PhlebotomyU

Student Workbook

Table of Contents

ORIENTATION TOPICS

The Phlebotomy Training Courses are designed to prepare students for California state licensure in phlebotomy and an entry level position in healthcare. Admission requirements for the Phlebotomy Training Courses we offer are largely defined by the California Department of Public Health (CDPH) for licensed Certified Phlebotomy Technicians I (CPT I).

Certified Phlebotomy Technician I License

The **California Department of Public Health (CDPH)** is the agency that issues the **Certified Phlebotomy Technician I (CPT I)** license. Any phlebotomist that wants to work in the state of California requires a CPT I license to work.

To be eligible to apply for a CPT I license, you will need the following:

1. Complete 40 hours of basic and advanced didactic (classroom) phlebotomy training from a phlebotomy training program accredited by the CDPH (which we are!)
2. Complete a minimum of 40 hours of phlebotomy practice in a clinical setting that includes performance of at least 50 venipunctures and 10 skin punctures and observation of arterial punctures in a phlebotomy training program approved by the CDPH.
3. Proof that you passed a Phlebotomy national certification exam from a certifying organization approved by the CDPH.
4. Provide proof that you have at least a U.S. high school education or equivalent by providing one of the following:
    - Official transcript showing the graduation date from an accredited high school in the U.S.
    - Proof of passing the General Educational Development (GED), High School Equivalency (HiSET) or California High School Proficiency Examination (CHSPE)
    - Official transcript showing credit for general education courses completed at an accredited college or university.
    - If your education is outside the U.S., then you will need to provide evaluated transcripts by "Current Members" of the National Association of Credential Evaluation Services (NACES) or "Endorsed Members" of the Association of International Credential Evaluators, Inc. (AICE).

Attendance

Students are expected to attend all classes of the course. Attendance is important but is the responsibility of each student. There will be material discussed in class that is not in the text and can be included in the exams. The student is responsible for obtaining any material missed due to an absence.

Students are expected to attend all classes of the course and report on time. Students must sign in and sign out on the designated computers to track attendance.

A grace period of five minutes shall be applied and anything beyond that will be considered tardy.

- **Three occurrences of tardiness and/or early departure will be considered an absence, unless otherwise discussed with the administrative staff.** Students will need to discuss with an administrator if a make-up class needs to be scheduled.
- **Students that accrue two or more absences will be considered to have abandoned the current course and the result will be an Incomplete.** Should the student wish to complete the course, they will be required to re-apply, repay and retake the course from the beginning.

Uniforms & Personal Appearance

Students are to present a respectable appearance and dress in a manner that is appropriate for safety.

Students are required to wear the following when attending class:

- Black Scrubs
- Closed toed shoes
- Jewelry is acceptable but must not interfere with the student's performance.
- Fingernails should be clean and well-manicured.
    - No artificial fingernails, nail jewelry or appliqués are permitted if there is any risk that they will inhibit safety or patient care
- Tattoos, when visible, should not display sexual, violent, or derogatory images or symbols
    - Any tattoos from the neck and up must be covered during class and the clinical externship
- Facial piercings must be removed during class and the clinical externship
    - Students may not have more than 2 earrings in each ear and only studs and small hoops will be acceptable.

Students who do not meet these standards may be required to leave the classroom and any such leave will be considered as an absence.

Behavior

Students are required to conduct themselves in an appropriate behavior that is acceptable to PhlebotomyU's policies at all times.

Unacceptable behavior may include but is not limited to the following:

- Eating and/or drinking in restricted areas
- Repeated tardiness
- Use of vulgar or obscene words/actions
- Lack of cooperation
- Use of Cell phones or any other electronics during class
- Any behavior that may hinder other students from performing their duties.

Student Break Room

There is a student break room available for students to utilize on their break. This facility includes a fridge, microwave, and coffee machine. A vending machine is also available in the building.

Smoking, Drugs and Alcohol Policy

PhlebotomyU prohibits smoking in the facility as well as outside stairways. Sale of tobacco products at our facility is also prohibited. We prohibit the use and distribution of illicit drugs and alcohol by students and employees.

Visitor Policy

No one may visit a classroom during class hours without permission from the administration office. Students are not allowed to bring children to the classroom or laboratories while attending class.

Non-Discrimination Policy

PhlebotomyU prohibits any type of discrimination or harassment based on race, ethnic group, national origin, religion, age, gender, sexual orientation, color, physical or mental disability, marital and/or veteran status.

EXTERNSHIP PREREQUISITES

For Phlebotomy Full Course Students Only:

To be eligible to go on a clinical externship, students must submit the following prerequisites to the PhlebotomyU Administration at info@phlebotomyu.com. Externship options are given on a first come, first serve basis to students who submit all the requirements listed.

Students will be given up to 6 months from the last day of classroom instruction to complete a clinical externship. If a student is unable to submit the externship prerequisites or commit to a clinical externship by this time, PhlebotomyU Administration will consider the student to have abandoned the course and will issue the student an Incomplete. Should the student wish to complete the Phlebotomy Full Course, they will have to re-enroll, repay and start the course from the beginning. Additional fees will apply.

Failure to Begin Externship

The clinical externship opportunity is offered to eligible students within 30 days of classroom instruction. Unless otherwise discussed with an administrator, students who fail to begin the externship after 30 days of classroom instructions may be required to repeat the classroom practical sessions of the course to be re-evaluated by an instructor. Additional fees may apply.

Students who begin and fail to complete their originally scheduled externship or students who have not been scheduled an externship after 180 days (6 months) of classroom instruction due to missing requirements, student unavailability and/or lack of communication will forfeit the externship included in their tuition. Should the student wish to continue with the course, they will be required to repeat the classroom practical sessions of the course and re-apply for a clinical externship. Additional fees will apply.

Externship Termination

Students who are terminated from their clinical placement or unable to get their CDPH California Phlebotomy Practical Training Assignment and Attestation form signed off by their designated externship site supervisor will Fail their clinical externship and will be issued an Incomplete for the Phlebotomy Full Course.

Program Prerequisites

Must be submitted before the first day of class.

- Valid Government Issued Photo ID that indicates date of birth
  e.g. Driver's License, State Identification Card or Passport

- Proof of U.S. High School Education or Equivalent
  You must submit one of the following:
  - Copy of accredited High School transcript (official or unofficial) with a stated graduation date
  - Copy of accredited college transcript (official or unofficial) with a stated graduation date or shows completion of sufficient general education credits to be equivalent to a high school education
  - Proof of passing the GED, HiSET or CHSPE exams
  - If your education is outside the U.S., please refer below for further instructions on what is required.
  - Post-secondary or vocational school certificates and transcripts are not acceptable

Externship Prerequisites

- **Cleared Background Check & Drug Screen**
  Instructions on how to sign up will be given on the first day of class.

- **Immunizations**
  - **Measles, Mumps & Rubells (MMR)**
    - Proof of 1 or 2 doses of MMR vaccine
    - Positive titers for MMR
    - Signed MMR Declination Form*
  - **Varicella (VZV)**
    - Proof of 1 or 2 doses of Varicella vaccine
    - Positive titer for Varicella
    - Signed Varicella Declination Form*
  - **Hepatitis B (HBV)**
    - Proof of 1, 2 or 3 doses of Hep B vaccine
    - Positive titer for Hep B
    - Signed Hep B Declination Form*
  - **Tetanus Diptheria & Pertussis (TDAP)**
    - Proof of TDAP within the last 10 years (not TD or dTAP)
    - Signed TDAP Declination Form*
  - **COVID**
    - Proof of annual COVID vaccine
    - Signed COVID Declination Form*
  - **Flu**
    - Proof of annual flu vaccine
    - Signed Flu Declination Form*

- **Negative Annual TB Test**
  - Negative Annual PPD TB Skin Test
  - Negative Annual QuantiFERON Gold or T-spot TB Blood Test
  - If you have a known history of having a positive PPD TB Skin Test or QuantiFERON Gold or T- Spot TB Blood Test, you must submit proof of a cleared Chest X-Ray within the last year

Recommended Externship Prerequisites

- Basic Life Support (BLS) Certificate from an American Heart Association (AHA) certified organization
  - If you are interested in a placement at **Scripps Health or San Ysidro Health**, they require students to provide a current BLS certificate from an AHA certified organization.
  - Most healthcare facilities will require you to obtain a BLS certificate upon employment and AHA certified BLS certificate should be a universally accepted type of certification.

**Some externship sites will not accept Declination waivers. Your externship site options may be limited. If you have a preferred externship site, please contact the Admin office to confirm what prerequisites are required to be considered.*

Obtaining Your Officially Sealed School Transcripts

Students will be required to have their high school or college institution submit a sealed official copy of their educational transcripts to the California Department of Public Health (CDPH) when applying for their CPT I license.

Students will need to contact their educational institutions to request a copy of their official transcripts be sent in an unopened envelope sealed by the school.

Important Notice regarding evaluation transcripts from outside the US: All non-U.S. transcripts must be evaluated by "Current Members" of the National Association of Credential Evaluation Services (NACES) or "Endorsed Members" of the Association of International Credential Evaluators, Inc. (AICE). This allows LFS to determine if the education is equivalent to a U.S. college or university education. The evaluation service will send an evaluation of the educational institution and academic courses directly to LFS.

To obtain an application, instructions, and information, visit them on the web:

- **National Association of Credential Evaluation Services (NACES):** http://www.naces.org/members.html

- **Association of International Credential Evaluators, Inc. (AICE):** http://aice-eval.org/members/

Applicants whose education and training/experience is from a non-U.S. school, college, university, or clinical laboratory, please make sure that the name is printed in English on all transcripts and supporting documents and that it matches the name on the application.

A lot of our students have had their transcripts evaluated with Educational Credential Evaluators. The General Report type should be sufficient.

Students will need to provide an evaluated copy of your transcript to be eligible to go on a clinical externship. The evaluation agency should provide a copy of the evaluation report, which is the unofficial copy that can submit to the PhlebotomyU Admin staff at info@phlebotomyu.com

Students will need to request a sealed official copy of the evaluated transcript to be sent to the CDPH after completion of the program and submission of the CPT I application. Further instructions will be given upon completion of the program.

BASIC PHLEBOTOMY DIDACTIC

This study guide will provide information about phlebotomy as a specialized area of clinical laboratory practice. The role of a phlebotomist has expanded, thus, creating the need to replace on-the-job training with structured training programs, which, in tum, has led to certification in phlebotomy. Healthcare facilities are finding it advantageous to require national certification of their phlebotomists to be within compliance of changing requirements by state and federal agencies. The reader can use this booklet as a study guide for the NCCT Certified Phlebotomy Technician exam. As such, this is a supplement for a review, and it is not meant to replace training textbooks and/or lecture notes.

PHLEBOTOMY AS A PROFESSION

Role of the phlebotomist

1. Collect routine capillary and venous specimens for testing as requested.
2. Prepare specimens for transport, ensuring its stability.
3. Transport specimen to the laboratory.
4. Promote good public relations with hospital staff and patients.
5. Comply with new and revised procedures as described in the procedure's manual.
6. Assist in collecting and documenting monthly workload and recording data.
7. Maintain safe working conditions.
8. Perform laboratory computer operations.
9. Participate in continuing education programs.
10. Perform other tasks assigned by supervisory personnel.

Professionalism

The phlebotomist is a member of a service-oriented industry that requires professional behavior at all times. Professionalism is an attitude and a set of personal characteristics needed to succeed in this area. Other characteristics imperative to a phlebotomist include:

- Dependability
- Honesty
- Integrity
- Empathy and compassion
- Professional appearance
- Interpersonal skills

Ethical Behavior

Ethical behavior entails conforming to a standard of right and wrong to avoid harming the patient in any way. Standards of right and wrong called the 'code of ethics' provide personal and professional rules of performance and moral behavior that all phlebotomists are expected to follow.

National Patient Safety Goals

- **Identify patients correctly** - Use at least two ways to identify patients. For example, use the patient's name and date of birth. This is done to make sure that each patient gets the correct medicine and treatment.
- **Improve staff communication** - Get important test results to the right staff person on time
- **Prevent Infection** - Use the hand cleaning guidelines from the Centers for Disease Control and Prevention or the World Health Organization. Set goals for improving hand cleaning. Use the goals to improve hand cleaning.

Healthcare Governing Agencies

- Occupational Safety and Health Administration (OSHA) – the federal agency responsible for reducing and preventing exposure to worker injuries. Performs inspections and fines institutions which are non-compliant.
- The Centers for Disease Control and Prevention (CDC) – the federal agency responsible for identifying, monitoring and reporting diseases capable of becoming epidemic
- Joint Commission on Accreditation of Health Organization (JCAHO) – a voluntary agency which establishes standards for hospital operations
- Centers for Medicare & Medicaid Services (CMS) – oversees Medicare, Medicaid, CLIA and COLA
- Clinical Laboratory Improvement Amendments (CLIA88) is the *federal law* that regulates *clinical laboratory testing*.
- California Department of Public Health (CDPH) - provides oversight for both clinical *laboratory operations* and for the licensed and certified *testing personnel* who perform testing in clinical laboratories. Phlebotomy training programs operating in California must be approved by CDPH.
- College of American Pathologists (CAP) – provides inspection and accreditation of *clinical laboratories*
- for CLIA.
- Commission on Office Laboratory Accreditation (COLA) – provides inspection and accreditation of
- *physician office laboratories* for CLIA.
- Clinical and Laboratory Standards Institute (CLSI) - formerly known as NCCLS, promotes the development and use of guidelines and standards within the healthcare industry
- American Association of Blood Banks (AABB)

In the healthcare setting, the 3 regulating agencies for safety* are:

1. **OSHA** - Occupational Safety and Health Administration
2. **CDC** - The Centers for Disease Control and Prevention
3. **NFPA** - National Fire Protection Association

OSHA Standards – OSHA requires all healthcare facilities to follow rules involving:

- *Hand hygiene* - proper handwashing
- *Hazardous waste disposal* - safe disposal of biohazard materials
- *Engineering controls* - use of safety devices
- *Annual employee safety training* – provided at no cost to employees
- *Bloodborne pathogens training* – provided at no cost to employees

BASIC INFECTION CONTROL, UNIVERSAL PRECAUTIONS AND LABORATORY SAFETY

Workplace Safety Regulations

Chemical Safety

- **Material Safety Data Sheets**
  General information, precautionary and emergency information about the product. Recently MSDS have been changed to Safety Data Sheets (SDS). These documents contain all the information on how to safely handle each chemical including how to contain and clean up a spill.
- OSHA mandates that all chemicals have MSDS. Details provided must include:
  - Product identification
  - Hazard(s) identification
  - Composition (ingredients)
  - First aid measures
  - Firefighting measures
  - Accidental release (spill) measures
  - Handling and storage

HazCom ("Right to Know Law")

Labeling must contain warning statements, precautions and first aid measures.

Fire Hazard

The National Fire Protection Agency (NFPA) has developed code words to assist healthcare workers in remembering the steps to take in case of a fire emergency

- RACE:
  - R – Remove individual in danger
  - A – Activate the fire alarm
  - C – Contain the fire by closing doors and windows
  - E – Extinguish, if possible, with the nearest fire extinguisher
- PASS (to operate a fire extinguisher):
  - P – Pull Pin
  - A – Aim at base of Fire
  - S – Squeeze Handle
  - S – Sweep side to side

Electrical Hazard

All electrical equipment used in a healthcare facility must be approved for safety by an OSHA application. Electrical equipment that appears to be damaged or in poor repair should not be used and be placed out of service.

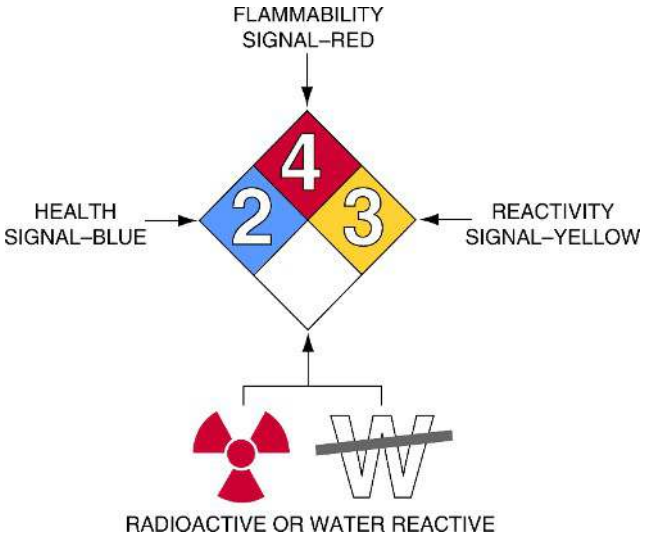
The **National Fire Protection Agency (NFPA)** has also developed a labeling system to alert workers of exposure dangers of chemicals.

NFPA Rating Explanation Guide

RATING NUMBER	HEALTH HAZARD	FLAMMABILITY HAZARD	INSTABILITY HAZARD
4	Can be lethal	Will vaporize and readily burn at normal temperatures	May explode at normal temperatures and pressures
3	Can cause serious or permanent injury	Can be ignited under almost all ambient temperatures	May explode at high temperature or shock
2	Can cause temporary incapacitation or residual injury	Must be heated or high ambient temperature to burn	Violent chemical change at high temperatures or pressures
1	Can cause significant irritation	Must be preheated before ignition can occur	Normally stable. High temperatures make unstable
0	No hazard	Will not burn	Stable

RATING SYMBOL	SPECIAL HAZARD
ALK	Alkaline
ACID	Acidic
COR	Corrosive
OX	Oxidizing
☢	Radioactive
W	Reacts violently or explosively with water
W OX	Reacts violently or explosively with water and oxidizing

This chart for reference only - For complete specifications consult the NFPA 704 Standard



Cleaning and Disinfection of Equipment

- Medical asepsis is a set of practices that reduce the risk of infection in the medical setting.
- Bleach (sodium hypochlorite) is used as a disinfectant to decontaminate surfaces and has been shown to be a highly effective germicide. Most commonly used is a 10% bleach solution (100 ml bleach + 900 ml water to make a 1 Liter bleach solution) with a ratio of 1 part bleach to 9 parts water

Biohazard Clean Up and Disposal

- Decontamination with 10% bleach or approved disinfectant
- Gloves must be worn during clean up
- **Most important step:** Concentrate on absorbing the spill and keeping it from spreading
- To clean small, dried blood spills, cover with a paper towel and moisten the area with disinfectant so as not to create an aerosol and disperse infectious material into the air
- Large blood spills need clay or chlorine-based powder
- Thoroughly remove all traces of body fluid from the surface, then wipe area with disinfectant

Standard Precautions

Standard precautions are precautions established to prevent patient to personnel transmission of infection. It is an approach to infection control that has 2 guidelines:

- Treat all patients, regardless of their disease and/or infection status, as potentially infectious.
- All blood, body fluids, and unattached, non-intact tissue should be considered potentially infectious.
- Focus of infection control turned from prevention of patient-to-patient transmission to prevention of patient-to-personnel transmission
- Standard Precautions must be part of overall infection control plan
- Purpose / Goal of Infection Control: Prevent the spread of infection within hospitals and other healthcare facilities
- All blood, body fluids, secretions, and excretions, except for sweat are considered to be contaminated with bloodborne pathogens and capable of transmitting an infection
- Healthcare professionals must use Standard Precautions with all patients at all times whenever contact with blood or body fluids is anticipated
- Standard Precautions include wearing gloves and using proper hand hygiene before and after each patient contact
- If there is a possibility of coming into contact with blood or other body fluids, the minimum PPE to wear is gloves

Safety Products

- Engineering controls are devices or systems designed to promote safety.
- Includes needle safety devices / needle guards, sharps containers, and syringe transfer device
- To prevent accidental needlesticks and exposure incidents, the **needle safety device** or needle guard should be activated immediately upon removal from the venipuncture site
- In an effort to reduce needlestick injuries, the needlestick Safety and Prevention Act of 2001 mandates that all sharps (needles, lancets, broken glass, etc.) be
- disposed of intact into a puncture resistant, tamper proof, spill proof, lockable **sharps container**
- When the container is ¾ full, the top is sealed and placed into a biohazard box for appropriate disposal. The containers are not shaken down or placed into biohazard bags and never emptied for reuse

Syringe Transfer Device

- Allows for safe transfer of blood from the syringe to the collection tubes without risking an accidental needle stick
- After collecting blood, the syringe needle is locked, removed and discarded in the sharps container.
- The transfer device is then attached to the syringe to allow blood to be collected into evacuated tubes
- The evacuated tube does not need to be uncapped
- After use, the syringe along with the attached transfer device is discarded in the sharps container

Personal Protective Equipment (PPE)

- Mask
- Goggles
- Face shield
- Respirator
- Lab coat
- Gloves
- Apron
- Gown

N95 Respirator Face Masks

- Used in the healthcare setting
- Designed to achieve a very close facial fit and very efficient filtration of airborne particles
- The edges of the respirator are designed to form a seal around the nose and mouth
- Individual healthcare workers are *fit tested* to make sure the mask makes a tight seal around the individual's nose and mouth

Gloves

- Gloves are the minimum required PPE under Standard Precautions
- Must be tight fitting yet not irritable to the hands
- Should fit snugly, but not so tight as to inhibit movement
- To avoid the risk of anaphylaxis, ask the patient about any Latex allergies before performing the procedure (*switch to non-Latex gloves* if necessary)

Order for putting on and removing PPE:

- **ON (Don)** – gown, mask, gloves
- **OFF (Doff)** – gloves, gown, mask

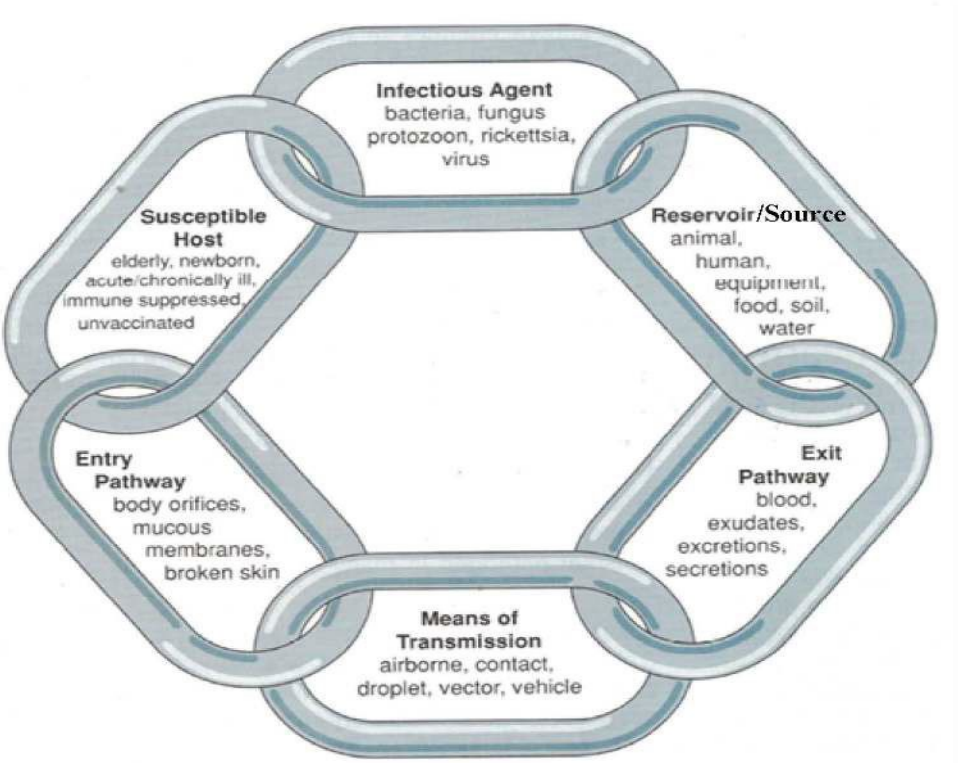
Preventing Infection Transmission

Infection Control

- Communicable infections are infections that spread from person to person
- Nosocomial infections now known as Healthcare Associated Infections (as per CDC). An HAI is an infection acquired by a patient who enters the hospital without any symptoms of it and appears to have acquired the infection during the hospital stay
- Methicillin-resistant Staphylococcus aureus (MRSA) and Clostridium difficile (C. diff) are examples of healthcare associated pathogens
- Urinary tract infection (UTI) is the most common nosocomial infection (NCCT)

The Chain of Infection

Components of the Chain



Breaking the Chain of Infection

Hand Washing: Performing regular hand hygiene is the first preventative measure against disease transmission in caring for patients.

According to the CDC, the simple act of hand washing is the single most important means of preventing the spread of viral and bacterial infections.

Wash before and after each patient (downward motion for at least 15 seconds)

Standard and Transmission Based Precautions

- Droplet infections (requiring a **face mask**) are dispersed by coughing and sneezing and include meningitis, whooping cough, influenza and respiratory syncytial virus
- Airborne infections (requiring an **N95** mask or respirator) are carried by droplet nuclei particles smaller than 5um and include tuberculosis, measles, chickenpox (varicella) and mumps.
- Contact infections (requiring **gown and gloves**) are transmitted by touching a contaminated surface. Examples are Clostridium difficile, rotavirus, antibiotic resistant infections, and herpes simplex
- Protective / Reverse Isolation precautions are used for patients who are highly susceptible to infections. Examples would be patients who are immunocompromised or undergoing chemotherapy.

BASIC ANATOMY AND PHYSIOLOGY OF BODY SYSTEMS WITH EMPHASIS ON THE CIRCULATORY SYSTEM AND MEDICAL TERMINOLOGY

Body Systems

- Skeletal - Bones (Support, Protection, Hemopoiesis)
- Muscular – Muscles (Movement, Blood circulation)
- Digestive - Stomach, Liver, Intestines (Food absorption, Waste disposal)
- Nervous - Brain, Spinal Cord, Nerves (Controls body systems)
- Urinary – Kidneys (Eliminates waste, Monitors Electrolytes)
- Respiratory - Lungs (Exchanges oxygen and carbon dioxide)
- Integumentary – Skin (Protects/Covers the body, Vitamin D)
- Reproductive – Genital Organs (Reproduction)
- Endocrine - Glands (Hormone production, Stress, Metabolism, Reproduction)

Circulatory System

- Also known as the Cardiovascular System
- Function: Transportation

The Heart

- Major structure of the circulatory/cardiovascular system
- It acts as a pump that circulates blood throughout the body
- Heart Structure
    - Heart chambers - ventricles are the pumping chambers of the heart
    - Valves - promote the one-way flow of blood and prevent backflow

Blood Vessels

The Vascular System is a closed system by which blood is circulated to all parts of the body.
The 3 types of blood vessel are:

- Arteries
- Veins
- Capillaries

Arteries

- Carry blood away from the heart
- Carry oxygenated blood (Blood rich in oxygen)
- Have thick walls because the blood is under higher pressure from the contraction of the ventricles
- The presence of a pulse distinguishes arteries from veins
- Smallest arteries are known as arterioles

Veins

- Return blood back to the heart
- Carry deoxygenated blood
- Walls are thinner and can collapse since blood is under lower pressure
- Have valves to prevent backflow of blood
- Smallest veins are known as venules

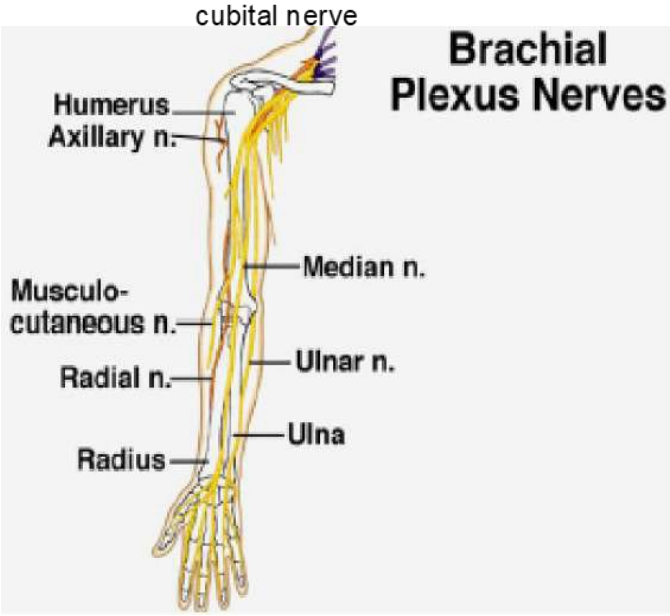
Capillaries

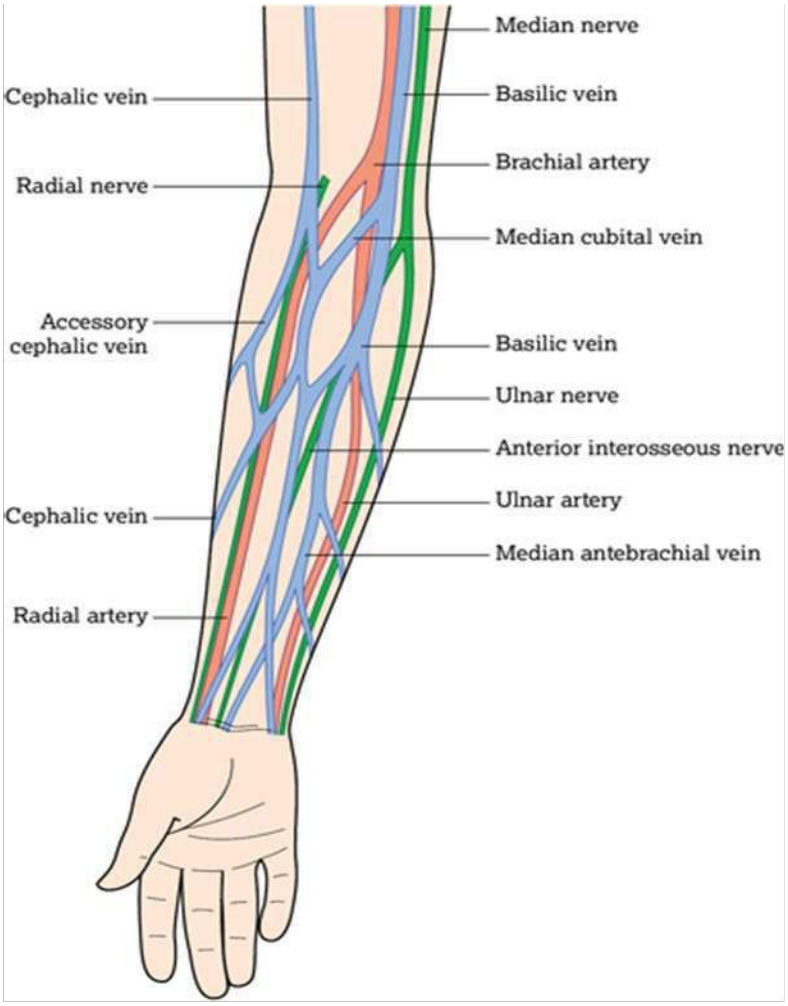
- Smallest blood vessels
- Microscopic, one-cell thick
- Connect arteries & veins
- Blood is mixture of venous and arterial blood
- Thin wall allows for gas exchange – the exchange of oxygen and nutrients for carbon dioxide and waste

Vascular Anatomy of the Arm

Major veins in the antecubital fossa

- Median cubital vein
  - First choice
- Cephalic vein
  - Second choice, fairly well anchored
- Basilic vein
  - Third choice, more painful, above brachial artery and next to median cubital nerve

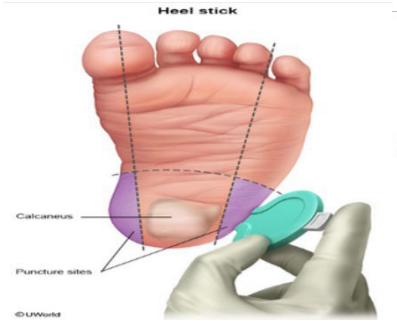


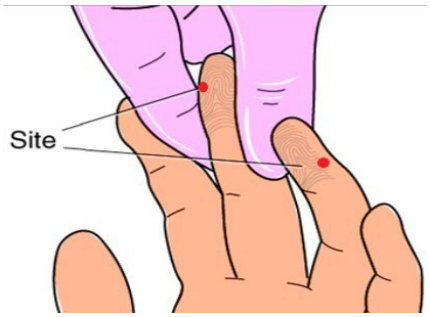


Capillary Puncture

A phlebotomist can also collect a blood sample from a capillary:

- Finger Sticks are performed on adults and older children
- Heel Sticks are performed on infants under the age of 6 months





Lymphatic System

- Lymph vessels spread throughout the entire body much like blood vessels.
- Returns tissue fluid to the bloodstream, protects the body by removing microorganisms and impurities. Processes lymphocytes and delivers fats absorbed from the small intestine to the bloodstream.

Blood Composition

1. **Plasma - Fluid Portion of Blood**
    - Makes up 55% of blood
    - 90% water & 10% dissolved substances
        - Albumin, antibodies, **fibrinogen**
        - Nutrients include carbohydrates and fats
        - Minerals include sodium, potassium, calcium
        - Gasses include oxygen, carbon dioxide
        - Other substances such as vitamins, hormones, urea

2. **Cellular Portion / Components / Formed Elements of Blood**
   Formed Elements make up 45% of blood composition (RBC, WBC and Platelets)

    - **Red Blood Cells (RBC) = Erythrocytes**
        - Transport Oxygen to tissues
        - Contain the protein Hemoglobin (Hgb)
        - Life span = 120 days

    - **White Blood Cells (WBC) = Leukocytes**
        - Fight infection
        - Only live for hours in bloodstream, much longer in tissues
        - **5 Types** of Leukocytes: Monocytes, Lymphocytes, Basophils, Eosinophils and Neutrophils

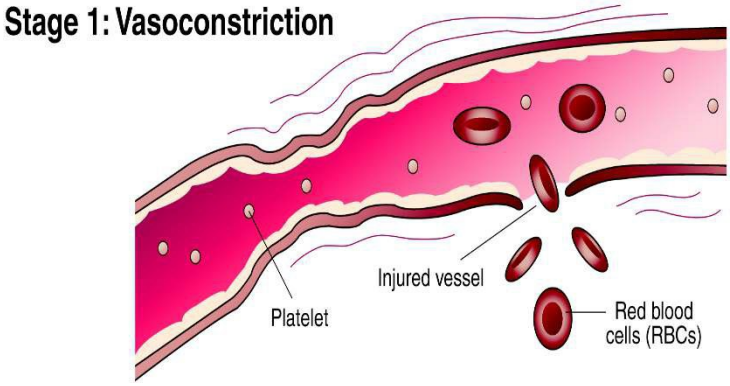
    - **Platelets = Thrombocytes**
        - Essential to coagulation, start the blood clotting process
        - Life span = 10 days

Hemostasis (clotting)

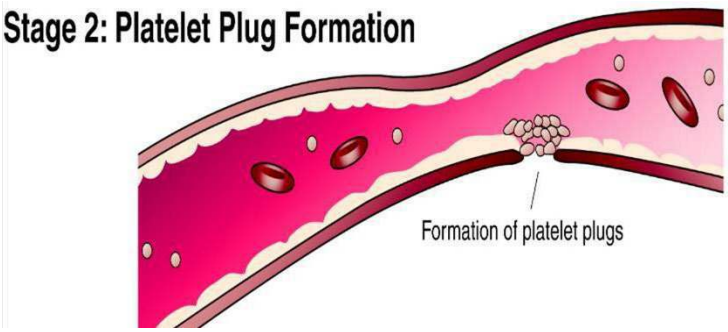
2 Definitions of Hemostasis:

- The blood vessels maintaining their natural state
- The process by which the body stops the leakage of blood from the vascular system after injury

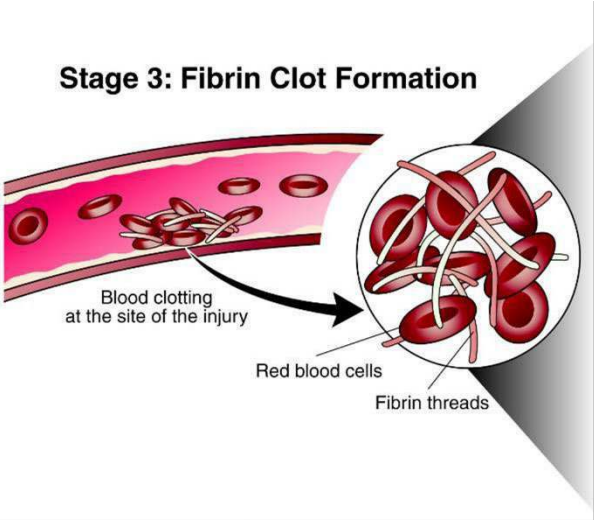
1. **Vasoconstriction**
   The hemostatic process begins after venipuncture procedure. When a blood vessel is damaged, the vessel constricts (narrows or becomes smaller) to lessen the amount of blood leaking out



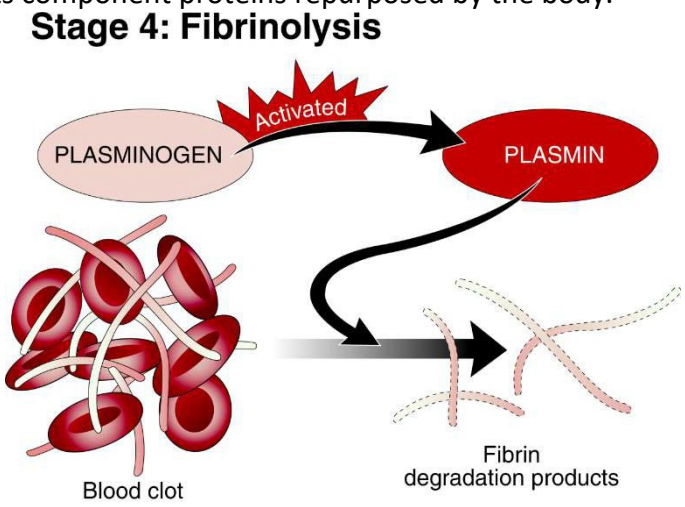
2. **Platelet plug formation** is sufficient to seal the site
   Platelets (thrombocytes) form a plug around the site of leakage. If the damage is small, a platelet plug is sufficient to stop the bleeding.



3. **Fibrin clot formation**
   Involves the interaction of a series of coagulation factors working together in a sequence to form a permanent platelet plug called a clot. When bleeding is significant, fibrinogen is converted to fibrin. Fibrin causes all blood cells to be trapped in a solid blood clot, and the clot stops the bleeding.

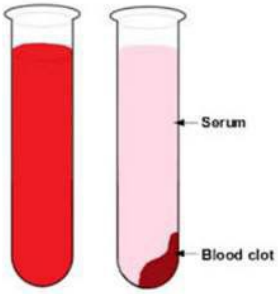


4. **Fibrinolysis**
   Dissolution of the blood clot once healing has occurred. Plasminogen to plasmin. Plasmin is an enzyme that breaks fibrin into small fragments. Once the blood vessel has repaired itself, the clot is no longer needed so it is broken down and its component proteins repurposed by the body.



Once the clotting process is complete,

- All the fibrinogen has been converted to fibrin
- The blood no longer contains any fibrinogen



Clotted blood is composed of 2 portions:

- **Serum** - the fluid portion of clotted blood, **does not contain any fibrinogen.**
- **Blood Clot** - the solid portion of clotted blood, made up of RBCs, WBCs and platelets all bound together by fibrin

Types of Blood Specimens

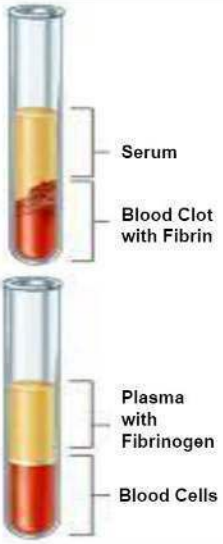
- **Whole Blood** – Blood in the same form as found in the body
  - Blood which is **unclotted**
  - Contains both plasma and blood cells (cellular elements)

- **Plasma** – The liquid obtained from **unclotted** whole blood
  - The plasma specimen must be separated from the cells by centrifuging the specimen
  - Plasma **contains fibrinogen**
  - Normally plasma has a clear pale-yellow appearance

- **Serum** – The liquid portion of **clotted** blood
  - The serum specimen must be separated from the solid clot
  - The serum must be separated from the blood clot by centrifuging the specimen
  - Serum **does not contain fibrinogen**
  - Normally serum has a clear pale-yellow appearance

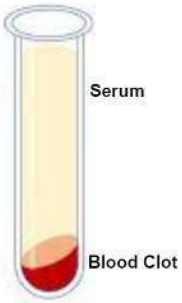
Specimen is allowed to clot → Clotted Blood is centrifuged

Specimen is prevented from clotting → Unclotted (Whole) Blood is centrifuged



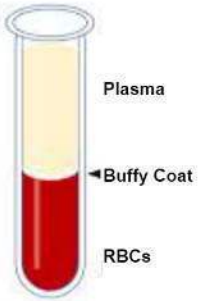
Serum Specimen

- Obtained from *clotted* blood
- Has 2 layers:
  1. **Serum**
     - fluid portion
     - *does not contain fibrinogen*
  2. **Clot**
     - RBCs, WBCs and platelets bound together by fibrin

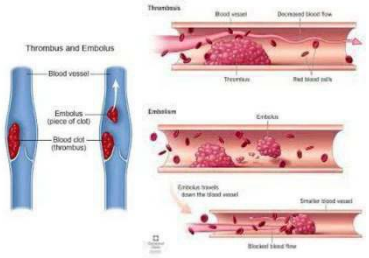


Plasma Specimen

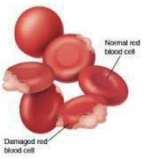
- Obtained from *unclotted* (whole) blood
- Has 3 layers:
  1. **Plasma**
     - fluid portion
     - *contains fibrinogen*
  2. **Buffy Coat**
     - WBCs and platelets
  3. **RBC layer**



Phlebotomy Terms



- Phlebitis: Inflammation of the vein
- Edema: Fluid in the tissues
- Hematoma: Blood in the tissues
- Hemoconcentration: Excessive RBCs in the specimen
- Tortuous: Winding or curvy veins
- Sclerotic: Hardened or scarred veins
- Fomite: Inanimate objects that harbor pathogens
- Lipemia: Excessive fat in the blood
- Thrombus: Blood clot
- Parenteral: An infection that enters the body through any pathway other than oral
- Nosocomial: Hospital acquired infection
- Pathogen: A disease-causing microorganism
- Embolus: A clot, fat particle, or air moving in the blood vessels
- Embolism: A clot, fat particle, or air that has been trapped in the blood vessel causing an occlusion (i.e., pulmonary embolism)



- Osteomyelitis: Inflammation of the bone
- Hemolysis: Ruptured erythrocytes (RBC)
- Basal State: Patient resting and fasting for 10-12 hours
- Iatrogenic: Harm caused by the treatment
- Hemostasis: The blood vessels maintaining their natural state. The process by which the body stops the leakage of blood from the vascular system after injury

- Homeostasis: The body maintaining its natural state
- Petechiae: Ruptured capillaries. Often caused by low thrombocytes (platelets)
- Sphygmomanometer: An instrument used for measuring blood pressure

BLOOD COLLECTION EQUIPMENT, TYPES OF TUBES AND ADDITIVES, PROPER ORDER OF DRAW WHEN ADDITIVES ARE REQUIRED AND SPECIAL PRECAUTIONS

Needle - device used to puncture the skin and access the vein for venipuncture

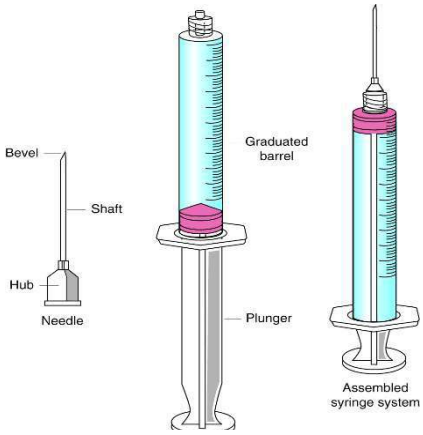
- Bevel - angled portion near the tip of the needle
- Lumen or Bore - hole seen at the bevel
- Needles must always be inserted in **bevel up** position

Needle Size / Needle Gauge

- The gauge of a needle refers to its outer diameter.
- The higher the gauge number, the smaller the bore (width) of the needle
- The most commonly used needles for venipuncture are 21-23 gauge, but the standard needle gauge is
- **21** gauge.
- The shorter the needle, the more control you have

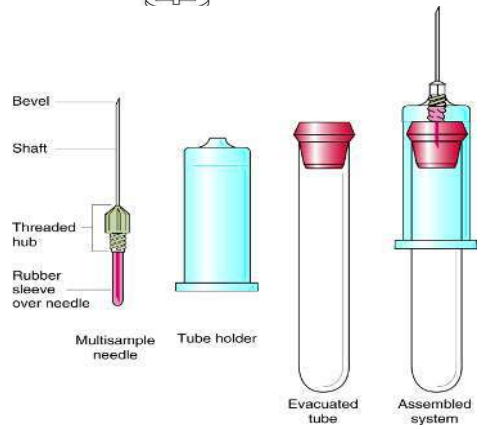
Syringe System

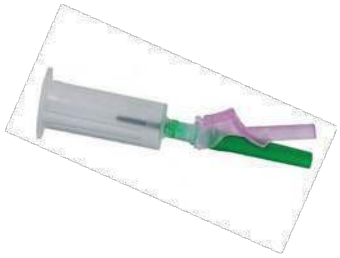
- Components:
  - Needle
    - 21-23 gauge
    - 1 – 1 ½ inch
  - Syringe Barrel – graduated to measure fluid drawn
  - Plunger - provides manual control of suction
  - Syringe transfer device - allows for safe transfer of blood into collection tubes
- **Used for fragile veins, rolling veins and ABG collection**



Evacuated Tube System (ETS)

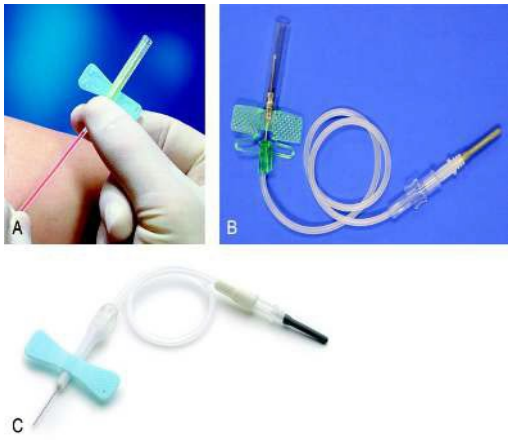
- Three basic components
  - Multisample needle (double pointed needle)
  - Plastic holder (hub)
    - Clear plastic cylinder used to hold the needle
    - Also referred to as the adaptor, needle holder, or tube holder
    - Flanges - extensions on the side of hub which aid in keeping the needle steady during tube placement and removal
  - Various types of evacuated (vacutainer) tubes
  - designed with a vacuum to automatically suction in blood when the tube cap is pierced
- Closed system - blood goes directly from the vein into the specimen tube
- Allows numerous tubes to be collected in a single draw
- Available from several manufacturers (most common is called Vacutainer)





Winged Infusion Set (Butterfly)

- Used for collecting blood from small or difficult veins (pediatric draws, draws from the back/dorsum of the hand)
- Small needle connected to 5 to 12 in. length of tubing
- Must have a safety device to reduce risk of needle stick
- Multisample needle has a Luer adaptor and can be attached to either a hub or a syringe
- Most commonly associated with accidental needle sticks



Infant Venipuncture

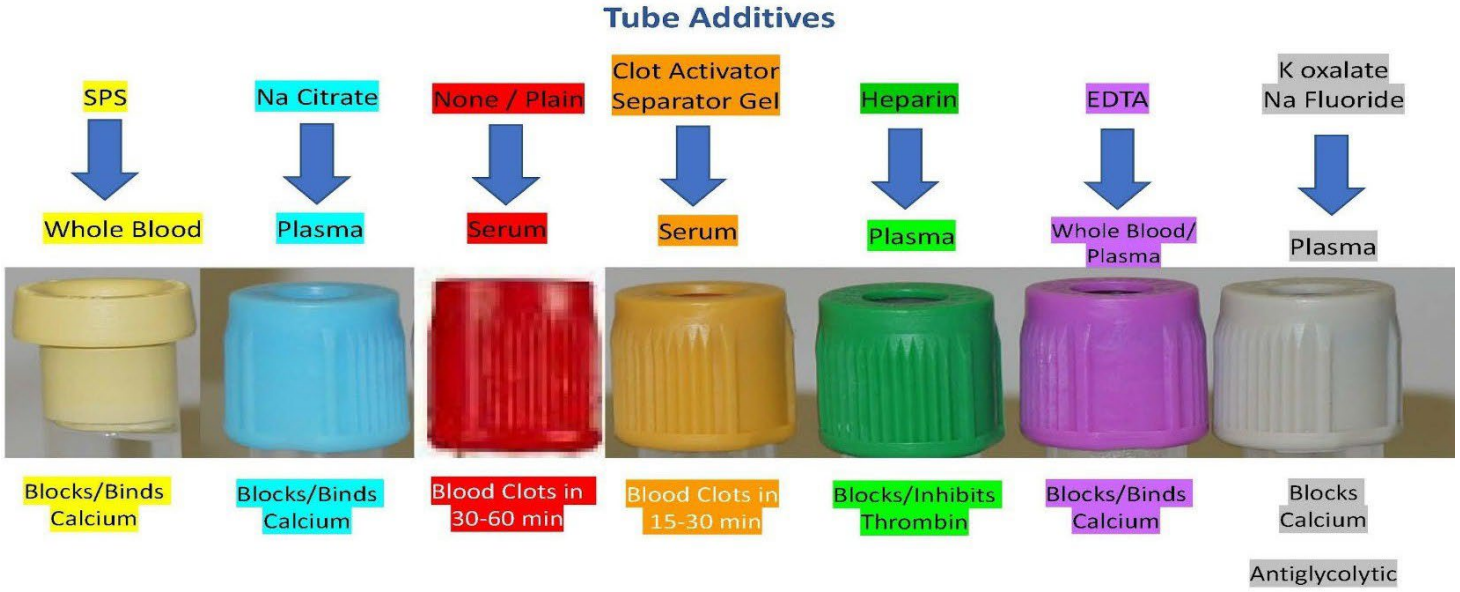
- Challenges
  - Small Veins
  - Non-cooperation
  - Elevated WBC's when crying
- Special Equipment
  - 23-gauge Winged Infusion Set
  - Use smaller pediatric tubes
  - Warming pads - warming the site increases local blood flow by up to seven times/sevenfold
- A heel stick is preferred for children less than 6 months old

Geriatric Venipuncture

- Challenges
  - Skin Changes – loss of collagen
  - Fragile Skin
  - Fragile Veins
  - Veins are prone to collapsing
- Special Equipment
  - Tourniquet may be applied over clothing, a clean dry washcloth or length of gauze
  - Use smaller tubes or a 23-gauge butterfly and syringe to prevent veins from collapsing
  - Use elastic dressing (Coban) because tape or band-aid might tear skin

Tube Additives

Additive: A substance placed within a tube or collection container (such as an anticoagulant, antiglycolytic agent, separator gel, preservative or clot activator). An additive can be a liquid, powder, gel or spray dried coating.



- The Red tube contains no additive and is called a plain tube
- Blood collected in a red tube will clot within 30 to 60 minutes
- The Gold tube contains 2 additives:
  - **Clot Activator:** makes blood clot within 15 to 30 minutes
  - **Gel**: Separator Gel, Gel Barrier or Polymer Thixotropic Gel permanently separates the serum from the clot once the tube is centrifuged
- The Tiger Top tube is the *rubber stopper version* of the gold tube. It also contains a clot activator and gel.
- Gold and Tiger Top tubes are called **SST** (Serum Separator Tubes)

Tube Color	Other Tube Names	Additives
Yellow	Sterile Tube	**SPS** (Sodium Polyanethole Sulfonate)
Blue	Light Blue	**Citrate** (Sodium Citrate, Na Citrate)
Green		**Heparin** (Sodium Heparin, Na Heparin)
Light Green	Plasma Separator Tube (PST)	**Heparin** (Lithium Heparin, Li Heparin) **Gel** (Separator Gel, Gel Barrier, Polymer Thixotropic Gel)
Purple	Lavender	**EDTA** (Ethylene DiamineTetraacetic Acid)
Gray		**Oxalate** (Potassium Oxalate, K Oxalate) **Fluoride** (Sodium Fluoride, Na Fluoride)

Tube Color	Anticoagulant
 Yellow	SPS
 Blue / Light Blue	Citrate
 Green Light Green / PST	Heparin
 Purple / Lavender	EDTA
 Gray	Oxalate

- An anticoagulant is any chemical that *prevents blood from clotting*
- An anticoagulant is an additive since it is a chemical in the tube

Additives of the Gray Tube

- The Gray tube contains *two additives*:
  - **K Oxalate** – anticoagulant (prevents blood from clotting)
  - **Na Fluoride** – antiglycolytic or glycolytic inhibitor
    - prevents *glycolysis* (the breakdown of sugar/glucose)
    - acts as a *preservative* for glucose (blood sugar)
    - makes the gray tube ideal for testing for *hyperglycemia* (high blood sugar) and screening for diabetes
- Even though glucose can also be tested using red or green tubes, *gray is the best choice for glucose testing*
- The gray tube can be called either the *oxalate tube* or the *fluoride tube*

Blood Culture Bottles

- Blood Culture (BC) – test to detect bacteria in the blood
- The yellow SPS tube was the original tube for collecting BC
- The yellow tube has been replaced by blood culture bottles/vials, which also contain the additive SPS
- Two culture bottles must be collected:
  - Aerobic – for bacteria which like to grow in O2-rich environment
  - Anaerobic – for bacteria which do not like to grow in the presence of O_2
- Blood culture collection involves two sets of blood cultures collected 5 – 10 minutes apart, from 2 different sites.
- This is done to rule out possible specimen contamination with bacteria from the skin surface

Order of Draw

- When multiple specimens need to be collected, tubes must be filled in a specific order
- The order of draw for the basic tubes as defined by the Clinical Laboratory Standards Institute (CLSI) from first to last:

Order	Tube Color or Name	Tube Additive(s)
1	Yellow / Blood Culture Vials	SPS
2	Blue / Light Blue	Citrate
3	Red / Plain	None
4	Gold / Tiger Top / SST	Clot Activator + Separator Gel
5	Green / Light Green / PST	Heparin
6	Lavender / Purple	EDTA
7	Gray	Oxalate + Fluoride

Special Rules

- Blood Culture – When using a butterfly Aerobic bottle is first unless a clearing tube is used.
- Red top – Must be fully clotted. Watch for Fibrin strands if the tube is centrifuged too soon
- SST – Cannot be used for certain test because of interference from gel barrier

Fill Level

- Fill all tubes in order to meet sample size / volume requirements
- If there is a fill line, make sure the sample collected is to that level
- Light Blue (Na Citrate) - tubes must be 90% full (to the fill line) to reach 9:1 blood to anticoagulant ratio
    - Short draws (QNS) will be rejected by the laboratory
    - Short draws result in abnormal test results
    - When using a butterfly, a clearing / discard tube must first be used to remove air from tubing

Tube Inversions

- Invert tubes after the draw is complete and the patient is holding pressure to ensure that there is adequate mixing of blood with tube additives
- Fully invert tubes the following number of times: 8-10

Antiseptics

- Substances or solutions used to destroy microbes on the skin
- The patient's skin must be cleansed prior to performing a venipuncture. Sterilizing the skin is not required for routine venipuncture
- Examples:
    - 70% isopropyl alcohol (routine draws)
    - Povidone-iodine
    - Benzalkonium chloride
    - Chlorhexidine gluconate
- Cleansing the skin in a **back-and-forth friction** is more effective than concentric circles
- If the skin needs to be cleansed using concentric circles, cleansing must be done in an outward direction, or from the center to periphy
- In preparing a site for venipuncture or dermal collection, 70% alcohol should be allowed to completely air dry. This accomplishes three things:
    1. It gives the solution time to destroy bacteria
    2. It prevents the alcohol solution from causing **hemolysis** of the red blood cells which might affect the test results
    3. It prevents patient discomfort
- After applying the antiseptic, you should never wipe, fan or blow dry the venipuncture site

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POST PUNCTURE CARE

After removing the needle, ask the patient to keep the arm straight and have them apply direct pressure on the puncture site using 2x2 cotton gauze

Bandaging

- It is the responsibility of the phlebotomist to assure that bleeding has entirely stopped after completion of the venipuncture before bandaging and releasing the patient
- All patients must be bandaged prior to leaving:
    - 2 x 2 Cotton Gauze and Elastic Dressing (Coban)
    - Paper Tape - second choice if Coban is not available
    - Band-Aid
- You must give patient post puncture care instructions:
  Inform patient not to remove bandage for at least 15 minutes but not leave on longer than 1 hour

Elastic Dressing (Coban)

- Elastic dressing is a water-vapor permeable, non-woven polyester fabric made of polyester urethane
- The fabric is coated with a self-adherent substance that gives the bandage the ability to stick to itself but not to skin or clothing
- It stays in place once applied
- Elastic dressing can maintain limited but significant levels of bandage pressure (compression bandage)
- It is primarily used in patients on anticoagulant therapy, those with bleeding disorders, allergies, dermatitis, eczema or fragile skin

Infants and Geriatrics

- Do not apply bandaging to infants as it is a choking hazard. Apply pressure until bleeding stops
- Geriatric patients tend to have thin skin that can tear when an adhesive bandage is removed, elastic dressing is used in these cases as it sticks to itself and not to the skin

APPROPRIATE DISPOSAL OF SHARPS, NEEDLES AND WASTE

Disposal of Equipment

- In an effort to reduce needlestick injuries, the Needlestick Safety and Prevention Act of 2001 (NSPA) mandates that all sharps (needles, lancets, broken glass, etc.) be disposed of intact into a lockable sharps container
- Any non-sharp contaminated waste needs to be disposed of into a biohazard waste container i.e.: Soiled PPE, paper towels used to wipe up blood or body fluid, used gauze.
- OSHA put the standard into force to minimize occupational exposure to bloodborne pathogens

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PROPER IDENTIFICATION OF PATIENT AND SPECIMENS AND THE IMPORTANCE OF ACCURACY IN OVERALL PATIENT CARE

Review and Clarify Orders

Requisition Forms - contain necessary information to carry out laboratory testing:

- The patient's full name and date of birth, or unique patient identifier
- The sex and age of the patient
- The test(s) to be performed
- The date and time of specimen collection, if appropriate
- Test priority
- CLSI requires the **name and address of the ordering physician** on a laboratory test requisition so that the test results can be sent to the correct provider

Patient Identification

- The **most critical step** in collecting a blood sample
- Promotes specimen integrity

Outpatient Identification

- The National Patient Safety Goals established by The Joint Commission recommend the confirmation of at least two patient identifiers before proceeding with any medical procedure including phlebotomy
- Having the patient state their **full name** and **date of birth** (DOB) will suffice for an outpatient
- It is the responsibility of the phlebotomist to provide complete and correct patient identification
- Errors in patient identification can lead to medical mistreatment and possibly death
- Any discrepancy in the information must be corrected before proceeding

Inpatient Identification

- All inpatients must have an armband attached to their arm
- All information on the Requisition must match armband
- For inpatients, in addition to verifying name and DOB, the phlebotomist should match the medical record number (MRN) on the test requisition to that on the patient's armband.
- If the armband does not match the requisition, you cannot continue with the draw until the Identity of the patient has been established
- Only nursing staff can apply, remove, or make changes to the armband

Document Blood Draw

- After the phlebotomist completes a draw, it is necessary to document that procedure in the computer system.
- The main purpose of verifying the draw is to tell the medical technologist in the lab to perform the test
- This allows tracking of the time, special comments (e.g. line draw or below IV) and phlebotomist's initials or employee ID number in case there are questions.
- If the LIS is interfaced with the lab's instruments the test will show up on the queue so the technologist can expect the specimen to arrive in the lab.

Evaluate Pre-test Conditions - promotes specimen integrity

1. Most common diet restriction – fasting
   - Notify nurse or physician if restrictions are not followed
   - No food or drink, except water, 8 to 12 hours prior
   - Patients may be required to fast for certain tests such as cholesterol or glucose
   - Make note of "non-fasting" if asked to proceed with test
2. Some patients may be required to be drawn in the basal state
   - Basal state is where the patient must be fasting and resting for at least 10 – 12 hours
   - A patient is not considered to be in the basal state if they are exercising, coughing, sneezing, in pain, emotional, or apprehensive
3. Blood Thinners (Heparin, Coumadin, Aspirin etc.…)
   - Non-prescription drugs (aspirin, cold medication, vitamins), prescription drugs, and alcohol intake often affect blood test results.
   - If necessary, record medications that might affect lab results
4. Avoid drawing from any VADs (Vascular / Venous Access Devices)

Vascular/Venous Access Areas & Devices to Avoid in Site Selection

- IV Sites
- Previously Active IV Sites
- Arterial Lines
- Heparin or Saline Locks
- Port, PICC and CVC
- AV Fistula / Shunt

Heparin Lock

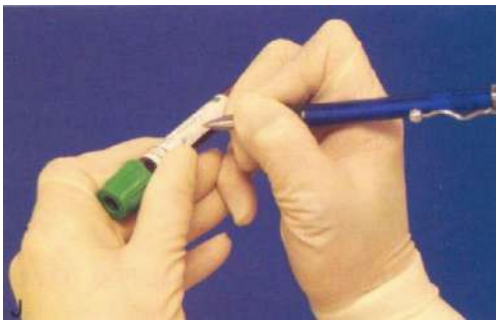
PICC Line

Port

- If a patient has a VAD placed on one arm, draw from the opposite ACF.
- If drawing from either ACF is not possible due to sclerosis, edema or hematoma, the alternative is to draw from the back (dorsum) of the hand.
- If a patient has an *IV in one arm* and *another type of VAD* in the other arm (PICC, CVC, fistula, etc.), it is better to draw from the arm with the IV
- Blood is *never drawn directly from an IV site* as the specimen would be *contaminated*
- with IV fluid and cause incorrect test results.
- Drawing blood from above *(proximal to) the IV site* should also be avoided because it would risk contaminating the sample with the contents of the fluid being administered.
- If drawing from an arm with an IV is unavoidable, it is best to draw from a site below *(distal to)* an IV to minimize specimen contamination with IV fluid.

Labeling - promotes specimen integrity

- **For Routine Venipunctures, label the tubes with:**
  - Patient's first and last name
  - Patient's date of birth
  - Patient's Medical Record Number (MRN)
  - Date & time the specimen was collected
  - Phlebotomist's initials or employee number



- Label tubes at bedside/in front of the patient
- Do not pre-label or label tubes after you have exited the room
- When labeling manually, use permanent ink
- Some facilities require the patient to review the labels on the tubes to assure that they are correct

Stat Test Labels

- **STAT** Tubes must be labeled as **STAT**
- STAT specimens must be taken to the lab for immediate analysis

It is especially crucial that patients having any Blood Bank (Immunohematology) testing, particularly transfusions, be properly identified. Failing to perform this step correctly can be fatal

- **ABO Confirmation**: Verifies the patient's blood type
- **Autologous Unit Donation:** Process by which a person donates a unit of blood for their own use

Specimen Integrity

- Maintaining specimen integrity ensures that all specimens are collected properly.
- Failure to promote specimen integrity leads to specimen rejection and the need to draw from the patient again.
- Procedures that promote specimen integrity:
  - Patient Identification
  - Documenting the Blood Draw
  - Evaluating Pre-Test Conditions
    - Diet Restrictions
    - Medications
    - Vascular Access Devices
  - Specimen Labeling

Collecting Non-Blood Specimens

Urine

- Fluid from the bladder
- Most frequently analyzed nonblood specimen
- Tests for urine include urinalysis (UA) and culture and sensitivity (C & S)
- Methods of collection:
    - Regular void
    - Midstream
    - Midstream clean catch
- Urinalysis (UA) Specimen Handling:
    - Urine specimens should be promptly transported to the lab
    - Specimens which cannot be analyzed promptly can be kept at room temperature and protected from light for up to 2 hours
    - Specimens held for longer than 2 hours should be refrigerated or transferred into chemical preservative tubes
    - Urine specimens that require both UA and C&S testing should be refrigerated or transferred to preservative tubes if immediate testing is not possible

Feces / Stool

- Stool specimens are typically collected in clean, dry, wide-mouth containers
- Containers must be labeled, sealed, and sent to the lab immediately after collection
- Special containers contain preservatives and can be kept at room temperature
- Multiple-day stool specimens must be kept refrigerated throughout the collection period
- Patients who need to collect stool specimens at home must be given the correct container, a biohazard bag, and written instructions
- Wear appropriate PPE whenever handling stool specimens (at the minimum, wear gloves)
- Examples of Stool Tests:
    - Occult blood test (FOBT)
    - Ova and parasites (O & P)
    - Culture and Sensitivity (C & S)
    - Clostridium difficile (C. diff.)

Other Specimens

- **Throat swabs**
    - Secretions from the back of the throat and tonsils are most often used to diagnose strep throat (Streptococcus)
    - Swabs can be cultured in the Microbiology department or used with a rapid strep screening test
    - A throat culture is collected using a sterile swab in a covered transport tube
- **Tissue specimens**
    - Biopsy samples - send to pathology
    - Pap Smear - send to cytology

Prevent Errors

Three crucial identification steps in phlebotomy must be performed in this sequence without deviation

1. Positively identifying the patient
2. Collecting the patient's blood into tubes
3. Labeling the tubes immediately afterward

Any change in this sequence or any deviation between steps has been linked to significantly increased chances for error.

Misidentified Patients or Samples

- Accepting responsibility for one's mistakes is crucial in healthcare
- Physicians and patients rely on accurate laboratory results for diagnosis and treatment
  Example: If a phlebotomist misses a tube on a draw, the only ethical choice is to inform the patient and perform a second draw

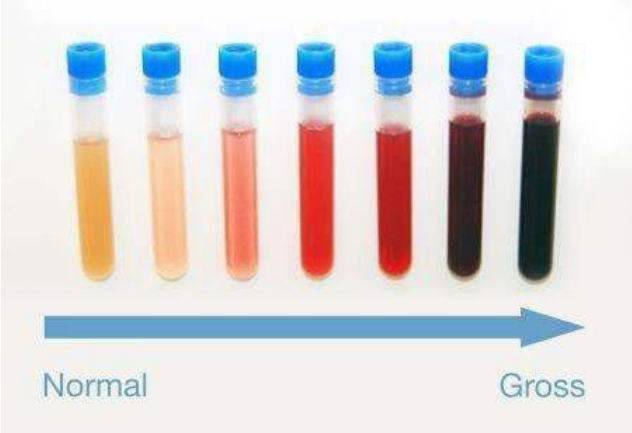
Medical Consent

- **Express**
  May be given verbally or in writing (Assent is giving verbal consent)
- **Implied**
  - Patient's actions imply consent without a verbal or written expression of consent.
  - Implied consent may be necessary in emergency procedure
- **Informed**
  - Requires that a patient be given adequate information regarding the method, risks and consequences of a procedure before consenting to it.
  - The patient's permission of consent must be obtained before initiating any medical procedure
  - Minors require consent of their parents or legal guardians
- **HIV Testing**
  - The client must be advised on the test and its purpose
  - The client must be advised on how the test may be used, the meaning of the test and its limitations
  - Requires informed consent
- **Refusal of Consent**
  Every patient has the right to refuse a medical procedure such as venipuncture

Pre-Analytical Errors

Errors made during specimen collection, handling and processing

- Vigorous mixing of a tube causes hemolysis
- Hemoglobin is released, which turns the serum or plasma red
- Elevated Potassium in the specimen
- Inadequate mixing of anticoagulant tubes can lead to micro clot formation **(most common error)**
- Incomplete clotting of serum tubes prior to centrifugation leads to fibrin strand formation
- Collection from above an IV will contaminate the specimen with IV fluid
- Incorrect order of draw risks carryover of additives
- Temperature of samples (room temperature vs chilled)
- A tourniquet left on for more than one minute can cause hemoconcentration
- Partially filled tubes (QNS or Short Draw)
- Blood cultures are likely to be rejected due to specimen contamination with skin surface bacteria
- The laboratory will not be able to detect every pre-analytical error. Still, the phlebotomist should be professional and try to avoid any errors when collecting and handling specimens, to ensure the test results are accurate.



PROPER SELECTION AND PREPARATION OF SKIN PUNCTURE SITE, INCLUDING SELECTION OF ANTISEPTIC

Skin Puncture Equipment

Capillary puncture is also called skin puncture or dermal puncture. If there are no veins available for venipuncture and a smaller amount of blood can be used for the tests requested, capillary collection may be appropriate.

Lancets - Used for performing capillary puncture, must be discarded in a sharp's container

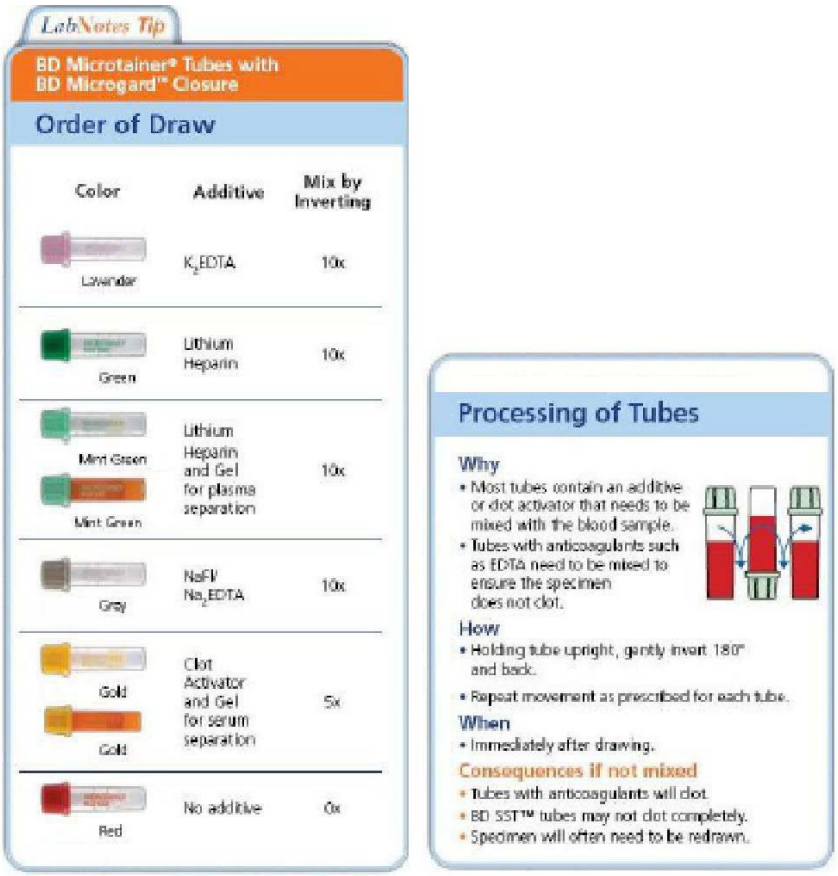
- Finger stick lancets
- Laser lancet
- Heel stick lancets

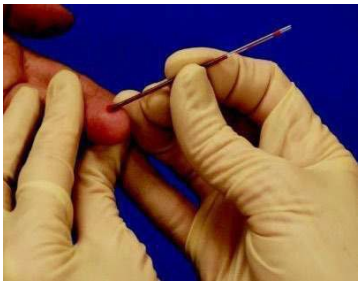
Collection Devices

- Micro collection containers
- Microhematocrit tubes
- Microsafe® Pipette
- Glass slides

Order of Draw for Microtainers

Lavender, Green, Gray, Gold, Red





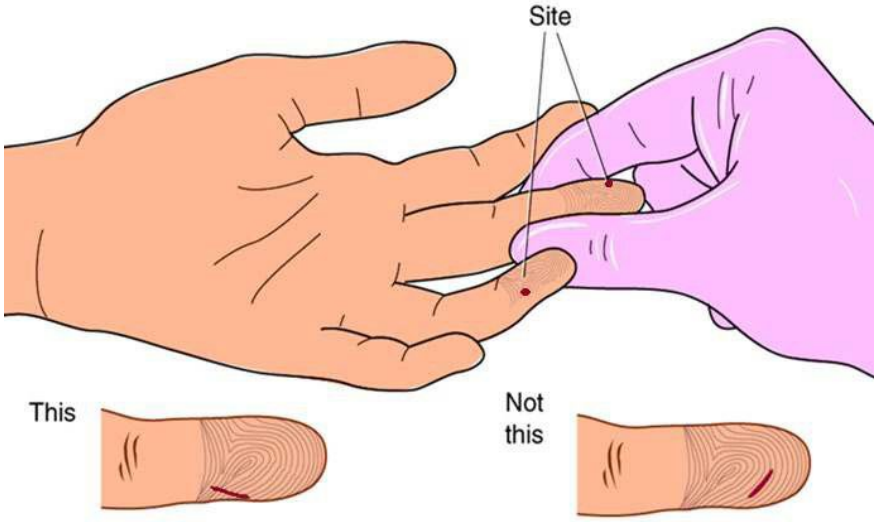
Skin Puncture Site

General Criteria for Finger Sticks

- Performed on adults and older children
- Choose a site that has normal color, and is free from scars, cuts, bruises, or rashes
- Do not choose a site which is cold, cyanotic (bluish), or edematous
- Warming the site, increases the local blood flow in the arterioles and capillaries seven times / sevenfold

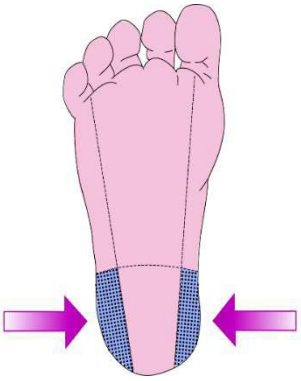
The best skin puncture site selection for older children and adults is the <u>hand</u>.

- Middle or ring finger (3rd or 4th digit)
- Non-dominant hand
- Central, fleshy portion of finger
    - Slightly to the side of center
    - Perpendicular to the whorls of the fingerprint
- Wipe away the first drop of blood to avoid tissue fluid (interstitial fluid) contamination
- Do not puncture side or tip of finger
- Do not puncture parallel to the grooves of the fingerprint
- Do not puncture fingers of infants or very young children



Heel Stick

- Used to perform neonatal (newborn) screening
- Preferred for infants less than 6 months of age
- Capillary blood samples may be taken from the heel of children until they begin to walk (toddler stage)



Site Selection for Infants

<u>Recommended site</u> is the medial or lateral plantar surface of the heel

High Risk Areas to Avoid:

- Posterior curvature
- Center of the heel

Depth of Skin Puncture:

- The lancet used for a heel puncture on a full-term infant should not penetrate beyond 2.0 mm (1.8 mm for a premature infant)
- If the blade were to go deeper, the heel bone (calcaneus) might be pierced leaving the child susceptible to a serious bone infection known as osteomyelitis

Neonatal (newborn) screening for metabolic disorders is done with a heel stick.

PKU Test

A phenylketonuria (**PKU**) **test** is done to check whether a newborn baby has the enzyme needed to use phenylalanine in his or her body. The blood collected is transferred directly to a special filter paper card

Guidelines for PKU Specimen Collection (for NCCT exam)

- Typically performed within 24 to 72 hours after birth
- Blood from a heel stick is collected using a screening card with absorbent circles
- Screening card is touched to the blood drop, not to the heel
- Apply blood to only 1 side of the card
- Each circle must be completely filled, but not oversaturated
- Do not go back to previously filled circles
- Cards must be allowed to air dry for up to 4 hours
- Cards must not be stacked while drying
- Do not use expired forms
- Submit forms to a state-approved lab within 14 days of collection

Skin Puncture Procedure

1. Identify the patient
2. Assemble equipment
3. Warm the site (Increase local blood flow seven-fold)
4. Clean the site
5. Prepare the puncture device
6. Perform skin puncture (finger stick or heel stick)
7. Dispose of puncture device in sharps
8. Apply pressure to the site
9. Wipe away the first drop of blood with gauze to avoid tissue fluid contamination
10. Position the site downward to enhance blood flow
11. Apply gentle intermittent pressure
    - Squeezing the site vigorously can introduce excess tissue fluid and hemolysis, which may cause erroneous results
12. Proceed to collect blood in appropriate devices
    - Use correct order of draw
13. Cap and mix additive containers gently
14. After collection, apply pressure to the site until bleeding stops
15. Bandage if older child or adult

Use of POCT Equipment Point of Care Testing (POCT)

Also known as alternative site or **waived testing**, ancillary, bedside, or near-patient testing. POCT brings laboratory testing to the location of the patient, POCT must be overseen by a CLS.

Reasons for POCT

- Convenience to the patient
- For most tests, short turnaround time
- Deliver prompt medical attention
- Help expedite patient recovery
- Portable, hand-held instruments
- Personnel must be trained
- QC & maintenance procedures mandatory to ensure reliable results

Urine POCT uses reagent strips

Glucose Monitoring is the most common POCT procedure

Examples of POCT:

- FOB- Fecal Occult Blood, screening test for colon cancer
- HCG - Human chorionic gonadotropin, Pregnancy Test
- Urine reagent strip - dipstick for urinalysis
- Troponin protein - test for heart attack or myocardial infarction (M.I.)
- Glucose - Glucometer testing for patients with diabetes / hyperglycemia
- Bilirubin - causes jaundice, a symptom related to liver & gallbladder disease
- Cholesterol - test for hyperlipidemia
- Hgb A1C - Hemoglobin AIC, long-term measure of blood sugar levels
- INR - International Normalized Ratio, evaluation of blood clotting
- Blood Urea Nitrogen (BUN) - test for kidney function
- Hematocrit (Hct) - measures percentage of RBCs

Glucose Monitoring

- Most common POCT procedure
- Monitors diabetic glucose levels
- Advantage: fast turnaround time for results
- Disadvantage: Results are inaccurate if QC is not performed
    - The device should be routinely disinfected
    - Ensure that the device is adequately charged before use
    - When using new test strips, make sure they are calibrated to the device
    - Test strips must be stored at room temperature (avoid extremes of heat, cold, or moisture as these may have negative effects on testing)
    - Do not used expired test strips

ADVANCED PHLEBOTOMY DIDACTIC
Advanced Infectious Disease Control and Biohazards

Occupational Exposure to Bloodborne Pathogens can happen if, any of the following occur:

- Skin pierced by a contaminated needle or sharp object
- Blood or body fluid splashed into the eye, nose, or mouth
- Blood or body fluids that come in contact with cuts, scratches, or abrasions
- Winged infusion sets (butterfly): responsible for most needlestick injuries

Procedure for Needle Sticks & Other Exposure Incidents

- The first step to take after a sharps injury is to wash the area with soap and water for a minimum of 30 seconds
- The most important step is to report incident to supervisor
- Medical evaluation is paid for by the employer and involves:
    - Employee needs to be tested for HIV
    - Patient (source) needs to be tested for HIV & HBV if, patient permits
    - Counseling and testing at periodic intervals if patient (source) is HIV+
    - Employee is alerted about acute viral symptoms within 12 weeks of exposure

Blood and Body Fluid Exposure

- Eye wash stations
- Hand washing
- Remove and replace soiled clothing
- Report to employee health
- File an incident report - most important step
- Counseling, education, and follow-up should be provided by an employer for up to one year after exposure

The Needlestick Safety and Prevention Act (NSPA)

- Outlines steps that employers must take in case of employees' sharps injury
- The provision includes for the immediate access to medical evaluation and treatment
- The source of the sharps injury must be identified and be tested for bloodborne pathogens
- Healthcare workers are required to participate in bloodborne pathogen exposure educational training

Hepatitis

- Hepatitis A (HAV) is caused by oral/fecal transmission, preventable by immunization
- Hepatitis virus B and C are bloodborne pathogens
- Hepatitis B (HBV) is the most transmissible infection among healthcare workers, preventable by immunization
- Hepatitis C (HCV) is the most transmissible infection among the general public
- Recently a cure has been developed for Hepatitis C

Human Immunodeficiency Virus (HIV)

- HIV Exposure Hazards
    - Found in most body fluids
    - Risk through blood, semen, pre-seminal, rectal fluids, vaginal fluid and breast milk
- Symptoms of Infection are flu-like in early stages

Spills

- A spill of blood or other body fluid represents a possible bloodborne pathogen exposure
- Special chemical solutions and kits can be used. Gloves must be worn. Cleanup should concentrate on the absorption of fluid without spreading it around
- Any glass or sharps involved must be handled using mechanical means (i.e., forceps, tongs, broom) and placed in a sharps container
- Non-sharp cleanup materials should be disposed of in biohazard bags
- The counter may be wiped down with a 10% bleach solution which will not damage the surface

OSHA Bloodborne Pathogen (BBP) Standards

- The facility must have all required documentation and set of procedures
    - Exposure Control Plan
    - Occupational Exposure to Bloodborne Pathogens
    - Procedure for needle sticks and other exposure incidents
    - Decontamination of Surfaces
    - Blood Spill Clean-Up
    - Biohazardous Waste Disposal
- OSHA can fine or shut down institutions which are non-compliant

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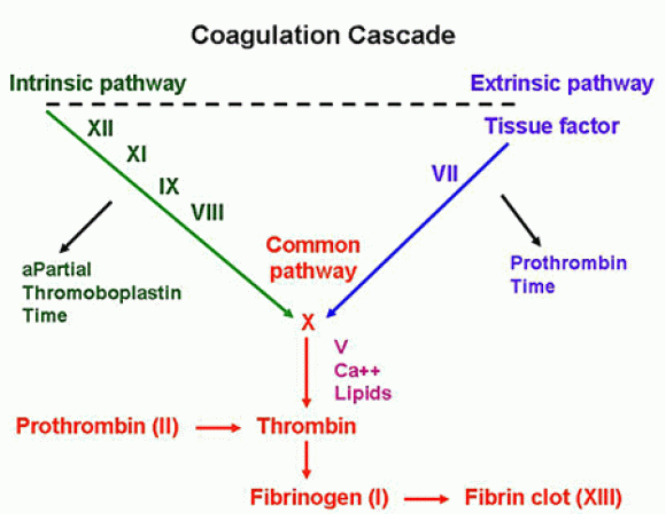
ANTI-COAGULATION THERAPY

Coagulation Cascade

- Blood (plasma) that is flowing throughout the
- body contains clotting (coagulation) factors, examples are calcium, thrombin and fibrinogen
- Once blood is removed from the body the clotting factors are activated in sequence
- The final step is conversion of fibrinogen to fibrin
- Clotting factors are activated in 2 groups:
    - **Intrinsic Pathway** is measured by a PTT or aPTT test
    - **Extrinsic Pathway** is measured by a PT / INR test



- Clotting factors are grouped into **2 pathways:**

Coagulation Pathway	Extrinsic Pathway	Intrinsic Pathway
Blood Test	PT / INR	PTT / aPTT
Related Drug Therapy	Coumadin / Warfarin	Heparin

Example from the NCCT:
A patient is receiving *Coumadin therapy*, and the doctor wants to check the effect of the treatment on the patient's blood clotting.

- Which *blood test* will they order? PT/INR
- Does the test check the intrinsic or extrinsic pathway? Extrinsic

Anticoagulants

Tube Color/Alternate Names	Anticoagulant	Anticoagulant Mode of Action*
Yellow	**SPS**	Blocks Calcium
Blue / Light Blue	**Citrate**	Blocks Calcium
Green Light Green / PST	**Heparin**	Blocks **Thrombin**
Lavender / Purple	**EDTA**	Blocks Calcium
Gray	**Oxalate**	Blocks Calcium

*Anticoagulants prevent blood from clotting by blocking certain coagulation factors from being activated. The word 'Blocks' can be substituted with *Binds*, *Inhibits*, or *Inactivates.*

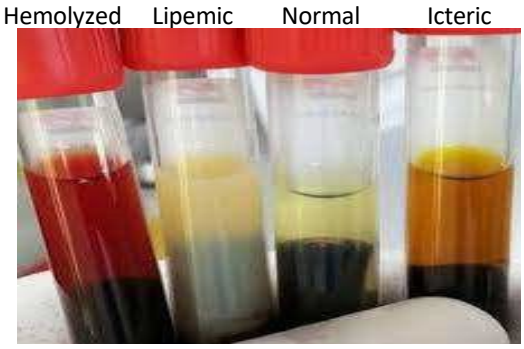
Patients With Clotting Deficiencies

- The phlebotomist is responsible for post venipuncture wound care which includes confirming that the site has stopped bleeding
- If the patient is on aspirin or other anticoagulant therapy, this may require applying pressure for five minutes or longer and the application of a pressure bandage before releasing the patient
- The phlebotomist should perform a "two-point check", visually inspecting the surrounding tissue for mounding or swelling—a sign of hematoma formation—and for bleeding at the skin's surface
- The patient may be able to assist with this process, but it remains the phlebotomist's responsibility to assure bleeding has stopped
- Ivy Bleeding Time - an old test for assessing platelet plug formation / hemostasis in the capillaries for patients with bleeding disorders. This test is no longer performed and has been substituted with PFA (Platelet Function Assay)

Knowledge of Pre-Analytical Sources of Error in Specimen Collection, Processing, Storage and Transport

Practices That Affect Results

- **Positive**
  - To increase blood flow to the area, a warm pad may be applied (not to exceed 42°C for 3-5 min)
  - The use of a blood pressure cuff in place of a tourniquet is acceptable if the cuff holds adequate pressure
  - Allowing the arm to "hang down" might help and the arm should be placed in a supported, downward position to prevent reflux of tube additives into the patient's vein.
- **Negative**
  - Rough handling of specimen leads to hemolysis
  - Patients should never pump their fist - leads to hemoconcentration and elevated potassium
  - Keeping a tourniquet on for more than 1-minute causes hemoconcentration
  - Partially Filled Tubes fail to meet specimen volume requirements (QNS)
  - Inadequate cleansing of puncture site leads to Specimen Contamination of Blood Cultures
  - Slapping the potential venipuncture site is never an acceptable practice and can be construed as battery (inappropriate physical contact)
- **Specimen Appearance**



The normal appearance of serum or plasma is a pale-yellow liquid. Changes in specimen appearance indicate an abnormal process or condition.

Condition of Specimen	Color / Appearance of Serum or Plasma	Related Processes and Conditions
Normal Specimen	Pale Yellow	-
Hemolyzed Specimen	Pink, Orange, or Red	Hemoglobin and potassium are released from ruptured RBCs
Icteric Specimen	Yellow-Green Dark Yellow	**Hyperbilirubinemia**: elevated bilirubin levels in the blood Patient with jaundice due to liver or gallbladder disease
Lipemic Specimen	Milky White	**Hyperlipidemia**: elevated levels of lipids/fats in the blood Patient was not fasting

Prioritizing Collections

It is important that a phlebotomist be able to prioritize blood draw orders. It assures that patients get correct and timely medical treatment.

Basic Order of Priority:

1. A timed test that is due
   (Examples of timed testing are TDM and GTT)
2. A STAT order
3. A Routine blood draw

Expanded Order of Priority:

1. Timed test due within *5 to 10 minutes*
2. STAT orders
3. Patient with *surgery or other procedure* scheduled for today
4. Timed test not due for another *30 – 60 mins.*
5. *Monthly* or *Weekly* testing

Therapeutic Drug Monitoring (TDM)

- Used to manage patient drug treatment
  - It is crucial to accurately monitor the levels of therapeutic medications as many of these drugs have harmful side effects.
  - The physician needs to know that the dose of a particular medication is at the appropriate level to assure its effectiveness.
  - If the level is too low, no medical benefit will be produced. If it is too high, there may be toxic consequences. This is called a therapeutic window.
  - Establishes drug dosages
  - Maintains dosages at beneficial levels
  - Avoids drug toxicity
- Time of dose given necessary
  - Critical for safe treatment
  - Must be consistent
- Team effort
  - Pharmacy, nursing & laboratory staff are working together
  - Phlebotomist is a key player-timed test must be drawn on time
- Collection times - critical for short half-life drugs
  - TDM is an example of timed testing
  - Peak specimen draw: collected 30-60 minutes after administration of drug
  - Trough specimen draw: collected immediately before administration of the next dose
- Collection tubes
  - Gel tubes must not be used because the gel may affect TDM results
  - Consult lab reference guide
- Examples of Drugs for TDM
  - Amikacin
  - Carbamazepine (Tegretol)
  - Digoxin (Lanoxin)
  - Dilantin (Phenytoin)
  - Gentamicin
  - Lithium
  - Phenobarbital (Barbiturates)
  - Salicylates (Aspirin)
  - Theophylline (Aminophylline)
  - **Tobramycin**
  - Valproic acid (Depakote)
  - **Vancomycin** (Vancocin)

Chain of Custody / Chain of Command

- Special protocol that must be strictly followed. Requires detailed documentation that tracks the specimen from the time of collection to the time reported
- A chain of custody (signed and dated receipt) must be established in legal cases such as DUI to establish a traceable “paper trail” of all persons who handled the specimen
- In court, those persons may be called upon to verify the correct collection, processing and testing of the sample
- A breach in the chain of custody can invalidate the legal case

Labeling Specimens

Routine Venipuncture

Label all the tubes with the following information:

1. Patient’s full name
2. Patient’s date of birth
3. Patient’s MRN or other unique ID number
4. Date & time of collection
5. Phlebotomist’s initials or employee ID number
    - Use permanent ink if labeling manually
    - Label tubes at bedside.
    - Do not pre-label or label tubes after you have exited the room

Microtainer labels

Most manufacturers have an adapter that attaches to microtainer tube to enable correct labeling

Blood Smear Slide Labels

Labels are placed or written on the frosted part of the slide.

Processing Specimens

How to Centrifuge

- A centrifuge is used to "spin down" blood samples to allow for separation of serum from the clot or separation of plasma from cells.
- These instruments need regular maintenance and calibration to assure optimum operation
- It is very important to assure that sample tubes are balanced when spinning them in a centrifuge
- The speed and timing of the instrument are determined by each laboratory to yield the volume of plasma or serum needed for testing
- Serum tubes need to be allowed to completely clot for 20 to 60 minutes to prevent fibrin strands from forming
- Use a timer for clotting and a time centrifuge
- Ideally specimens that need to clot before centrifugation should be centrifuged within 60 minutes of collection
- Ideally anticoagulated samples should be centrifuged within 30 minutes of collection for plasma
- If samples are not centrifuged within 120 minutes of being collected, then they should be recollected
- Leave lid closed during operation, if not closed, aerosols may be released into the air
- Centrifuge each specimen only once to:
    - Avoid hemolysis
    - Avoid deterioration of the analyte (the chemical being tested)
    - Avoid alteration of test results
- Temperature-controlled refrigerated centrifuge required for chilled specimens

Aliquot

- An aliquot is a portion of a specimen taken from the original sample to have further testing done in a different area of the lab
- It is crucial to have the exact same information on the aliquot container as the original tube
- To avoid identification errors, **pre-labeling is allowed** when aliquoting specimens. Aliquoting is the number one cause of misidentification errors
- When separating specimens, a bench top splash shield should be used to prevent splashes of blood or body fluids from coming into contact with the processor
- Specimens are not poured directly into aliquot containers
- Disposable transfer pipettes are used in moving portions of the sample to the aliquot tube
- If serum or plasma is needed, aliquoting is necessary

Storage

- Blood specimens collected in a gray top tube (sodium fluoride & potassium oxalate) for glucose analysis are stable for 24 hours at room temperature and 48 hours if refrigerated at 4-8°C
- If glucose was not collected in gray top tube, then samples should be processed within 30 minutes
- A urine or stool sample that cannot be tested within 2 hours should be refrigerated to prevent overgrowth of bacteria or deterioration of analytes; However, the specimen should be brought to room temperature before testing

Deliver Specimens to The Laboratory

Specimen Handling

- Inappropriate / Rough handling can cause
    - Hemolysis in the specimen
    - Breakage of specimen tube and possible pathogen exposure
- Store tubes with stopper up
    - Aids in clot formation in the serum tube
    - Reduces agitation of clotted cells
    - Blood in contact with stopper can be source of specimen contamination and contributes to aerosol

Specimens Requiring Special Handling

Some blood specimens require special treatment and handling to preserve the analyte while being transported to the lab for testing

- Some specimens need to be transported on ice
    - Lactic acid / Lactate and ammonia are chilled in ice, as they deteriorate very quickly at room temperature. Lactic acid must be collected without using a tourniquet.
    - To slow down metabolic processes, completely immerse sample in ice slurry (mixture of ice & water)
    - The level of ammonia will become elevated if the specimen is kept at room temperature
- Some specimens need to be transported at 37°C
    - Will precipitate or agglutinate if below body temperature
    - Can be wrapped in heel warmer or placed in a heat block (portable incubator)
    - Tests that must be kept warm:
        - Cold agglutinin
        - Cryoglobulin
        - Cryofibrinogen

    *Some tests may require collection tube to be pre-warmed
- Some specimens need to be protected from light during transport.
    - These tests are protected from light by either wrapping the specimen in aluminum foil or transferring the spun serum or plasma to an amber aliquot tube
    - Examples: Bilirubin, Vitamin B, Carotene
    - Bilirubin is extremely light sensitive. It may drop in concentration as much as 50% in one hour if exposed to light.

Time Sensitive Specimens

- Time sensitive samples, such as lactic acid levels, are likely to be a STAT order as they deteriorate very quickly after being drawn.
- These samples must be delivered to the lab immediately to ensure accurate results
- Renin activity testing - collect midmorning after patient has been sitting, standing or walking for at least 2 hours and seated for 5-15 mins. Patient is drawn in upright or supine position depending on doctor's order.

Biohazard Bags

- Biohazard transport bags are used to transfer specimens to the lab to prevent the spread of infection.
- Two pockets, with zipper seal to prevent leakage
    - The front pocket holds the specimen
    - The back pocket is for any labels or paperwork
- Must display biohazard logo
- To prevent the spread of infection, especially when drawing patients with special precautions, seal the specimen in the bag before exiting the patient's room.

Deliver Specimens to the Correct Department in the Clinical Laboratory

There are many departments within a clinical laboratory, and each is responsible for a certain discipline of testing

- The Chemistry department measures levels of glucose and other nutrients, enzymes, hormones, lipids and proteins, vitamins, therapeutic drugs, drugs of abuse, minerals and trace elements
- Hematology describes and measures levels of red blood cells, white blood cells and platelets
- Blood Bank or Immunohematology does blood types and transfusions
- Urinalysis analyzes urine samples
- Coagulation tests for abnormal blood clotting times
- The Serology / Immunology area tests for antibodies to viruses such as HIV (Human Immunodeficiency Virus), Levels of hormones like HCG (Human chorionic gonadotropin) and autoimmune antibodies such as ANA (Antinuclear Antibodies) RPR (screening test for syphilis)
- Microbiology tests blood, other body fluids and tissues for the presence of bacteria, viruses, and parasites (culture specimens).

(Refer to the Additional Resources section for tests, tubes and departments)

Purple / Lavender Tube | Hematology

- **CBC** – Complete Blood Count
- **Hgb** – Hemoglobin
- **Hct** – Hematocrit
- **H&H** – Hemoglobin and Hematocrit
- **ESR** – Erythrocyte Sedimentation Rate

Pink Tube | Blood Bank / Immunohematology

- ABO blood typing / ABO group
- Cross match / X-match
- Type and Cross / Type and Screen
- Specialty tube specifically used for Immunohematology. It contains EDTA, similar to the purple tube.

Red Tube | Serology / Immunology

- **HIV –** Human Immunodeficiency Virus
- **HCG –** Human Chorionic Gonadotropin (Pregnancy test)
- **ANA –** Antinuclear Antibodies (Test for Autoimmune diseases)
- **RPR –** Rapid Plasma Reagin (Screening test for Syphilis)

Blue / Light Blue Tube | Coagulation

- Prothrombin Time (Pro Time **PT or PT/INR**)
    - INR = International Normalized Ratio
    - Test for the Extrinsic pathway
- Partial Thromboplastin Time (**PTT or aPTT**)
    - aPTT = Activated Partial Thromboplastin Time
    - Test for the Intrinsic pathway

Yellow Tube | Microbiology

- **Blood Culture** (BC)
    - **FUO –** fever of unknown origin
    - **Bacteremia –** bacteria in the blood
    - **Septicemia –** severe infection causing damage to several organs
- Currently, Aerobic and Anaerobic blood culture vials or bottles are used

Red/SST, Green/PST | Chemistry

Several tubes can be used for Chemistry specimens, due to the variety of tests being ordered

- **INDIVIDUAL TESTS**
  - *Albumin*
  - *Bilirubin*
  - *Creatine Kinase* (CK) – test for heart attack/myocardial infarction
  - *Troponin* – test for heart attack/myocardial infarction
- **CHEM PANELS –** several tests ordered together as a group
  - **Electrolyte Panel /** Electrolytes (includes Na, K, Ca, Cl)
  - **Hepatic/Liver Panel** (includes ALT, AST)
  - **Renal/Kidney Panel** (includes BUN, Creatinine)
  - Basic Metabolic Panel **(BMP)**
  - Comprehensive Metabolic Panel **(CMP)**

Serum Chemistry	Plasma Chemistry
• **Red** • **Gold / Tiger Top / SST**	• **Green** • **Light Green / PST**

Examples:

Serum Bilirubin = Red or SST
Plasma Bilirubin = Green or PST

Serum BMP = Red or SST
Plasma BMP = Green or PST

BMP* = Red or SST
Plasma BMP = Green or PST

Routine Chemistry (Serum is preferred)	STAT Chemistry (Plasma is preferred)
• Red • Gold / Tiger Top / SST	• Green • Light Green / PST

Examples:

Routine CMP = Red or SST
STAT CMP = Green or PST

Routine Troponin = Red or SST
STAT Troponin = Green or PST

Troponin* = Red or SST
STAT Troponin = Green or PST

Routine Plasma Chemistry	STAT Plasma Chemistry
• Green • Light Green / PST	• Green • Light Green / PST

Green and PST tubes are used for all Plasma Chemistry, whether testing is Routine or STAT

Examples:

Plasma Albumin = Green or PST

Routine Plasma Albumin = Green or PST

STAT Plasma Albumin = Green or PST

Routine Serum Chemistry	STAT Serum Chemistry
• Red • Gold / Tiger Top / SST	• Orange / RST

Examples:

Routine Serum Albumin = Red or SST
Serum Albumin = Red or SST
Albumin = Red or SST
Routine Serum Liver Panel = Red or
SST Serum Liver Panel = Red or SST
Liver Panel = Red or SST

STAT Serum Albuin = Orange / RST
STAT Serum Liver Panel = Orange / RST

Orange Tube | Chemistry

STAT testing requires fast specimen processing, which can include the following tubes:

- **Green and PST** tubes can be used for STAT plasma specimens only. They cannot be used for serum since they do not allow blood to clot.
- **Orange** tube is the specialty tube used for STAT serum testing. The tube contains 2 additives:
  - Thrombin - causes blood to clot **within 5 minutes**
  - Gel Separator – separates serum from the clot once tube is centrifuged
- The orange tube is also called the RST (Rapid Serum Tube) or Thrombin tube
  - This tube is used specifically for when STAT serum is ordered
  - It is not widely used due to its higher cost
  - It is not included in the Order of Draw for basic tubes

Red, Gold and Tiger Top tubes are used only for routine serum specimens. They cannot be used for STAT orders because they take too long to clot.

Gray Tube | Chemistry

The presence of an antiglycolytic makes the gray tube the best choice for blood tests related to *sugar* and *diabetes*:

- **Glucose /** Blood Sugar
- **FBS –** Fasting Blood Sugar
- **FBG –** Fasting Blood Glucose
- **GTT –** Glucose Tolerance Test
- **ETOH –** Blood Alcohol
- **Lactic Acid / Lactate**

Tests That Require Specific Tubes

Certain Chemistry tests are drawn using specific tubes due to their special collection requirements

Blood Test	Tube Color
• Vancomycin Gentamicin Tobramycin	• Red only for serum TDM • Green only for plasma TDM
• Ammonia	• Green or Light Green / PST

Non-Blood Specimens

Patient Instructions

- **Urine**
  - For accurate results, a urine specimen for 24hr analysis should be kept refrigerated during the collection. Refrigeration prevents the analytes in the specimen from deteriorating at room temperature.
  - The collection must *begin* and *end* with an empty bladder as a specific time frame is required. The patient should empty the bladder and then begin the 24-hour timing. At the end of the 24- hour cycle, the patient saves the last urine and ends the collection.
  - Urine cortisol is tested using a 24-hour urine sample due diurnal variation (changes that happen over a 24-hour period).

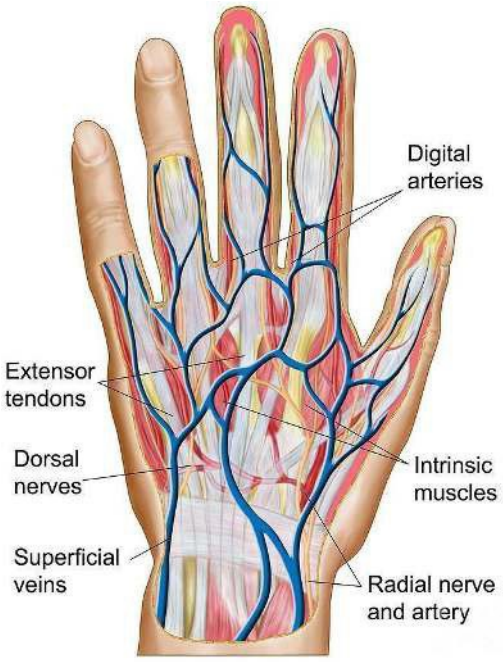
- **Stool**
    - Fecal occult blood tests (FOBT) are a screening test for colon cancer. It is done on special collection cards supplied to the patient by the ordering doctor's office or lab to assess the presence of intestinal bleeding
    - It is necessary to avoid ingesting vitamin C or red meat for 72 hours prior to the start of the test and during specimen collection, as this may produce false test results
    - Stool samples should be kept in a cool dry space away from direct sunlight.
- **Sputum**
    - Mucus or phlegm that is expectorated (coughed up)
    - Sputum specimens are sometimes collected to diagnose lower respiratory tract infections such as bronchitis, pneumonia, or Tuberculosis (TB)
    - First morning specimens are preferred for sputum collections as secretions tend to collect in the lungs overnight and a larger volume of specimen can be produced.
    - It is advisable to wait at least an hour after the patient has eaten to minimize the risk the patient will gag or vomit.
    - Rinsing the mouth with water before the collection will reduce the risk of contaminating the sample with normal mouth flora
    - Instruct patient to collect the specimen by taking a deep breath, then coughing up phlegm from deep within the chest
    - Sputum specimens are collected into sterile cups, transported at room temperature and quickly delivered to the lab. If the container is not sterile, other contaminating organisms may cause a false positive result. Failure to transport to the lab in a timely fashion may cause the loss of bacteria and a false negative culture result.

Processing Non-blood Specimens

- Make sure samples are labeled correctly
- Make sure specimens are delivered to the correct department
- Confirm with the patient that the specimen was collected and stored correctly
  Example: Refrigerated vs Room Temperature
- Confirm that the sample was collected in the appropriate container

ANATOMICAL SITE SELECTION AND PATIENT PREPARATION

Venipuncture Site Selection



Dorsal Hand Veins

Hand veins are close to the surface and tend to "roll". A smaller (23g) needle and lower angle (10-15 degrees) may help the phlebotomist be successful.

When selecting a site for venipuncture, some areas should be avoided if possible

- Blood drawn from an edematous area may contaminate the sample with tissue fluid
- Scarred and tattooed skin is more susceptible to infection and has decreased circulation
- Veins in these locations may be difficult to palpate or penetrate
- Dyes from tattoos can interfere with testing

Unless directed not to do so, a site with a rash or a healed and unbruised previous venipuncture site can be used

Patients with Special Needs

- Mastectomy - always draw from the opposite arm to avoid causing lymphedema
- Sclerosed (scarred) vein - avoid areas with scars to prevent patient discomfort
- Burns - avoid sites with burns due to increased infection risk
- Mobility Issues - do not transfer patients without proper training
- Dementia - ask a provider for assistance if patient cannot understand instructions
- Bleeding Disorders - apply direct pressure on the puncture site until bleeding stops
- Diabetes - patients with severe diabetes generally have poor circulation

Routine Blood Collection

- Set-up
- Tourniquet
- Palpate
- Alcohol
- Adjustment
- Alcohol
- Palpate
- Anchor 1
- Puncture / Anchor 2
- Activate tube
- Deactivate tube
- Tourniquet
- Gauze
- Remove needle
- Lock safety

Applying the Tourniquet

- The advised time limit for having a tourniquet applied to an arm is one minute
- This limit is in place to prevent flow constriction and increased risk of clotting during the venipuncture
- Hemoconcentration and elevated potassium (K+) can occur if the tourniquet is left on for more than one minute
- Apply 3-4 inches above draw site

Use of Antiseptics to Sterilize the Skin

- Alcohol based antiseptics include 70% isopropyl alcohol, Chlorhexidine, and Tincture of Iodine
- Non-alcohol-based antiseptics include Povidone Iodine, Benzalkonium, and Soap and Water

Blood Collection Based on Test Ordered

ETOH Level

- When drawing a blood specimen for an alcohol (ETOH) level, it is imperative not to use any solution containing alcohol to clean the venipuncture site. It can be argued that this practice would falsely elevate the patient's result - invalidating its use in a court of law
- The solution used to clean the skin must be aqueous (alcohol free). Using Benzalkonium, Povidone Iodine, or antiseptic soap or a vigorous scrub with water to clean the site is preferred
- When drawing an alcohol level, the site does not have to be sterile

Blood Culture Collection

- Reason to order
  - Fever Unknown Origin (FUO)
  - Bacteremia
  - Septicemia
- Special requirements
  - Yellow Tube, Sodium polyanethol sulfonate (SPS)
  - Blood culture vials/bottles
    - Anaerobic
    - Aerobic
- Skin antisepsis (Chlorhexidine is best choice)

Blood Culture (BC) Preparation

- To minimize the risk of contamination by normal skin flora, sites for blood culture collection require a 30 – 60 second scrub to access the bacteria beneath the dead skin cells in the area
- Chlorhexidine gluconate is the antiseptic of choice. It is not appropriate for infants *under 2 months* of age.
- Benzalkonium chloride can is the second-best choice. It is not appropriate for children *under 2 years* of age.
- Povidone Iodine (non-alcohol based) or Tincture of Iodine (alcohol based)
- Isopropyl alcohol may be used for blood culture preparation but requires a longer scrub with at least two pads
- Whichever antiseptic is used, it is imperative to scrub in a back-and-forth motion, or in concentric circles from the inside to the outside of the site for the required time, to allow the area to air dry and not to retouch the site before performing the venipuncture

Antiseptic

- Sterilizing the skin before performing the venipuncture is the most important part of BC collection
- Failure to follow sterile technique contaminates the specimen with skin surface bacteria
- Specimen contamination of blood cultures interferes with interpretation of results
- Various cleaning agents used such as:
    - Chlorhexidine (CHG) - most preferred antiseptic for blood culture
    - Benzalkonium chloride
    - Povidone-iodine or Tincture of iodine

Blood Culture Procedure

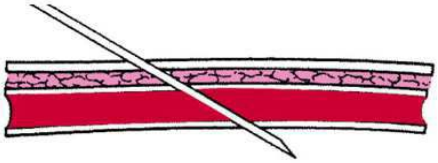
- First cleanse
    - Surface dirt and debris are removed
    - 70% isopropyl alcohol, allow to air dry
- Second cleanse
    - Scrub back and forth or in concentric circles with chlorhexidine, benzalkonium, or tincture iodine and allow to air dry
- Palpating the site is not recommended. But, if necessary, a gloved finger should be cleaned the same as the site of venipuncture
- Fill aerobic bottle first, especially if using a butterfly needle
- Mix each bottle
- Clean iodine from patient's skin with alcohol after collection of blood cultures

Blood Smear

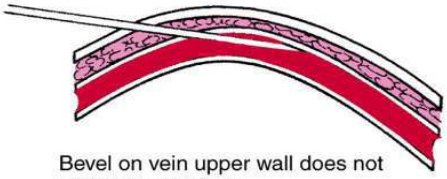
- Blood drop can be obtained by normal finger or heel puncture following proper skin puncture procedure
- Place drop of blood on slide (must be 1-2 mm above the frosted edge)
- A second slide (spreader) is used at a 30-degree angle in order to smear the sample
- 100 WBCs are counted to determine the percentage and identity of the leukocytes
- Blood drop can also be obtained from a purple (EDTA) tube using a diff safe device
- The smear must be spread quickly, and ideally must have a feathered edge

Needle Positioning

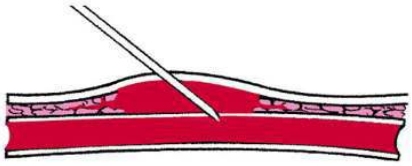
- Insert bevel and a half to two bevels deep for routine venipuncture
- The bevel must ALWAYS face UP



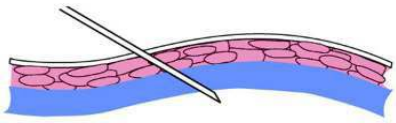
Needle inserted too far



Bevel on vein upper wall does not allow blood to flow

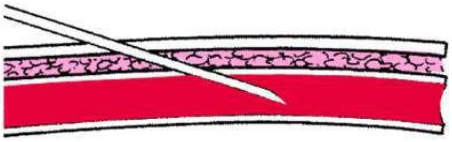


Needle partially inserted and causes blood leakage into tissue



When a vein rolls, the needle may slip to the side of the vein without penetrating it

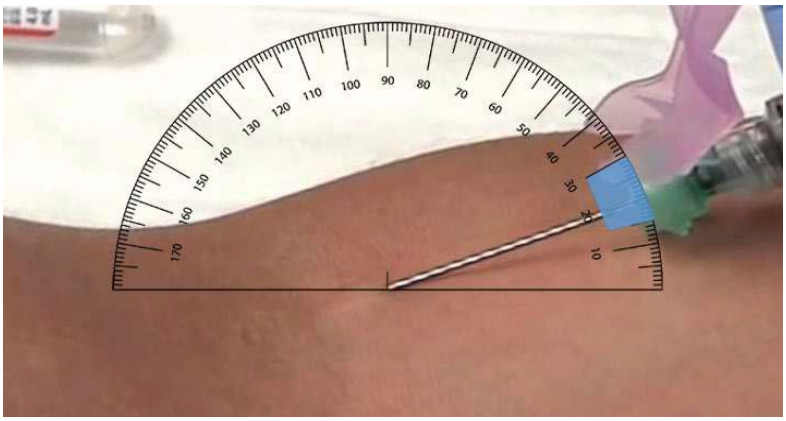
Bevel on vein lower wall does not allow blood to flow



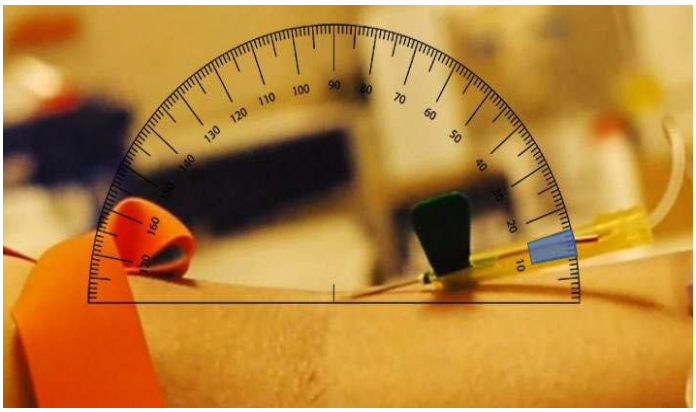
Correct insertion technique; blood flows freely into needle

Angle at 15-30^{o} for routine venipuncture (ETS / syringe).

The deeper the vein, the greater the needle angle



Angle at 10-15° for Butterfly



RISK FACTORS AND APPROPRIATE RESPONSES TO COMPLICATIONS THAT MAY ARISE FROM PHLEBOTOMY

Prevent Interference in Clinical Analysis

- In preparing a site for venipuncture or dermal collection, 70% alcohol should be allowed to completely dry. This accomplishes three things: it gives the solution time to destroy bacteria, prevents the alcohol solution from causing hemolysis of the red blood cells which might affect the test results, and prevents patient discomfort
- Never wipe, fan or blow at a site that has been cleansed
    - Alcohol must air dry to allow time for it to work and inhibit bacteria
    - Wiping can prevent alcohol from working properly and can introduce more microbes
    - Fanning creates air turbulence and can introduce more microbes
    - Blowing introduces microbes from the mouth into the cleansed site
- Let chlorhexidine, benzalkonium, or iodine completely dry before performing blood cultures If the liquid iodine contaminates the blood culture it can interfere with the test results
- Iodine comes in two formulations, one is alcohol based and the other is aqueous (water) based:
    - Tincture of iodine is made by dissolving iodine in alcohol
    - Povidone-iodine (PVP or Betadine) is made by dissolving iodine in water
- When drawing blood for an alcohol level, it is crucial to avoid cleaning the venipuncture site with any solution containing alcohol
    - Doing so might contaminate the specimen and invalidate the results, especially in a court of law
    - Isopropyl alcohol, tincture of iodine and solutions of chlorhexidine and alcohol (Chloraprep) should not be used
- Blood is never drawn from an **IV site** as the specimen would be contaminated with IV fluid and cause incorrect patient results
    - It is wise to avoid drawing blood from an arm with an active IV.
    - Drawing from above the site would risk contaminating the sample with the contents of the fluid being administered

Blood Return Not Established

Collapsed Vein

- A vein might collapse if the vacuum from the tube is too great for the patient's vein or if the plunger of a syringe is pulled back too quickly
- Discontinue a draw immediately if a vein collapses
- Use smaller tubes on second attempt or consider using a butterfly and syringe instead of ETS

Missed Vein

- Slightly repositioning the needle forward or backward may relocate the needle in the vein
- Reposition by retracting the needle bevel closer to the surface of the skin, then adjust angle towards the vein and advance
- If the phlebotomist is unable to establish blood flow, then the draw must be terminated and reattempted elsewhere
- Procedure for failure to get blood
    - evaluate situation
    - find new location
    - only two attempts allowed
    - never probe

Defective Equipment

- Despite good quality control measures, tubes can become faulty due to production, transport or storage issues and may lose all or part of the vacuum
- It is good practice for the phlebotomist to carry extra tubes for the requested tests in case a tube will not fill
- If the current tube appears to be defective, trying a new tube is the first thing to do to recover the draw
- If these measures fail, the draw may have to be discontinued, and an attempt made to draw from another site

Adverse Reactions

Hematoma

- A hematoma may form as blood leaks from a vessel under the skin
- Likely causes may be excessive movement of the needle within the arm, failure to remove the tourniquet before removing the needle, inserting the needle through the vein or excessive probing in an attempt to establish blood flow
- Whenever a hematoma begins to form during a venipuncture, the procedure should be terminated and direct pressure applied to the area
- A hematoma can cause injury to vessels, nerves and tissues in the area and even cause compartment syndrome if not controlled
- Future use of the area for venipuncture may be compromised
- Upon release of the tourniquet and removal of the needle, direct pressure should be applied to the wound site for 5 minutes in the case of hematoma formation

Petechiae

- Petechiae are tiny red dots resulting from ruptured capillaries that form under the skin, or a blood clotting anomaly
- Petechiae are most commonly associated with a tourniquet applied too tightly
- The appearance of petechiae after the application of a tourniquet is not a cause for discontinuing the venipuncture
- These small red dots usually resolve themselves after the procedure is completed

Nerve Injury

- Nerve damage typically occurs during a venipuncture when nerves are accidentally pierced, causing significant pain to the patient. The blood draw should be discontinued immediately
- This may happen if the basilic vein is chosen and the correct angle of needle insertion (< 30 degrees) is not followed
- The basilic vein is always chosen last as it is located in an area of the antecubital fossa that contains an artery and many nerves
- Nerve injuries can result in a lawsuit being filed against the phlebotomist

Syncope

- Excessive sweating (diaphoresis) and pallor are symptoms of syncope (fainting)
- Failure to recognize and act on an impending syncopal episode can result in serious patient injury
- The draw should be immediately discontinued, and the patient treated
- Calling for assistance may be required
- If a patient is known to have a history of syncope (fainting) during blood draws, it is best to perform the procedure in a supine position, this minimizes the chance of patient injury
- If a patient is about to faint there is no bed available, lay the patient on the floor
- People who experience syncope may also complain of nausea before fainting
- Some patients have been known to vomit upon fainting

Seizure

- Seizures are considered a serious complication, and medical assistance should be sought immediately.
- Whenever a patient has a seizure, the procedure should be terminated (remove needle and take off tourniquet)
- Protect the patient from injury, lay them on the floor if necessary

Allergies

- Latex allergy - remove latex gloves, wash hands and switch to non-latex gloves
- Coban is the best choice for bandaging. Paper tape is the second-best choice.
- A patient with a shellfish allergy is sensitive to anything containing iodine. Therefore, 2% iodine, betadine or povidone solutions should not be used as an antiseptic for blood culture collection.
- Chlorhexidine may not be used if the patient is allergic to alcohol.
- Anaphylaxis – severe, life-threatening allergic reaction

RECOGNITION OF PROBLEMS IN TEST REQUISITIONS, SPECIMEN TRANSPORT, PROCESSING AND CORRECTIVE ACTIONS TO TAKE

Queries or Errors

- It is the responsibility of the phlebotomist to assure complete and accurate identification of the patient.
- Any discrepancy with labels, armbands or requisitions must be corrected before proceeding with collecting a specimen.
- The phlebotomist should go to the nurse's station, explain the problem, and have a new armband with correct information placed on the patient.
- At no time should the phlebotomist change or update any information on labels, requisitions, armbands, or charts – those changes are the job of the patient's caregiver.
- Test requisitions must contain certain information as they become part of the patient's medical record.
- The ordering doctor's name is needed to ensure the test results are sent to the correct physician and facility.
- The patient's date of birth is used to confirm the right person is being drawn.
- Patients must be identified without divulging any personal information.
- In an outpatient setting, ask the patient to verbally state and spell their full name including first, last, middle and suffix and compare the name to the requisition.
- Never include any part of the patient's name when asking the patient to state and spell his or her name.
- Including the patient's name in the questions may prompt the patient to nod and not take an active role in patient identification and patient safety.
- Protected Health Information (PHI) is any information that can potentially identify the patient or the patient's medical condition or diagnosis.

Specimen Suitability

- Make sure the correct tube and required amount of the sample has been collected for each test
  Example: A light blue tube must be 90% filled as the correct patient result depends on a ratio of 9 parts blood to 1-part anticoagulant.
- Make sure the correct amount of time has been followed for processing specimens.
  - Serum tubes need to be allowed to completely clot for 20 to 60 minutes to prevent fibrin strands from forming. Typically, a serum tube requires clotting in the upright position at room temperature for at least 30 minutes to produce the volume and clarity of serum necessary for testing. These are not usually used for STAT tests.
  - However, a serum tube containing thrombin that clots in 5 minutes has recently been offered by a manufacturer. It is called an orange RST (rapid serum tube)
- Make sure the specimen was kept at the correct temperature / light exposure.
  - Levels of bilirubin are susceptible to deterioration if exposed to light. Bilirubin is the most light sensitive – it may drop in concentration as much as 50% in one hour. Therefore, these tests are protected from light by either wrapping the specimen in aluminum foil or transferring the spun serum or plasma to a brown aliquot tube. Vitamin A samples also need to be protected from light and may be wrapped with aluminum foil.
  - Some blood specimens require special treatment and handling to preserve the analyte while being transported to the lab for testing.
    - Lactic acid and ammonia are chilled in ice slurries as they deteriorate very quickly at room temperature.
    - Cryoglobulin must be kept at body temperature (in a 37-degree C heat block) until analysis can begin.
    - Cryofibrinogen
    - Cold Agglutinin

Prevent Sources of Error Regarding Specimen Integrity

Hemolysis

- Hemolysis is the destruction of red blood cells, releasing hemoglobin and potassium into the plasma.
- Hemolysis can be caused by too much mechanical pressure from too small a needle (25g), too much vacuum on the vein (such as when using a large tube) or pulling too hard on the plunger of a syringe.
- Drawing through a hematoma may cause erroneous test results due to hemolysis.

QNS

If the amount of sample did not meet sample size criteria, it is considered a short draw or "QNS" (quantity not sufficient) and would have to be recollected.

When drawing a blue (citrate) tube with a butterfly, use a clearing / discard tube first, before filling the blue tube. This prevents air from the butterfly tubing from entering the blue tube and causing it to be underfilled.

Clotted Specimen

The most common pre-analytical error made at the time of blood collection is failing to adequately mix the tubes. If the blood is not well mixed with the anticoagulant, partial clotting can occur leading to microscopic fibrin strands and inaccurate test results.

Factors That Might Affect Results

- Make notes of any factors that could change the test results i.e.
    - Not fasting (Cholesterol and Glucose test require fasting)
    - Not rested for basal state (Cortisol is a test that requires the patient to be in basal state)
    - Fibrin strands due to centrifugation prior to sample clotting
    - Short draw for a PT/PTT citrate tube
    - Bilirubin sample not protected from light
    - Cold Agglutinin sample not kept warm
- For all the above examples, specimens would be rejected and need to be redrawn.

Perform Specimen Collection on Difficult to Draw Patients

Chemotherapy

- Patients who have received chemotherapy treatments frequently have fragile veins
- The use of vacuum tubes on these veins may apply too much pressure, causing them to collapse
- A syringe and butterfly would offer more control and the prospect of a successful draw
- It is prudent to balance the use of the smallest needle that will allow for a good specimen with equipment that guards against damage to the vessels and tissues
- A winged infusion set with a 23g needle and a syringe might be the best choice

Dialysis

Dialysis patients will have an AV shunt / Fistula that should be avoided for blood draws.

Edema

Edematous areas should be avoided because the blood sample will be contaminated with tissue fluid and give false test results.

Pediatric

- For neonates, the lancet used for a heel puncture on a full-term infant should not penetrate beyond 2.0 mm (1.8 mm for a premature infant)
    - Capillary blood samples may be taken from the medial or lateral side of the heel of children until they begin to walk at which time the heel becomes tougher and more difficult to penetrate
- For children aged 6 months or older, as well as for toddlers, it is better to do either a venipuncture in the ACF or a finger stick.
    - A winged infusion set with a 23g needle and a syringe might be the best choice
    - Collect the minimum amount (removal of more than 10% of an infant's blood volume may lead to cardiac arrest and anemia)
    - When a larger amount of blood is needed from a child, the veins of the antecubital area may be used.
        - If the medial cubital vein is not usable, the cephalic would be chosen next
        - The basilic vein is selected last as it lies near the brachial artery and many nerves
    - Scalp veins are only used in neonates and usually only by nursing personnel
- Approach the child slowly, speak clearly. Lower yourself to the patient's level. Explain procedure in child's terms. Do not say "It won't hurt."
- Use age specific equipment (23g Butterfly, pediatric tubes)
- May consider EMLA (topical anesthetic)
- Earn parents' or guardians' trust
- Ask a parent to hold the child

Geriatric

- Geriatric patients often have thin skin and small veins that are close to the surface.
- The use of a regular ETS multi sample needle and large tubes may exert too much pressure on the vein, causing it to collapse.
- Using a butterfly set with pediatric or short draw tubes which contain less vacuum might be used.
- Elastic dressing is commonly used to bandage the patient as the adhesive from a Band-Aid might damage the skin when removed.

Bariatric / Obese

- A BP (blood pressure) cuff may be used on obese patients as it does not roll into a "cord" as a strap tourniquet would when placed on a very large arm.
- To accomplish this, the patient's blood pressure is taken, and the pressure of the cuff is maintained below the diastolic (no more than 40 mmHg) for no more than a minute.

Sclerosed Veins

- When venipunctures are repeated on the same veins in the same area, scar tissue (sclerosing) can develop.
- This makes veins difficult to puncture and can affect patient results due to impaired circulation.

APPLICATIONS OF BASIC CONCEPTS OF COMMUNICATION, INTERPERSONAL RELATIONS, STRESS MANAGEMENT, PROFESSION BEHAVIOR, ETHICS AND LEGAL IMPLICATIONS OF PHLEBOTOMY

Verbal and Non-Verbal Cues

Non-Verbal Communication - Body Language

- 55% of all language
- Multidimensional
- Involves:
    - Kinesics - the study of nonverbal communication
    - Proxemics - the study of an individual's concept of space
    - Appearance - makes a statement
    - Touch – takes a variety of forms, different meanings
        - Personal space: an invisible bubble around one's body in which one feels safe.
            - Keeping an arm's length distance avoids invading another's personal space.
            - The size varies per individual and their needs at the time.
            - Children generally have the widest bubble of personal space.
    - Intimate space: being in someone's intimate space means being able to make physical contact. Blood draws are performed in the patient's intimate space.

Kinesics:

- Body motion & language
- Facial expression
- Gestures
- Eye contact

Kinesics Slip

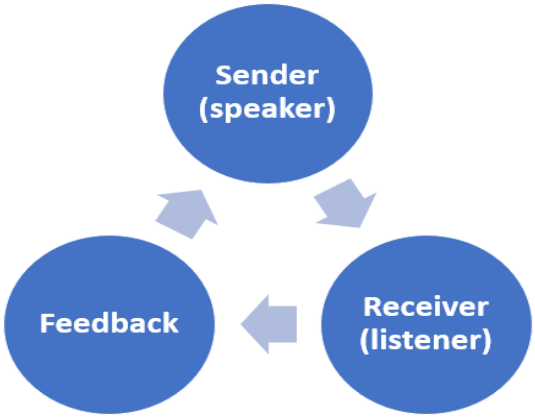
- Verbal and nonverbal messages do not match
- People trust what they see over what they hear
- Be aware of patient nonverbal messages
- Be aware of nonverbal messages you are sending

Communication

Definition of Communication: Means by which information is exchanged or transmitted

Components

- Effective communication involves the interaction of two people
- The listener must focus on what is being said and give feedback to the speaker to ensure understanding. This is known as active listening (most important part of communication)
- Making eye contact, nodding in agreement, taking down notes, and non-threatening use of personal space are aspects of positive body language
- Studies have shown that 55% of communication is body language, 38% is the tone of voice, and 7% is the actual words spoken



- Closed-ended communication: Answerable by 'yes' or "no'
- Open-ended communication: Not answerable by 'yes' or "no'
- Threatening or coercing a patient to have any medical procedure is considered assault i.e. *"if you don't let me collect your blood, your illness will become more critical."*
- If a patient refuses a procedure, it is best to consult the health care provider as to how to proceed.

QUALITY ASSURANCE IN PHLEBOTOMY NECESSARY TO PROVIDE ACCURATE AND RELIABLE LABORATORY RESULTS

Quality Control

- Quality control (QC) is a set of procedures conducted before patient testing to assure the test system is performing correctly.
- A test system includes all aspects of the test to be performed including equipment and instrumentation.
- The quality control results must be documented to prove they have been done and be within certain preset limits.
- If they haven't been properly documented, it will be assumed the QC was not run and therefore the patient results are not valid.
  Example: The temperature of laboratory equipment (refrigerators, freezers, instruments, rooms) is monitored to ensure proper specimen handling to produce accurate test results. If an entry in the temp log was not entered, it will be assumed that temperature was not checked.

Quality Control Follow Up

- If the quality control indicator does not function properly, the patient results cannot be released. Example: Temperatures out of range should be reported to a supervisor and corrective action documented on the temperature log
- Patient results can be affected if any part of the testing process is not temperature controlled.
- Reporting patient results from a test that has failed QC leads to medically **invalid results** that may cause a patient to be treated incorrectly. (This is the most important consequence)

Quality Assurance

Order of Draw - prevents carryover of chemical additives.

Tube Inversions - invert all tubes 8 to 10 times.

Correct Tube Types

Most tests require a specific tube for accurate results.

- CBC specimen submitted in a EDTA lavender tube
- Electrolytes, BMP, and CMP require a gold SST or light green PST tube.
- Tobramycin drug level requires a Plain Red or Green tube.
- Protime and PTT require a light blue tube filled to the fill line.

Recording Draw Site

- Reference ranges for many tests are different for capillary, venous and arterial samples.
- The phlebotomist needs to add the source of the specimen to the label if relevant.

Tracking Test Orders and Tubes

- When a test order is entered into the laboratory information system (LIS), a unique identifying number is assigned to that order. This is called the accession number. This number establishes an electronic trail for all paperwork and processes attached to that test request from order to result and allows that specimen to be retrieved for additional testing.
- The container identification number is generated for each tube in the test order. It differs from the accession number which is associated with the entire order. The CID allows retrieval of an individual tube within the test order.

Correct Device

- Specimens can hemolyze due to the use of a needle which may be either too small or too large for a vein and a vacuum tube which puts too much pressure on a vessel.
- Blood culture collections must use specific equipment and sterile techniques.

Quality of Equipment

Expiration Dates

- Evacuated tubes have expiration dates to assure the viability of their contents, their sterility, and the strength of the vacuum.
- Decreased vacuum strength may not allow the tube to fill properly.
- Outdated additives may not keep the blood from clotting or adequately preserve the analytes to be measured.

Defects

- As with any manufactured device, a certain number of items are expected to have defects.
- The vendor's good quality control program should find and prevent these from getting out into the market.
- Documenting the occurrence is always a good idea and if there are more instances within a certain lot or shipment, the manufacturer should also be notified.
- It is the phlebotomist's responsibility to assure the equipment to be used for blood collection is acceptable before use on a patient.
- The needle is always inspected after removing the cap for any defect including straightness, burrs and an open lumen.
- Needles are never recapped. The needle and the holder, syringe or butterfly to which it is attached should be placed in a sharp container.

Sterility

- Make sure safety seals are not broken.
- Make sure equipment is not soiled.

Correct Storage

- When restocking tubes, the oldest are used first to avoid costly wasting of outdated equipment.
- The tubes are maintained at room temperature (approximately 22 degrees C)

The Patient Care Partnership

- Replaced 'Patient Bill of Rights'
- Informs patients about what they should expect during their hospital visit with regard to their rights and responsibilities.
- It may take the form of a law or a non-binding declaration.
- Guarantees patient information, fair treatment, and autonomy over medical decisions, among other rights.
- All questions regarding test results should be referred to the patient's nurse or doctor.

Quality Indicators*

Quality Indicators monitor the level of patient care

The top 2 quality indicators pertaining to phlebotomy are:

- The number of needlestick injuries
- Blood culture contamination rates

Adapt Interactions Based on Type of Patient

Pediatric Venipuncture

- Approach the child slowly, speak clearly. Lower yourself to the patient's level. Explain procedure in child's terms. Do not say "It won't hurt."
- Use age specific equipment.
- May consider EMLA (topical anesthetic)

Geriatric

- Elderly patients may have specific conditions to consider:
- Hearing impairment
- Visual impairment
- Mental impairment
- Taking the time to explain the procedure is very helpful in assuring good communication and understanding. This is especially true for elderly patients who may have hearing or understanding impairments.
- Making eye contact, speaking slowly with a stronger voice and using visual aids can help. If necessary, write out what you are trying to say.
- Asking the patient to repeat what you have stated can assist in knowing if they understood what you have said.

Special Needs

- Performing a venipuncture on a sleeping patient can result in injury to the patient or the phlebotomist. The patient should be gently awakened and alerted to the impending procedure. If unable to wake the patient, the nurse should be consulted as to how to proceed.
- Adapt to patients' needs or restrictions with a physical disability (i.e.: Drawing from a patient in a wheelchair, drawing from a patient who is visually impaired)

Special Vacutainer Collection Tubes

- **Black top tube** is used for Erythrocyte Sedimentation Rate (ESR). This tube contains Citrate.
- **Orange top tube** is used when you need serum for STAT testing. The tube contains Thrombin. Not widely used due to high cost.
- **Pink top tube** is used for Blood Bank testing. The tube contains EDTA.
- **Royal Blue top tube** is used for Trace Element and Trace Mineral testing. The tube contains EDTA.
- **Tan top tube** is used for Lead testing. The tube contains EDTA.
- **Pearl White** or Plasma Preparation Tube (**PPT**) is used for PCR testing. It contains EDTA and gel.
- **Yellow ACD** tube is used for DNA testing. The tube contains ACD. This tube is different from the original Yellow SPS tube.

Specialty Tubes and the Order of Draw

- Whenever applicable, treat the specialty tube as one of the 7 basic tubes based on its additive.
- Example: When drawing with a gray, a pink, and a red, and a blue tube, the order of draw will be blue (citrate), red (plain), pink (EDTA), gray (oxalate/fluoride).

(Refer to the Additional Resources section for specialty tubes and tests

PKU Test

- A phenylketonuria (**PKU**) **test** is done to check whether a newborn baby has the enzyme needed to use phenylalanine in his or her body
- Phenylalanine is an amino acid that is needed for normal growth and development
- The blood sample for **PKU** is usually taken from your baby's heel (called a heel stick)
- The lancet used for a heel puncture on a full-term infant should not penetrate beyond 2.0 mm (1.8mm for a premature infant)

Arterial Blood Gas

- Arterial Blood Gas (ABG) is collected via arterial puncture using a syringe.
- Arterial blood sample is obtained from the radial artery in the wrist.
- Second choice is the brachial artery in the upper arm.
- The *pulse is palpated* to locate the artery and the syringe needle is inserted into the artery at an angle of 30-45°.
- After the needle is removed, *direct pressure* must be applied on the puncture site for at least 5 minutes.
- The specimen is placed in ice and transported immediately to the lab.

Allen Test

The purpose of the Allen Test is to check for collateral circulation in the ulnar artery. It is performed prior to Arterial Blood Gas collection

- Have patient make a fist
- Occlude ulnar and radial artery in wrist
- Have patient open hand slowly (should appear blanched or drained of color)
- The ulnar artery is released while the radial is still obstructed to determine blood flow
- A positive result indicates return of blood (flushed) to the hand via the ulnar artery
- A negative result indicates inability of the ulnar artery to adequately supply blood to the hand
- If the Allen Test result is negative the radial artery should not be used, and another site must be selected

Glucose Tolerance Test (GTT)

- Screening test for diabetes
- GTT is an example of a timed test (specimens have to be collected within a specified time)
- The gray tube is the best choice for collecting GTT specimens.

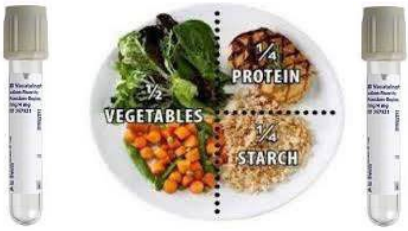
Types of GTT Collection

- 1-hour GTT
  - Instruct patient to drink *50g Glucola* (concentrated sugar drink) and finish it within 5 minutes
  - Record the time the patient finishes the drink and begin timing
  - 60 minutes after finishing the drink, a glucose specimen is collected (1-hour specimen)

- 2-hour GTT
  - A fasting glucose (baseline) specimen is first collected.
  - Other blood specimens may be collected with the fasting specimen.
  - Instruct patient to drink *75g Glucola* and finish it within 5 minutes
  - Record the time the patient finishes the drink and begin timing
  - 1 hour after finishing the drink, a second specimen is collected (1-hour specimen)
  - 2 hours after finishing the drink, a third specimen is collected (2-hour specimen)

- 3-hour GTT
  - A fasting glucose (baseline) specimen is first collected. Other blood specimens may be collected with the fasting specimen.
  - Instruct patient to drink *100g Glucola* and finish it within 5 minutes
  - Record the time the patient finishes the drink and begin timing
  - 1 hour after finishing the drink, a second specimen is collected (1-hour specimen)
  - 2 hours after finishing the drink, a third specimen is collected (2-hour specimen)
  - 3 hours after finishing the drink, a fourth specimen is collected (3-hour specimen)

- 2-hour Postprandial (2-HR PP)
  - A fasting glucose (baseline) specimen is first collected.
  - After fasting is completed, the patient *eats a meal* as specified by the physician
  - 2 hours after the patient has finished eating a meal, a glucose specimen is collected (postprandial specimen)



LEGAL ISSUES RELATED TO BLOOD COLLECTION

Perform Task Within the Scope of Practice

- The scope of practice for a health care worker includes tasks and duties for which they have been trained or certified to perform.
- Procedures considered within the phlebotomist's scope of practice include:
    - Inspection of equipment for defects
    - Sterility and expiration dates
    - Documenting refrigerator & freezer temperatures
    - Correct patient identification
    - Specimen labeling
    - Other assessments of the pre-analytic phase of laboratory testing
- Moving a patient is not within the phlebotomist's scope of practice. If the patient requests to be moved, the phlebotomist may relay this information to the caregiver. The patient does have the right to receive help, but it must be from someone with the knowledge and training to correctly assist the patient
- Other tasks **not within the scope of practice**:
    - Performing high complexity tasks
    - Calibrating or Repairing equipment
    - Maintenance of laboratory hematology instruments
    - Performing microscopic examination of specimens
    - Collecting tissue specimens
    - Discussing patients' lab results
    - Restraining a patient

Comply with Laws Related to Medical Records and Confidentiality

- The HIPAA (Health Insurance Portability and Accountability Act) law was enacted in 1996 to protect medical records and other personal/protected health information (PHI). It provides for the privacy and security of a person's health documents by requiring the patient to state who is allowed to access their records. Addressing patient complaints in private would be an example of compliance with HIPAA
- The HIPAA law defines PHI as any documentation that can identify an individual and that is stored or transmitted electronically or by other means.
- Under the HIPAA law, the patient has the right to specify who is to see their PHI.
- According to HIPAA the patient's PHI cannot be released without their written permission. This would include whether testing had been drawn or if the patient has presented to the lab.

Comply with Laws Governing Reportable Incidents

- Negligence is defined as the failure to exercise due care. Repeated mistakes after counseling or re-education are grounds for termination.
- Battery is inflicting harm on someone. It is the most common lawsuit against phlebotomists.
- Assault is the threat of harm. Threatening language may be considered a form of assault.
- Fraud is deception by words or conduct.
- Liability is being responsible for one's actions.
- Malpractice is improper or unskilled care by a licensed member of the healthcare team.
- A sentinel event is an unexpected occurrence that leads to death or serious physical or psychological injury.
- The Joint Commission (TJC), formerly known as JCAHO, maintains a list of reportable sentinel events and TJC must be notified of these events.
- The most serious sentinel event for a phlebotomist is misidentification of a patient which can cause misdiagnosis, incorrect treatment, or death.

Prevent Occurrences That Could Result in Legal Action

- Hematoma
- Nerve Damage
- Probing
- Patient Fall

GLOSSARY

ABG: Arterial Blood Gas - A test that analyzes arterial blood for oxygen, carbon dioxide, and bicarbonate content, in addition to blood pH. Used to test the effectiveness of respiration

Accession Number: Unique number given to each test request

Afebrile: Not feverish

Aliquot: A fraction of a specimen

Antecubital Fossa - The part of the arm. opposing the elbow

Anticoagulant - The anticoagulant solutions used for the preservation of stored whole blood and blood fractions are acid citrate dextrose (ACD), citrate phosphate dextrose (CPD), citrate phosphate dextrose adenine (CPDA1), and heparin. Anticoagulants used to prevent clotting of blood specimens for laboratory analysis are heparin and several substances that make calcium ions unavailable to the clotting process, including EDTA (ethylenediaminetetraacetic acid), citrate and oxalate.

Antisepsis: The practice of using antiseptics to eliminate the microorganisms that cause disease

Antiseptic: Something that discourages the growth of microorganisms. By contrast, aseptic refers to the absence of microorganisms

ASAP: As soon as possible

Asepsis: The state of being free from disease-causing contaminants or preventing contact with microorganisms

Aseptic: The absence of microorganisms

Basal State: Patient resting and fasting for 10-12 hours

Battery: The basis of tort in this case is the unprivileged touching of one person by another

Bleeding Time: A test done to ascertain platelet function

Blood Borne Infection: An infection transmitted from blood to blood

CDC: Center for Disease Control and Prevention

CLIA: The Clinical Laboratory Improvement Amendments of 1988 are federal regulatory standards that apply to all clinical laboratory testing performed on humans in the United States

CLIA Waived Testing: Tests can be waived under CLIA if they are determined to be “simple tests with an insignificant risk of an erroneous result”

CLSI: The Clinical and Laboratory Standards Institute is a volunteer-driven, not-for-profit, standards development organization

Complete Blood Count: The number of red blood cells, white blood cells and platelets (per cubic millimeter) that are present in a patient's sample of blood is determined

Contamination: Soiling or polluting by inferior material, as by the introduction of organisms into a wound

Coumadin – Anticoagulant used to prevent blood clots. Trademark for the preparation of warfarin solution

Creatinine Clearance: (24-hour Urine and Serum) test is both a blood and urine collection. The blood test had no fasting requirements but is preferably collected at the time the urine collection is completed

Cyanotic: Bluish skin color due to lack of oxygen

Defamation of Character: Injury to another person's reputation, name or character through spoken (slander) or written (libel) words

Diaphoresis: Excessive or abnormal sweating in relationship to your environment and activity level

Diurnal Variations: Measuring of the body's ability to metabolize certain substances, monitoring changes in the patient's condition within a 24-hour period

DNR: Do not resuscitate

D-dimer: Drawn in a Light Blue – Sodium citrate tube. This test is used to help rule out the presence of an inappropriate blood clot (thrombus)

Edema: Fluid in the tissues

EDTA: Ethylene diamine tetraacetic acid. A calcium binding agent that is used as an anticoagulant for laboratory blood specimens

Electrolyte: A substance that will acquire the capacity to conduct electricity when put into a solution. Include sodium, potassium, chloride, calcium and phosphate. Also known as "lytes"

Embolus: A clot, fat particle, or air moving in the blood vessels

Embolism: A clot, fat particle, or air that has been trapped in the blood vessel causing an occlusion i.e. pulmonary embolism

EMLA: Eutectic Mixture of Local Anesthetic. Usually, a topical spray that will briefly anesthetizes the skin prior to a puncture

Ethanol: Another name for alcohol in blood testing. Also known as ETOH

Fibrillation: Rapid, inefficient contraction of muscle fibers of the heart caused by disruption of nerve impulses

Fibrin: The protein formed during normal blood clotting that is the essence of the clot

Fibrin Strands: Formed in a centrifuged blood sample when the blood was not allowed to clot for at least thirty minutes prior to centrifugation

Fibrinogen: The protein from which fibrin is formed / generated in normal blood clotting

Flash: The appearance of a small amount of blood in the neck of a syringe or butterfly

Fomite: Inanimate objects that harbor pathogens

Formed Elements: Red Blood Cells, White Blood Cells and Platelets

Geriatrics: The branch of medicine dealing with the diseases, debilities and care or aged people

Good Samaritan Law: This deals with the rendering of first aid by health care professionals at the scene of an accident or sudden injury. It encourages health care professionals to provide medical care within the scope of their training without fear of being sued for negligence

Hematoma: Blood in the tissues

Hematuria: Blood in the urine

Hemoconcentration: Excessive RBC's in the specimen

Hemoglobin:The oxygen carrying pigment of the red blood cells

Hemolysis: Ruptured RBC's

Hemostasis: The blood vessels maintaining their natural state

Heparin: Heparin is a naturally occurring anticoagulant produced by basophils and mast cells. In therapeutic doses, it acts as an anticoagulant, preventing the formation of clots and extension of existing clots within the blood. While heparin does not break down clots that have already formed (unlike tissue plasminogen activator), it allows the body's natural clot lysis mechanisms to work normally to break down clots that have formed

Hematocrit: The ratio of the total red blood cell volume to the total blood volume and expressed as a percentage

HIPAA: The Federal Health Insurance Portability and Accountability Act of 1996

HIV Consent: Special permission is needed to give an HIV test

Homeostasis: The body maintaining its natural state

Hyperglycemia: Abnormally high blood sugar level

Hypoglycemia: Abnormally low blood sugar level

Iatrogenic: Harm caused by the treatment

Iatrogenic Anemia: Anemia resulting from repeated blood collections

Idiopathic Anemia: Anemia in which bone marrow stops making new red blood cells

Impermeable: Does not allow the passage of liquids

Implied Consent: The patient's actions give permission for the procedure without verbal or written consent, for example holding out their arm or going to the ER

Informed Consent: Giving the patient adequate information concerning the method, risk and consequences for a specific procedure including its risks, expected outcomes and alternatives

Inoculate: To implant a disease agent of antigen into a person to stimulate disease resistance (immunity)

Invasion of Privacy: The release of medical records without the patient's knowledge and permission

Lipemia: Excessive fat in the blood

LIS: Laboratory information system. Used to order tests, print labels for specimens and enter test results

Lymphedema: A type of swelling which occurs in lymphatic tissue when excessive fluid collects in the arms or legs because the lymph nodes or vessels are blocked or removed

NCCLS: National Center for Clinical Laboratory Standards. This agency is a national organization that establishes standards for Phlebotomy procedures

Negligence: This is the failure to exercise the standard of care that a reasonable person would give under similar circumstances and someone suffers injury because of another's failure to live up to a required duty of care

Neonatal: Newborn and especially the human infant during the first month after birth

Nosocomial: Hospital acquired infection

NPO: *Non per os*. Latin phrase meaning nothing by mouth. No food or drink

Oncology: The study and treatment of cancer

OSHA: The Occupational Safety and Health Administration, an agency of the US government under the Department of Labor with the responsibility of ensuring safety at work and a healthful work environment

Osteomyelitis: Inflammation of the bone

Pathogen: A disease-causing microorganism

Parental Consent for Minors: A parent or legal guardian must give permission for procedures administered to underage patients depending on the state law may range from 18 to 21 years old

Parenteral: An infection that enters the body through any pathway other than oral

Petechiae: Ruptured capillaries

Phlebitis: Inflammation of the vein

PKU: Phenylketonuria

POCT: Point of care testing

Quality Assurance: (QA) is defined as a program that guarantees quality patient care by tracking the outcomes through scheduled audits in which areas of the hospital look at the appropriateness, applicability and timeliness of patient care

Sclerotic: Hardened or scarred veins

Septicemia: Systemic infection associated with the presence of a pathogenic organism introduced during a venipuncture

Sphygmomanometer: An instrument for measuring blood pressure

SPS: Sodium polyanethol sulfonate

Thixotropic Gel: Gel barrier located at the bottom of separation tubes

Thrombus: Blood clot

Tort: An injury or wrong committed, either with or without force, to the person on property of another, for which civil liability may be imposed

Tortuous: Winding or curvy veins

Verbal Consent: When a person is read a verbal version of a consent form and then they give their verbal consent in place of a written consent to participate

Whole Blood: Blood from which none of the elements have been removed. It is usually referred to as that blood, collected from a donor and anticoagulated for the purpose of blood replenishment for a recipient

PRACTICE QUESTIONS

	Test	Collection Tube
1	AST	
2	PT	
3	PSA	
4	CBC	
5	Cholesterol	
6	Glucose	
7	ESR	
8	FBS	
9	INR	
10	Gentamicin	
11	BC	
12	D-Dimer	
13	Lactic Acid	
14	RPR	
15	BMP	
16	PTT	
17	Estrogen	
18	STAT Lyte	
19	CMP	
20	Ca	
21	ABO Group	
22	Rh Type	
23	BUN	
24	Electrolyte	
25	Bilirubin	
26	HCG	
27	Tobramycin	
28	Vancomycin	
29	Alcohol	
30	Albumin	

Abbreviation	Definition
ABY	
APTT	
BILI	
BP	
BUN	
CMP	
CBC	
Ca	
Cl	
CLIA	
CO_2	
DIFF	
EDTA	
EMLA	
ESR	
FBS	
FUO	
GLUC	
GTT	
HbG or HB	
HBV	
HCG	
HCT	
HIPAA	
IV	
INR	
JCAHO	

Abbreviation	Definition
K+	
LYTES	
MI	
mL	
MSDS	
Na	
Na Citrate	
Na Fluoride	
Na Heparin	
K Oxalate	
CLSI	
OSHA	
pH	
POCT	
PPE	
ProTime	
PTT	
QA	
QC	
QNS	
RBC	
RPR	
Temp	
Type & Xmatch	
UA	
UTI	
WBC	

BASIC QUIZZES

Basic Infection Control, Universal Precautions and Safety

1. The phlebotomist should use which of the following resources for information about any chemical spill and any necessary procedure?
    a. Material Safety Data Sheet
    b. Clinical Laboratory Improvement Amendments
    c. Poison Control Center
    d. Physician's Desk Reference

2. Before drawing blood on patients who have not been identified as potentially infectious, what type of precautions are used?
    a. Contact Precautions
    b. Standard Precautions
    c. Droplet Precautions
    d. Airborne Precautions

3. Which of the following microorganisms is commonly associated with a Nosocomial infection?
    a. Staphylococcus epidermidis
    b. Group A Streptococcus
    c. Methicillin-resistant Staphylococcus aureus
    d. Neisseria gonorrhoeae

4. Which of the following transmission-based precautions should be used for bacterial meningitis?
    a. Contact
    b. Complete Isolation
    c. Airborne
    d. Droplet

5. Which of the following chemicals is most commonly used to disinfect surfaces and the bottom of the phlebotomy tray?
    a. Benzalkonium Chloride
    b. Chlorhexidine Gluconate
    c. Isopropanol
    d. Sodium Hypochlorite

6. When mixing a 10% bleach disinfectant solution following OSHA guidelines, the solution ratio 1:9 should be mixed by adding
    a. 70 ml water to 30 ml bleach
    b. 10 ml water to 90 ml bleach
    c. 9 ml water to 10 ml bleach
    d. 90 ml water to 10 ml bleach

7. When entering a room marked with Contact Precautions. Which of the following items must be worn? (Select the two (2) correct answers.)
    a. Gloves
    b. Mask
    c. Gown
    d. N95 respirator
    e. Goggles

8. What is the correct order for donning PPE?
    a. Gloves, Mask, Gown
    b. Gown, Mask, Gloves
    c. Mask, Goves, Gown
    d. Mask, Gown, Gloves

9. When transferring blood from a syringe into evacuated tubes you must?
    a. Uncap the evacuated tubes, place them into a tube rack and transfer the blood from the syringe through the hypodermic needle
    b. Remove the hypodermic needle from the syringe and transfer the blood into capped evacuated tubes by pushing on the syringe plunger
    c. Remove the hypodermic needle from the syringe after activating the safety device and transfer the blood into capped evacuated tubes using a syringe transfer device
    d. Uncap the evacuated tubes, place them into a tube rack and transfer blood from the syringe using a syringe transfer device

10. When must the needle guard be engaged?
    a. Before applying the pressure bandage
    b. Immediately after removing the needle
    c. After removing the tourniquet
    d. Before discarding in a biohazard bag

Basic Anatomy and Physiology of Body Systems with Emphasis on The Circulatory System and Medical Terminology

1. A hematoma is
    a. Blood in the tissue
    b. Excessive red blood cells in a specimen
    c. Fluid in the tissue
    d. Winding or curving veins

2. Lipemia is
    a. Inflammation of the veins
    b. A hospital acquired infection
    c. Ruptured red blood cells
    d. Excessive fat in the blood

3. The Endocrine system
    a. Circulates blood throughout the body
    b. Breaks down food to a form that can be absorbed
    c. Secretes hormones
    d. Protects the body from bacterial invasion

4. The Integumentary system
    a. Filters waste products and regulates body fluids
    b. Secretes hormones
    c. Controls and coordinates activities to the various body systems
    d. Protects the body from bacterial invasion

5. Thrombocytes are also known as
    a. Platelets
    b. Red blood cells
    c. White blood cells
    d. Capillaries

6. In the Circulatory system veins
    a. Carry oxygenated blood away from the heart
    b. Are the smallest blood vessel where gas exchange occurs
    c. Carry blood back to the heart
    d. Do not have valves

7. Anticoagulated blood that has been centrifuged provides
    a. Plasma
    b. Thixotropic gel
    c. Serum
    d. Hematoma

8. Leukocytes are also known as
    a. White blood cells
    b. Platelets
    c. Red blood cells
    d. Fibrin

9. A fomite is
    a. A blood clot
    b. Hardened or scarred veins
    c. Winding or curvy veins
    d. Inanimate object that harbors pathogens

10. Gas exchange between blood and air occurs in the
    a. Respiratory system
    b. Endocrine system
    c. Skeletal System
    d. Integumentary System

Blood Collection Equipment, Types of Tubes and Additives, Proper Order of Draw When Additives are Required and Special Precautions

1. The most common needle gauge to use for routine venipuncture is
    a. 15
    b. 18
    c. 21
    d. 23

2. Which of the following is the correct order of draw?
    a. Green, Red, Light Blue
    b. Red, Green, Light Blue
    c. Light Blue, Red, Green
    d. Green, Light Blue, Red

3. In which tube will the blood clot?
    a. Red
    b. Gray
    c. Green
    d. Light Blue

4. Why do Sodium citrate tubes have a line or an arrow somewhere on the tube?
    a. Indicate Sodium Citrate levels in the tube
    b. Ensure the correct blood to additive ratio
    c. Allow the phlebotomist to under fill the tube and adjust blood volume
    d. Indicate the correct placement of the tube in the adapter

5. Which of the following tubes contain an antiglycolytic agent?
    a. Serum Separator Tube
    b. EDTA Tube
    c. Sodium Citrate Tube
    d. Potassium Oxalate Tube

6. Alcohol should be allowed to completely dry to avoid
    a. Hemoconcentration
    b. Hemolysis
    c. Hemostasis
    d. Hemodilution

7. For routine venipuncture, the phlebotomist should cleanse in which of the following motions?
    a. Back and Forth
    b. Up and Down
    c. From the Inside Out
    d. From the Outside In

8. What is the proper aseptic technique when cleaning the venipuncture site? (Choose 2 correct answers)
    a. Let the alcohol air dry before inserting the needle
    b. Allow the alcohol to soak into the skin, then wipe off excess with sterile gauze
    c. Wipe the site in a back-and-forth motion with an alcohol wipe
    d. Wave above the site with a gloved hand to dry the alcohol faster

9. When taking a blood sample from a geriatric patient, the patient's veins are small, and the skin is translucent. Which of the following should you use? (Select the three (3) correct answers.)
    a. ETS multi-sample needle
    b. Band-Aid
    c. Pediatric Tubes (Short Draw Tubes)
    d. Butterfly
    e. Coban

10. The physician orders CBC, Calcium, and Glucose tests on an 11-month-old infant. Which of the following is the most appropriate for this blood collection?
    a. Heel lancet and two microcollection tubes
    b. Heel lancet and three microcollection tubes
    c. 23G butterfly needle and two pediatric evacuated tubes
    d. 23G butterfly needle and three pediatric evacuated tubes

Post-Puncture Care / Appropriate Disposal of Sharps, Needles and Waste

1. To prevent post-puncture hematoma formation after a successful venipuncture, you must apply firm and direct pressure with a cotton
    a. Gauze and instruct the patient to bend the arm
    b. Gauze and instruct the patient not to bend the arm
    c. Balls and instruct the patient to bend the arm
    d. Balls and instruct the patient not to bed the arm

2. Upon arriving at work, you notice all the sharp containers are full. You should
    a. Gently shake the containers to settle the contents
    b. Seal the containers in biohazard bags and replace
    c. Put the containers in a biohazard box and replace
    d. Carefully empty the containers into a biohazard box and refill

3. It is required by OSHA that a sharps container be
    a. Changed every thirty days
    b. Changed when it is ¾ full
    c. Placed inside a locked container
    d. Placed far from the draw station

4. A phlebotomist has completed a skin puncture on a one-year-old patient. Children this age should not have a bandage applied because
    a. They run a higher risk of contamination
    b. They run a risk of choking
    c. Clotting occurs quickly for children this young
    d. They run a higher risk of petechiae

5. A phlebotomist is preparing to draw a patient whose skin is thin and paper-like. Which of the following should the phlebotomist use to secure the gauze?
    a. Paper Tape
    b. Bandage
    c. Micropore
    d. Elastic Dressing

6. You accidentally drop a tube and blood is spilled on the counter, which of the following actions should you take next?
    a. Assess the counter to determine if it would be damaged by bleach and water
    b. Collect another blood sample
    c. Absorb the spill using paper towel
    d. Secure a biohazard container for disposal

7. After an uncomplicated venipuncture, the patient is still bleeding after three minutes of continuous pressure. You ask the patient if she is on any blood thinners. The patient indicates that she is, and states that this is normal for her. How should you proceed?
    a. Apply a pressure bandage and let the patient leave
    b. Bend the arm up, apply a pressure bandage, wait two more minutes, and notify the nurse
    c. Hold direct pressure for five more minutes, apply a bandage, and let the patient leave
    d. Hold direct pressure until the bleeding stops then apply a pressure bandage.

8. Your patient presents with multiple skin tears and very thin skin. What should you use following the blood draw?
    a. 2 x 2 gauze and paper tape
    b. 2 x 2 gauze and Band-Aid
    c. 2 x 2 gauze and roll up gauze
    d. 2 x 2 gauze and elastic dressing

9. Which of the following acts as a compression bandage?
    a. Gauze
    b. Band Aides
    c. Ace Bandages
    d. Elastic Dressing, (Coban)

10. After applying the dressing, you should instruct the patient to
    a. Not remove the dressing for at least 15 minutes
    b. Hold pressure for 1 hour
    c. Replace the dressing when they get home
    d. Take the bandage off whenever they like

Proper identification of Patient and Specimens and the Importance of Accuracy in Overall Patient Care

1. What is required information on a laboratory test requisition for a blood specimen?
    a. Patient's Social Security Number
    b. Source of the Sample
    c. Diagnosis
    d. Name of the Physician

2. Two patients in the waiting room with the same exact name are waiting for phlebotomy testing. You should confirm patient ID by
    a. Asking both patients to state their name
    b. Verifying spelling of the names in the medical records
    c. Asking each patient to state their DOB
    d. Verifying DOB in the medical records

3. A "person-specific" identifier would include which of the following
    a. Date of Birth
    b. Race
    c. Religion
    d. Home Address

4. When should you label the specimen?
    a. During assembly of the equipment
    b. Upon completion of the blood draw
    c. Before approaching the patient's side
    d. After the patient is released

5. The phlebotomist must label blood bank specimens with which of the following information? (Select the three (3) correct answers.)
    a. Patient's Date of Birth
    b. Patient's Room Number
    c. Patient's First and Last Name
    d. Date And Time of Collection
    e. Physician's name

6. The patient has an IV in the right arm and sclerosed veins in the left arm. Where should you attempt to draw from first?
    a. Above the IV Site
    b. Below the IV Site
    c. Left Arm
    d. Left Hand

7. Upon identifying the patient, you notice the middle initial and birth year on the requisition and labels do not match the patient's armband. What do you do first?
    a. Go to the nurse's station to have the information corrected
    b. Ask the patient's relative to verify the patient's identity
    c. Write the correct information on the armband and in the patient's chart
    d. Write the correct information on the requisition and labels

8. Which of the following is required on a label? (Select the two (2) correct answers.)
    a. Patient's Gender
    b. Patient's Name
    c. Phlebotomist's Identification Number
    d. Phlebotomist's Department Number
    e. Patient's Age

9. Which of the following should be on the label of a specimen after the venipuncture? (Select the three (3) correct answers.)
    a. Phlebotomist's Initials
    b. Patient's DOB
    c. ICD-10 Diagnosis Code
    d. Date of Draw
    e. Lab ID

10. Failure to properly mix blood in an anticoagulant tube is likely to result in
    a. Hemolysis
    b. Microclots
    c. Hemoconcentration
    d. No Adverse Effects

Proper selection and preparation of skin puncture site, including selection of antiseptic

1. When collecting blood for newborn screening, you should
    a. Use a Heel stick procedure
    b. Use special patient identification banding
    c. Maintain a warm temperature at the site
    d. Use a syringe method

2. The physician has ordered a PKU test. What is the maximum depth of penetration?
    a. 1.5 mm
    b. 2.0 mm
    c. 2.5 mm
    d. 3.0 mm

3. When performing a heel stick, you should use the
    a. Central arch area of the heel
    b. Inside of the heel
    c. Lateral side of the heel
    d. Center portion of the heel

4. Skin punctures in adults are performed using the distal portion of the
    a. 4th or 5th Fingers
    b. 3rd or 4th Fingers
    c. Index Finger
    d. 2nd or 3rd Fingers

5. When performing a heel stick on an infant, what is the preferred site?
    a. Posterior Curvature of the Heel
    b. Lateral or Medial Plantar Surface of the Heel
    c. Ring Finger
    d. Index Finger

6. Which of the following is a coagulation test performed as a POCT?
    a. HCT
    b. BUN
    c. D-dimer
    d. INR

8. Place the options below in the correct order of draw when using microtainers.

___ Heparin

___ No Additive

___ EDTA

___ Sodium Fluoride

9. What effect does warming the site have on skin punctures?
    a. It causes hemolysis
    b. It prevents hemoconcentration
    c. It makes blood flow more quickly
    d. It increases localized blood flow up to sevenfold

10. The doctor has ordered a dermal puncture on an infant. During the puncture the infant suddenly moves, and the phlebotomist punctures the calcaneus. What complication is likely to arise from this incident?
    a. Petechiae
    b. Achilles Tendon Rupture
    c. Osteomyelitis
    d. Osteotome

11. A pediatrician has ordered a lead screening on a toddler. Which of the following is the most appropriate site for a skin puncture?
    a. Heel Stick
    b. Thumb (First Digit)
    c. Pointer Finger (Second Digit)
    d. Ring Finger (Fourth Digit)

ADVANCED QUIZZES

Advanced Infectious Disease Control and Biohazards

1. Which of the following must be completed by an employer, and is required by OSHA, at no cost to the employee, following a needlestick?
    a. Offer Hepatitis B vaccine if the needle was contaminated
    b. Place exposed personnel on antiviral medications
    c. Offer HIV testing to the employee's spouse or significant other
    d. Provide a confidential medical evaluation

2. What is the most common means of transmission of Hepatitis A?
    a. Sexual contact
    b. Contact with contaminated needles
    c. Contact with fecal contaminated food/water
    d. Forceful coughing

3. You perform a venipuncture on a patient with Varicella. What is the minimum precaution level you must take?
    a. Isolation
    b. Droplet
    c. Airborne
    d. Contact

4. What PPE should you put on before entering a patient's room in airborne isolation?
    a. Surgical Mask
    b. N95 Respirator
    c. Mask with Face Shield
    d. Full Face/Head Mask

5. You must collect blood from a patient in contact precautions. What Is the best type of tourniquet you should use?
    a. A Disposable Tourniquet
    b. A Blood Pressure Cuff
    c. A Pediatric Tourniquet
    d. A Velcro Tourniquet

6. After drawing a patient for an HIV, HBV and HCV antibody test, you accidentally stick your finger during the draw. What should you do next?
    a. Report the incident to the immediate supervisor
    b. Wash the site with a disinfectant for a minimum of 30 minutes
    c. Wash the site with soap and water for a minimum of 30 seconds
    d. Report directly to a licensed healthcare provider for treatment

7. The most important thing to do if you sustain a sharps injury is to
    a. Inform the patient
    b. Look up her medical history
    c. File an incident report
    d. Change gloves immediately

8. Which is a healthcare worker at the greatest risk of, following an exposure incident, from a needlestick injury?
    a. HCV
    b. HAV
    c. HPV
    d. HBV

9. While processing you accidentally dropped a tube, and now there is broken glass on the laboratory floor. Which of the following actions should you take next?
    a. Assess the counter to determine if it would be damaged by bleach and water
    b. Pick up the pieces of broken glass from the floor
    c. Use mechanical means to remove broken glass and dispose in sharps container
    d. Secure a biohazard container for disposal

10. Which of the following has the highest risk for a needlestick injury?
    a. Single Sample Needle
    b. Winged Infusion Set
    c. Lancets
    d. Syringes

Anti-Coagulation Therapy / Knowledge of Pre-Analytical Sources of Error in Specimen Collection, Transport, Processing and Storage

1. The intrinsic pathway is measured by a
    a. PT test
    b. PTT test
    c. CBC
    d. ESR

2. The extrinsic pathway is measured by a
    a. PTT test
    b. PT test
    c. ESR
    d. CBC

3. During a venipuncture the patient has excessive bleeding from Coumadin. Which of the following should you do immediately after removing the needle?
    a. Immediately apply a pressure bandage
    b. Ask the patient to hold pressure on the site and then look for a physician
    c. Hold pressure on the site for a minimum of five full minutes until the bleeding stops
    d. Hold pressure on the site until the bleeding begins to stop and apply a bandage

4. You have drawn a sample on a suspected DUI driver. Which of the following should occur when giving the sample to the lab?
    a. The sample identification is verified
    b. A technician will sign for the sample
    c. The sample is photographed
    d. The lab technician verifies the search warrant

5. Which of the following actions is not indicated by CLSI?
    a. Use a blood pressure cuff in place of a tourniquet
    b. Heat the AC area to make veins more prominent
    c. Slap the area to make veins more prominent
    d. Hang the arm down for several seconds to have more blood pool in the arm

6. Warming the site has what effect?
    a. It allows the veins to roll
    b. It prevents hemoconcentration
    c. It makes blood flow more quickly
    d. It increases localized blood flow

7. What is required for a sputum collection?
    a. 24-hour collection
    b. Plastic transport cup, immediate delivery to lab
    c. Sterile cup, immediate delivery to lab
    d. Plastic transport cup, 24-hour collection

8. What should you do if urine testing will be delayed more than an hour?
    a. Place the urine on ice, then in the refrigerator
    b. Protect the specimen from light
    c. Place the urine specimen in the refrigerator
    d. Store the urine at room temperature

9. What should be done to maintain the quality of serum specimens sent to the laboratory?
    a. Use a timer for serum clotting and use a timed centrifuge
    b. Centrifuge specimens 3 hours after collection
    c. Use a timed centrifuge and record the temperature of the blood
    d. Immediately centrifuge after collecting the specimen

10. You are assigned to manage an outpatient draw station. Prioritize the following patients in the correct order.

    ___ TDM testing due in 60 minutes

    ___ Type and screen on a patient due for surgery that day

    ___ Weekly PT/INR

    ___ STAT troponin level on a patient sent over from a doctor's office

Anatomical Site Selection and Patient Preparation

1. You have orders to draw blood on a patient with edema in the left arm and burns on the right arm. Which of the following is the preferred draw site?
    a. Foot Vein
    b. Antecubital Vein
    c. Right Hand Vein
    d. Femoral Vein

2. When preparing a site for a routine venipuncture, you should cleanse in which of the following motions?
    a. Back and Forth
    b. Up and Down
    c. From the Inside Out
    d. From the Outside In

3. You prepare for a blood culture on a patient and you notice that the patient has a shellfish allergy. Which solution should you use on this patient to avoid the potential for anaphylactic shock?
    a. 2% iodine
    b. Betadine
    c. Povidone iodine
    d. Chlorhexidine

4. A tourniquet in place longer than one minute is likely to cause
    a. Hematuria
    b. Hematoma
    c. Thrombosis
    d. Hemoconcentration

5. A bariatric patient has come to the lab for a blood draw. Inspection of both arms did not reveal any veins. Which of the following should you use to draw blood from this patient's hand?
    a. 21g Syringe
    b. 21g ETS
    c. 23g Butterfly with a 40 to 45-Degree Angle
    d. 23g Winged Infusion Set at a 10 To 15-Degree Angle

6. When you select a site for venipuncture you should avoid any areas with? (Select the three (3) correct answers.)
    a. Tattoos
    b. Rash
    c. Previous Venipuncture Sites
    d. Edema
    e. Scarring

7. A person was brought to the hospital by the police to be tested for DUI. The phlebotomist should prep the skin by wiping the area with
    a. 70% Isopropyl
    b. 70% Isopropyl and Chlorhexidine
    c. Antiseptic Soap and Chlorhexidine
    d. Soap and Water

8. You are preparing for a syringe draw on a patient with no allergies, when cleaning the site, the best method to use would be
    a. Isopropyl alcohol and clean from outside to inside in a circular motion
    b. Isopropyl alcohol and clean from inside to outside in a circular motion
    c. Chlorhexidine and clean from inside to outside in a circular motion
    d. Chlorhexidine and clean from outside to inside in a circular motion

9. A patient informs you that she recently had a mastectomy of the right breast. Which is the appropriate draw site?
    a. Right Arm
    b. Left Arm
    c. Either Arm
    d. Either Hand

10. When you are using a butterfly for blood cultures, which of the following should be drawn first?
    a. Anaerobic
    b. Aerobic
    c. Pediatric
    d. Doesn't Matter

Risk Factors and Appropriate Responses to Complications That May Arise from Phlebotomy

1. To reposition the needle if you miss the vein.
    a. Move the needle slightly forward or back
    b. Reposition and probe for the vein
    c. Push the needle side to side
    d. Remove the needle and start over

2. While you are drawing the first of five tubes the patient becomes pale and begins to sweat. Which of the following should the phlebotomist do first?
    a. Reassure the patient
    b. Remove the tourniquet and needle
    c. Pause the collection
    d. Call for assistance

3. After applying the tourniquet, you notice the development of petechiae. What should you do next?
    a. Remove tourniquet and assess the other arm
    b. Continue with the procedure
    c. Consult the nurse
    d. Refer the patient back to the physician

4. You draw on an outpatient with diabetes, when the patient starts to complain of lightheadedness. Which of the following should you do next?
    a. Check the patient's glucose level
    b. Lay the patient on the floor
    c. Give the patient orange juice and muffin
    d. Call for assistance

5. After using latex gloves and a non-latex tourniquet, the patient indicates he is highly allergic to latex. Which is your best course of action?
    a. Change gloves and proceed with the same tourniquet
    b. Change gloves and use a new tourniquet
    c. Wash hands, change to gloves, and proceed with the same tourniquet
    d. Wash hands, change to non-latex gloves and use a new tourniquet

6. Which of the following should you do with a patient known to have syncope?
    a. Inform the physician that the patient cannot be drawn
    b. Give the patient orange juice
    c. Position the patient supine
    d. Position the patient prone

7. You are in the process of filling a second tube, but the tube is not filling. The needle did not move during the tube switch, the vein did not move, and the first tube filled without any problems. Which of the following actions should you take next?
    a. End the draw and make a second attempt
    b. Remove the existing tube and try another tube
    c. Remove the existing tube and continue with the order of draw
    d. Advise the doctor

8. While drawing blood, you notice that blood has stopped entering the tube and the vein has collapsed. Which of the following should you do next?
    a. Remove the tourniquet, pull out the needle, and select a different vein
    b. Pull the needle back and reposition into the vein
    c. Feel for the vein, reposition the needle, and enter the vein
    d. Advance the needle deeper into the vein

9. The patient has a hematoma at the site you performed the venipuncture. Which of the following are likely causes of the hematoma? (Select the three (3) correct answers.)
    a. Failure to remove tourniquet prior to removing the needle
    b. Insertion of the needle through the vein
    c. Undisclosed antihypertensive medication
    d. Excessive probing to locate the vein
    e. Patient was not fasting

10. You are collecting a CBC from a patient's hand. There is no blood return in the hub and the patient indicates pain. Which of the following should you do next?
    a. Advance the needle a little further and observe for blood flash in the hub
    b. Release the tourniquet and discontinue the draw
    c. Pull the needle back slightly
    d. Reposition the needle and release the tourniquet

Recognition of Problems in Test Requisitions, Specimen Transport, Processing and Corrective Actions to Take

1. Which tests require special handling? (Select the three (3) correct answers.)
    a. CBC
    b. Ammonia
    c. Cold Agglutinin
    d. Blood Culture
    e. Bilirubin

2. You enter a patient's room but are unable to awaken the patient. The patient does not have a wristband on; however, there is a wristband on the bed rail and a family member in the room. How should the phlebotomist identify the patient?
    a. Match the room number to the room number on the orders
    b. Check the wrist band attached to the bed rails
    c. Check with the nurse's station and have the nurse apply a wristband
    d. Return to the lab

3. Which of the following is a likely complication from repeated phlebotomy procedures in the same area?
    a. Thrombosis
    b. Sclerosed Veins
    c. Petechiae
    d. Varicose Veins

4. An ESRD patient has an IV in the left forearm and an AV fistula in the right. You used an ETS to collect from the left ACF and there was an error in the results. You should have collected
    a. Above the fistula in the right arm
    b. Below the fistula in the right arm
    c. Below the IV in the left arm
    d. Above the IV in the left arm

5. When drawing a patient with thin skin and extremely fragile veins, what is the best choice?
    a. ETS, 22g, 1 1/2"
    b. ETS, 21g, ¾"
    c. Winged Infusion, 23g, ¾"
    d. Winged Infusion, 21g, 1 ½"

6. When a blood sample does not meet sample size criteria, it is considered?
    a. QA
    b. QC
    c. Hemolyzed
    d. QNS

7. If an EDTA tube is not inverted immediately it may be rejected for
    a. A Falsely High Blood Cell Count
    b. Hemoconcentration
    c. Hemolysis
    d. Microclots

8. You collected a specimen from a small antecubital vein using a 25-gauge butterfly in a 10ml SST tube. The specimen was determined to be unsuitable for testing. The specimen was most likely rejected because it was
    a. QNS
    b. Hemolyzed
    c. Exposed To Light
    d. At Room Temperature

9. You perform a blood draw for CBC, chemistry, and bilirubin. After the draw, you wrap the bilirubin tube in aluminum foil. Why?
    a. To cool down the specimen
    b. To heat the specimen
    c. To protect specimen from light
    d. To prevent contamination of the specimen

10. You realize, after finishing the draw, you missed a tube. Which of the following actions should you take?
    a. Transfer blood from a full tube into the missing tube
    b. Inform the patient and redraw all the tubes
    c. Inform the patient and perform a 2nd collection of the missing tube
    d. Have the patient reschedule

Applications of Basic Concepts of Communication, Interpersonal Relations, Stress Management, Professional Behavior, Ethics and Legal Implications of Phlebotomy

1. Which is the key element in effective communication?
    a. Speaking In A Loud Voice
    b. Personal Space
    c. Active Listening
    d. Body Language

2. A hospital patient states that he does not want his blood drawn. You tell the patient, "If you don't let me collect your blood, your illness will become more critical." This statement is considered which of the following?
    a. Battery
    b. Hearsay
    c. Tortuous
    d. Assault

3. Which is considered open-ended communication?
    a. "Tell me what brings you in today."
    b. "Have you had a fever in the past 24 hours?"
    c. "Are you experiencing significant pain?"
    d. "Is the cough keeping you awake at night?"

4. You are asked to draw blood on a non-responsive patient in the emergency department. This draw would be conducted under
    a. Expressed Consent
    b. Informed Consent
    c. Refusal Of Consent
    d. Implied Consent

5. Which is an example of negative nonverbal communication?
    a. Folding the arms across the chest
    b. Maintaining eye contact
    c. Taking notes
    d. Nodding the head

6. When dealing with elderly patients, which can you do to improve the communication process? (Select the three (3) correct answers.)
    a. Speak Softly
    b. Speak Slowly and Loudly
    c. Avoid Visual Aids
    d. Make Eye Contact
    e. Take Time and Listen Carefully

7. Which of the following are National Patient Safety Goals? (Select the three (3) correct answers.)
    a. Speaking directly to patient in a calm and friendly way
    b. Identify the patients correctly
    c. Ask about latex or alcohol allergies before beginning procedures
    d. Improve staff communication
    e. Prevent infection

8. You enter a room with airborne precautions and ask an elderly patient to state her name and date of birth. The patient states she can't hear what you are saying. Which of the following should you do?
    a. Move closer and speak louder so the patient can hear through the N95 respirator
    b. Briefly pull the N95 respirator away from the face so the patient can hear
    c. Draw the patient based on implied consent
    d. Shout through the N95 respirator so the patient can hear

9. Which of the following statements represents correct patient identification for a phlebotomist in an outpatient setting?
    a. "Ms. Smith, I need to see your driver's license."
    b. "Is your name Ms. Smith?"
    c. "May I have your name please?"
    d. "Is your name Brad Smith?"

10. A patient is having an HIV test. Which form of consent must you obtain prior to venipuncture?
    a. Conditional
    b. Implied
    c. Informed
    d. Expressed

Quality Assurance in Phlebotomy Necessary to Provide Accurate and Reliable Laboratory Results

1. You should avoid collecting a CBC from a crying infant because
    a. The specimen may be hemolyzed
    b. WBC's may be elevated
    c. The specimen may have hemoconcentration
    d. Platelets are more likely to clump

2. A lipid test has been ordered for a patient, but the patient had a cup of black tea at 0400. Which of the following is the time the test can be completed?
    a. 0700
    b. 1100
    c. 1300
    d. 1600

3. After a tiger top tube was centrifuged, you notice that the serum was milky white. Which condition does this indicate?
    a. Hypertension
    b. Anemia
    c. Icterus
    d. Lipemia

4. Which of the following is likely to happen to the specimen if you do not invert a lavender top tube 8 to 10 times?
    a. Hemolysis will occur
    b. Potassium will be released into the plasma
    c. Microclots will form
    d. Calcium will precipitate

5. You have orders for an FBS, INR, and CBC Stat. Which is the correct tube selection and order of draw?
    a. Red, Lavender, Light Blue
    b. Red, Light Blue, Lavender
    c. Lavender, Light Blue, Gray
    d. Light Blue, Lavender, Gray

6. Which is the correct pairing for a chemistry specimen collection?
    a. Gold and Blood Type
    b. SST and Lactic Acid
    c. Green and Electrolytes
    d. Yellow and Prothrombin Time

7. When an order is entered into the laboratory information system (LIS), labels are generated for each tube to be drawn. What is the name of that number?
    a. Medical Record Number
    b. Fin Number
    c. Accession Number
    d. Container Identification Number (CID)

8. Which of the following is the unique number assigned to the requisition?
    a. Health Facility Number
    b. DOB
    c. Patient ID
    d. Accession Number

9. You record the temperatures of the specimen storage refrigerators on log sheets every day. A staff member notices that the readings have not been written down for the last two days. Which is the likely consequence of this omission?
    a. The phlebotomist who neglected to document the temperatures will be fired
    b. An inspector will give the lab a deficiency on the next inspection
    c. The readings will be filled in by the supervisor
    d. Patient results will be compromised

10. The doctor has ordered a CBC, Cholesterol, and PT on a fasting patient. The phlebotomist is in the process of collecting the last tube when the nurse walks in with an add-on for a glucose test. Which tube should you use to collect the glucose?
    a. Light Green Top
    b. SST
    c. Lavender Top
    d. Gray Top

Legal Issues Related to Blood Collection

1. The hospital is short-staffed and has asked you to help. Which of the following tasks are considered outside the normal phlebotomist scope of practice?
    a. Collect a tissue sample
    b. Process venous samples
    c. Perform a heel stick on a 2-day-old infant
    d. Perform a finger stick

2. A patient asks you to forward the results of the tests to her PCP. This action is covered under
    a. Implied consent
    b. Written consent
    c. HIPAA
    d. CLIA

3. Which is considered PHI? (Select the three (3) correct answers.)
    a. Diagnosis Code
    b. Year of Admission
    c. Date of Birth
    d. Hospital Name
    e. Phone Number

4. You collect blood from a postoperative patient in a hospital bed with no problems. Before you leave the patient asks for help moving from the bed to a chair. While you are assisting the patient falls. Were you wrong for helping the patient?
    a. Yes, because it was out of the phlebotomist's scope of practice
    b. Yes, because there should be more than one person moving a patient from a bed
    c. No, because the phlebotomist's actions are covered under the Joint Commission standards
    d. No, because the patient has a right to receive help

5. Which is an error you might commit that is most likely to lead to a sentinel event?
    a. Failing to document QC
    b. Using the wrong size needle
    c. Misidentifying a patient
    d. Using the wrong tube

6. Repeated clerical or technical errors by a phlebotomist are considered
    a. Assault
    b. Fraud
    c. Liability
    d. Negligence

8. Can a phlebotomist tell his neighbor that a friend has been admitted to the hospital?
    a. Yes, because the phlebotomist did not violate HIPAA
    b. Yes, because the phlebotomist did not disclose any PHIs
    c. No, because the phlebotomist breached confidentiality
    d. No, because the phlebotomist was negligent

9. A woman calls the lab and asks if her husband has been in yet. She gives you his full name and his birthdate. Which of the following should you do?
    a. Let her know if her husband has been in already
    b. Let her know the information can't be released over the phone
    c. Take her name and number and have a nurse call her back
    d. Transfer her call to the integrity officer of the hospital

10. According to the Patient's Bill of Rights, which of the following phlebotomist actions indicates a need for more professionalism?
    a. Performing a venipuncture on the basilic vein.
    b. Obtaining implied consent from the patient.
    c. Discussing the lab results with the patient.
    d. Drawing a child with assent.

11. You are asked to perform a UA and to perform microscopic testing of the specimen. Which of the following standards does this action violate?
    a. OSHA
    b. CLIA
    c. CLSI
    d. COLA

*Practice questions sourced from NCCT online interactive review

ADDITIONAL RESOURCES

Basic Tubes

ORDER OF DRAW	TUBE TOP COLOR AND ALTERNATE NAMES	ADDITIVE MODE OF ACTION	SPECIMEN TESTING	LABORATORY DEPARTMENT
1	YELLOW SPS / BLOOD CULTURE AEROBIC AND ANAEROBIC VIALS/BOTTLES	SPS (**S**ODIUM **P**OLYANETHOLE **S**ULFONATE) • ANTICOAGULANT THAT BINDS/BLOCKS/INHIBITS CALCIUM • ANTICOAGULANT THAT DOES NOT INHIBIT BACTERIAL GROWTH	BLOOD CULTURE / BC • FUO (**F**EVER OF **U**NKNOWN **O**RIGIN) • SEPTICEMIA • BACTEREMIA	MICROBIOLOGY
2	LIGHT BLUE/BLUE	CITRATE / SODIUM CITRATE (Na CITRATE) • ANTICOAGULANT THAT BINDS/BLOCKS/INHIBITS CALCIUM • PRESERVES CLOTTING FACTORS	COAGULATION STUDIES PROTHROMBIN TIME/PROTIME/ PT-INR (*EXTRINSIC PATHWAY*) PARTIAL THROMBOPLASTIN TIME / PTT / APTT (*INTRINSIC PATHWAY*) FIBRINOGEN D-DIMER	COAGULATION

ORDER OF DRAW	TUBE TOP COLOR AND ALTERNATE NAMES	ADDITIVE MODE OF ACTION	SPECIMEN TESTING	LABORATORY DEPARTMENT
3	RED / PLAIN RED	NONE BLOOD TAKES 30 MINS. TO 1 HOUR TO CLOT	ROUTINE CHEMISTRY TESTS FOR SERUM BMP, CMP, LIPID PANEL, THYROID PANEL, HEPATIC PANEL, RENAL PANEL CEA, CPK / CK TSH, FSH, LH, ESTROGEN, PSA, ALBUMIN, CALCIUM, CHOLESTEROL, BILIRUBIN TDM (THERAPEUTIC DRUG MONITORING)	CHEMISTRY
			HIV ANTIBODIES, HCG (HUMAN CHORIONIC GONADOTROPIN, ANA (ANTI-NUCLEAR ANTIBODY), IMMUNOGLOBULINS, RF (RHEUMATOID FACTOR) RPR (RAPID PLASMA REAGIN)	SEROLOGY / IMMUNOLOGY
4	GOLD / SST (SERUM SEPARATOR TUBE) / TIGER TOP / SPECKLED RED	CLOT ACTIVATOR BLOOD CLOTS IN 15 – 30 MINS. SEPARATOR GEL / THIXOTROPIC GEL THE GEL FORMS A BARRIER BETWEEN THE SERUM AND THE CLOT AFTER CENTRIFUGATION	ROUTINE CHEMISTRY TESTS FOR SERUM *NOT COMPATIBLE WITH TDM TESTING	CHEMISTRY

ORDER OF DRAW	TUBE TOP COLOR AND ALTERNATE NAMES	ADDITIVE MODE OF ACTION	SPECIMEN TESTING	LABORATORY DEPARTMENT
5	GREEN	SODIUM HEPARIN (Na HEPARIN) ANTICOAGULANT THAT BINDS/BLOCKS/INHIBITS THROMBIN NATURAL ANTICOAGULANT OF THE BODY	STAT CHEMISTRY TESTS FOR PLASMA ALT, AST, BUN, ELECTROLYTES AMMONIA LACTIC ACID/LACTATE (2nd BEST CHOICE)	CHEMISTRY
6	LAVENDER/PURPLE	EDTA (**E**THYLENE**D**IAMINE **T**ETRAACETIC **A**CID) ANTICOAGULANT THAT BINDS/BLOCKS/INHIBITS CALCIUM ANTICOAGULANT THAT PRESERVES THE MORPHOLOGY (SIZE AND SHAPE) OF BLOOD CELLS PREVENTS PLATELET CLUMPING AND PRESERVES THE APPEARANCE OF BLOOD CELLS	HEMATOLOGY TESTS CBC (COMPLETE BLOOD COUNT), DIFFERENTIAL (DIFF. CT.) HEMOGLOBIN AND HEMATOCRIT/Hgb + Hct/ H and H ESR (ERYTHROCYTE SEDIMENTATION RATE) / SED RATE (2nd BEST CHOICE) HEMOGLOBIN A1C / HgbA1C/ A1C	HEMATOLOGY
7	GRAY	OXALATE / POTASSIUM OXALATE (K OXALATE) ANTICOAGULANT THAT BINDS/BLOCKS/INHIBITS CALCIUM FLUORIDE / SODIUM FLUORIDE (Na FLUORIDE) ANTIGLYCOLYTIC / GLYCOLYTIC INHIBITOR	GLUCOSE • GTT (GLUCOSE TOLERANCE TEST) • FBS (FASTING BLOOD SUGAR) • FBG (FASTING BLOOD GLUCOSE) ALCOHOL / ETOH LACTIC ACID / LACTATE (BEST CHOICE)	CHEMISTRY

Specialty Tubes

TUBE TOP COLOR AND ALTERNATIVE NAMES	ADDITIVE MODE OF ACTION	SPECIMEN TESTING	LABORATORY DEPARTMENT
PINK	EDTA*	ABO BLOOD TYPING / ABO GROUP CROSS MATCH / X-MATCH TYPE AND CROSS / SCREEN ANTIBODY SCREEN/ ABY Rh TYPING	BLOOD BANK / IMMUNOHEMATOLOGY
ROYAL BLUE / DARK BLUE	CLOT ACTIVATOR (SERUM SPECIMEN) *OR* EDTA* (PLASMA SPECIMEN)	TRACE ELEMENTS / TRACE MINERALS • MERCURY, ALUMINUM, ZINC TOXICOLOGY/ DRUG SCREENING HEAVY METALS SCREENING NUTRITION STUDIES	SEND OUT TO REFERENCE LABORATORY FOR SPECIAL CHEMISTRY OR TOXICOLOGY
LIGHT GREEN / GREEN+BLACK / PST (PLASMA SEPARATOR TUBE)	LITHIUM HEPARIN SEPARATOR GEL THE GEL FORMS A BARRIER BETWEEN THE PLASMA AND THE BLOOD CELLS AFTER CENTRIFUGATION	STAT CHEMISTRY TESTING FOR PLASMA *NOT COMPATIBLE WITH TDM TESTING	CHEMISTRY

TUBE TOP COLOR AND ALTERNATIVE NAMES	ADDITIVE MODE OF ACTION	SPECIMEN TESTING	LABORATORY DEPARTMENT
TAN	EDTA*	LEAD	SEND OUT TO REFERENCE LABORATORY FOR SPECIAL CHEMISTRY
BLACK	CITRATE	ESR (ERYTHROCYTE SEDIMENTATION RATE) (BEST CHOICE)	HEMATOLOGY
ORANGE / RST (RAPID SERUM TUBE)	THROMBIN BLOOD CLOTS WITHIN 5 MINUTES SEPARATOR GEL	STAT SERUM TESTING	CHEMISTRY
PEARL WHITE / PPT (PLASMA PREPARATION TUBE)	EDTA* SEPARATOR GEL	PCR TESTING (POLYMERASE CHAIN REACTION)	MOLECULAR
YELLOW ACD	ACD (ACID CITRATE DEXTROSE) ANTICOAGULANT	DNA / GENETIC TESTING PATERNITY TESTING HLA PHENOTYPING	GENETICS

Legend

* Term defined in Basic Tubes table

Chemistry Tests and their Preferred Collection Tubes (Based on NCCT Guidelines)

CHEMISTRY PANELS	PREFERRED TUBE*
Comprehensive Metabolic Panel (CMP)	Red
Basic Metabolic Panel (BMP)	Red
Lipid Panel	Red
Acute Hepatitis Panel	Red
Hepatic Function Panel / Liver Function Panel	Red
Obstetric Panel / Prenatal Panel	Red
Renal Function Panel / Kidney Function Panel	Red
Thyroid Function Panel	Red
Electrolyte Panel / Electrolytes	Green

INDIVIDUAL CHEMISTRY TESTS	PREFERRED TUBE*	NOTES
Albumin	Red	Most abundant blood protein Included in the CMP
Alkaline Phosphatase	Red	Liver enzyme Included in the CMP, liver function panel
Bilirubin	Red	Waste product processed by liver Included in the CMP, liver function panel
Cholesterol	Red	Included in the Lipid Panel
CEA (Carcinoembryonic antigen)	Red	Screening test for cancer
Sodium (Na)	Red	Included in the CMP, electrolyte panel
Potassium (K)	Red	Included in the CMP, electrolyte panel
Calcium (Ca)	Red	Included in the CMP, electrolyte panel
T3, T4, TSH (Thyroid Stimulating Hormone)	Red	Included in thyroid function panel
FSH (Follicle Stimulating Hormone)	Red	Female reproductive hormone
LH (Luteinizing Hormone)	Red	Female reproductive hormone
Estrogen	Red	Female reproductive hormone
Progesterone	Red	Female reproductive hormone
Estradiol	Red	Female reproductive hormone
Testosterone	Red	Male reproductive hormone
PSA (Prostate Specific Antigen)	Red	Male reproductive hormone
Troponin	Red	Test for myocardial infarction (heart attack)
CPK / CK (Creatine Kinase)	Red	Test for myocardial infarction (heart attack)
Ammonia	Green	Waste product processed by liver Included in liver function panel
ALT (Alanine Aminotransferase)	Green	Liver enzyme Included in CMP, liver function panel
AST (Aspartate Aminotransferase)	Green	Liver enzyme Included in CMP, liver function panel
BUN (Blood Urea Nitrogen)	Green	Waste product processed by kidneys Included in CMP, kidney function panel

*If the preferred tube is **Red**, an alternate choice is **SST / Gold / Tiger Top**
*If the preferred tube is **Green**, an alternate choice **PST / Light Green**

IN-CLASS PHLEBOTOMY TRAINING RESOURCES

PHYSICIANS LABORATORY REQUEST FORM

PHLEBOTOMY U
EDUCATING. IT'S IN OUR BLOOD

LABORATORY SERVICE REQUEST

Patient Information

Last Name	First Name	MI	Date of Birth (m/d/y)	Today's Date
Home Address	City, State, Zip	Home Phone		Alternate Phone
Martial Status Single ☐ Married ☐ Divorced ☐	SSN# Sex Female ☐ Male ☐	Hispanic Yes ☐ No ☐		Veteran Status Yes ☐ No ☐
Medical Record Number	Inpatient Location	Ethnic Code		

BILLING INFORMATION

Bill to: ☐ Client ☐ Patient ☐ Insurance ☐ Case# ☐ Visit# Attach a copy of both sides of the insurance card

ORDERING PHYSICIAN INFORMATION

Last Name	First Name	Ordering Provider #
Address	Suite #	Phone #
City, State, Zip		Fax #
(Required) Physician Signature		Date

REPORTING INFORMATION

Fax Results to (Name/#)	Call Results to (Name/#)	Home Care Agency Contact Name/#

COLLECTION INFORMATION

(REQUIRED) Specimen Collected at Date (m/d/y) Time (AM/PM) Collected by (First & Last Name)

TEST SPECIMEN INFORMATION

STAT ☐ FASTING ☐ NOT-FASTING ☐ To Decline a Reflex Test, *write the test name here:*

Order only tests that are medically necessary for the diagnosis or treatment of the patient.
Provide ICD codes for each tes ordered use the highest specificity. Write the corresponding number below next to each test(s) ordered.

ICD CODE	TEST NAME	CODE	ICD CODE	TEST NAME	CODE	ICD CODE	TEST NAME	CODE
ORGAN/DISEASE PANELS				Iron & IBC	IIBC	**MICROBIOLOGY/MOLECULAR**		
	Basic Metabolic Panel	MP		Lipase	LIPAS	Specimen Source:		
	Comp Metabolic Panel	CMPN		Magnesium	MG			
	Hepatic Function Panel	HFP		Urine Microalbumin	UMAR		Bacterial Culture Aerobic Includes Gram Stain	Multi
	Acute Hepatitis Panel	AHP		Occult Blood, Fecal	FOB			
	Lipid Panel (Fasting)	LPC		Phosphorus	PKOS		Bacterial Culture Anaerobic Must be ordered separately	Multi
	Renal Panel	RP		Prostate Specific Ag	PSA			
	Obstetric Panel	Multi		PTH Intact and Calicum	PTH		C. Difficile Antigen & Toxin	CDTXN
CHEMISTRY/IMMUNOLOGY				Testosterone	TESTO		Group A Strep by PCR	GASP
	Allergy Panel (Common Food)	ALLF		Troponin-I	1TROP		Chlamydia (circle source) CX Rectal Urine Urethra Throat	CTNAA
	Allergy Panel (Common Aero)	ALLR1		Transferrin	TRF			
	Allergy Panel (Add'l Pollen)	ALLPN		Thyroid Stim Hormone	TSH		Chlamydia/Gonorrhea (circle source) CX Rectal Urine Urethra Throat	CNGNAA
	Amylase	AMY		Uric Acid	URIC			
	B-HCG, Quant	HCG		Vitamin B12	B12		Gonorrhea (circle source) CX Urine Urethra Throat	GCNAA
	C-Reactive\Protein	CRP		Vitamin D25 Hydroxy	VD25			
	CRP, High Sensitivity	CRPHS	**HEMOTOLOGY/COAGULATION**				Stool Culture	STOLC
	CK Total	CK		Hemogram	HEMO		Ova & Parasites w/ stain	OVAP
	CKMB	CKMB		CBC w/ auto differential	CBC		Urine Culture	URINC
	Estradiol	EST		PT with INR	PT		Vaginitis Panel (Candida Trichamonas, Gardnerella)	DNAVAG
	Free T4	FT4		PTT	PTT			
	FreeT3	FT3		Sedimentation Rate	ESR	**TRANSFUSION SERVICES**		
	Ferritin	FER	**URINALYSIS**				Cord Blood Studies	CBLD
	Folate	FOL		Urinalysis Reflex Microscopic	URS	*Date & time Blood Needed:*		
	FSH	FSH		Urinalysis Reflex Culture	URC		Crossmatch	XM
	Glucose 1hr PG 50gm	GLUPD		Urinalysis w/ Micro Reflex Culture	URMC	*Product Type & #units & Transfusion Location:*		
	Glucose 2 hr PP 75gm	GLUPP		Urinalysis w/ Microscopic	URM			
	Hemoglobin A1C	GLYHB	**ADDITIONAL TESTS**					
	Hepatitis C Ab	HCAB						
	HIV Ag/Ab Combo	HIVCO						
	Immuoglobulin, G.M.A.	IGQ						

SPECIAL INSTRUCTIONS
GLUCOSE TOLERANCE TESTING (GTT)

Gestational Glucose Tolerance/Oral Glucose Tolerance

1 HOUR GTT: One-hour Glucose Tolerance Test
Tube: 1 x Gray
Testing Schedule/Setup:

- Patient drinks 50g of Glucola
- Draw GTT 1-hour after the patient finished drinking the Glucola.

Instructions: No food during testing, no drinks except sips of water. Patient needs to remain in the facility throughout testing and needs to be on time at each draw interval. No exercise or strenuous activity. The test may be discontinued if the patient feels dizzy or vomits.

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2 HOUR GTT: Two Hour Glucose Tolerance Test
Tube: 3 x Gray
Testing Schedule/ Setup:

- Draw fasting tube as baseline
- Patient drinks 75g of Glucola
- Draw GTT 1 hour after patient finished drinking the Glucola
- Draw GTT 2 hours after patient finished drinking the Glucola

Instructions: No food during testing, no drinks except sips of water. Patient needs to remain in the facility throughout testing and needs to be on time at each draw interval. No exercise or strenuous activity. The test may be discontinued if the patient feels dizzy or vomits.

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3 HOUR GTT: Three Hour Glucose Tolerance Test
Tube: 4 x Gray
Testing Schedule/ Setup:

- Draw fasting tube as baseline
- Patient drinks 100g of Glucola
- Draw GTT 1 hour after patient finished drinking the Glucola
- Draw GTT 2 hours after patient finished drinking the Glucola
- Draw GTT 3 hours after patient finished drinking the Glucola

Instructions: No food during testing, no drinks except sips of water. Patient needs to remain in the facility throughout testing and needs to be on time at each draw interval. No exercise or strenuous activity. The test may be discontinued if the patient feels dizzy or vomits.

2-HOUR PP: Two Hour Postprandial (After a Meal)
Tube: 2 x Gray
Testing Schedule/ Setup:

- Draw fasting tube as baseline
- Collect postprandial sample 2 hours after completion of a meal

Note: Gray top tube is the best choice for glucose testing according to current NCCT guidelines. However, in the actual laboratory setting the Green top tube is commonly used.

BLOOD CULTURE TESTING

Blood Culture Procedure

Cleaning Preparation

1. Clean the site with alcohol to remove the oils and dirt on the skin surface.
2. The site is then cleaned with chlorhexidine, benzalkonium, or 2 percent tincture of iodine solution.
3. The cleaning is done with a back-and-forth motion or circular motion, starting at the site of the puncture, and moving in concentric circles outward.
4. The iodine is painted on the area, not flooded over the site. Iodine is an effective antiseptic only if it can dry before the venipuncture is attempted. (Note: ask patients if they are allergic to iodine.)

Blood Drawing Procedure

1. Remove protective sealer from the top of each blood culture bottle (Aerobic & Anaerobic)
2. Clean the top of each bottle with alcohol/iodine (depending on location).
3. Select the vein before cleaning the site.
4. Fill the appropriate bottle, according to the device selected.
5. Invert bottles 8 times.

Set-Up Procedure

All Blood Cultures are drawn at 2 different sites and 15 minutes apart unless mentioned otherwise.

24 HOUR URINE TESTING

How to Do A 24 Hour Urine Collection

Decide on the day and time to start the collection. In most instances, a blood test is required on the day of completing the test, therefore it is usually best to start in the early morning of a day prior to a hospital or GP visit (say between 6 and 8AM). Write on the bottle the date and time you start.

When you start the collection, empty your bladder and DISCARD the first urine into the toilet. All urine passed in the next 24-hour period should be passed into the bottle.

It is important that you collect the urine for an entire 24-hour period, for example if you start at 8 AM on Sunday, then finish at 8AM on Monday.

If for some reason the collection is not complete (it is easy to forget a sample), then the collection is usually useless. If possible, discard the collection and start again, but you may not have enough time before your hospital visit.

Keep bottles refrigerated or on ice throughout the collection period (see test instructions).

Exactly **24 hours after you started** the collection, empty your bladder, this time **INTO THE CONTAINER**, whether you feel you want to go or not. Note down on the bottle the date and time again and ensure that the bottle is securely closed.

Points to note:

- It is not important how much urine you pass during the 24 hours, some people will pass less than half a bottle full and some will pass several bottles full. Do not drink more than usual to try to fill the bottle. If you find that you need more than one bottle, try to get another from your GP or local hospital. In an emergency a clean glass or plastic bottle that has been thoroughly washed and rinsed with clean water will suffice for most tests.
- When you need to open your bowels, pass urine into the bottle first.
- Ladies may find it easier to pass urine into a basin and then pour it into the container.

Patient Instructions for Collecting a 24-Hour Urine Specimen

Important: To ensure accurate test results, please follow these instructions carefully.

1. Ask your laboratory whether you should refrigerate this bottle during the collection period.
2. At the hour you choose to start the collection period, urinate into a toilet and flush as usual.
3. Record the starting time and date in the space provided below.
4. For the next 24 hours, collect all your urine in this bottle.
5. BE sure to urinate when the 24-hour collection period ends and include this urine in the bottle.
6. Record the ending time and date in the space provided below.
7. Promptly bring the bottle back to the laboratory.

Collection Start Time: Hour:_____ Date:_____

Collection End Time: Hour:_____ Date:_____

Patient and Test Information for 24 Hour Urine Collection

Patient Name: _____
Date of Birth: _____
Hospital #: _____
Doctor's Name: _____
Test Required: _____
Preservative Added: _____
# of Bottles Used: _____
Total Volume Collected: _____

Collection Start Time: Hour: _____ Date: _____
Collection End Time: Hour: _____ Date: _____

Caution!

This bottle contains a strong preservative chemical which can irritate the skin or damage property. DO not breathe vapor. DO not spill or get on your skin. Keep out of reach of children. If splashes in the eye, flush on the skin, wash off immediately with water.

FECAL OCCULT BLOOD TEST (FOBT)

Colon Cancer Screening Protocol

Instructions to Patient:
One of the bowel diseases for which early detection is both possible and beneficial is colon cancer. Although you may have no bowel problems, your physician has recommended that you have a screening examination for colon cancer. This involves multiple stool specimens for the presence of blood. We request your cooperation in following the proper diet and stool collection procedures.

Diet:
For up to 3 days prior to and throughout the collection period, eat no meat of any kind: however, fish and chicken are allowed, it is also important to eat a high roughage diet (lots of fruit and vegetables) supplemented by bran cereal, if possible. Take no Vitamin C, aspirin or aspirin containing medicines (such as Alka-Seltzer, Anacin, Ascriptin, Excedrin, Florinal, or other over the counter pain or cold remedies).

Stool Collection:
We have provided you with 3 cardboard squares called hemoccult test slides. With the applicator stick, obtain a small stool specimen from 2 different places. In each of the 3 separate bowel movements, apply the stool to the front part of the slide. If you regularly use laxatives or other stool aids, you may continue to do so. Please store the kit in a cool dry space, away from direct light.

We appreciate your cooperation in this cancer screening program. Please be assured that the frequency of colon cancer in healthy people is very small, but that if present the early detection of tumor can be of great benefit to the individual patient.

OVA AND PARASITE TESTING (O&P)

Ova and Parasite Specimen Containers (O & P)- Procedure

1. The patient receives 3 vials:
    - O&P – Blue/Gray vial
    - Culture vial- Orange vial
    - Pink vial- Giardia

2. Instruct patients to initially collect specimens in a clean separate container.
3. Using the applicator spoon provided on the vial cap, the patient will scoop fecal matter into the vial to the indicated “fill line.”
4. Vials need to be stored in a cool dry place and not refrigerated.
5. Return vials to the laboratory when completed.

STEPS OF VENIPUNCTURE PROCEDURE FOR PRACTICAL EVALUATION

- Greet the patient, lift the arm rest, have patient sit in the draw chair, then lower the arm rest.
- Ask the patient for their full name and date of birth. Confirm that the information matches what is in your requisition form.
- Introduce yourself, state you are a student phlebotomist, and ask permission to draw patient's blood.
- Sanitize your hands. Collect venipuncture materials and organize them at the draw station. Put on gloves.
- Ask the patient to straighten their arm and support their elbow with a fist.
- Apply the tourniquet 3-4 inches above the ACF and ask patient to make a fist.
- Find a vein by palpating using the non-dominant index finger. This should take no longer than 10 seconds.
- Remove the tourniquet and ask the patient to relax their fist.
- Cleanse the intended puncture site with an alcohol pad, using a back-and-forth or circular motion.
- While letting the alcohol air-dry, assemble the needle and organize tubes in Order of Draw. Make sure all materials are properly placed, and within reach.
- Reapply the tourniquet without touching the cleansed area. Instruct patient to make a fist and keep their arm straight.
- Set your grip on the hub using the dominant hand. With the non-dominant hand, pull back the safety device then uncap the needle. Visually inspect the needle to confirm bevel is up.
    - If necessary, cleanse a gloved finger of the non-dominant hand with alcohol to re-palpate the vein.
- Use the thumb of non-dominant hand to anchor the skin 1-2 inches below the vein by pulling the skin downward toward the wrist.
- Anchor the dominant hand by keeping 1-2 fingers lightly pressed onto the arm of patient.
- Align the needle tip with the intended puncture site. Inform the patient they will feel a slight pinch, then gently insert the needle 1 ½ to 2 bevels deep at an angle of 15-30 degrees.
- While keeping the needle steady, use the non-dominant hand to pick up the first tube and gently insert it into the back of the hub (follow the recommended Order of Draw when filling tubes).
- To activate the tube, push the bottom of the tube using the thumb, while the index and middle finger grasp the wings of the hub to keep the needle steady. Confirm blood flow in the tube.
    - If there is no blood flow, palpate for the vein with the non-dominant index finger, repeat anchor 1, then try repositioning the needle to reacquire the vein.
- When the first tube is full, ask the patient to release their first. Remove the tube while keeping the needle steady by supporting the back of the hub with the thumb or index finger. Gently return the tube to the collection tray.
- Following the Order of Draw, pick up the next tube and activate it, waiting for it to fill completely.
- Once the last tube is almost full, use the non-dominant hand to remove the tourniquet. Remove the last tube from the hub and gently place the tube in the collection tray.
- While keeping needle steady, use the non-dominant hand to pick up a gauze pad and hold it to the side of the puncture site.
- Gently remove the needle without pulling up the skin or scratching the skin. Once the needle is out, point it forward and downward, and activate the safety device with your thumb, while simultaneously using your non-dominant hand to place the gauze directly on the puncture site.
- Ask patient to apply pressure on the gauze with a finger and to keep their arm straight, as you dispose of needle in the sharps container.

- While the patient holds pressure on the gauze, gently invert all tubes 8 to 10 times. Label tube(s) correctly, then show each labelled tube to the patient, asking them to confirm if the information is correct.
- Lift the gauze from the puncture site and perform a visual 2-point check (confirm there is no active bleeding or swelling)
    - If there is bleeding or swelling, continue to apply direct pressure for up to 5 minutes.
    - If the gauze pad is soaked with blood, discard it and replace it with a new gauze pad
- Apply a bandage by securing the gauze with Coban or paper tape. Tell patient to keep the bandage on for at least 15 minutes but no longer than an hour.
- Lift the arm rest and ask patient to stand. Confirm that the patient is not feeling dizzy. Thank the patient.
- Properly dispose of biohazard waste and disinfect the collection tray. Disinfect the draw chair and side table as necessary.
- Remove gloves and properly dispose of them, then sanitize/wash your hands.