENGE
SCORE: _____/40 POINTS

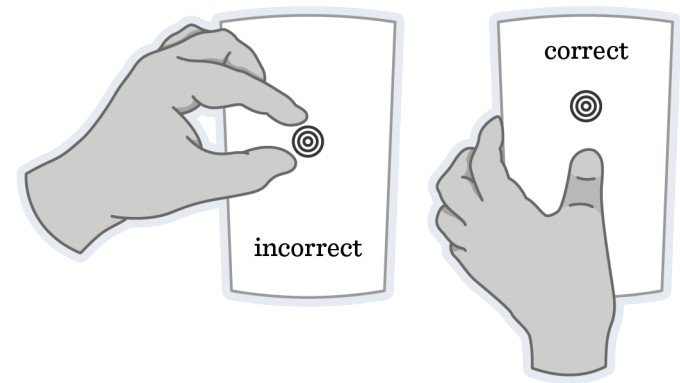
PHLEBOTOMY PROCEDURES

Anchoring below the venipuncture site

Proper anchoring below the venipuncture site along with a quick insertion helps prevent veins from rolling away from the needle. To anchor, place the thumb of your nondominant hand approximately 2 inches below the intended site of insertion. Hold down firmly with a slight distal tug downwards. Avoid pushing hard or directly into the skin, which can cause pain to the patient or potential bruising. Holding the skin tightly also helps reduce pain when the needle is being inserted and helps keep the vessel steady.

Avoid using a C method of anchoring (one finger above the site of the intended venipuncture site and the thumb below, forming a C). This method does hold the skin taut, but also increases the risk of an accidental needle stick of your own finger.

4.6 Anchoring veins



VENIPUNCTURE INSERTION PROCESS

ANGLE OF NEEDLE INSERTION

CORRECT ORDER FOR VENIPUNCTURE STEPS
EVACUATE TUBE METHOD (30 STEPS)

WINGED INFUSTION METHOD

SYRINGE METHOD (36 STEPS)

VENIPUNCTURE ORDER OF THE DRAW

PATIENT SAFETY THROUGHOUT THE COLLECTION

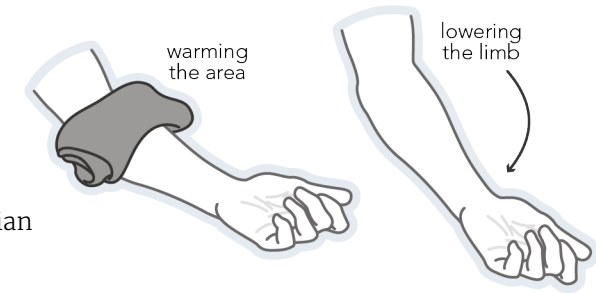
COMPLETE VENIPUNCTURE STEPS CHALLENGE SCORE _____/100 POINTS

COMPLICATIONS FROM PRIMARY COLLECTION

VENIPUNCTURE REMOVAL PROCESS

INVERTING EVACUATED TUBES

Complications from primary collection



A common problem that can occur with venipuncture is that the phlebotomy technician cannot easily see or palpate a suitable vein. You can warm the area to help find a vessel, or lower the arm below the patient's heart. Some facilities have a policy that outlines how many times you can retry phlebotomy. It is generally accepted that a phlebotomist tries only twice before asking someone else to collect the sample. So be sure that the site chosen has a good chance of being successful. If you cannot find a vessel, ask another phlebotomy technician to try, ask your supervisor for advice, or notify the provider.

If you don't see a flash when using a butterfly needle or there is no blood flow into the tube with the ETS system, you might have missed the vein. First pull the needle back very slightly. If you have transfixed the vessel, pulling back on the needle will place it in the vein and blood flow can begin. Vacuum tubes will not fill completely if you have transfixed, so it can be necessary to discard the light blue tube and use another one to continue the blood collection. If blood does not begin to flow after slightly pulling back on the needle, do not dig or probe into the arm blindly. Nerves cannot be seen or felt, and blind moving of the needle could cause excessive pain or damage to the patient. Re-palpate the site and determine if you can feel where the vein is compared to the needle. If the vein is fairly close to the needle, anchor below the needle with your nondominant hand and attempt to move the needle closer to the vein. If the patient expresses any indication of pain, stop the attempt.

Occasionally, while performing a venipuncture, blood flow will unexpectedly stop. You might have advanced the needle too far (causing it to touch the back wall of the vein), or not advanced the needle deep enough into the vein. Perform a slight readjustment of the needle to determine if you can restart the blood flow. The blood collection tubes rarely malfunction, but it is possible for the vacuum in the tube to be insufficient to withdraw blood, or the rubber stopper on the tube might not have been properly punctured. If this is suspected, try another tube. However, it is possible that the vein collapsed, and you can need to perform another puncture. Use a new needle for every attempt, even on the same patient.

If blood flow stops or if no blood is evacuated into the collection tubes, do not repeatedly move the needle in and out, back and forth, or side to side. This is painful for the patient and can cause excessive bleeding and bruising. This also increases the risk of puncturing an artery or damaging a nerve. It is acceptable in these situations to advance the needle slightly. If that does not work, pull it back slightly; but if this does not work, remove the needle.

During or after the venipuncture process, patient complications can occur. Check for any signs or symptoms that indicate the patient is having difficulty tolerating the procedure. But remember that patients might not—for various reasons—speak up even if they are uncomfortable or in pain. Before the start of the procedure, ask patients to let you know if they are having any problems during or after the venipuncture. Knowing how to identify and address these complications will minimize the chance of a negative outcome for you and the patient.

Some complications that can occur during or after a blood collection include the following.

- ***Nerve damage:*** If a patient reports moderate to severe pain, a sensation of numbness, or a feeling of pins and needles immediately after you insert the needle, it is possible that a nerve has been hit, and you must stop the procedure immediately. If the pain or numbness continues after the needle is removed, the patient might need additional medical care to determine the extent of the damage to the area.
- ***Hematoma:*** A hematoma is the most common complication associated with phlebotomy. Pushing the needle through both walls of the vein can cause a hematoma to form due to the blood that leaks into the surrounding tissue. Hematomas usually disappear in a few days and cause no harm. If a hematoma develops during a blood collection, it can put pressure on a nearby nerve if it grows too large and could damage the nerve. If a hematoma starts to appear during the blood collection, you must stop the collection immediately. Reduce the risk of causing a hematoma by performing venipuncture smoothly and accurately, applying the right amount of pressure for the right amount of time after removing the needle, and applying a bandage that puts pressure on the site.
- ***Phlebitis:*** Phlebitis is inflammation of a blood vessel. It usually occurs when one vein has been accessed repeatedly.
- ***Thrombosis:*** A thrombus is a solid mass composed of blood (clot) that can partially or fully block a vein or artery, causing difficulty when performing venipuncture.
- ***Petechiae:*** These are small red dots that develop on the skin below the tourniquet. They can result due to routine application of a tourniquet, or in cases where a tourniquet is applied too tightly or left on too long. If you notice petechiae, there is no need to stop the blood collection. The chances of petechiae increase for patients who have platelet abnormalities, so it is important to apply adequate pressure after the collection and make sure that the patient has stopped bleeding before any bandage is applied.

CAPILLARY PUNCTURES

Capillary collection method

Dermal punctures, also called capillary blood collections or finger sticks, are done for a variety of reasons. They can be performed for tests that require a small amount of blood, when a patient does not have an accessible vein but a blood collection is essential, or if the test requires capillary blood. A dermal puncture can also be ordered for a patient who is at risk of ***iatrogenic anemia***, since a smaller volume of blood is used for tests performed using this method. Capillary blood collections are common for many point-of-care (POC) blood tests, including glucose, cholesterol, and ***hematocrit***.

iatrogenic anemia. Anemia caused by collecting too much blood from a patient by volume in a given amount of time.

hematocrit. Portion of blood that is expressed as a percentage by volume and consists of packaged red blood cells.

The patient's age, health status, and requested tests all assist in determining whether a venipuncture or capillary blood collection is necessary. For infants younger than 1 year old, a capillary collection is the preferred method because it requires less blood. Infants' veins are small, and numerous venipuncture procedures can result in damage to the vessels. Capillary collections require less blood and therefore reduce the chance of iatrogenic anemia.

Some older adults have compromised veins that are difficult to find. In these cases, use a capillary collection to obtain the blood for testing. Patients who are underweight also run the risk of iatrogenic anemia. Because a smaller amount is needed for a microcollection tube, the use of a capillary collection helps reduce this risk. A dermal puncture blood specimen contains three types of blood: arterial, capillary, and venous. When a dermal puncture is chosen over a venipuncture, document this on the medical requisition to alert the laboratory that the blood has a different composition than venous blood.

Even in healthy adults, you can use a capillary blood collection when there is no need for a large volume of blood, when the test is to be performed repeatedly (such as for home glucose testing), or when the test being performed requires capillary blood. In adults, capillary blood collections are performed on the middle or ring finger of the nondominant hand. In infants up to 1 year old, capillary blood collections are performed on the heel.

When the testing requires only a small amount of blood, the patient's condition indicates that a venipuncture is not appropriate, or the blood test requires a dermal puncture, you may need to perform a finger or heel stick. The following is the step-by-step dermal puncture procedure.

1. Introduce yourself.
2. Identify the patient using at least two methods of identification.
3. Position the patient. The patient should be sitting or lying down. It can be helpful to have the patient place their hand below the level of the heart.
4. Wash hands.
5. Don gloves.
6. Assemble the equipment: disposable gloves, isopropyl alcohol swabs (or the antiseptic specified by the workplace), adhesive bandage, gauze, lancet, and microcollection tubes.
7. Check the warmth of the hand chosen. A warmed site makes the blood flow easier.
8. Identify the site. For adults and children older than 1 year, use the middle or ring finger (third or fourth digit) for a dermal puncture. The little finger is too thin, and the bone is too close to the surface. The index finger is likely to be too sensitive or have thick calluses. The thumb has a pulse, so it should be avoided as well. It is preferable to use the fleshy off-center side of the finger for the dermal collection. The tip of the finger is more sensitive, has fewer capillaries, and can have calluses. Never perform a finger stick on a finger that is cold, cyanotic (blue), scarred, swollen, or has a rash. If you are not sure whether the finger is suitable for a finger stick, use another finger. If the finger is thickly callused, choose another finger.
9. If the patient's fingers are cold and the blood supply is limited, have the patient open and close their hand a few times or rub their hands together vigorously. You also can instruct the patient to place their hand below the level of the heart for 30 seconds. Or have the patient wash their hands in warm water to raise the temperature, remove any contaminates, and increase blood flow.
10. Cleanse the site with isopropyl alcohol. Let it air-dry.

11. Puncture the site with the lancet. When using an incision lancet (one that will make a little slash in the skin), make the puncture perpendicular to the fingerprint lines. This will help the blood form into a large drop that is easy to collect. Cuts made parallel to the fingerprint lines cause the blood to flow down the finger, making the blood more difficult to collect.(Many facilities provide and encourage the use of auto-lancets, which regulate the skin puncture depth. This is safer for the patients and simpler for the phlebotomist.)

12. Dispose of the lancet into the biohazard sharps container.

13. Wipe away the first drop of blood. This helps remove any alcohol or tissue fluid from the blood collection.

14. Allow the blood to drip into the collection tube. Cap the tube when it is filled. If the blood flow is slow or stops, you can have the patient drop the hand below the level of the hear. You can provide pressure to the first joint of the finger with a press-and-release technique, allowing the blood to form large drops. Do not "scoop" the blood to speed collection, because this can affect accuracy of test results. If you are collecting multiple tubes, you should have a container for the filled but uncapped tubes while you are collecting another tube. Do not take longer than 2 minutes to fill each tube. Gently invert the tubes to mix.

15. After capping the tubes, use a gauze pad and apply pressure to the puncture site for several minutes. When the bleeding has stopped, put an adhesive bandage over the puncture site if the patient is an adult or responsible child. Children can remove the bandage and swallow it. Adhesive bandages can irritate or tear the skin of infants.

16. Label every specimen before leaving the patient's bedside.

17. Thank the patient.

18. Observe for any complications.

19. Collect all garbage from the area. Check the floor for anything that might have fallen during the collection.

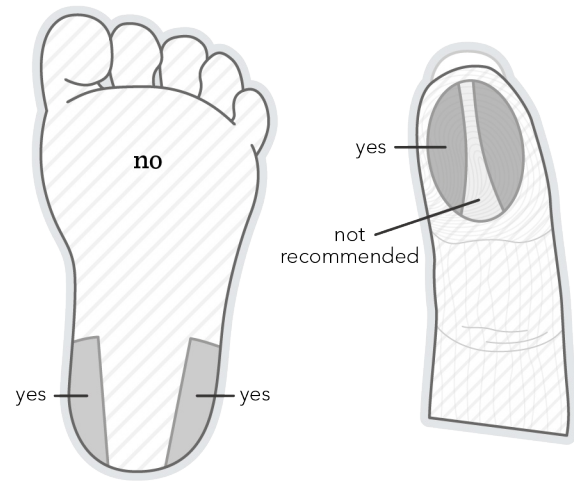
20. Remove gloves.

21. Wash hands.

When performing a dermal puncture for other blood tests (glucose, cholesterol, hematocrit), follow the manufacturer's instructions specific for each test. The steps will remain the same except for how the blood is collected and the method the blood is put in the cassette, cuvette, or strip. Follow the instructions for a dermal collection (including wiping away the first drop of blood) and avoid milking the finger, which can hemolyze the specimen or in other ways alter test results.

A heel stick is used to obtain capillary blood from infants younger than 12 months. The veins of infants are too small for a standard venipuncture, and infants do not have sufficient tissue on their fingers for a finger stick. Heel sticks can be used for almost any blood test. The following is the step-by-step procedure for a heel stick.

1. Assemble the equipment: disposable gloves, a heel warming device (optional), isopropyl alcohol swab (or the antiseptic specified by your workplace), a sterile lancet no deeper than 2 mm, microcollection tubes, and a gauze pad.
2. Choose the right lancet. Each lancet will puncture the skin to a specified depth. For example, if the child's weight is equal to or less than 1 kg, choose a lancet that punctures the skin to a depth of 0.65 mm. Never use a lancet that goes deeper than 2 mm. A common size used for infants is a 1 mm depth lancet.
3. Position the patient. If possible, a child should be supine. Check with the patient's nurse or provider to see whether there are restrictions about positioning.
4. Apply the heel warmer for 3 to 5 minutes.
5. Wash your hands, and don gloves.
6. Select a site. The best sites for a heel stick are the lateral or medial sides of the heel. The skin between the lateral and medial sides should be considered a secondary site. Do not use the back of the heel—there is too little skin/tissue in that area, and a lancet puncture can damage the bone. Do not use a site that was recently used or has a hematoma or scratch.
7. Cleanse the site.
8. Place the lancet on the skin, and make the puncture. After the puncture has been made, use your thumb and fingers to gently squeeze the heel. Do not squeeze for a long time or use excessive pressure. Doing so can affect the accuracy of the test results.
9. Wipe away the first drop of blood.



10. Touch the open tip of the collection tube to the puncture site. The blood should drip into the tube. Allow the blood to passively drip into the tube. Do not scoop the blood to speed collection, because this can affect the accuracy of the test results.

11. If the flow of blood stops, wipe away any surface clots with a gauze pad, and stop squeezing the heel. These actions will remove surface clots that have stopped the blood flow and allow the capillaries to refill.

12. When the tubes are filled and capped, use a gauze pad and apply pressure to the puncture site to stop further bleeding.

13. Observe for any signs of complications.

14. Label all tubes before leaving the patient.

15. Bandage as appropriate for an infant.

CHALLENGE

When performing a bilirubin blood collection on an 8-month-old infant, which of the following equipment should you gather?

A. Alcohol pad and 2 mm lancet,
B. Povidone-iodine pad and 2 mm lancet
C. ETS tube and 21-gauge needle
D. Alcohol pad and 3 mm lancet

Answer: A is correct. A blood collection on an infant younger than 1 year old is best performed via a dermal puncture. When performing a dermal puncture for bilirubin, alcohol should be used; povidone-iodine can adversely affect test results. Never use a lancet that goes deeper than 2 mm. A 21-gauge needle can be too large to use on an infant, even if a venipuncture is to be performed.

Capillary order of the draw

The order of the draw is equally important for dermal puncture collections, but for distinctly different reasons. The order of the draw for a venipuncture is followed to help prevent additive cross-contamination. With dermal punctures, because the blood begins to clot as soon as the flow begins, the order of the draw helps ensure that the sample is collected in an order that has the least negative effect on the blood test. The following is the CLSI order of the draw for capillary collection.

- Blood gas collections: When a blood gas is performed on an infant, the patient can cry or hold their breath during the procedure. Collecting any blood gases first helps ensure that the blood that is tested is as close as possible to what is in the patient's body.
- Purple, lavender, pink, or pearl cap tubes contain the additive EDTA. Because clotting of the blood can alter the hematology of the specimen, it is important to collect any EDTA tubes as close to first as possible.
- Green: Green cap tubes contain the additive heparin.
- Any other additive specimens.
- Serum: Red or gold cap tubes contain no additive or clot activator. Because the blood from a dermal puncture starts to clot as soon as the blood flow begins, and the serum is required to clot.

LABELING AND POSTPROCEDURE CARE

STUDENT NOTES

END OF MODULE 4

QUIZ

Summary Notes

Ready to move on?

Use all the resources?

key take aways

MODULE 5: SPECIAL COLLECTIONS

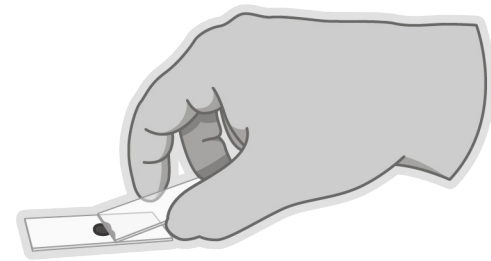
- peripheral blood smears
- blood cultures
- assisting other health professionals with specimen collection
- inborn errors of metabolism
- blood donations
- volume requirements calculations
- non-blood specimen collection

PERIPHERAL BLOOD SMEARS

A ***blood smear*** is a thin film of blood spread onto a microscopic glass slide. Blood smears are used to microscopically examine blood. Either venous blood in a tube or capillary blood collected by ***capillary puncture*** (also called a dermal puncture) may be used. Blood smears can also be prepared by applying blood directly from a finger onto the slide. It is important to prepare these blood slides properly to ensure accurate diagnoses for patients.

Depending on your facility, you might prepare blood smears yourself or assist laboratory personnel in preparing them. If a smear is needed to confirm abnormal findings, it must be prepared within 1 hr of collection when the specimen is obtained in an EDTA tube.

To prepare blood smears, the wedge method is used. This is the touching of two slides at an angle, which forms a wedge shape. Most large laboratories use an automated slide-maker, which creates a perfect thin smear with the push of a button. These are available in fixed and portable versions and produce consistent, high-quality smears that stain well and support high-quality results. Both techniques—automated and by hand—produce thin smears from fresh, anticoagulated drops of blood.



blood smear. A blood test procedure performed on microscopic slides that gives information about the number and shape of blood cells.

capillary puncture. Also known as a dermal puncture or finger stick, used to collect small samples of blood composed of capillary, venous or arterial blood.

Steps to perform a manual slide smear

1. Wash hands and don gloves.
2. Assemble the equipment needed for the dermal puncture, or obtain a tube of uncoagulated blood (usually containing EDTA).
3. Make sure you have at least two clean microscopic glass slides.
4. If performing a dermal puncture
   a. Perform the finger puncture using a semi-automated lancet device.
   b. Wipe away the first drop of blood with a piece of gauze.
   c. Apply pressure to the first finger joint to obtain a free-flowing drop of blood.
   d. Allow the drop of blood to fall onto the glass slide toward one end.
   e. If preparing smears using tubes of blood, check the specimen for proper labeling.
5. Use a safety device to access the blood. If no safety device is available, carefully uncap the specimen tube behind a safety shield and use a disposable pipette or plastic dropper to remove some of the blood. You may also use applicator sticks or a capillary tube to place the drop on the slide.
6. Place the slide on a flat work surface, and apply a drop of blood onto the slide approximately ½ to 1 inch from the end of the slide.
7. Discard the applicator stick or capillary tube into a sharps container.
8. Pick up the spreader slide with your dominant hand, holding it at a 30° to 35° angle.
9. Place the edge of the spreader slide on the smear slide in front of the drop of blood.
10. Pull or back up the spreader slide toward the frosted end of the slide until the spreader slide touches the blood drop.
11. Let the blood drop spread almost to the edges of the spreader slide.
12. Push the spreader slide toward the clear end of the slide (with one light, smooth, fluid motion) until you come off the end. Maintain the 30° to 35° angle.
13. Label with the patient information using a permanent marker or aliquot label.
14. Allow the smear to air dry before staining. Do not blow on it.

REMINDER

Make sure the frosted side of the microscopic glass slide is facing up when using slides that have a frosted end. Do not place the drop of blood directly on the frosted end; it is used to write the patient information or to affix an aliquot label. Make sure that all slides are properly labeled and double-checked to ensure they match the patient information exactly.

NOTE

Most of the drop of blood should spread out onto the glass slide. It will be thicker at the drop and thinner at the opposite end. If properly made, there will be a critical area used for performing the differential, and a tail with a feathered edge that is slightly rounded. Blood smears should not touch the edges of the microscopic glass slide. They should appear smooth and without irregularities, streaks, or holes.

BLOOD CULTURES

Blood cultures are laboratory tests used to check for bacteria or other micro-organisms in a blood sample. Providers order this test to assist in diagnosing conditions in patients who have a fever of unknown origin (FUO).

If you work in a hospital—especially one with a busy emergency department—you might receive several blood culture requisitions. The blood sample is sent to a laboratory, where it is processed, placed into a specialized dish, and observed to see whether micro-organisms grow. (This is the actual culture process.) If this occurs, further tests will be done to identify the specific micro-organisms present in the blood sample.

blood culture. A laboratory test used to check for bacteria or other micro-organisms in a blood sample.

Steps to perform a blood culture

1. Introduce yourself.
2. Properly identify the patient as you would with any blood collection, using at least two patient identifiers.
3. Wash hands, and don gloves.
4. Assemble supplies, including a winged infusion set or syringe needle, adapter, and blood culture collection bottles. You will need one set of blood culture bottles per collection (one ***aerobic*** and one ***anaerobic***).
5. Review the medical requisition form to determine how much blood needs to be collected.
6. Mark blood collection bottles with the level of blood required.
7. Remove the protective cap (making sure to avoid removing the entire cap), and cleanse the top of the blood collection bottles with an antiseptic (alcohol).
8. Apply a tourniquet.
9. Palpate to find an accessible blood vessel. Then remove the tourniquet while you prepare the skin.
10. Clean the intended area of venipuncture for 60 seconds with alcohol or ***chlorhexidine gluconate***. Apply light friction using an outward spiral technique from the site by placing the swab on the venipuncture site and moving outward, using concentric circles to a diameter of 2 to 2.5 inches.
11. Allow the area to dry completely.

anaerobic blood culture bottle. Type of blood culture bottle used to collect specimens to test for microbes that thrive in an airless environment.

aerobic blood culture bottle. Type of blood culture bottle used to collect specimens to test for microbes that thrive in air.

chlorhexidine gluconate. An antiseptic antibacterial agent used to help cleanse the patient's skin for blood collection.

12. Cleanse the area again, using the outward spiral, taking care to cover the entire 2- to 2.5-inch area, this time using povidone-iodine.
13. Do not touch this area after it has been cleansed. Allow it to dry completely.
14. Reapply the tourniquet after you are sure the area has dried.
15. Ask the patient to clench their hand into a fist.
16. Stretch the skin downward below the collection site, using the thumb of your nondominant hand to anchor the vein in place.
17. Quickly insert the needle into the vein at a 15° to 30° angle with the bevel facing up. Pop the blood culture bottle onto the double-pointed needle. (If the blood culture set includes aerobic and anaerobic and you are using a butterfly needle, collect the aerobic first.)
18. Have the patient unclench their fist as blood enters the tube or bottle.
19. As each tube is removed from the needle holder, gently invert to properly mix the specimen.
20. Remove the tourniquet before 1 min.
21. Monitor the patient's condition.
22. Make sure not to disturb the needle's position as tubes fill.
23. If there are more evacuated tube system (ETS) tubes to be collected, proceed to collect them in the proper order of draw.
24. Quickly remove the needle using the same angle as insertion.
25. Apply gauze, using pressure, to the puncture site.
26. Activate the safety device so that the needle is immediately covered.
27. Dispose of the entire needle assembly into a sharps container.
28. Make sure that the vein is not leaking by conducting a two-point check, observing the site for up to 10 seconds after releasing pressure and removing the gauze. If visible bleeding occurs (or if the surrounding tissue rises), keep applying pressure until bleeding stops.
29. Apply a bandage or tape clean gauze over the puncture site.
30. Label all blood collection bottles and tubes before leaving the patient.
31. Check the patient's status again.
32. Leave the room or dismiss the patient.

Assisting other health care professionals with specimen collections

INBORN ERRORS OF METABOLISM

In the U.S., newborns are routinely screened for various metabolic and genetic defects by analyzing a blood sample collected on a specific filter paper. Screening newborns assists in the early detection of genetic, metabolic, and infectious diseases and disorders. Blood-spot testing for newborn screenings are performed before the newborn is 72 hr old. If the specimen is obtained before the newborn is 24 hr old, a second specimen should be obtained for screening up to 2 weeks of age. Screenings aid in the early detection, diagnosis, and treatment of the following conditions.

- *Cystic fibrosis*
- *Hypothyroidism*
- *Phenylketonuria (PKU)*
- *Galactosemia*
- Other genetic disorders (*biotinidase deficiency*, *sickle cell disease*)
- Infectious diseases (human immunodeficiency virus [HIV], toxoplasmosis)

Newborn screenings are state-required blood specimens that are collected onto specific forms or cards. These forms include absorbent areas called filter paper. Fill out the forms completely in ink with all required information, and check the forms for expiration dates; the substances within the absorbent areas can expire.

Double-check that the guardian's phone number is correct and included on the form. If any of the tests performed have positive results, the parent or guardian will be notified immediately so appropriate care and treatment can begin.

cystic fibrosis. Mucous secretions that accumulate in various organs.

hypothyroidism. Decreased thyroid function.

phenylketonuria (PKU). A metabolic genetic disorder characterized by a deficiency in the hepatic enzyme phenylalanine hydroxylase. Classic PKU causes permanent intellectual disability, seizures, delayed development, behavioral problems, psychiatric disorders, a mousy body odor, lightening of skin and hair, and eczema. Phenylalanine can be found in most foods; if not broken down, it can rise to toxic levels in infants. Brain damage can occur when phenylketone levels become toxic.

galactosemia. Lack of an enzyme that breaks down galactose (a milk sugar) into glucose. If untreated, the infant can slowly starve to death.

biotinidase deficiency. Deficiency of the enzyme that breaks down biotin.

sickle cell disease. Abnormal hemoglobin structure.

Newborn screenings are almost always performed as a capillary puncture on the infant's heel. To perform a heel stick on an infant, you must follow the procedures listed on the required state forms. Following is a common list of instructions used in the collection of these samples.

- Properly identify the infant.
- Ensure that the paperwork or card is filled out completely, including parent's/guardian's phone number.
- Avoid touching the filter paper part, even with gloved hands, to prevent contamination.
- Wash hands and don gloves.
- Check the temperature of the infant's heel, and warm it if necessary.
- Cleanse the infant's heel with an antiseptic, and allow the skin to dry.
- Puncture the heel, across the prints of the heel, with a semi-automated lancet device no deeper than 2 mm.
- Wipe off the first drop of blood.
- Allow a large blood droplet to form at the puncture site.
- Touch the filter paper to the drop of blood to soak through completely in each circle. The circles must be totally saturated. This is evident by viewing the paper from both sides.

5.1 Newborn screening

Newborn Screening | Infant Record #: | SN 333123

Infant's name: | Sex: ☐ F ☐ M
Date of birth: | Date of collection:
Time of birth: | Time of collection:
Birth weight: | Current weight:

SPECIMEN DATA
☐ Heelstick ☐ 1st collection
☐ Venipuncture ☐ Repeat
Birth: ☐ Single ☐ Multiple:

Mother's name:
Record #: | Phone #:
Infant's physician:
Liscense #: | Phone #:
Submitter's name:
Submitter's ID:
Is mother or infant on steroids? ☐ Yes ☐ No
Is mother or infant on antibiotics? ☐ Yes ☐ No

ADDITIONAL DATA *check all that apply*

RACE	FOOD SOURCE
☐ White	☐ Breast
☐ Black	☐ Milk formula
☐ Native American	☐ Soy formula
☐ Asian	☐ TPN
☐ Unknown	☐ NPO
☐ Other:	☐ Other:

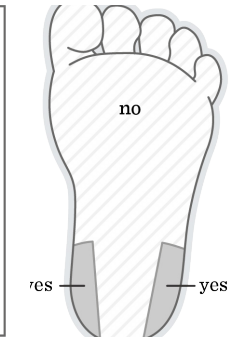
SN 333123
LOT # W123
Expires 4/15/20XX
Do not handle filter paper.
Fill circles with blood, be sure it soaks through. Further collection instructions on back of form.

Note: Blood is applied to only one side of the form. Avoid touching the skin with the card. Avoid blotting or attempting to color in the circle with several blood drops, this can cause serum rings and alter test results.

- Do not use capillary tubes because they often make the filter paper rough and cause overabsorption.
- Air-dry the blood spots thoroughly for 3 hr at room temperature. Keep them away from direct sunlight and heat.
- Wet filter papers should not touch each other because they are sticky and will adhere to other forms.

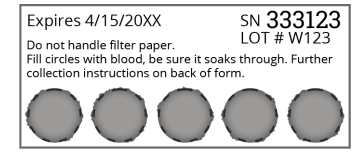
Once thoroughly dried, mail state collection forms to the appropriate state laboratories for testing. Send the cards with all other required paperwork. It is important that infants who test positive for these conditions are treated quickly. Do not postpone submitting completed collection cards.

5.2 Heel stick

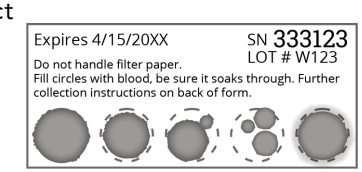


5.3 Blood spots

Correct



Incorrect



These specimens can be unusable and rejected if any of the following occur.

- A circle is oversaturated.
- All circles are not completely filled.
- An expired form is used.
- The form is not received within 14 days of collection.
- The specimen is contaminated with a foreign substance.
- The specimen is not allowed to dry thoroughly.
- The circles have serum rings.

BLOOD DONATIONS

Blood donations are another type of special collection that phlebotomists perform. Blood donations can be collected for submission to a ***blood bank*** for use as needed by hospitals and other facilities. In some situations, patients donate their own blood to use for a transfusion or upcoming surgery. This type of blood donation is an ***autologous transfusion***.

Most of the blood used in blood donations is handled in blood banks. These facilities are responsible for the collection, processing, and storing of blood for transfusions and other purposes. The blood bank department in a hospital is usually part of the laboratory. It serves as the screening and release point for donor units and other blood products that patients might need. Blood bank departments work closely with regional blood centers that provide blood and blood products to hospitals for dispensing to patients upon provider request. In larger facilities, the hospital blood bank might draw donor units; but increasingly, these duties reside in the regional blood centers that serve a community or region.

Blood banks can also perform ***therapeutic phlebotomy***, which is the intentional removal of blood to lower red blood cells (***polycythemia vera***) or lower iron levels (***hemochromatosis***). How facilities assign this procedure varies by organization.

As with any blood collection, it is critical to avoid misidentification of the patient during blood bank collections in order to prevent fatal transfusion errors. The collection process is as follows.

1. Wash hands and don gloves.
2. Properly identify the patient as you would with any blood collection, using at least two patient identifiers.
3. Perform the venipuncture procedure, and collect the appropriate tubes. This is often a plain red-top tube and an EDTA tube. (Some ETS tube stoppers are pink. Confirm additive on the label before use.)
4. Label the specimens with specific blood bank labels in the presence of the patient. (Follow the procedure required by the laboratory.)
5. Recheck information by comparing the labels on the tubes with the patient armband or specific blood bank identification band.
6. Perform post-venipuncture patient care.
7. Deliver the specimens and blood bank requisition to the blood bank or the facility's transfusion service as soon as possible.
8. Gravity helps fill the blood collection bags. Make sure bags are hung lower than the patient's arm during collection. If a blood collection bag only fills partially before the procedure is complete, the blood collection might have to begin again. Do not combine two bags. Monitor the patient during and after the procedure to keep them safe and prevent injury from any complications during the donation process.

blood bank. A place where blood is collected from donors, typed, separated into components, stored, and prepared for transfusion to recipients; a blood bank may be a separate free-standing facility, or part of a larger laboratory in a hospital.

autologous transfusion. When a patient donates blood to be used for their own needs for future use.

therapeutic phlebotomy. A form of phlebotomy prescribed as treatment for patients who have polycythemia vera or hemochromatosis.

polycythemia vera. High red blood cell count.

hemochromatosis. High iron count.

Collecting donor blood

Donated blood can be processed into various blood products (red blood cells, plasma, platelets). ***Apheresis*** techniques allow the removal of one or more blood products during blood collection via special equipment. ***Plasmapheresis*** is the removal of blood plasma from whole blood.

apheresis. Removal of blood plasma from a patient's body without withdrawing the blood itself. The process separates the blood into plasma and cells, returning the cells to the patient's blood. Also known as Power Red.

plasmapheresis. Removal of blood plasma from whole blood.

Some parameters for blood donation have been established to help keep the donor as safe and healthy as possible. General requirements for blood donation include the following.

- Age at least 17 years old (16 years old in some states with parental permission)
- Weight at least 110 pounds
- Donations at least 56 days apart

When apheresis will be performed, the requirements change slightly.

- For males donating via apheresis, the following criteria are recommended.
  - Age 17 or older
  - Weight 130 pounds or greater
  - Height 61 inches or greater
- For females wishing to donate via apheresis, the following criteria are recommended.
  - Age 17 or older
  - Weight 150 or greater
  - Height 65 inches or greater

It is important that each donor is healthy and feeling well. A complete medical history must be provided. A mini physical examination is done, including temperature, pulse, and blood pressure. The potential donor's hemoglobin (or hematocrit) levels are also measured. The blood specimen is tested for HIV, AIDS, and hepatitis. If any of these levels are out of range, the person will not be allowed to donate blood. The medical history includes questions about sexual activity, recent out-of-country travel, and use of medications.

CHALLENGE

A patient can donate blood if they meet which of the following criteria?

A. 13 years old, with parent permission
B. Weight less than 110 pounds
C. Donated blood 9 weeks ago
D. Negative for AIDS but positive for HIV

Answer: C is correct. A healthy person, 17 years or older (16 with parental permission), weighing at least 110 pounds, without HIV/AIDS or any other transmissible disease, can donate blood after 8 weeks.

Autologous blood donation

Autologous refers to self. Many individuals donate blood for their own future use. This type of donation has become popular due to increased concern of the transmission of bloodborne pathogens. When a patient donates blood before a surgical procedure, they must have a written order from a provider and must be in good health so the donation does not stress their body before surgery. The hemoglobin must be at least 11 g/dL, and the surgical procedure must be scheduled for more than 72 hr after the autologous blood donation. Autologous blood is collected in the same manner as donor blood collection but is labeled strictly for the donor's use and may not cross over to the general blood supply. If the blood is not used during surgery, the patient may have the blood transfused back after any procedure is performed.

VOLUME REQUIREMENT CALCULATIONS

Iatrogenic anemia is caused by blood loss due to repeated venipunctures in a short period of time. Older adult patients, pediatric patients, and patients who are underweight are most susceptible to phlebotomy–induced iatrogenic anemia. Older adult patients can be at higher risk due to medications that can suppress bone marrow production, which increases the risk of anemia. They can also be at risk due to decreases in nutritional intake, especially if they have experienced extreme weight loss. Because many older adult patients see several medical professionals, they can have a significant amount of blood collected by each professional, which can increase the risk of iatrogenic anemia. For patients who have cancer, both the cancer treatments and the effect of the disease on the body can increase the risk for iatrogenic anemia. Infants—especially those who are premature or had a low birth weight—have a risk of iatrogenic anemia due to a lower volume of blood.

To help prevent iatrogenic anemia, it is important to understand the implications of collecting too much blood in a short period of time. Be willing to communicate any concerns with the appropriate health care professional. If you have a venipuncture request that seems excessive, check with the nurse or provider to ensure that the patient will not be put at risk. Contact the provider if the medical requisition requires blood tests that will collect more than the recommended amount. The provider can order different tests, reduce the number of tests, or order only the most essential tests.

For infants, no more than 10% of blood volume should be collected in a short period of time. For adults, collecting more than 100 mL can result in decreased hemoglobin or hematocrit.

To calculate infant blood volume, perform the following calculation.

- Convert the infant's weight from pounds to kilograms.
- Divide pounds by 2.2. (For example, $6.2 \text{ lb} \div 2.2 = 2.82 \text{ kg}$.)
- Multiply the number of kilograms by 100. (For example, $2.82 \times 100 = 282 \text{ mL}$.)
- Convert blood volume in milliliters to liters. (For example, $282 \text{ mL} \div 1{,}000 = 0.28 \text{ L}$.)

Document the amount of blood collected in each tube so the total amount of blood removed over time can be calculated.

Collect only the minimum required amount of blood to avoid causing iatrogenic anemia, which can lead to shortness of breath, fatigue, and the need for blood transfusions.

Communicate regularly with the supervisor or laboratory manager to provide the best care for all patients. Discuss any concerns you have about provider ordering patterns or the timing of a patient's collection requests with your supervisor or the laboratory supervisor.

CHALLENGE

For patients who are hospitalized, blood can be drawn every day or every few hours. Which of the following types of anemia often results?

A. Hemolytic B. Sickle cell C. Iatrogenic D. Pernicious

Answer: Option C is correct. Iatrogenic anemia is caused by blood loss due to repeated venipunctures, which is common in hospitalized patients whose blood is drawn regularly. Hemolytic anemia, sickle cell anemia, and pernicious anemia are not caused by repeated venipuncture.

NONBLOOD SPECIMEN COLLECTION

Urine specimens

One of the most commonly performed diagnostic tests involves urine specimens. Many providers order a urinalysis because it is low-cost, low-risk, and can provide valuable information about a patient's condition (glucose levels, hormone levels). Providers order a variety of urine tests (routine, 24-hour, ***culture and sensitivity*** [C&S], drug testing) to aid in diagnosing conditions. Urine specimens are collected using various methods (***random***, first morning urine, fasting, ***clean-catch midstream***, catheter, suprapubic). Following the proper steps when performing each method of collection helps provide the most accurate test results. For example, some hormone levels are higher in the morning. Therefore, to achieve the most accurate results, this is when these specimens should be obtained.

culture and sensitivity. A urine test performed to test for urinary tract infections.

random. A urine specimen that may be collected at any time without the restrictions of fasting, timing or aseptic condition.

clean-catch midstream. A method of performing a urine collection that helps prevent bacterial contamination.

With every urine specimen collection, provide all information possible to help the patient perform the collection properly. Allow the patient to ask questions, and repeat information when necessary. Provide written information if the patient needs or requests it. When performing urine testing, wear gloves and change gloves between specimens. Perform the tests on a flat surface, and keep the specimen as stable as possible to prevent accidental spilling.

Random collection

The most commonly performed urine test is the routine or random collection, which means there are no preparations or time restrictions. However, the time of the collection must still be documented. The facility will provide guidelines on the method to perform a routine urine collection. Common instructions that can be used for all urine specimen collections include the following.

- Wash hands before and after handling urine specimens.
- Wear gloves at all times, and change gloves between specimens.
- Confirm patient identification by using at least two patient identifiers.
- Always use a sterile specimen container.
- Label all specimens on the side of the container (not the lid).
- Label all specimens in front of the patient.
- Promptly test or transport specimens.
- Dispose of urine per facility guidelines (unless contaminated with blood, which needs to be disposed of as biohazard waste per OSHA).

The patient performs urine specimen collection through detailed instruction provided by medical personnel. Each urine test has specific collection requirements to ensure the best results. Special urine tests requiring more detailed urine specimen collection processes include ***glucose tolerance test (GTT)***, ***postprandial***, 24-hour urine collection, and drug testing.

glucose tolerance test (GTT). A test performed to determine how well a patient's body metabolizes sugar.

postprandial. After a meal.

Glucose tolerance test

Follow the basic recommendations for a urine specimen collection, with the special instructions required for the tests. When performing a GTT, confirm that the patient is fasting (usually for 12 hr). Blood and urine tests should be performed at the same time in the order recommended by the facility. The collections must occur together, usually every 1 or 2 hr. Make sure the collections are performed on time and the time is accurately documented. If the specimens are not collected on time, document the reason and the actual time of collection.

Postprandial test

A postprandial urine test requires a patient to void and then eat a meal. A urine specimen is collected 2 hr after a patient eats a prescribed amount of carbohydrates or glucose solution. For patients who have diabetes mellitus, this test monitors the effects of a prescribed insulin dosage. For patients who do not have diabetes mellitus, this test is a screening tool.

24-hour urine collection

For 24-hour urine collection, the patient receives a container (with a lid) large enough to hold 3 to 4 liters of fluid. Instruct the patient to void and discard the first morning urine specimen, then initiate the collection process after discarding that morning specimen. Inform the patient if there are any special handling instructions—such as when the specimen is expected to be returned, and if refrigeration is necessary.

Drug testing

When performing a urine test that determines what nonprescription drugs a patient has in their system, both privacy of the patient and accuracy of the results are very important. Some urine tests performed for drug screenings may be monitored. A chain of custody form can accompany the collection process. Confirm that the form is completely filled out. Everyone who handles the specimen must sign and date the form. The facility can have other instructions for performing this type of collection. Because these tests may be used in legal situations, make sure to understand and perform all steps required.

Clean-catch midstream collection

A clean-catch midstream urine specimen collection requires collection of the middle volume of urine. Inform the patient to void a small amount of urine into the toilet, and then begin the collection. Stop collecting the urine before the urine flow is complete by moving the container. Then finish voiding into the toilet.

Culture and sensitivity. To perform a clean-catch midstream urine specimen collection for C&S testing, provide the patient with additional instructions. To help prevent contamination from bacteria on the surface of the labia or penis, use an antiseptic wipe to cleanse the genitals prior to the collection. The wipes are an antiseptic of choice of the facility. Never use alcohol, peroxide, or iodine to cleanse the area; these harsh antiseptics can hurt the patient or damage delicate tissue.

With most tests, the urine is collected into a sterile container that has a lid placed on it, and then the urine is transported into another vessel. Another method of performing a urine test is by chemical analysis using the reagent strip method. Urine is collected in a sterile container. A reagent strip is dipped into the urine for the time ordered by the type of test, removed, and analyzed. Wear gloves when dipping the reagent strip and throughout the duration of test. The absorbent pads for each chemical test on the reagent strip will change colors depending on the level of the substance in the patient's urine. Use the analysis chart provided with the reagent strips to determine the level of substance by matching colors as closely as possible. Perform this test in adequate lighting to help match colors correctly. Dispose of the used reagent strip in a biohazard bag.

- COMPLETE KNOWLEDGE CHECK QUESTIONS
- COMPLETE "URINE TEST MATCHING"
  SCORE: _____/50 POINTS

Other nonblood specimens

You may perform other nonblood collections (saliva, sputum, fecal, semen specimens) or perform buccal or throat swabs.

Saliva specimens

Performing specimen collection for a ***saliva test*** begins with many of the same requirements of collecting blood and urine: introducing yourself, confirming you have the correct patient using at least two patient identifiers, washing your hands and donning gloves. These specimens are used to test for hormone, alcohol, and drug levels. Usually kits are available with instructions on how to perform the test. If instructions are not available, check with the facility for proper procedures. Make sure that all specimens are labeled in front of the patient and brought to the laboratory promptly.

saliva test. A collection of the fluids from the patient's oral cavity to help monitor hormone, drug, and alcohol levels.

Sputum specimens

Not to be confused with saliva (fluid from the oral cavity), a sample for a sputum test is collected from the lungs, trachea, and bronchi. Instruct the patient to take a deep breath and expectorate by coughing deeply and spitting the thick matter from their lungs into the specimen container. Follow the instructions at the facility for the procedures for collecting this specimen. Make sure to introduce yourself, identify your patient, wash your hands, and don gloves. It is better to collect this test before or several hours after a patient eats to prevent vomiting. A larger volume of sputum is available in the morning after it has accumulated throughout the night. Make sure that all specimens are labeled in front of the patient and brought to the laboratory promptly.

Fecal specimens

You may also be asked to obtain a fecal specimen. ***Fecal tests*** are performed to determine if a patient has a possible bacterial infection, parasites, and occult blood. Specific dietary instructions may be necessary prior to the patient collecting a specimen. Make sure to know these requirements and be able to instruct your patient on the proper preparation for the test. To help make sure that the test is as accurate as possible, use a clean container with a lid. Place labels on the specimens in front of the patient, and on the container (not the lid—a label on the lid can be misplaced when the lid is removed). Placing the label on the container helps keep the specimen properly identified.

fecal test. A collection of stool or feces to test for the presence of parasites, blood, or an infection.

Semen specimens

Semen specimens are used to perform sperm counts to help assess fertility. They can also be used to help prove identity in rape cases. Like urine and blood specimen collections, introduce yourself and confirm patient identity with at least two patient identifiers. Wash hands and don gloves before handling semen specimens. Patients should be instructed on how long to refrain from ejaculation prior to specimen collection. Check with the facility for exact requirements. Handling instructions include collection into a sterile container. Do not use a condom; many condoms contain spermicides, which will adversely affect test results. Keep the specimen warm, and protect it from light. To help ensure accurate test results, the specimen should be brought to the laboratory for testing within 1 hr. All specimens must be labeled.

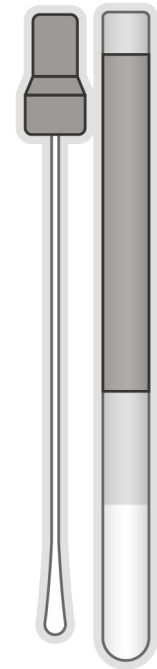
Throat swab

A throat swab is a culture specimen usually obtained to test for strep throat. You will perform the test with a kit that has instructions for proper procedures. If there are no instructions, review facility requirements for the test. For throat swab collections, wipe both tonsils, the throat, and all areas that look inflamed or infected with the swab. Wash hands before and after performing the test. Wear gloves, and change them between patients. Stand to the side of the patient when performing the test, or wear a mask to protect yourself from airborne contamination. Label all specimens in front of the patient, and test the collection or take to the laboratory promptly.

Buccal swab

A buccal swab differs from a throat swab in where the specimen is collected. A buccal swab is collected from the inside of the cheek in the mouth to collect a patient's DNA. When performing a buccal test, introduce yourself, properly identify the patient with at least two patient identifiers, wash hands, and don gloves. Perform the specimen collection per the facility's instructions. Commonly the collection is performed by gently rubbing a sterile swab against the inside of the patient's cheek. Place the used swab in an appropriate container, labeled in front of the patient and transport accordingly.

5.4 Throat swab test kit



END OF MODULE 5

QUIZ

Summary Notes

Ready to move on?

Use all the resources?

key take aways

MODULE 6: PROCESSING

- PREPARING LABORATORY SPECIMENS FOR STORAGE OR TESTING
- SPECIMEN HANDLING
- COORDINATING WITH NON-LABORATORY PERSONNEL
- LABORATORY INFORMATICS
- REPORTING AND DISTRIBUITNG LABORATORY RESULTS

PREPARING LABORATORY SPECIMENS FOR STORAGE OR TESTING

After ensuring the patient's safety and completing the venipuncture procedure accurately, the next step is to process the specimen and properly transport it to the laboratory. Laboratories face challenges with time management, test accuracy, specimen rejection, and specimen transportation processes. Abide by any specific handling requirements for the requested test in a timely manner to ensure accurate results. The time it takes for the entire process—including ordering, specimen collection, transportation, processing, analysis, and reporting—is the turnaround time.

In a hospital or a large laboratory facility, you will handle specimens and perform testing on-site. Whether you are performing tests on-site, working in a reference laboratory, or performing POC testing, it is imperative to follow specimen-handling processes with accuracy. Prior to processing, important steps in handling and transporting include mixing the sample, creating ***aliquots***, adding ***diluents***, ***centrifuging***, packaging the labeled specimen in a ***biohazard*** bag, and following thermal and light-sensitivity procedures.

When tubes contain an additive, invert them gently to mix the additive with the blood and to distribute the additive evenly throughout the sample. Mix it as soon as possible after the collection. Shaking the tube can result in a hemolyzed specimen. Not mixing it enough can result in the formation of clots, which can alter the test results. It is not necessary to mix blood samples in tubes that do not contain additives.

aliquot. To divide specimens into smaller portions.

diluent. A solution (such as water or saline) that reduces the concentration of a specimen.

centrifuge. A device that spins laboratory specimens at high speeds to separate the samples into their components for testing purposes.

biologic hazard. Also known as biohazard; any biological risk to organisms.

Special handling

Special handling is a requirement for transporting some specimens.

- ***Thermolabile*** specimens
  - Use a heat source or heat blocks to regulate temperature.
  - Use ice slurries, refrigerators, or freezers for chilling purposes. Do not use cold or ice packs.
  - Avoid fluctuating temperatures.
- ***Photosensitive*** specimens
  - Protect these from light.

thermolabile. Sensitive to high temperatures.

photosensitivity. An abnormal reaction to or a change resulting from exposure to light.

Tests that require special handling of specimens include ammonia and lactic acid, for which the blood tube must sit in an ice slurry (a thick mixture of water and ice) immediately after collection. For cold agglutinins, the sample must remain at body temperature—37° C (98.6° F). Protect blood samples for bilirubin and folate levels by wrapping the blood tube in foil. Blood gas tests can be stored at room temperature for 15 to 30 minutes or in an ice slurry for up to 1 hour. Delivery speed is crucial to prevent the loss of gases from the blood prior to analysis. For coagulation tests, analysis should take place within 1 hour of collection. Prothrombin time (PT) is an exception. A delay up to 24 hours at room temperature will not affect the results. Room temperature for laboratory purposes is 22° C (71.6° F).

CHALLENGE

A phlebotomist is preparing a blood specimen for a bilirubin test. Which of the following special handling requirements is necessary for this specimen?

A. Protect it from light by wrapping it in foil.
B. Immediately immerse it in an ice slurry.
C. Create an aliquot from the specimen.

Answer: A is correct. Blood samples for bilirubin levels require protection from light, which the phlebotomist can achieve by wrapping the blood tube in foil

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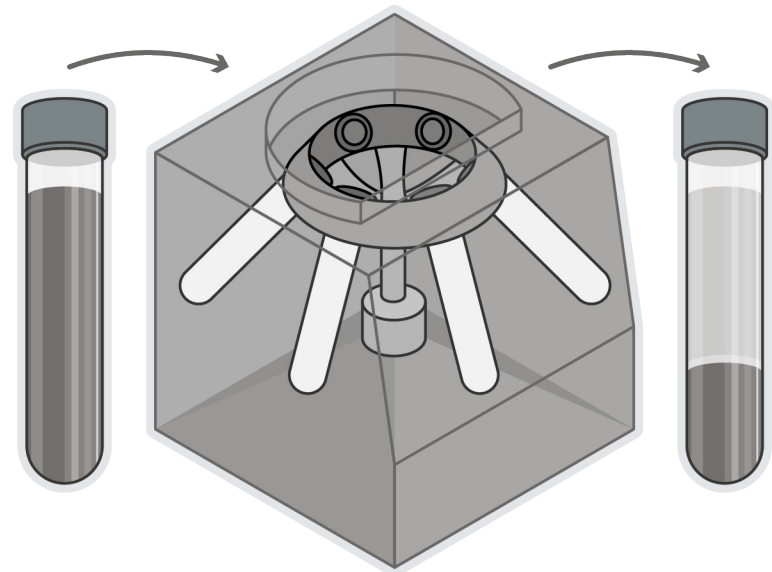
Centrifuging



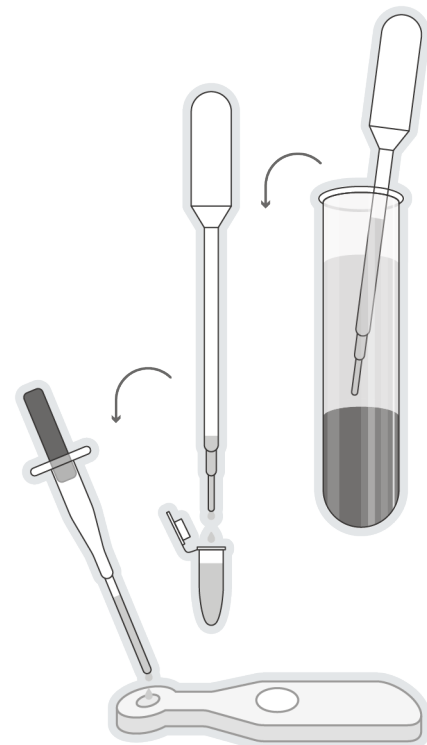
Some specimens require centrifuging or other additional processing prior to transporting them to the reference laboratory. Specimens that require separating the serum or plasma from the cells require centrifuging. To use the correct centrifuge, be aware of the tube type, rotor, spin time, capacity, noise level, and proximity to other equipment. Some centrifuges accommodate only a few tube sizes, while others have adapters for various sizes. The type of rotor can produce either a flat gel barrier (which is best for immunoassay and chemistry tests) or an angled gel barrier (which can be problematic for some chemistry tests).

The steps of centrifuging include the following.

- ***Pre-centrifugation*** is the handling and processing of specimens after collection and before centrifugation. It is important that the process begins as soon as possible after collection; the delay in separating plasma from cells should not exceed 2 hours. If a specimen for centrifugation does not have an anticoagulant additive, it should clot before going into the centrifuge. Clotting usually takes 30 to 60 minutes at room temperature. Do not chill these samples, because that will delay clotting. If the patient is taking an anticoagulant, that will also delay clotting. Be sure to protect any photosensitive specimens from light, either by wrapping them in foil or placing them in an amber specimen container. Shield photosensitive specimens from light as much as possible during the process.
- ***Centrifugation*** is the processing of specimens by spinning them in a centrifuge at high speeds, forcing the heavy elements of the specimen (blood cells) to move to the bottom of the tube and the lighter substances (serum, plasma) to remain at the top. The time and speed of centrifugation are critical elements the laboratory and the centrifuge manufacturer establish. These procedures should be clear and available in every laboratory. If the time in the centrifuge is inadequate, portions of blood cells can remain in the serum or plasma and affect test results. It can also result in incomplete formation of the barrier gel. Place tubes in the centrifuge with their stoppers or caps on. Balance them so that tubes of the same size and that are holding the same volume of blood are opposite each other. Without that balance, they are at higher risk for breakage. Never open the lid of the centrifuge before it has completely stopped spinning. Do not centrifuge specimens more than once.

- ***Post-centrifugation*** is the handling and processing of specimens once the centrifugation process is complete and removal of the serum or plasma is necessary. Removal is best immediately after centrifugation and no longer than 2 hours later. Serum might require room temperature, refrigeration, freezing, or protection from light, depending on the test it will undergo. In general, serum and plasma should remain at room temperature no longer than 8 hours before testing. Otherwise, it needs refrigeration. If testing does not take place within 48 hours, then freezing is necessary.

Some specimens have time limits and temperature requirements after centrifuging—room temperature, refrigeration, storage in the dark, or freezing—depending on the testing requirements.



Aliquoting

Aliquot specimens right after completing the centrifugation process. To aliquot a sample, hold the empty tube adjacent to the specimen tube, use a disposable pipette to transfer the serum (without cells) from the specimen tube to the aliquot tube, and label the specimen accordingly.

Packaging

When transporting specimens via postal service mail or express delivery services, be sure to comply fully with local, state, and federal laws that govern their special packaging and biohazard identification. Complete shipping paperwork, including the patient's identification, specimen identification, and test information.

To prepare samples for transportation to a reference laboratory, package the specimens using the following supplies.

- Original specimen tubes or plastic screw-cap transfer tubes
- Absorbent materials
- Watertight primary containers
- Watertight secondary containers (resealable bags, plastic canisters, foam boxes)
- Strong outer packaging (fiberboard boxes or mailing tubes, wooden boxes, rigid plastic containers)
- Coolants (ice packs, dry ice), if necessary

Placing in biohazard bags

Prior to placing specimens in biohazard bags, be sure to label the specimen with the patient's full name, the date and time of the specimen collection, and the source and type of specimen. To prepare these samples correctly, place the labeled specimen into a biohazard bag and then into a primary container with absorbent material surrounding it and usually above any necessary coolants. Place all of these materials within the secondary container and place the specimen documentation above the secondary container. The documentation may have a separate bag. Make sure to use this bag and seal if required. Then place the secondary container and the documentation inside the shipping container.

SPECIMEN HANDLING

In many settings, the phlebotomy team accepts and accessions (checks in) all specimens that come into the laboratory for testing. Therefore, it is important to know how to handle and process these specimens correctly. Handling requirements also include pre-collection specifics (time, temperature, light). When tests require specific timing, heat, cold, or protection from light, your role in transporting specimens to the laboratory after collection is as important as the venipuncture for securing a high-quality test result.

For timed tests when patients are taking a specific medication or drinking a liquid preparation (such as for a glucose tolerance test) make sure they have satisfied the testing requirements. Examples include a 2-hour postprandial blood glucose level, which requires a fasting blood glucose level plus a blood glucose test at exactly 2 hours after patients started eating their meal or consumed the liquid preparation. Other timed tests include peak and trough values for antibiotics like gentamicin or vancomycin, for which the phlebotomist collects blood samples at a specific time after the administration of the antibiotics. Coordinate these procedures with the clinical staff—including nurses and medical assistants—to ensure accurate results.

Label every type of collection container immediately after collection with the patient's name, the date and time of collection, and the specimen type. Position it correctly on the tube or container. If the facility requires it, sign or initial the specimen. Then compare the information on the label with the patient's wristband, or verbally verify it with the patient. If the container has a lid, make sure that the label is on the container, not on the lid.

Wear gloves when handling patient-collected, nonblood specimens. Change gloves between each specimen. Correct handling is essential, because incorrect handling can affect the quality of the specimen. For example, components of urine change if the specimen stands at room temperature for an extended period of time. If the specimen will not be tested immediately, refrigerate urine specimens and process them within 1 hour of collection. Some urine tests are best performed at room temperature. Be aware of what the specimen is being tested for to ensure proper handling. Use evacuated transport tubes containing preservatives for transporting urine specimens to reference laboratories. To transfer urine from a collection container to the transport container, use a disposable pipette, or pour the urine into the tube after removing the stopper. Preservatives in these tubes prevent bacterial overgrowth and prevent changes in the urine that can affect test results.

When handling preserved urine specimens, keep the tubes at room temperature no longer than 72 hours before performing a ***urinalysis*** with ***chemical reagent strip testing***. Keep tubes for culture and sensitivity (C&S) tests at room temperature for up to 72 hours. Otherwise, if not preserved, refrigerate them if there is any delay in transferring the urine to the culture medium. Complete the laboratory requisition forms for all specimens for transportation to other sites for analysis. This form should include the patient's name, date, type of test, ordering provider's name, ICD-10-CM code for diagnosis (if the form requires it), and a line where the provider can sign after reviewing the results. When sending specimens to the laboratory, use plastic biohazard bags with zipper seals. These bags feature an outside pocket in which to place the laboratory request. They also protect those who transport the specimen from any pathogens in the specimen. Ideally, blood tubes should remain upright during transportation to prevent unnecessary agitation (which could cause hemolysis) and to promote effective clotting in specimens that do not have anticoagulant additives.

urinalysis. An evaluation of urine by physical, chemical, and microscopic testing methods.

reagent. A chemical substance that reacts in specific, predictable ways to detect or synthesize other substances in chemical reactions.

chemical reagent strip testing. A method of urinalysis involving the use of plastic strips with pads containing a substance that causes a specific chemical reaction.

CHALLENGE

A phlebotomist is preparing to mail laboratory specimens to a reference laboratory. Which of the following information must be listed on the labels of the individual specimens?

A. Patient's health insurance policy number
B. Specific tests and their procedure codes
C. Type of specimen and its source

Answer: C is correct. When labeling the individual specimens, include the patient's full name and date of birth, time and date of collection, and source and type of specimen. Additional information (insurance numbers, tests) should be on the laboratory requisition or order form.

Delivery of specimens from clinics or blood-collection stations to reference laboratories should be as prompt as possible. With delays between collection and processing, glucose in blood cells can break down and interfere with results of various tests (phosphorus, glucose, aldosterone, calcitonin, enzymes). It is also essential to transport microbiology specimens quickly so that the laboratory technicians can transfer the specimens to the culture media or incubator. These samples include blood, urine, sputum, wound exudate, stool, and other body substances. The sooner they get to the environment where micro-organisms can grow, the sooner the technicians can identify them and generate the results so that the patients can receive proper treatment.

The delivery process must include adequate specimen handling, packaging, and communication with the courier or other delivery services. Coordinate the schedule of pickups, including the process for delivering stat specimens, where to place the specimens for pickup, and how to document the delivery process accurately and completely.

Specimen delivery methods include the following.

- ***Hand delivery*** directly to a reference laboratory, following timeliness of delivery guidelines, completing log-in processes, and using necessary carrying devices (trays, carts, tube racks, leakproof containers).
- ***Pneumatic tube systems***, usually in an inpatient setting. These systems have enhanced mechanical reliability, increased transport distance and speed, specific control mechanisms, and shock-absorbing features to help prevent hemolysis of blood samples. There is an inner padding that lines the canister and separates the blood tubes. Use caution when choosing this type of transport for tests for potassium, plasma hemoglobin, lactate dehydrogenase, and acid phosphatase, because of the increased chance of disrupting red blood cells, which can affect the test results. Coagulation specimens also need protection from shock and vibration to prevent platelet activation. For most other tests, this is an efficient means of transport that does not interfere with analysis.
- ***Automated carrier*** using a transport vehicle, such as a motorized container car that travels on a network of tracks to various destinations within the facility. This includes some of the same features of pneumatic tube systems.

pneumatic tube system. A method of transportation and distribution of laboratory test results and other documents.

CHALLENGE

A phlebotomist is working with the clinical team to incorporate an automated carrier system into the facility's newly renovated laboratory. Which of the following actions must be taken to avoid hemolysis of blood samples?

A. Use plastic liners in case of a leak.
B. Protect specimens from vibration or shock.
C. Send one specimen at a time.

Answer: B is correct. Automated carrier systems must have minimal vibration or shock to prevent hemolysis of blood samples. Shock-absorbent padding and separating tubes from one another can help prevent this.

Chain of custody

The process that maintains control of and accountability for each specimen from the time of collection to the time of disposal is the ***chain of custody***. All individuals who have handled a specimen must document their identity on the chain-of-custody form each time the specimen transfers. The form also requires the following components.

- Name and identifying information of the patient, body, subject, or object the specimen came from
- Name of the person who obtained and processed the specimen
- Date, location, and signature of the person attesting that the specimen is the correct one and matches its documentation
- Signature and date from every person who had possession of the specimen for any amount of time, even if only for transporting

chain of custody. The chronological documentation (paper trail) showing the acquisition, custody, control, transfer, analysis, and disposition of specimens that provide evidence.

Sample Lab
1234 Main Street
Example, KS 12345
800.555.1234

Chain of Custody Record

Organization:
Contact:
Address:
Phone #:

Sample ID #:
Collection date:
Collection time:
Sealed: ☐ Yes ☐ No

RELINQUISHED BY		RECEIVED BY	
Print name:		Print name:	
Signature:	Date:	Signature:	Date:
Organization:	Time:	Organization:	Time:

LABORATORY DESCRIPTION OF SAMPLE

Item #	Description of item *(container, marks, scratches, condition)*

CHAIN OF CUSTODY

	Signature	Print name	Date	Time
Relinquished by				
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by				

EVIDENCE DISPOSAL

Disposition site: Performed by: Date:
Disposition #: Witnessed by: Date:
Method of disposition:

When transferring specimens during chain-of-custody processes, label the specimen correctly and place it in a biohazard bag with a permanent seal that verifies that no one has opened it until it is ready for analysis. These specimens are legal evidence; there must be no tampering with them until they reach their final destination. An intact seal provides evidence that there has been no tampering during the specimen's transfer to the laboratory.

CHALLENGE

Sealed or locked specimen transfer bags are used as part of which of the following?

A. Chain of custody
B. Plasma thawing
C. Centrifuging

Answer: A is correct. For chain of custody, phlebotomists place specimens into specimen transfer bags. These are sealed or locked until the laboratory technician opens them for specimen analysis. The seals on these bags ensure tamper-evident transfer.

Several situations require initiating and following a chain-of-custody process, including forensic analysis, workplace drug testing, drug testing of professional athletes, neonatal drug testing, and blood alcohol content (BAC) testing. Occasionally DNA analysis, rape test kits, and parentage testing require following chain-of-custody guidelines for legal purposes.

Forensic specimens

Forensic laboratory analysis involves various types of specimens, for example, from vaginal swabs after rape, blood and body fluids from crime scenes, and postmortem specimens from autopsies. Special handling of specimens is crucial, because the specimens might be decomposing, available in only trace amounts, or require analysis by a forensic scientist in extreme environments. ***Forensic specimens*** also involve toxicology testing of substances after poisoning or substance abuse. Collecting these specimens can require special training or experience and supervision. Unlike specimens collected in a clinical setting, forensic specimens can be in any condition, clotted, or in containers that would otherwise be unacceptable.

forensic specimens.
Samples of legal value in a civil or criminal case.

CHALLENGE

A phlebotomist is following handling and processing guidelines for a forensic specimen. Which of the following is a possible reason for this mandate for forensic specimen testing?

A. Crime scene investigation
B. Pre-employment physical examination
C. Employer's random drug screen

Answer: A is correct. Forensic specimens include vaginal swabs after rape, blood and body fluids from crime scenes, and specimens obtained during autopsies.

Drug testing

The Department of Health and Human Services initiated federal drug testing, which is mandatory for some government employees and many private-sector employees. Workplace drug testing often follows the U.S. Department of Transportation's mandated testing regulations, which have become an industry standard. Many employers require urine drug testing and use the Federal Drug Testing Custody and Control Form (CCF) for the process. This form must document the handling and storage information for specimens from the time they are obtained to their final disposal. Phlebotomists must undergo training and evaluation in the correct use of the CCF per federal guidelines. The process for collection has extremely specific guidelines to ensure that employees providing the specimen cannot tamper with it, such as adding water to dilute it or replacing it with urine they previously collected from someone else and concealed in clothing or a handbag.

Urine drug tests can usually detect marijuana use within the past week and the use of cocaine, heroin, and other illegal drugs within the past 2 days. However, they do not measure the degree of impairment or the frequency of use.

Workplace drug testing

- Ensures compliance with federal regulations, customer contracts, and insurance carrier requirements
- Reinforces a company's no-drug-use policy
- Minimizes the risk of hiring an employee who uses drugs illicitly
- Identifies employees who use drugs illicitly so that employers can enforce disciplinary action
- Improves the safety and health of employees

Sports-related drug testing

- Detects use of stimulants (amphetamines, anabolic steroids, alcohol, diuretics, street drugs, peptide hormones, anti-estrogens, $beta_2$ agonists) to enhance athletic performance
- Encourages regulation of nutritional and dietary supplements
- Analyzes blood and urine to detect ***blood doping*** or the use of ***erythropoietin***

blood doping. Injection of blood cells or blood substitutes to increase athletic endurance by boosting the bloodstream's oxygen-carrying capacity.

erythropoietin. A medication for patients who have had chemotherapy to treat cancer; also used illicitly by some athletes to boost production of red blood cells and thus increase endurance.

Neonatal drug testing

- Detects the use of cocaine, opiates, amphetamines, methamphetamines, and phencyclidine, which cause prenatal drug exposure and neonatal abstinence syndrome (withdrawal)
- Requires obtaining specimens for analysis within 24 hours after childbirth to detect recent drug use
- Confirms maternal drug use 24 to 72 hours prior to childbirth if the newborn's urine is positive for these substances

Law enforcement officers who detain individuals they suspect of driving under the influence might conduct various sobriety tests. Then, depending on state laws, they might request or require a urine, blood, or breath test. The most accurate of these methods for identifying alcohol levels is blood specimen analysis from a routine venipuncture or capillary stick procedure. In the U.S., the legal limit for BAC is 0.08%, or 80 mg/100 mL. Drivers younger than age 21 must have no detectable alcohol in their blood.

When collecting specimens for BAC testing, follow the chain-of-custody guidelines and special collection techniques. Clean the venipuncture site with an antiseptic that does not contain alcohol, such as chlorhexidine. Using alcohol for this purpose could lead to a false positive result. Do not use iodine swabs, because they contain alcohol.

COMPLETE "PROCESSING SPECIMENS" QUIZ
SCORE: _____/50 POINTS

COORDINATING COMMUNICATION WITH NON-LABORATORY PERSONNEL

As a phlebotomist, you will interact with many medical professionals, including physicians, nurses, laboratory technicians, respiratory therapists, and radiologic technologists. It is important to coordinate communication with non-laboratory personnel about processing and collection, and to monitor and adjust communication according to best practices and patients' needs.

Computer programs now manage workflows and communication specific to each provider of services. In addition, effective communication involves using standard terminology and abbreviations, and accurate documentation. Documentation includes recording contact notes on laboratory reports or laboratory logs. All computer interactions provide documentation that managers can monitor and review for HIPAA compliance and the quality of patient care.

Computers and networks play key roles in the scheduling, managing, and processing of patients, specimens, and clinical workflow. You must become familiar with the software, communication methods, and processes within your organization. Software that supports the ordering, processing, and routing of specimens helps streamline workflows that once were paper-intensive. Software that links test results to provider alerts depending on preset values contributes to an effective and efficient communication process. Each organization establishes policies and procedures for communication about specimen processing and collection.

The use of laboratory information systems requires knowledge of software and hardware components to communicate effectively with non-laboratory personnel. You will use these and other essential instruments for the following tasks.

- Transmitting test requisitions electronically or in print format
- Creating specimen labels, collection lists, and schedules
- Monitoring and updating necessary specimen records
- Storing, reporting, and sending results to non-laboratory personnel stations
- Submitting charges on patients' accounts to necessary departments
- Maintaining records of procedures, policies, and inventory details

Always follow HIPAA guidelines and policies. By enhancing security measures—such as creating passwords, firewalls, and back-up programs—health care facilities comply with HIPAA requirements for protecting the confidentiality of patients' records. HIPAA regulations also apply to the electronic communication of laboratory information, including scanning, faxing, and e-mail.

REPORTING AND DISTRIBUTING LABORATORY RESULTS

Point-of-care (POC) tests are laboratory tests performed close to the site of patient care (such as the patient's bedside or the examination room of a provider's office). When performing POC testing, be aware of values that indicate a potentially life-threatening or health-endangering situation. A critical value is a test result that is significantly above or below the expected reference range. It could indicate a potentially life-threatening situation for the patient and requires an immediate response.

When a critical value occurs, report this result promptly and directly to the ordering provider. Not all laboratory values have a critical level, but each laboratory or facility has a list of tests that require monitoring patients' results for critical values. Learning the difference between an elevated or decreased value and a critical value is important. Depending on the nature of the test—from simple screening to complex profiles—a change in a patient's homeostasis will result in an abnormal test value in either a quantitative numeric value or a simple positive or negative outcome.

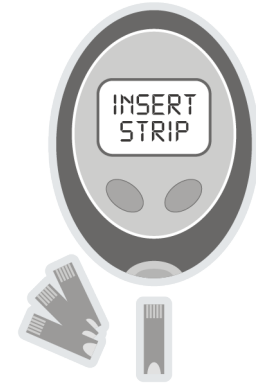
The specific critical values can differ by facility and can change over time. Become familiar with the general tests that providers monitor for critical values, and learn the values for your organization. For example, if the laboratory's expected reference range for a fasting blood glucose level is 70 to 100 mg/dL and a patient's result is 464 mg/dL, that is a critical value that warrants immediate reporting to the provider.

With POC and CLIA-waived testing, collect and prepare specimens to insert immediately into automated clinical analyzers for fast and accurate results. These tests include the following.

- Electrolytes (sodium, potassium, chloride, calcium, magnesium)
- Hematology (WBCs, RBCs, Hct, Hgb)
- Glucose, hemoglobin A1c
- Cholesterol (HDL, LDL, total cholesterol, triglycerides)
- Blood coagulation (PT, international normalized ratio [INR])

Microbiology and toxicology testing, including the rapid antigen detection test (for identifying streptococcal pharyngitis), fecal occult blood studies, chemical reagent strip testing, and urine pregnancy testing provide positive or negative results or—with reagent strip testing—a variety of numeric values or ranges for interpretation.

A common POC test is a blood glucose level. Patients who have diabetes mellitus routinely have results greater than the high limit of the reference range. Sometimes these results are within normal limits for those specific clients. You need to know when a high result is normal or expected for patients due to their condition, and when to notify the provider. When using a coded glucometer, compare the code on the glucometer with the code on the strips prior to each patient's testing. Complete quality controls with a ***control material*** when opening a new package of test strips, when several tests have been significantly out of range, or when changing the glucometer's batteries.



control material. Sample specimens with known laboratory values, used prior to processing a patient's sample.

CHALLENGE

A phlebotomist is performing point-of-care testing to monitor blood coagulation values. This testing is likely to involve which of the following tests?

A. PT and INR
B. Oxygen saturation
C. Sodium and potassium

Answer: A is correct. Blood coagulation monitoring involves measuring clotting times (PT and INR) to manage bleeding and clotting disorders.

You will collect and handle specimens, perform some POC and CLIA–waived tests, identify abnormal and critical values, and report results. However, a licensed health care professional must then review and evaluate those results.

COMPLETE KNOWLEGE CHECK QUESTIONS

MODULE 7: FOCUS ON PHLEBOTOMY

- CHALLEGES

What now?

- Practice tests
    - Details

- Focused review

- Ready for skills
    - Pay tuition – how to
    - Schedule skills how to

Upon successful completion of the online course work, all students are required to complete an additional 4 hour in person skills lab before being eligible for National Board Testing and certification.

Skills Lab Address: 4693 Quitman Highway
Hodge, LA 71247

2020 EKG Skills Lab Dates

April 20	9 AM – 12 PM	Sept. 16	9 AM – 12 PM
April 20	6 PM – 9 PM	Sept. 16	6 PM – 9 PM
May 13	9 AM – 12 PM	Oct. 7	9 AM – 12 PM
May 13	6 PM – 9 PM	Oct. 7	6 PM – 9 PM
June 17	9 AM – 12 PM	Oct. 28	9 AM – 12 PM
June 17	6 PM – 9 PM	Oct. 28	6 PM – 9 PM
August 5	9 AM – 12 PM	Nov. 11	9 AM – 12 PM
August 5	6 PM – 9 PM	Nov. 11	6 PM – 9 PM
April 26	9 AM – 12 PM	Dec. 9	9 AM – 12 PM
April 26	6 PM – 9 PM	Dec. 9	6 PM – 9 PM

*** These dates are subject to change. Check website for most up to date information. ***

To register for skills lab, go to our website: www.stickitphlebotomy.com and select “skills lab” at the top of the page. You may then filter for what class you are looking for and click the “register” button to add your name. Students must register at least 7 days prior to skills lab.

Please direct all questions to sherry@stickitphlebotomy.com

Woah, there…

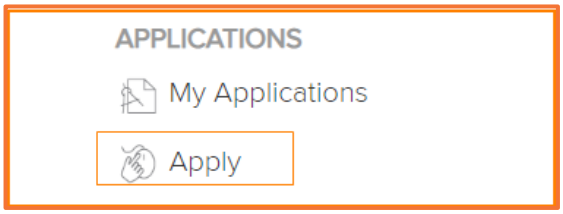
Everything beyond this point requires your successful completion of skills lab.

How to Apply for an NHA Exam Through Your Institution

Step 1: Log into your Candidate account at NHANOW.com.

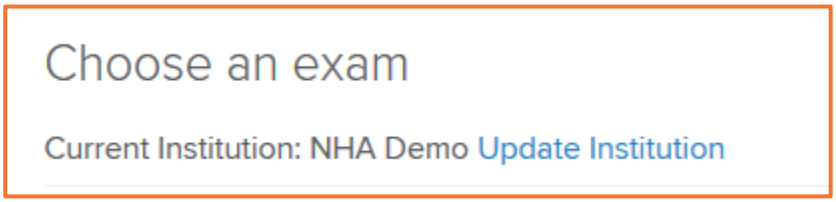
- See **How to Create an NHA Account** if you need assistance creating an account. Make sure your account is linked with your current Institution.

Step 2: Select **Apply** on the left side of your page under Applications.



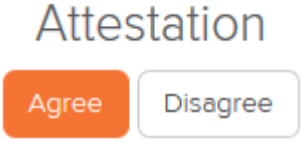
Step 3: Under **Choose an exam** select the certification type and making sure correct Institution is shown next to Current Institution.

- If the wrong institution is listed, click **Update Institution** to edit your account.

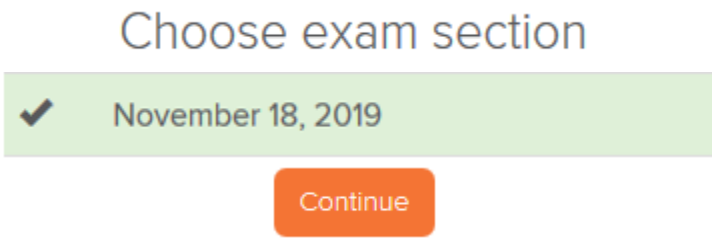


Step 4: Read the **Attestation** and if applicable **Agree** to the terms at the bottom of the page.

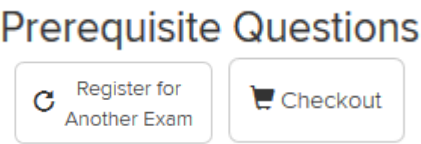
- If you cannot agree to the terms you may not be eligible to sit for the exam.



Step 5: Choose exam section by clicking the exam date from the list of dates available and then click **Continue**.



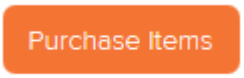
Step 6: Answer Prerequisite Questions then choose **Register for Another Exam** or **Checkout**.



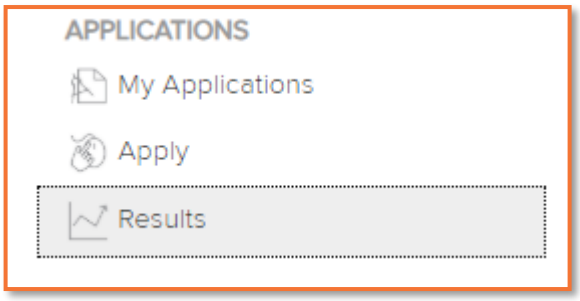
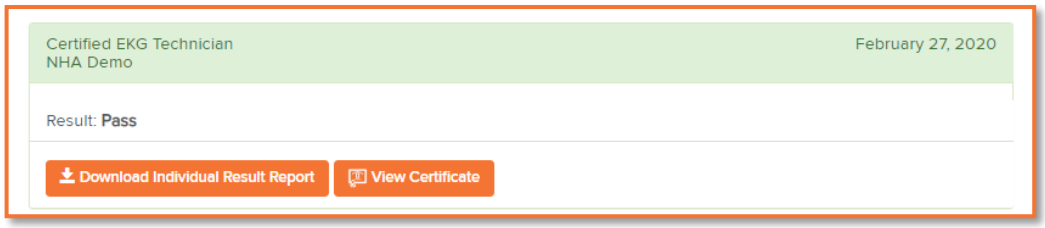
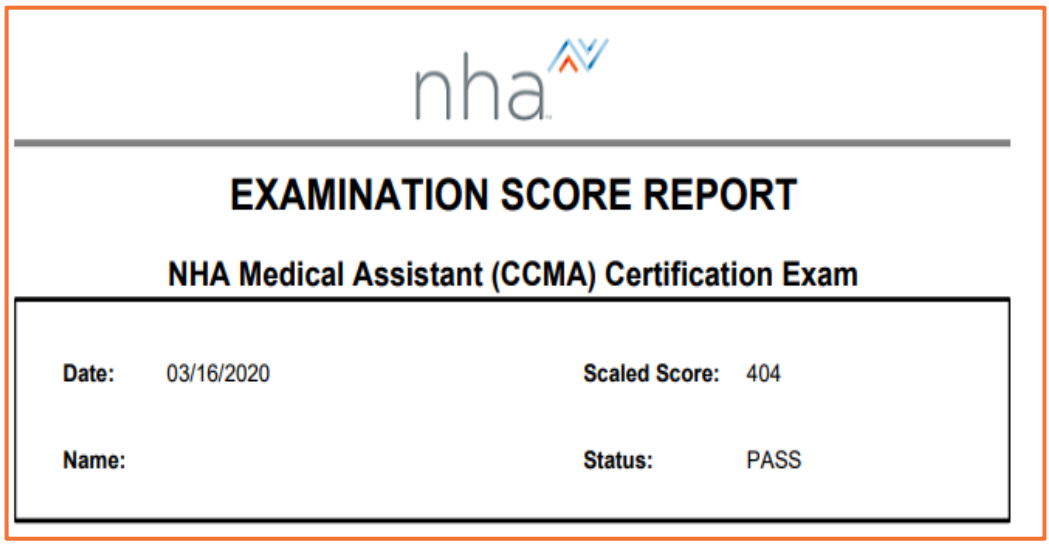
Step 7: On the Checkout page verify your Basic/Billing information and then click the **Continue Checkout** tab at the bottom of the page.

Step 8: Provide payment type as needed and click **Purchase Items**.

- A confirmation email will be sent to the email address associated with this account.



How to View Certification Exam Results - Candidates

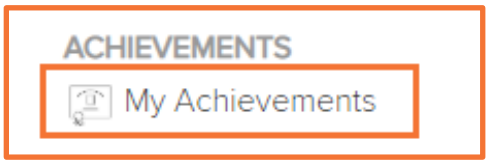
Step 1: Log into your account at NHANOW.com.	
Step 2: Click on **Results** on the left side of the page.	
Step 3: This will show your test date and **Result** of pass or fail. To view your score out of the 500 points possible please click on **View detailed score report** button.	
Step 4: This will pull up your score report showing more details regarding your score and will show you your final scaled score out of 500. **A passing score for the certification exam is 390 out of a possible 500 points.*	

For additional questions, please contact your NHA specialist or contact us via Live Chat at nhanow.com.

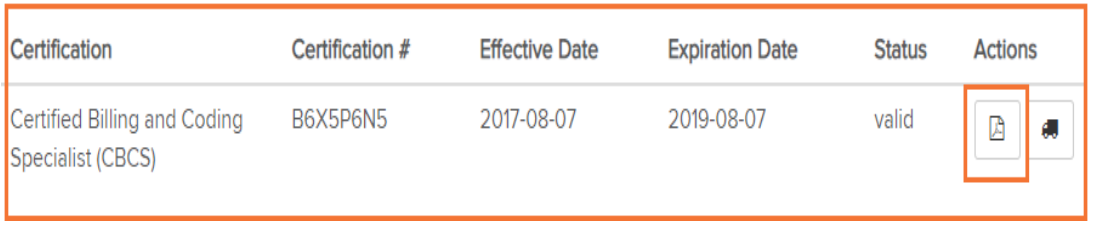
How to Download/Print your NHA Certification

Step 1: Log into your Candidate account at **NHANOW.com**.

Step 2: Select **My Achievements** from the left-hand side of the screen.



Step 3: Under **Actions**, on the right-hand side of the screen click on the **Paper Icon** to download your certificate.



Certification	Certification #	Effective Date	Expiration Date	Status	Actions
Certified Billing and Coding Specialist (CBCS)	B6X5P6N5	2017-08-07	2019-08-07	valid	

Step 4: Print your certificate.

For additional questions, contact us via **Live Chat** at nhanow.com.

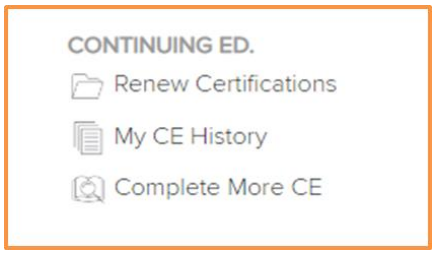
How to Renew your Certification

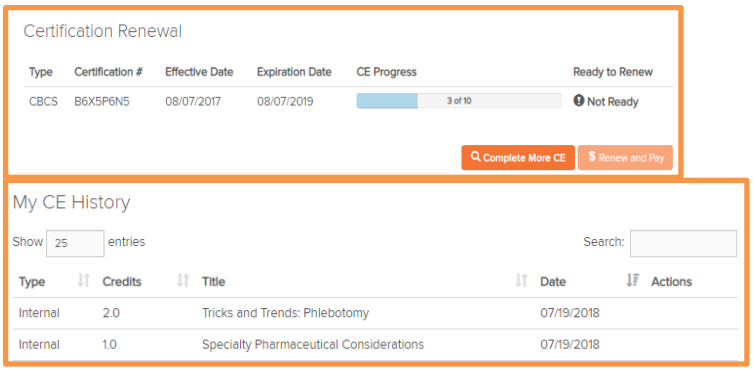
Applicable for all NHA certifications except for ExCPT

Step 1: From the home page, NHANOW.com, click on **Login or Create Account**.

Step 2: Choose **Complete More CE** from the left side of the screen.

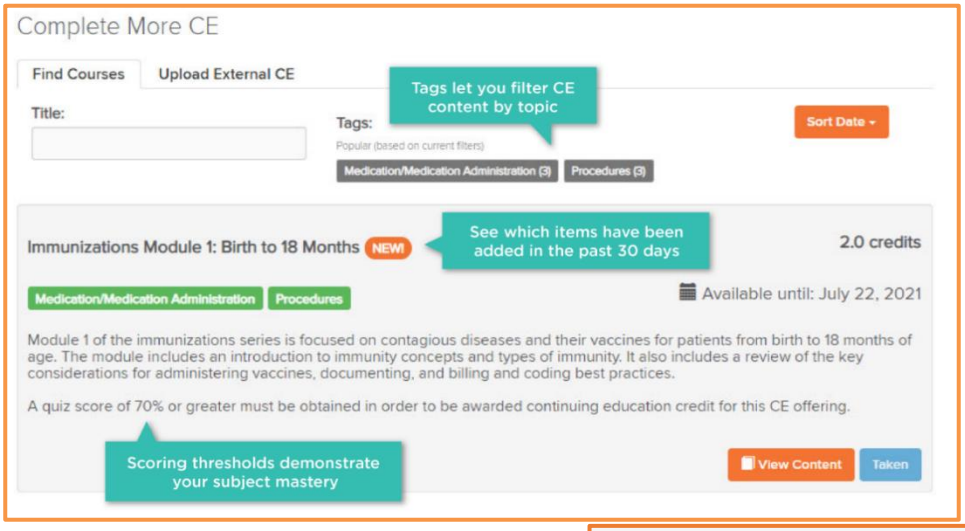
- Renew Certification will allow you to view status
- My CE History will show all previously completed credits



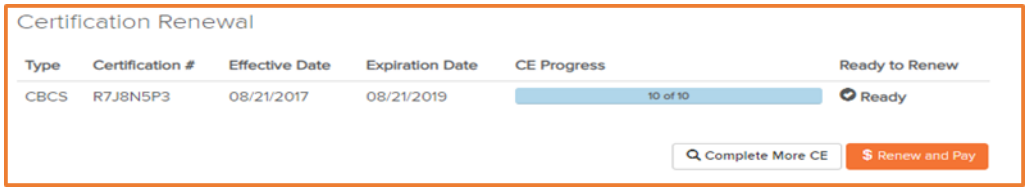


Step 3: **Complete More Courses** will allow you to obtain credits. Click on **View Content** to review material and **Take exam** to complete the assessment.

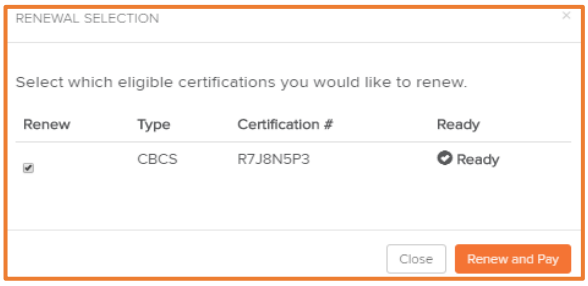
- Some CE items now require a 70% score to obtain CE credit.
- The performance profile report will be displayed once the quiz is complete and you may print this report for your records.



Step 4: Once the required number of credits have been completed please click on **Renew and Pay**.



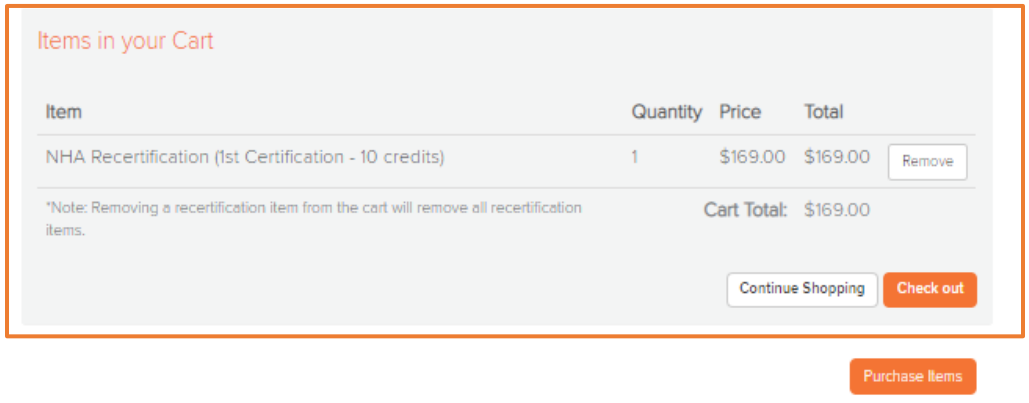
Step 5: To renew, make sure to choose the certification(s) and click **Renew and Pay**.



Step 6: Once you have verified the items in your cart choose **Check out**.

- Verify mailing information and click on **Continue Checkout**
- Fill in credit card information and click on **Purchase Items**
- **Print** this page for your **Receipt**

**Make all address updates in your NHA account.*



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