



PhlebotomyU

CERTIFIED PHLEBOTOMY TECHNICIAN 1 (CPT1)



INTRODUCTION

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 turn, 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 specimen 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 procedures 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:

- A. Dependability
- B. Honesty
- C. Integrity
- D. Empathy and compassion
- E. Professional appearance
- F. 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.

Basic Infection Control, Universal Precautions and Safety.

Workplace Safety Regulations and Governing Bodies and Their Roles

- OSHA (Occupational Safety and Health Administration) is the federal agency responsible for reducing and preventing exposure to worker injuries
- The CDC (Centers for Disease Control and Prevention) is the federal agency responsible for identifying, monitoring and reporting diseases capable of becoming epidemic
- CMS (Centers for Medicare & Medicaid Services) oversees Medicare, Medicaid, CLIA'88 and COLA
- CLIA (CLIA'88) is the federal law that regulates medical laboratory testing
- COLA - Commission on Office Laboratory Accreditation - Grants official approval to physician's office laboratories
- AABB – American Association of Blood Banks
- JCAHO - Joint Commission on Accreditation of Health Organization - A voluntary agency which establishes standards for hospital operations
- CAP - College of American Pathology - Organization of board-certified pathologist

Chemical Hazard

- 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.
- HazCom ("Right to Know Law")
 - Labeling must contain warning statement, precautions and first aid measures.

Material Safety Data Sheet (MSDS) - 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




Fire Hazard

- The National Fire Protection Agency (NFPA) has developed a "code" word to assist healthcare workers in remembering the steps to take in case of a fire emergency
- The word is RACE and stands for: 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)

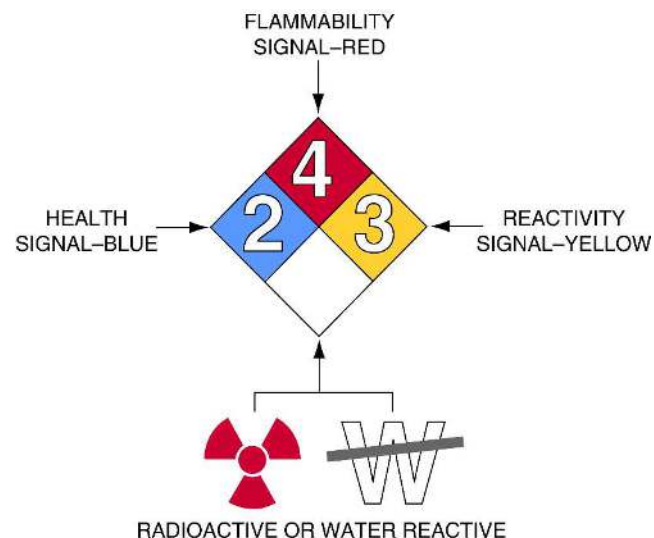
Electrical Hazard

- All electrical equipment used in a healthcare facility must be approved for safety by an OSHA-app
- Electrical equipment that appears to be damaged or in poor repair should not be used

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

NFPA Rating Explanation Guide					
RATING NUMBER	HEALTH HAZARD	FLAMMABILITY HAZARD	INSTABILITY HAZARD	RATING SYMBOL	SPECIAL HAZARD
4	Can be lethal	Will vaporize and readily burn at normal temperatures	May explode at normal temperatures and pressures	ALK	Alkaline
3	Can cause serious or permanent injury	Can be ignited under almost all ambient temperatures	May explode at high temperature or shock	ACID	Acidic
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	COR	Corrosive
1	Can cause significant irritation	Must be preheated before ignition can occur	Normally stable. High temperatures make unstable	OX	Oxidizing
0	No hazard	Will not burn	Stable		Radioactive
					Reacts violently or explosively with water
					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 the act of sterilization and refers to equipment and surfaces, not patients
- 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)
 - Decontamination with 10% bleach or approved disinfectant
 - Gloves must be worn during clean up
 - Large blood spills need clay or chlorine-based powder
 - Concentrate on absorbing and keeping it from spreading
 - To clean small, dried blood spills, it is important to moisten the area with disinfectant so as not to create an aerosol and disperse infectious material into the air
 - Finally, wipe area with disinfectant

Standard Precautions: Precautions established to prevent patient to personnel transmission of infection.

Standard precautions is an approach to infection control that treats all patients, regardless of their disease and/or infection status, as potentially infectious

- All blood, body fluids, and unattached tissue considered potentially infectious
- Focus of infection control turned from prevention of patient-to-patient transmission to prevention of patient-to-personnel transmission
- Must be part of overall infection control plan
- All blood, body fluids, secretions, and excretions, except for sweat are considered to be contaminated with bloodborne pathogens and capable of transmitting the 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

Safety Products

- To prevent accidental needlesticks and exposure incidents, the needle safety device 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 proof, lockable sharps container
- When the container is $\frac{3}{4}$ 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 to collection tubes without the needle.



Personal Protective Equipment (PPE)

- Mask
 - Goggles
 - Face shield
 - Respirator
 - Lab coat
 - Gloves
 - Apron
 - Gown
-
- **ON (Don)**– gown, mask, gloves
 - **OFF (Doff)** – gloves, gown, mask



Preventing Infection and Transmission

The purpose of infection control is to implement procedures and policies that prevent the spread of infection

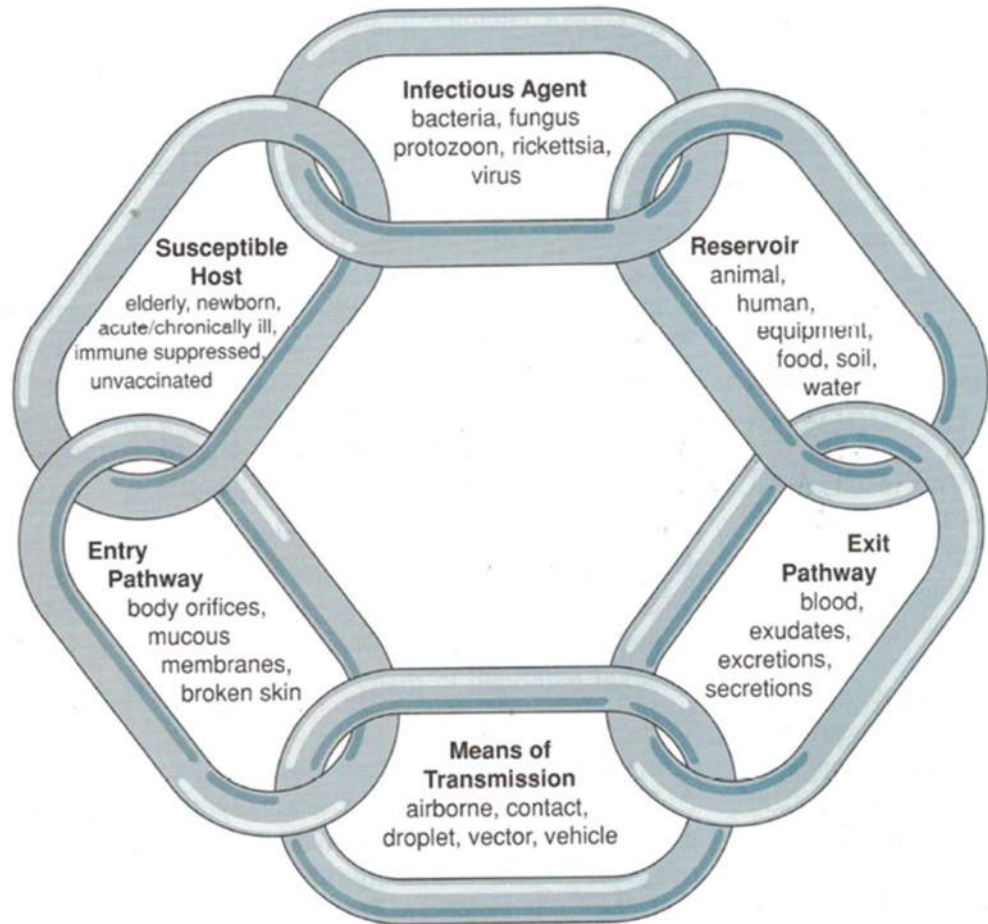
Infection:

- 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 two of the most common healthcare associated pathogens.

The Chain of Infection

Components of the Chain



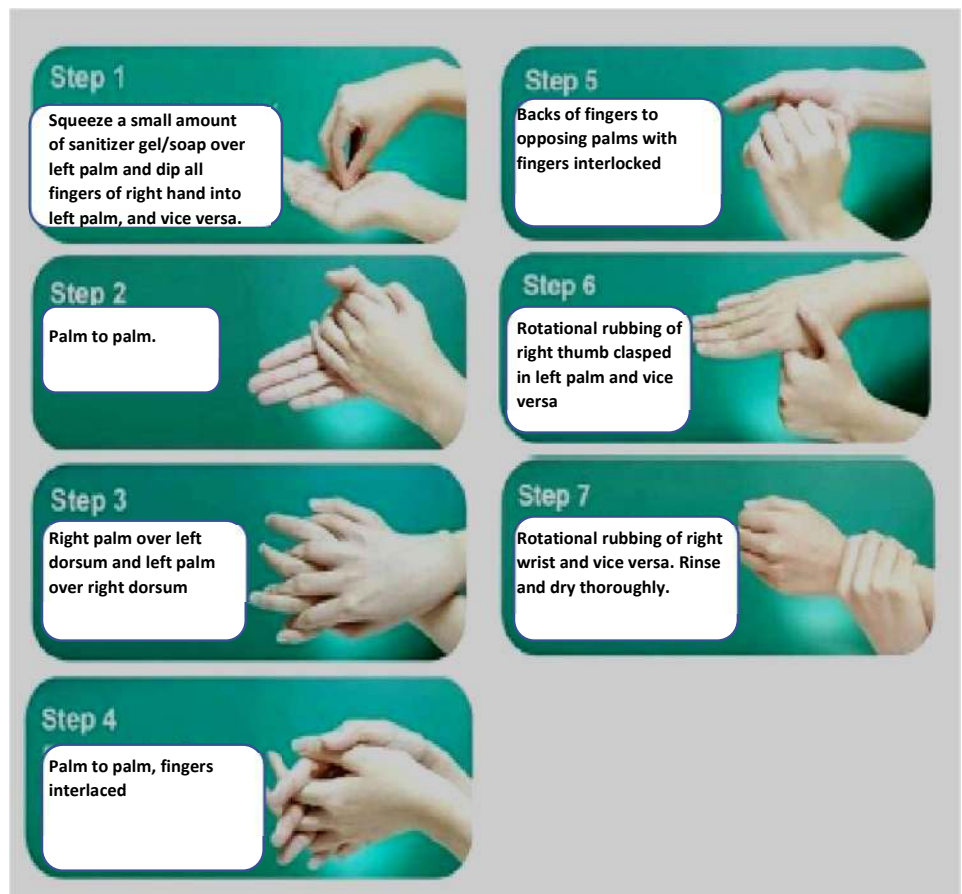
Breaking the Chain of Infection

Hand Washing

Performing regular hand hygiene is the first of 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 15 seconds)



Standard and Transmission Based Precautions

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

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

Circulatory System

The Heart

- A major structure of the circulatory/cardiovascular system
- It circulates blood throughout the body
- Heart Structure
- Layers of the heart
- Heart chambers
- Valves
- Coronary arteries

Blood Vessels

The Vascular System is a closed system by which blood is circulated to all parts of the body.

- Veins
- Arteries
- Capillaries

Arteries

- Carry blood away from heart
- Have thick walls, because the blood is under pressure from the contraction of the ventricles
- Pulse distinguishes arteries from veins
- Smallest arteries are known as arterioles

Veins

- Return blood to heart
- Carries deoxygenated blood (bluish-red)
- Walls are thinner and can collapse
- Smallest veins are known as venules

Capillaries

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

Lymphatic System

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

Body Systems

- Skeletal System-Hemopoiesis, Calcaneus
- Muscular-Muscular-Movement, Blood circulation
- Digestive-Digestive-Food absorption, Waste
- Nervous-Nervous-Controls body systems
- Urinary-Urinary-Eliminates waste, Monitors Electrolytes
- Respiratory-Respiratory-Exchanges oxygen and carbon dioxide
- Integumentary-Integumentary-Protects the body, Vitamin D
- Reproduction-Reproduction-Procreation
- Endocrine-Endocrine-Hormone production, Stress, Metabolism, Reproduction

Common Tests

- Human chorionic gonadotropin (HCG) -Reproductive
- Cortisol -Urinary
- Glucose tolerance test (GTT) -Endocrine

Blood Composition

Whole Blood

- Blood in the same form as found in the body

Plasma

- The top layer of clear liquid separated from whole blood used for testing. Also the fluid portion of the blood in the living body
- Contains fibrinogen

Serum

- Normally a clear pale-yellow fluid separated from a clotted blood specimen which has the same composition as plasma except that it does not contain fibrinogen

Fluid Portion of Blood

- The fluid portion of blood-55%
- 90% water & 10% dissolved substances
- Albumin, antibodies, fibrinogen
- Nutrients include carbohydrates and fats
- Minerals include sodium, potassium, calcium
- Gases include oxygen, carbon dioxide
- Other substances such as vitamins, hormones, urea

Cellular portion / components / Formed Elements

- 45% of composition RBC, WBC, Platelets

Erythrocytes – RBC

- Transport Oxygen and carries CO₂ to tissues.
- Life span = 120 days

Leukocytes – WBC (Monocytes, Lymphocytes, Basophils, Eosinophils, Neutrophils)

- Fight infection
- Formed in bone marrow and lymphatic tissue
- Extra vascular function
- Only hours in bloodstream, much longer in tissues

Thrombocytes - Platelets

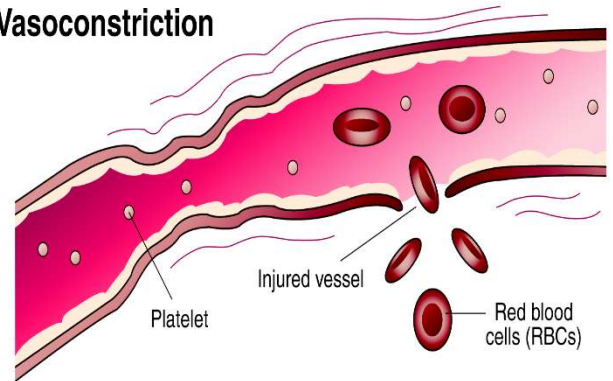
- Essential to coagulation, starts clotting process
- Life span = 10 days

Hemostasis

The process by which the body stops the leakage of blood from the vascular system after injury

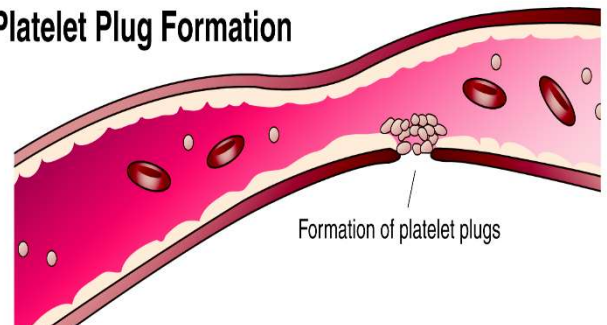
1. The hemostatic process begins after venipuncture procedure

Stage 1: Vasoconstriction



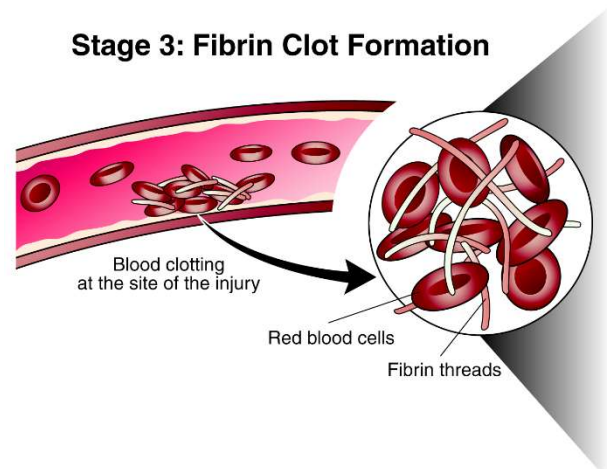
2. Platelet plug formation is sufficient to seal the site

Stage 2: Platelet Plug Formation



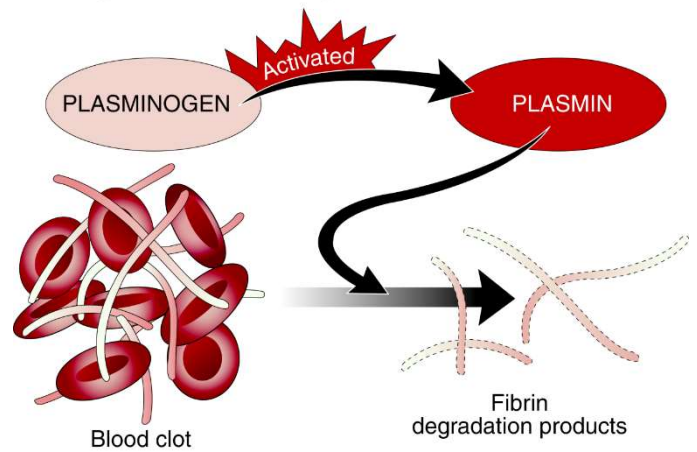
3. Fibrin clot formation
 - Involves the interaction of a series of coagulation factors working together in a sequence to form a permanent platelet plug called a clot

Stage 3: Fibrin Clot Formation

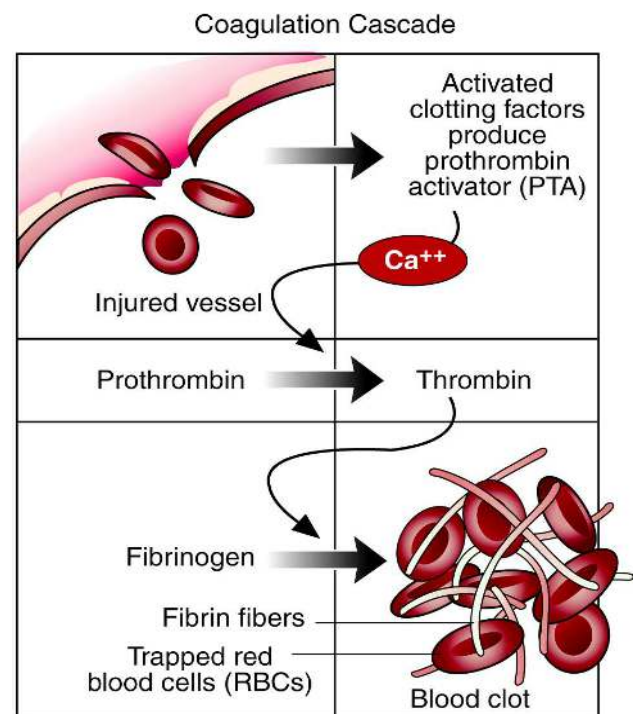


4. Dissolution of the blood clot once healing has occurred.
Plasminogen to plasmin. Plasmin is an enzyme that breaks fibrin into small fragments

Stage 4: Fibrinolysis



- Coagulation cascade, which means each factor activates next factor in sequence like a cascade
- The liver is responsible for the synthesis of the coagulation factors and when the liver is diseased, the coagulation factors are impaired, and bleeding may result



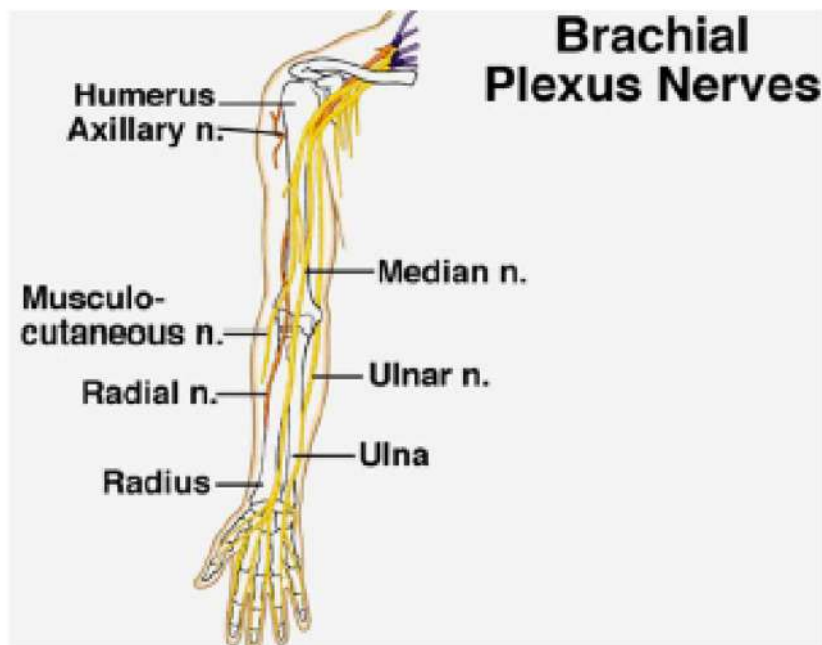
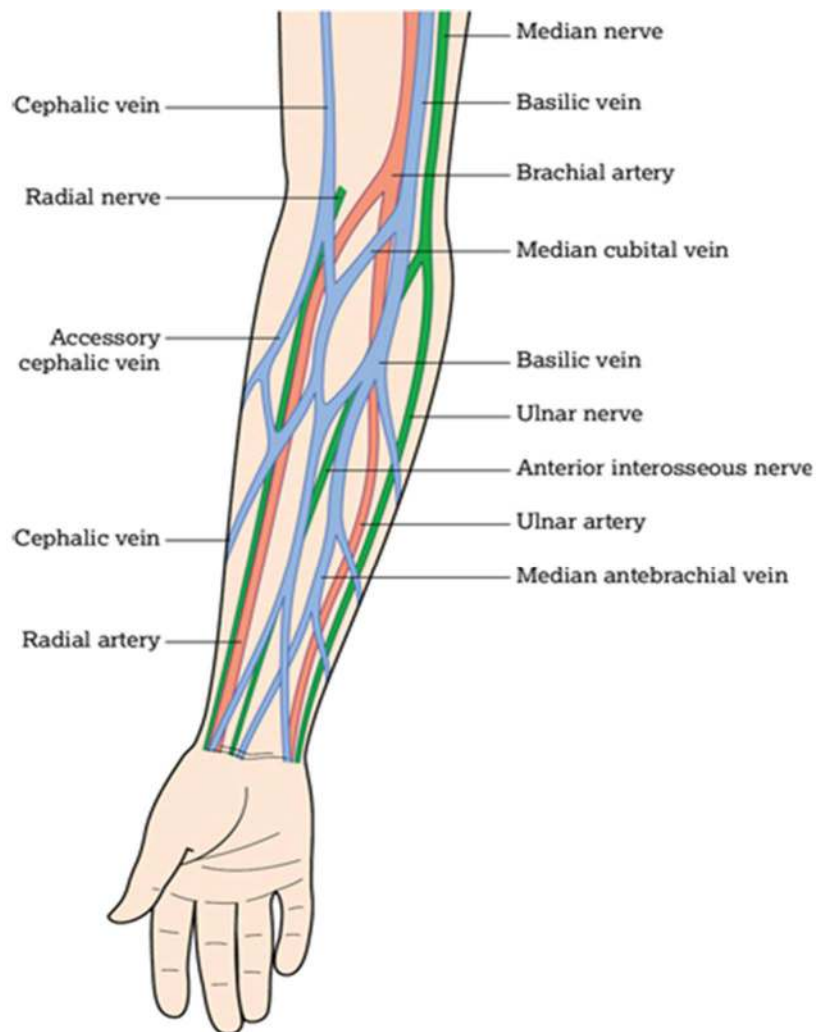
Gas Exchange

Oxygen and carbon dioxide exchange at the capillaries

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



Review and Clarify Orders

Requisition Forms

- 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
- The patient's name or unique patient identifier
- The sex and age or date of birth of the patient
- The test(s) to be performed
- The date and time of specimen collection, if appropriate

Patient Identification

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
- Errors in patient identification lead to medical mistreatment and possibly death
- Having the patient state their name and date of birth (DOB) will suffice for an outpatient
- Any discrepancy in the information must be corrected before proceeding
- It is the responsibility of the phlebotomist to provide complete and correct patient identification

Inpatient Identification

- All inpatients must have an armband
- Requisition must match armband
- For inpatients, in addition to stating name and DOB, the phlebotomist should match the medical record number 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

Document Blood Draw

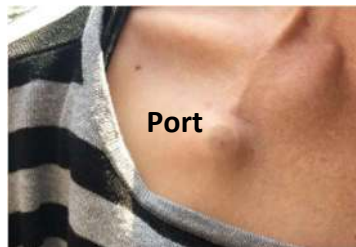
- After the phlebotomist completes a draw, it is necessary to document that procedure in the computer system
- This allows tracking of the time, special comments (e.g. line draw or below IV) and phlebotomist's initials in case there are questions
- If the LIS is interfaced with the labs instruments the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

Evaluate Pre-test Conditions

- Most common diet restriction – fasting
- Notification of nurse or physician if restrictions are not followed
- Make note of “non-fasting” if asked to proceed with test
- 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
- 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

Vascular access areas & devices to avoid in site selection

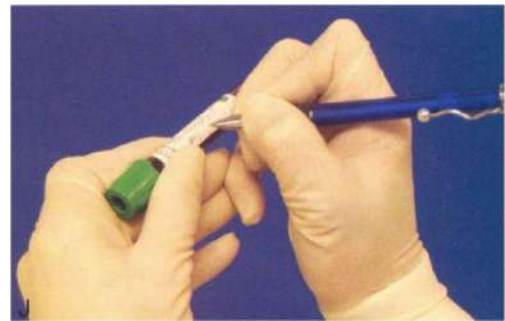
- IV Sites
- Previously Active IV Sites
- Arterial Lines
- Heparin or Saline Locks
- Vascular Access Devices (Port, Picc and CVC)
- AV Fistula / Shunt



Labeling

Label the tubes

- Patient's name
- ID number
- Date & time
- Collector's initials
- Use permanent ink
- Label tubes at bedside.
- Do not pre-label or label tubes after you have exited the room
- Specimens should be labeled immediately after drawing at the patient's side
- Some facilities require the patient to review the labels on the tubes to assure that they are correct
- Never label tubes before the blood draw
- **STAT** Tubes must be labeled as **STAT**
- 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 correctly perform this step can be fatal

- Patient full name
- Patient ID number
- Patient date of birth
- Date and time of collection
- Phlebotomist's initials
- **Autologous Donation**
 - Process by which a person donates a unit of blood for their own use

Specimen Collection

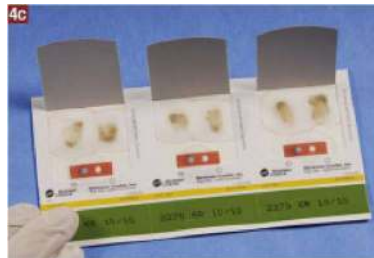
Urine

- Fluid from the bladder
- Most frequently analyzed nonblood specimen
- Regular void
- Midstream
- Midstream clean catch
- Catheterized
- Suprapubic
- Pediatric collections



Feces / Stool

- Occult blood test
- Ova and parasites (O & P)
- C & S
- Fecal fat



Other Specimens

- Throat swabs
- Secretions from the back of the throat, tonsils and most often used to diagnose strep (Streptococcus)
- Tissue specimens
- Biopsy samples



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
- i.e: If a phlebotomist misses a tube on a draw, the only ethical choice is to inform the patient and perform a second draw

Identification

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

- (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 significant interruption between steps has been linked to significantly increased chances for error.

Types of Consent

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

Expressed

- Required for treatment that involves surgery, experimental drugs or high-risk procedures
- Maybe given verbal or in writing

Implied

- Patient's actions imply consent without a verbal or written expression of consent.
- Implied consent may be necessary in emergency procedure

HIV Consent

- The client must be advised on the test and its purpose
- How the test may be used, the meaning of the test and its limitations
- Requires informed consent

Refusal of Consent

- Every patient has the constitutional right to refuse a medical procedure such as venipuncture

Pre-Analytical Errors

Vigorous mixing causes hemolysis affecting

- Elevated Potassium
- Magnesium
- Most enzyme tests

Inadequate mixing of anticoagulant tubes:

- Micro clot formation

Incorrect order of draw

Temperature of samples

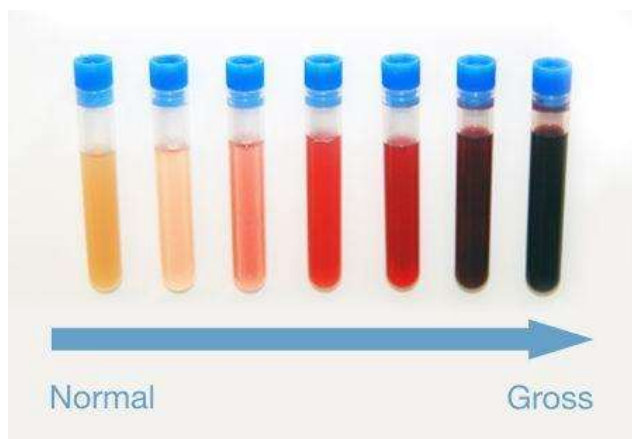
Hemoconcentration

Hemolysis

Partially filled tubes

Specimen contamination

Incomplete clotting prior to centrifugation (Serum Tubes)



Hemolysis

Skin Puncture Equipment

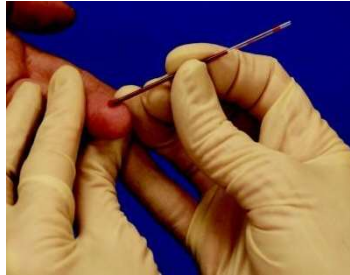
Lancets

- Finger stick lancets
- Laser lancet
- Heel stick lancets

If there are no veins available for venipuncture and a smaller amount of blood can be used for the tests requested, a capillary collection may be appropriate

Collection Devices

- Micro collection containers
- Microhematocrit tubes
- Microsafe® Pipette



LabNotes Tip

BD Microtainer® Tubes with BD Microgard™ Closure

Order of Draw

Color	Additive	Mix by Inverting
 Lavender	K ₂ EDTA	10x
 Green	Lithium Heparin	10x
 Mint Green	Lithium Heparin and Gel for plasma separation	10x
 Gray	NaF/ Na ₂ EDTA	10x
 Gold	Clot Activator and Gel for serum separation	5x
 Red	No additive	0x

Processing of Tubes

Why

- Most tubes contain an additive or clot activator that needs to be mixed with the blood sample.
- Tubes with anticoagulants such as EDTA need to be mixed to ensure the specimen does not clot.

How

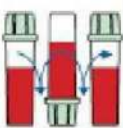
- Holding tube upright, gently invert 180° and back.
- Repeat movement as prescribed for each tube.

When

- Immediately after drawing.

Consequences if not mixed

- Tubes with anticoagulants will clot.
- BD SST™ tubes may not clot completely.
- Specimen will often need to be redrawn.



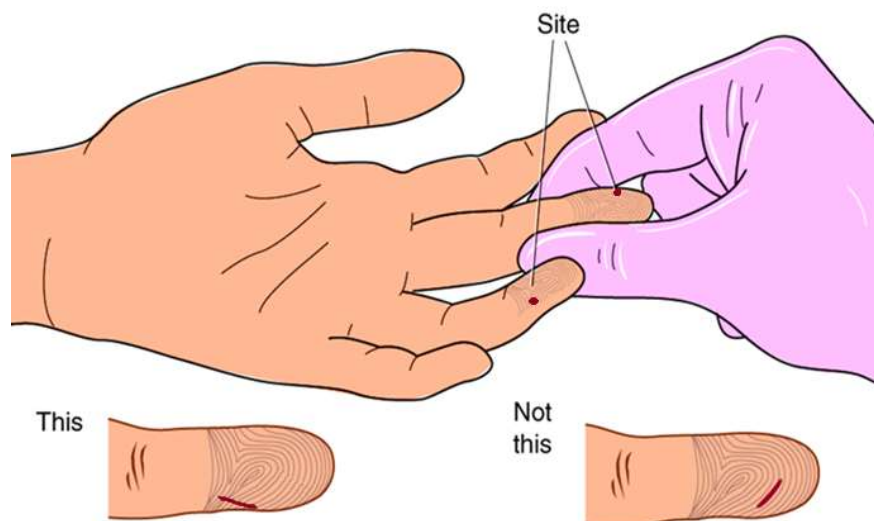
Skin Puncture Site

General Criteria

- Warming the site, increases the blood flow seven times
- Normal color, and free from scars, cuts, bruises, or rashes
- Do not choose cold, cyanotic, or edematous

Hand

- Middle or ring finger (3rd or 4th)
- 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 contamination
- Do not puncture side or tip of finger
- Do not puncture parallel to the grooves of the fingerprint
- Do not puncture the index finger
- Do not puncture the little finger
- Do not puncture fingers of infants or very young children



Heel

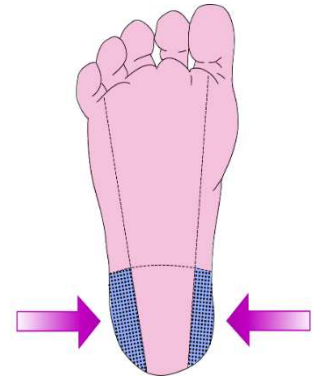
- Infants & Children
- Venipuncture too difficult
- Damaged veins
- Chance of injury when restrained
- Small amount needed

Recommended site

- Medial or lateral plantar surface of the heel

High risk areas

- Posterior curvature
- The lancet used for a heel puncture on a full-term infant should not penetrate beyond 2.0 mm (0.85mm 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



Capillary blood samples may be taken from the medial or lateral side heel of children until they begin to walk at which time the heel becomes tougher and more difficult to penetrate

Neonatal screening for metabolic disorders is done with a heel stick. The blood collected is transferred directly to a special filter paper card

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

Skin Puncture Procedure

- Identify the patient
- Assemble equipment
- Warm the site (Increase blood flow seven-fold)
- Clean the site
- Prepare the puncture device
- Perform skin puncture
- Dispose of puncture device in sharps
- Apply pressure to the site
- Wipe away the first drop of blood with gauze (To avoid tissue fluid contamination)
- Position the site down- ward to enhance blood flow
- Apply gentle intermittent pressure
- Squeezing the site vigorously can introduce excess tissue fluid and hemolysis, which may cause erroneous results
- Proceed to collect blood in appropriate devices
- Use correct order of draw
- Cap and mix additive tubes gently
- After collection, apply pressure to the site until bleeding stops
- Bandage if older child or adult

Point of Care Testing (POCT)

- FOB- Fecal Occult Blood
- INR
- Urine dip
- Human chorionic gonadotropin (HCG) - Pregnancy Test
- Glucose
- Cholesterol
- Troponin protein
- Bilirubin
- HA1C



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
- Short Turn Around Time
- Deliver prompt medical attention
- Help expedite patient recovery
- Portable, hand-held instruments
- Personnel must be trained
- QC & maintenance procedures mandatory



POCT- Glucose Monitoring

Most common POCT procedure



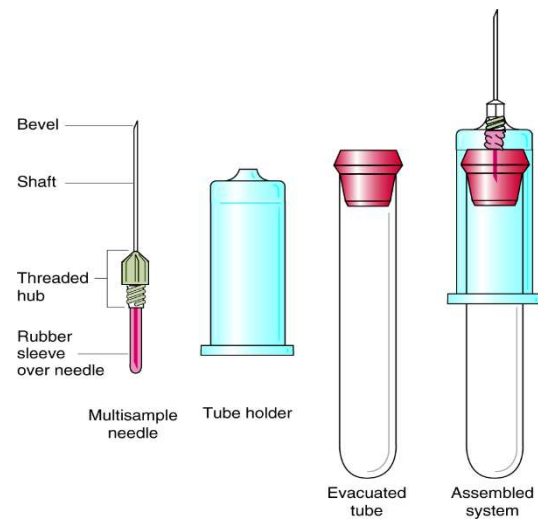
Urine

Reagent strip

Blood Collection Equipment

Evacuated Tube System (ETS)

- Closed system
- Allows numerous tubes to be collected
- Available from several manufacturers
- Three basic components
 - Multisampling needle (double pointed needle)
 - Plastic holder
 - Various types of evacuated tubes



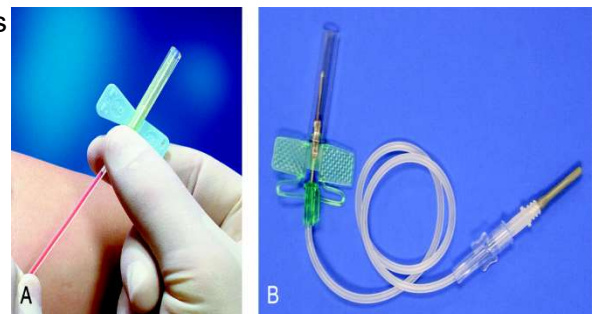
Needle & Tube Holder (Hub)

- Refers to tube hub or adapter
- Clear plastic cylinder
- Flanges
- Extensions on the side of holder
- Aid in tube placement and removal



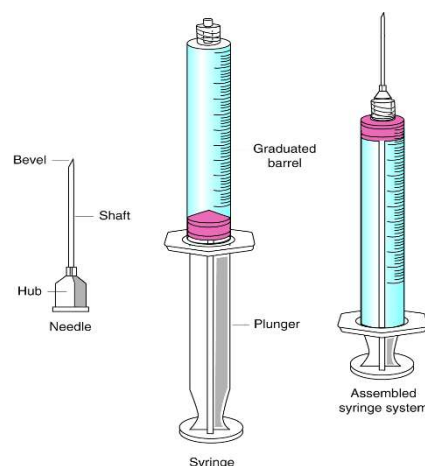
Winged Infusion Set (Butterfly)

- "Butterfly" used for collecting blood from small or difficult veins
- Small needle connected to 5 to 12 in. length of tubing
- Must contain safety device to reduce risk of needle stick
- Normal angle of insertion is 10-15 degrees



Syringe System

- **Used for fragile veins, rolling veins and ABG**
- Components
- Needles
 - 21-23 gauge
 - 1 – 1 ½ inch (better control with 1-inch needle)
- Syringe
- Barrel - Graduated
- Plunger
- Syringe transfer device
- Allows for safe transfer of blood to collection tubes without the needle



• Infant Venipuncture

- Challenges
 - Small Veins
 - Noncooperation
 - Elevated WBC's when crying
- Special Equipment
 - Use smaller pediatric tubes
 - Winged Infusion Set
 - Warming pads

• Geriatric Venipuncture

- Challenges
 - Skin Changes – loss of collagen
 - Fragile Skin
 - Fragile Veins
 - Veins prone to collapse
- Special Equipment
 - Elastic dressing – tape or band-aid might tear skin
 - Tourniquet may be applied over clothing, a clean dry washcloth or length of gauze
 - If necessary, use smaller tubes or syringe to prevent veins from collapsing

Tube Size / Needle Gauge

- The gauge of a needle refers to its outer diameter
- The most commonly used needle for venipuncture is a 21-23 gauge. The needle size must be large enough to prevent hemolysis (break down of blood cells)
- The higher the gauge number, the smaller the bore (width) of the needle

Antiseptics

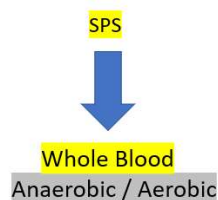
- Substances or solutions used to prevent sepsis
- Bacteriostatic
- Safe to use on human skin
- Clean in concentric circles
- Examples:
 - 70% isopropyl alcohol (routine draws)
 - Povidone-iodine
 - Benzalkonium chloride
 - 0.5% chlorhexidine gluconate
- In preparing a site for venipuncture or dermal collection, the 70% alcohol should be allowed to completely dry. This accomplishes two things: it gives the solution time to destroy bacteria and prevents the aqueous alcohol solution from causing hemolysis of the red blood cells which might affect the test results
- You should never fan or blow dry the venipuncture site



Tube Additives



Binds Calcium	Clots in 30 - 60 Mins	Clots in 15 - 30 Mins	Inhibits thrombin	Binds Calcium	Anti glycolytic
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Special Rules

- **Blood Cultures** - False positive is caused by improper cleaning of the puncture site. When using butterfly Aerobic bottle is first unless clearing tube is used.
Red top- Must be fully clotted. Watch for Fibrin clot if centrifuged too soon.
SST- Cannot be used for certain test because of interference with gel barrier

Order of Draw

Anaerobic / Aerobic



Yellow



Blue

Red

SST

Grn

Lav

Grey



Tube Additives

MANEMONIC	COLOR	ADDITIVE	PRODUCT USED	TEST
YOUNG	YELLOW	SPS	WHOLE BLOOD	BLOOD CULTURE
Bodies	BLUE	NA CITRATE	PLASMA	PT/PTT
REALTY	RED	PLAIN	SERUM	CHEMISTRY NON GEL SERUM
SHOULD	SST	ACTIVATOR	SERUM	CHEMISTRY (CMP, B-12, ALB)
GET	GREEN	HEPARIN	PLASMA	STAT CHEMISTRY
Large	LAVENDER	EDTA	WHOLE BLOOD/PLASMA	HEMATOLOGY
Grains	GREY	K OXALATE NA FLUORIDE	PLASMA	GLUCOSE, ALCOHOL, LACTIC ACID

Fill Level

- Fill all tubes
- If there is a fill line, make sure the sample collected is to that level
- Light Blue (Na Citrate) - Must be full to the line, 9:1 blood to anticoagulant
 - If not full will be rejected
 - Short draw results in prolonged pt/ptt
 - When using butterfly must use clearing tube to remove air from tubing



Additive

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

Tube Inversions

- Invert tubes after the draw is complete and the patient is holding pressure
- Fully invert tubes the following amount of times:



Post Puncture Care

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
- Gauze
- Tape
- Band-Aid
- Elastic Dressing (Coban)
- 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 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
- It is primarily used in patients on anticoagulant therapy, those with bleeding disorders 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

Disposal of Equipment

- 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 lockable sharps container
 - When the container is $\frac{3}{4}$ 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
 - OSHA put the standard into force to minimize occupational exposure to bloodborne pathogens
 - Engineering controls (i.e. sharps containers, safety devices, needles systems)
 - Sharp containers must be puncture resistant, tamper, and spill proof
 - Revised to conform to Needle stick Safety and Prevention Act
 - 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
-

ADVANCED

Blood and Body Fluid Exposure

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

OSHA BBP Standard

- 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
- Fine institutions which are non-compliant

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
- Initially, decontaminate and report incident to supervisor
- Medical evaluation 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

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 needle stick injuries

Hepatitis

- Hepatitis A is caused by oral/fecal transmission
- All other hepatitis virus (B, C, D, E) are bloodborne pathogens
- Hepatitis B (HBV) is the most transmissible infection among healthcare workers, and the only one preventable by immunization
- Hepatitis C 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
- Isolated from all body fluids
- Risk through blood
- Symptoms of Infection
- Early stages, flu-like

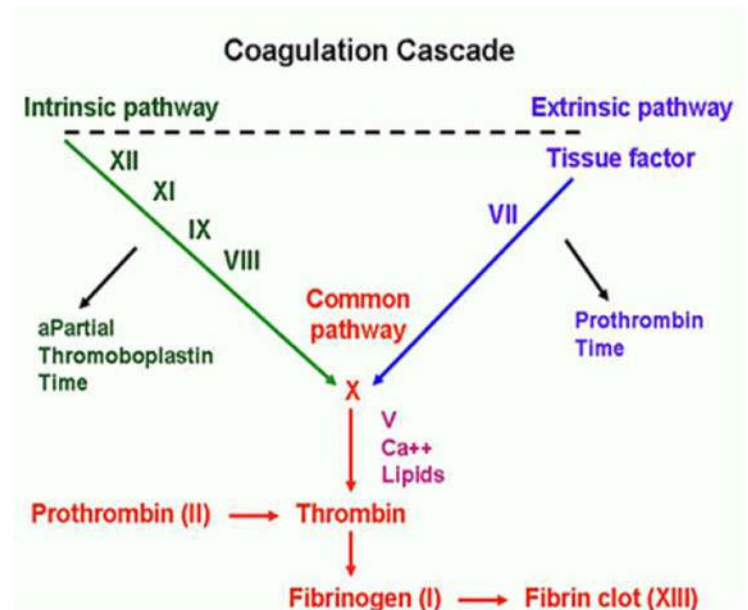
Spills

- 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 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

Patients with Clotting Deficiencies

- The phlebotomist is charged with 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

- Intrinsic pathway
 - Measured by a PTT or APTT test
- Extrinsic pathway
 - Measured by a PT / INR test
- Blood (plasma) that is flowing throughout the body contains clotting factors and fibrinogen
- Once blood is removed from the body the clotting factors are activated



Chain of Custody

- 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

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 additive into the patient’s vein.

Negative

- Rough handling
- Hemolysis
- Patients should never pump their fist
- Hemoconcentration
- Partially Filled Tubes
- Specimen Contamination
- Slapping the potential venipuncture site is never an acceptable practice and can be construed as assault and battery

Prioritizing Collections

Therapeutic Drug Monitoring (TDM)

Used to manage patient drug treatment

- 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 & lab
- Phlebotomist key player-timed test

Collection times

- Peak collected 30-60 minutes after administration of drug
- Trough collected immediately before administration of the next dose
- Critical for short half-life drugs

Collection tubes

- Gel tubes may affect TDM
- Consult lab reference guide
- 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 too high, there may be toxic consequences. This is called a ***therapeutic window***.

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

1. A timed draw that is due (i.e. TDM)
2. A STAT draw
3. Routine draws

Labeling Specimens

Test Labels

- Specimens should be labeled immediately after drawing at the patient's side
- Some facilities require the patient to review the labels on the tubes to assure that they are correct
- Never label tubes during equipment assembly or before approaching the patient
- CLSI recommends five pieces of information that should appear on the label of a specimen. These include: Patient's name, date of birth, unique identification number (such as medical record number), time and date of collection, and the initials or identifying number of the collector

Routine Venipuncture

- Label the tubes
 - Patient's name
 - ID number
 - Date & time
 - Collector's initials
 - Use permanent ink
 - 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 slides Labels

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



Deliver Specimens to the Laboratory

Specimen Handling

- Rough handling can cause
 - Hemolysis in the specimen
 - Lead to breakage
- Store tubes with stopper up
 - Aids in clot formation of 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
 - Lactic acid and ammonia are chilled in ice slurries as they deteriorate very quickly at room temperature
 - Slows down metabolic processes
 - Completely immerse in slurry of ice & water
 - i.e. ammonia, lactic acid, plasma rennin
 - Some specimens need to be transported at 37°C
 - Will precipitate or agglutinate if below body temperature
 - Can be wrapped in heel warmer.
 - Tests that must be kept warm:
 - Cold agglutinin
 - Cryoglobulin
 - Cryofibrinogen
- *Some tests may require collection tube to be pre-warmed

- Bilirubin is extremely light sensitive. It may drop in concentration as much as 50% in one hour if exposed to light
- 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
- Examples: Bilirubin, Vitamin B, Carotene

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

Biohazard Bags

- Biohazard transport bags are used to transfer specimens to the lab in an effort to prevent the spread of infection.
- Two pockets, with zipper seal to prevent leakage
- The inside one holds the specimen and
- The outside pocket is for any labels or paperwork
- Must display biohazard logo



Processing Specimens

How to Centrifuge

- A centrifuge is used to “spin down” blood samples to allow for separation of serum or 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
- If samples are not centrifuged within 120 minutes of being collected, then they should be rejected
- Leave lid closed during operation-if not closed, aerosols may be released into the air
- Centrifuge each specimen only once to:
 - Avoid hemolysis
 - Analyte deterioration
 - 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
- 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
- Transfer into tubes using transfer pipettes
- Pouring over specimens not allowed (aerosols)



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 not collected in gray top tube then samples should be processed within 30 mins
- A urine or stool sample 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 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
- Citrate tubes go to the Coagulation area
- 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 (Anti-nuclear Antibodies)
- Microbiology tests blood, other body fluids and tissues for the presence of bacteria, viruses, and parasites.

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.

Stool

- Fecal occult blood tests (FOBT) are 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 as this may produce false test results
- Stool samples should be kept in a cool dry space away from direct sunlight.

Sputum

- 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.

- Sputum specimens are collected into sterile cups and quickly delivered to the lab when a bacterial infection such as bronchitis or pneumonia are suspected. 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
 - i.e. Refrigerated, Room Temperature,
- Confirm that the sample was collected in the appropriate container

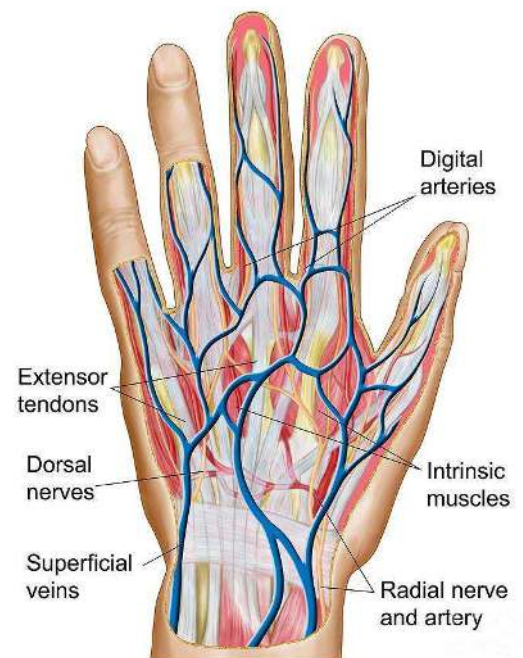
Advanced Venipuncture Site Selection

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.



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, which may affect test results, can occur if the tourniquet is left on for more than one minute
- Apply 4-5 inches above draw site

Blood Collection Based on Test Ordered

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



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. Using 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

Patients with Special Needs

- Mastectomy
- Burns
- Mobility
- Bleeding Disorders
- Diabetes

Blood smear slides

- Blood can be obtained by normal finger or heel puncture following proper skin puncture procedure
- Place drop of blood on slide (must be 1-2mm 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 Culture Collection

- Reason to order
 - Fever Unknown Origin
 - Bacteremia
 - Septicemia
- Special requirements
 - Yellow Tube, Sodium polyanethol sulfonate (SPS)
 - Two vials/bottles
 - Anaerobic
 - Aerobic
 - Skin antisepsis



Blood Culture 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
- Although not appropriate for children under 2 years of age, 2% benzalkonium chloride can be used as an antiseptic to clean blood culture venipuncture sites
- Although not appropriate for infants under 2 months of age, chlorhexidine gluconate has become the antiseptic of choice
- 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 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

Blood Culture Procedure

- First cleanse
- Surface dirt and debris removed
- 70% isopropyl alcohol, air dry
- Second cleanse
- Scrub concentric circles 1% to 2% tincture iodine and allow 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 anaerobic bottle first, unless collected with butterfly
- Mix each bottle
- Clean iodine from patient's skin with alcohol after collection of blood cultures

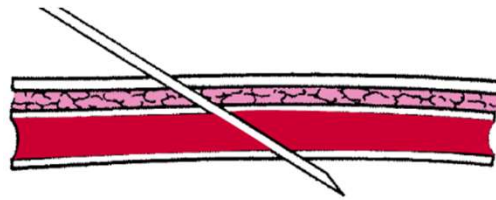


Antiseptic

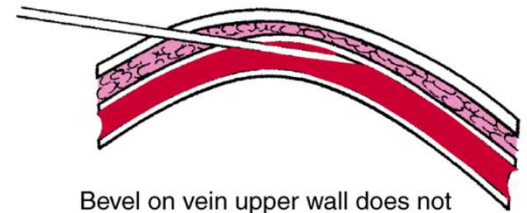
- Most important part of BC collection
- Failure to follow sterile technique
- Introduces skin surface bacteria - CONTAMINATION!
- Interferes with interpretation of results
- Various cleaning agents used such as:
 - Chlorhexidine
 - benzalkonium chloride
 - Povidone-iodine

Needle Positioning

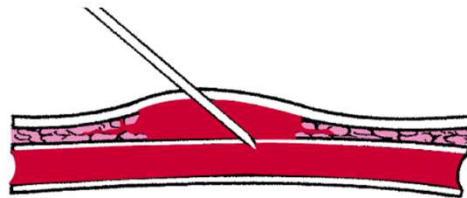
- Insert the needle the correct depth
- Insert bevel and a half depth for routine Venipuncture
- The bevel must ALWAYS face UP



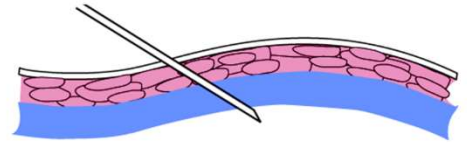
Needle inserted too far



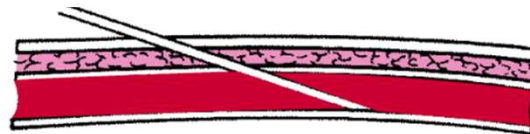
Bevel on vein upper wall does not allow blood to flow



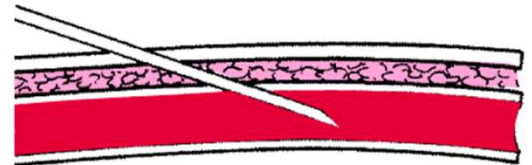
Needle partially inserted and causes blood leakage into tissue



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

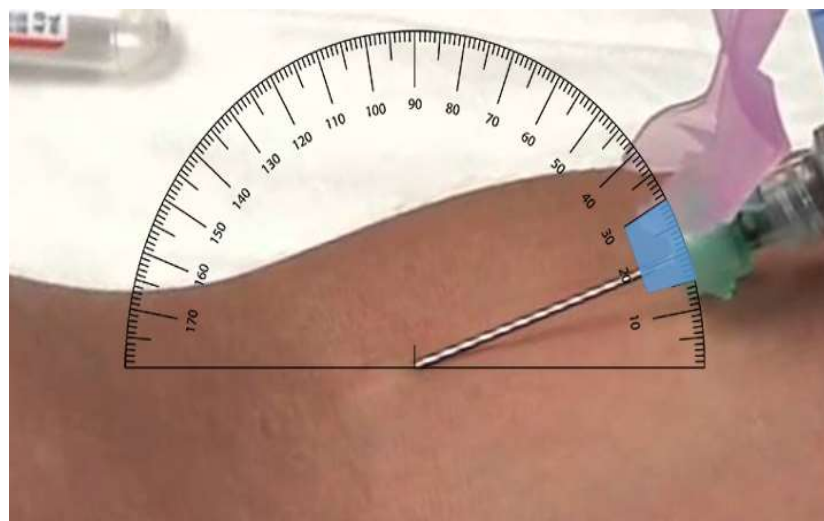


Bevel on vein lower wall does not allow blood to flow

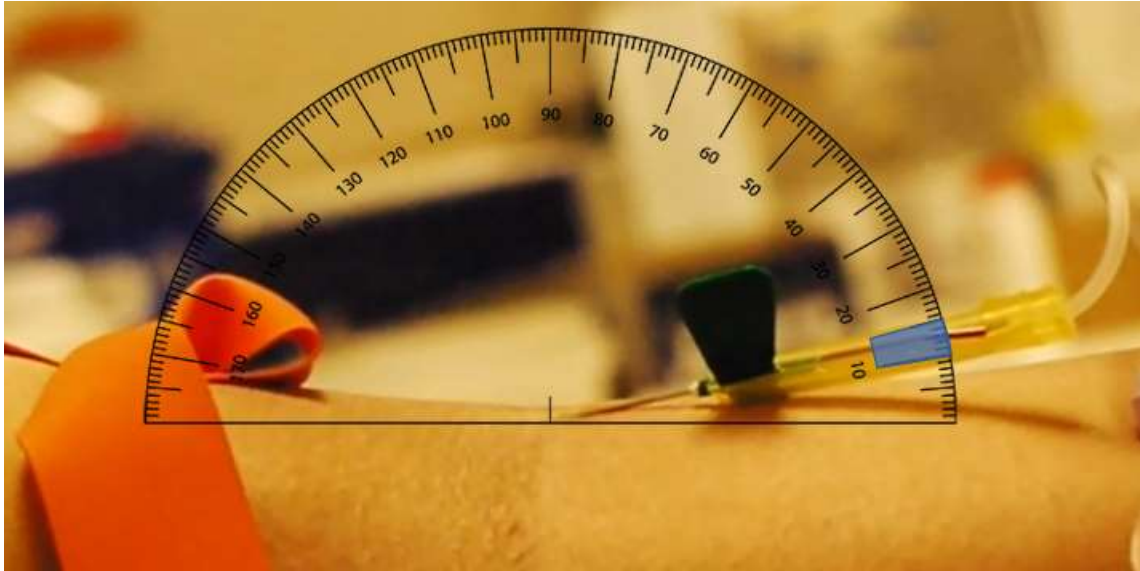


Correct insertion technique; blood flows freely into needle

Angle at 15-30° for routine venipuncture (hub / syringe). The deeper the vein, the greater the needle angle



Angle at 10-15° for Butterfly



Prevent Interference in Clinical Analysis

- In preparing a site for venipuncture or dermal collection, the 70% alcohol should be allowed to completely dry. This accomplishes two things: it gives the solution time to destroy bacteria and prevents the aqueous alcohol solution from causing hemolysis of the red blood cells which might affect the test results
- 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 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, while 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. 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 syringe

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
- 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 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
- Petechiae are most commonly associated with tourniquet application
- 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
- 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
- People who experience syncope may also complain of nausea before fainting
- Some patients have been known to vomit

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

Allergies

- Latex allergy
- Paper tape
- 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

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 amount of the sample has been collected for each test
 - i.e. A light blue tube must be filled adequately as the correct patient result depends on a ratio of 9 parts blood to 1-part anticoagulant
- 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 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

Prevent Sources of Error Regarding Specimen Integrity

Hemolysis

- Hemolysis is the destruction of red blood cells releasing hemoglobin into the plasma.
- Hemolysis is the rupture of red blood cells in a specimen caused by too much mechanical pressure from too small a needle (25g), too much vacuum on the vein 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 is not adequate for the test requested, it is considered "QNS" (quantity not sufficient) and would have to be recollected

Clotted

- 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

Incorrect Specimen Type

- A doctor requests a blood culture but the lab requests a urine culture inadvertently
- A doctor orders an FOBT but the patient is given an O&P kit instead
- The lab collects a routine urine instead of a clean catch mid-stream

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 23ga 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

Perform Specimen Collection on Difficult to Draw Patients

Pediatric

- The lancet used for a heel puncture on a full-term infant should not penetrate beyond 2.0 mm (0.85mm for a premature infant)
- Capillary blood samples may be taken from the lateral side of the heel of children until they begin to walk at which time the heel becomes tougher and more difficult to penetrate
- A winged infusion set with a 23ga 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
- Once a child begins to walk, the heel becomes too calloused to use for dermal blood collection
- Scalp veins are only used in neonates and usually only by nursing personnel
- Approach child slowly, speak clear. 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)
- 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 mutisample needle and 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

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

Factors That Might Affect Results

- Make notes of any factors that could change the test results i.e.
 - Not fasting
 - Not rested for basal state
- Fibrin clot from 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
- Samples would be rejected and need to be redrawn

Verbal and Non-Verbal Cues

Non-Verbal

- 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
 - Area in which one feels safe
 - Varies per individual
 - Size depends upon needs at the time
 - Children generally have the widest bubble

Kinesics

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

Kinesics Slip

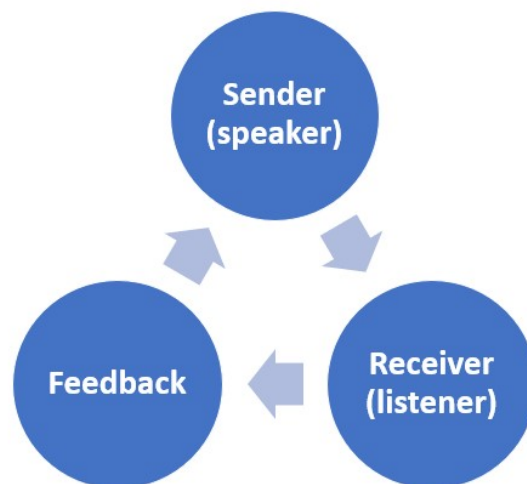
- Verbal and nonverbal messages do not match
- People trust what they see over what they hear (do as I say, not what I do).
- Be aware of patient nonverbal messages
- Watch nonverbal messages you are sending

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 assure understanding. This is known as active listening
- Making eye contact and non-threatening use of personal space are aspects of 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.



- 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 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
- The temperature of laboratory equipment (refrigerators, freezers, instruments, rooms) is monitored to insure proper specimen handling to produce accurate test results

Follow Up

- If the quality control indicator does not function properly, the patient results cannot be released
- 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

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

Adapt Interactions Based on Type of Patient

Pediatric Venipuncture

- Approach child slowly, speak clear. 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

- 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 their wheelchair)

Quality Assurance

Correct Tubes

- Most tests require a specific tube for accurate results i.e.:
 - CBC specimen submitted in a tube other than the required EDTA lavender tube
 - An electrolyte study submitted in a sodium heparin green tube
 - Tobramycin drug level submitted in a plain red tube instead of an SST

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
- 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 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

Expiration Dates

- Evacuated tubes have expiration dates to assure the viability of their contents, their sterility and the strength of the vacuum
- Decreased vacuum 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 sharps container

Sterility

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

Incorrect 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)

Perform Special Collections

Trace Elements

- Royal blue tubes are used for heavy metal screens
- EDTA - Lavender label (plasma)
- Activator - Red label (serum)
- Royal Blue
 - Toxicology
 - Nutrition
 - Trace Elements

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 (0.85mm for a premature infant)

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

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 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 protected health information (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 (Protected Health Information)
- According to HIPAA the patient's protected health information (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
- Assault is the threat of harm
- Fraud is deception by words or conduct
- Liability is being responsible for one's actions
- A sentinel event is an unexpected occurrence that leads to death or serious physical or psychological injury
- The Joint Commission (TJC) maintains a list of reportable sentinel events and TJC must be notified of these events
- The most serious of these for a phlebotomist is miss-identification of a patient which can cause misdiagnosis, incorrect treatment or death

Prevent Occurrences That Could Result in Legal Action

- Hematoma
- Nerve Damage
- Probing
- Patient Falls

Arterial Blood Gas

Allen Test

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

Allen Test Steps:

- 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

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

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

Deformation 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: Ethylenediaminetetraacetate. 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 of 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 or 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

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	_____

Abbreviations

What does this stand for?

ABY	_____
APTT	_____
BILI	_____
BP	_____
BUN	_____
CMP	_____
CBC	_____
Ca	_____
Cl	_____
CLIA	_____
CO2	_____
DIFF	_____
EDTA	_____
EMLA	_____
ESR	_____
FBS	_____
FUO	_____
GLUC	_____
GTT	_____
HbG or HB	_____
HBV	_____
HCG	_____
HCT	_____
HIPAA	_____
IV	_____
INR	_____
JCAHO	_____

Abbreviations

What does this stand for?

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

PRACTICE QUESTIONS

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. 900ml water to 100 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

- 8) What is the correct order for donning PPE?
- Gloves, mask, gown
 - Gown, mask, gloves
 - Mask, gloves, gown
 - Mask, gown, gloves
- 9) When transferring blood from a syringe into evacuated tubes you must?
- Uncap the evacuated tubes, place them into a tube rack and transfer the blood from the syringe through the hypodermic needle
 - Remove the hypodermic needle from the syringe and transfer the blood into capped evacuated tubes by pushing on the syringe plunger
 - 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
 - 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?
- before applying the pressure bandage.
 - immediately after removing the needle.
 - after removing the tourniquet.
 - 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

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 both patients 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. ethnicity
 - c. phone number
 - d. medical record or ID number
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. donor's name
6. The patient has an IV in one arm and sclerosed veins in the other arm. Where should you attempt to draw from first?
 - a. above the IV site
 - b. below the IV site
 - c. arm
 - d. hand below the sclerosed veins
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 nurse 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 sex
 - b. patient's name
 - c. phlebotomist's identification number
 - d. phlebotomist's name
 - 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 D.O.B.
 - c. diagnosis
 - d. date of draw
 - e. lab ID
10. Failure to mix the 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
 - 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. 5th finger
 - 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 with as a POCT?
 - a. HCT
 - b. BUN
 - c. D-dimer
 - d. INR
7. Place the options below in the correct order of draw when using micro containers.

☐ heparin
☐ no additive
☐ EDTA
☐ sodium fluoride

8. What effect does warming the site have on skin punctures?
 - a. hemolysis
 - b. hemoconcentration
 - c. blood flows more quickly
 - d. increases localized blood flow

9. 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. hematoma

10. 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)

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. 25
 - 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. 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?
 - 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 and 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. Physician orders an ESR, PT and D-dimer on an 11-month-old infant. Which of the following is the most appropriate for this blood collection?
- a. Heel puncture and two microcollection tubes
 - b. Heel puncture and three microcollection tubes
 - c. 21G 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 bend the arm
2. Upon arriving to 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 $\frac{3}{4}$ full
 - c. placed inside a locked container
 - d. placed out of reach of children
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 infection
 - 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 vacuum tube filled with blood 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. Don a gown and mask
 - c. Absorb the spill using paper towels
 - 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 bandage and let the patient leave
 - b. Bend the arm up, apply a 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, apply a pressure bandage, and notify the nurse
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 bandage (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

Advanced Infectious Disease 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
 - b. Place exposed personnel on medications
 - c. Offer HIV testing to the employee's significant other
 - d. Provide a confidential medical evaluation

2. What is the most common means of transmission of Hepatitis A?
 - a. consensual 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. 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 Latex 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 ER supervisor
 - b. Wash with a disinfectant for a minimum of 30 minutes
 - c. Wash the site with soap and water for a minimum of 30 seconds
 - d. Go to your provider for treatment

7. The most important thing to do if you sustain a sharps injury is to
 - a. inform the patients doctor
 - b. look up her medical history
 - c. file an incident report
 - d. change the needle 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 break a tube filled with blood on the counter, spilling it on the laboratory floor. Which of the following actions should you take next?
- a. Call EVS
 - b. Put on a gown
 - c. Use mechanical means and sharps container
 - d. Secure a trash 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. D-dimer 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 is verified
 - b. A technician will sign for the sample
 - c. The sample is photographed
 - d. The lab technician make a written statement

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 causes veins to collapse
 - b. It makes blood flow more slowly
 - 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
 - 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?
- Place the urine on ice
 - Keep the specimen at 37C
 - Place the urine specimen in the refrigerator
 - Store the urine at room temperature
9. What should be done to maintain the quality of specimens sent to the laboratory?
- Use a timer for serum clotting and use a timed centrifuge
 - Record the temperature of the blood
 - Use a timed centrifuge and record the temperature of the blood
 - Record the temperature of the lab and use a timer for serum clotting
10. You are assigned to manage an outpatient draw station. Prioritize the following patients in the correct order. (1 – 4)
- ☐ 2-hour post-prandial glucose level 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. hand vein
 - d. femoral vein

2. When preparing a site for 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. petechia
 - 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. 23ga 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 healed 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 the 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. Fish 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 911

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 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?
- Remove the tourniquet, pull out the needle, and select a different vein
 - Pull the needle back and reposition into the vein
 - Feel for the vein, reposition the needle, and enter the vein
 - 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.)
- failure to remove tourniquet before removing the needle
 - insertion of the needle through the vein
 - undisclosed hypertensive medication
 - excessive probing to locate the vein
 - wrong needle gauge used
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?
- Advance the needle a little further and observe for blood flash in the hub
 - Release the tourniquet and discontinue the draw
 - Pull the needle back slightly
 - 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 wrist band 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. Report to 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. from 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 3/4"
 - c. winged infusion 23g 3/4"
 - d. winged infusion 21g 1 1/2"

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. micro clots

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
- QNS
 - hemolyzed
 - exposed to light
 - 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?
- To cool down the specimen
 - To heat the specimen
 - To protect specimen from light
 - 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?
- Transfer blood from a full tube into the missing tube
 - Inform the patient and redraw all the tubes
 - Inform the patient and perform a 2nd collection of the missing tube
 - 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 an 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. "Are you Brad Pitt?"
10. A patient is having a 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 AST
 - d. yellow and D-dimer
7. When a 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?
- health facility number
 - DOB
 - patient ID
 - 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?
- The phlebotomist who neglected to document the temperatures will be fired
 - An inspector will give the lab a deficiency on the next inspection
 - The readings will be filled in by the supervisor
 - 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?
- light green top
 - SST
 - lavender top
 - 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
7. 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

8. 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

9. 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.

10. 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

Handbook for Practical Phlebotomy Students

2018 Edition

PHYSICIANS LABORATORY REQUEST FORM



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	
Marital Status Single <input type="checkbox"/> Married <input type="checkbox"/> Divorced <input type="checkbox"/>	SSN#	Sex Female <input type="checkbox"/> Male <input type="checkbox"/>	Hispanic Yes <input type="checkbox"/> No <input type="checkbox"/>	Veteran Status Yes <input type="checkbox"/> No <input type="checkbox"/>
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 test 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			MICROBIOLOGY/MOLECULAR					
	Basic Metabolic Panel	MP		Iron & IBC	IIBC	Specimen Source:		
	Comp Metabolic Panel	CMPN		Lipase	LIPAS		Bacterial Culture Aerobic Includes Gram Stain	Multi
	Hepatic Function Panel	HFP		Magnesium	MG		Bacterial Culture Anaerobic Must be ordered separately	Multi
	Acute Hepatitis Panel	AHP		Urine Microalbumin	UMAR		C. Difficile Antigen & Toxin	CDTXN
	Lipid Panel (Fasting)	LPC		Occult Blood, Fecal	FOB		Group A Strep by PCR	GASP
	Renal Panel	RP		Phosphorus	PKOS		Chlamydia (circle source)	CTNAA
	Obstetric Panel	Multi		Prostate Specific Ag	PSA		CX Rectal Urine Urethra Throat	CNGNAA
				PTH Intact and Calcicum	PTH		Chlamydia/Gonorrhea (circle source)	GCNAA
CHEMISTRY/IMMUNOLOGY			HEMATOLOGY/COAGULATION			TRANSFUSION SERVICES		
	Allergy Panel (Common Food)	ALLF		Testosterone	TESTO		Stool Culture	STOLC
	Allergy Panel (Common Aero)	ALLR1		Troponin-I	1TROP		Ova & Parasites w/ stain	OVAP
	Allergy Panel (Add'l Pollen)	ALLPN		Transferrin	TRF		Urine Culture	URINC
	Amylase	AMY		Thyroid Stim Hormone	TSH		Vaginitis Panel (Candida Trichomonas, Gardnerella)	DNAVAG
	B-HCG, Quant	HCG		Uric Acid	URIC			
	C-Reactive Protein	CRP		Vitamin B12	B12			
	CRP, High Sensitivity	CRPHS		Vitamin D25 Hydroxy	VD25			
	CK Total	CK						
	CKMB	CKMB						
	Estradiol	EST						
	Free T4	FT4						
	FreeT3	FT3						
	Ferritin	FER						
	Folate	FOL						
	FSH	FSH						
	Glucose 1hr PG 50gm	GLUPD						
	Glucose 2 hr PP 75gm	GLUPP						
	Hemoglobin A1C	GLYHB						
	Hepatitis C Ab	HCAB						
	HIV Ag/Ab Combo	HIVCO						
	Immuoglobulin, G.M.A.	IGQ						



GLUCOSE TOLERANCE TESTING (GTT)

1. 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 patient finished Glucola.

Instructions: No food during testing. Patient needs to remain in facility throughout testing and needs to be on time at each draw interval.

2. 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 drinks Glucola
- Draw GTT 2 hours after patient drinks Glucola

Instructions: No food during testing. Patient needs to remain in facility throughout testing and needs to be on time at each draw interval.

3. 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 drinks Glucola
- Draw GTT 2 hours after patient drinks Glucola
- Draw GTT 3 hours after patient drinks Glucola

Instructions: No food during testing. Patient needs to remain in facility throughout testing and needs to be on time at each draw interval.

4. 2-HOUR PP: Two Hour Postprandial

Tube: 2 x Gray

Testing Schedule/ Setup:

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

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 a 2 percent tincture of iodine solution.
 3. The cleaning is done with a 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 patient 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 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 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 bottle 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 jug and then pour it into the container

Patient Instructions for Collecting a 24-Hour Urine Specimen

Important: To insure 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 just 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 Starting Time: Hour _____ Date _____

Collection Ending Time: Hour _____ Date _____

Patient and Test Information for 24 Hour Urine Collection

Patient Name _____

Hospital # _____

Doctor's Name _____

Test Required _____

Preservative Added _____

of Bottles Used _____

Total Volume Collected _____

Collection Starting Time: Hour _____ Date _____

Collection Ending 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 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 two 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 aspirin or aspirin containing medicines (such as Alka-Seltzer, Anacin, Ascriptin, Excedrin, Florinal, or other over the counter pain or cold remedies) and take no preparations.

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 and 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.

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:
 - a. O&P – Blue/Gray vial
 - b. Culture vial- Orange vial
 - c. Pink vial- Giardia
2. Instruct patient to initially collect specimen in a clean separate container.
3. Using the applicator spoon provided on vial cap, 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 laboratory when completed.

Common Chemistry Test Abbreviations

Na - Sodium
Ca - Calcium
K - Potassium

ALP, AP - Alkaline
Phosphatase
Crea - Creatinine
P - Phosphorus

Lytes - Electrolytes
CO₂ - Carbon Dioxide
Cl - Chlorine/Chloride

Common Test Panels

Comprehensive Metabolic Panel (CMP)

- Albumin
- Creatinine
- Alkaline Phosphatase
- Glucose
- Alanine Aminotransferase (SGPT)
- Potassium
- Aspartate Aminotransferase (SGOT)
- Sodium
- Blood Urea Nitrogen
- Total Bilirubin

Basic Metabolic Panel (BMP)

- Glucose
- BUN/Creatinine Ratio
- Blood Urea Nitrogen
- Sodium
- Creatinine
- Potassium

Electrolyte Panel

- Sodium
- Potassium
- Carbon Dioxide (CO₂)
- Chloride

Lipid Panel

- Cholesterol
- Low Density Lipoproteins
- Triglycerides
- High Density Lipoproteins
- Very Low-Density Lipoproteins

Acute Hepatitis Panel

- Hepatitis B Surface Antigen
- Hepatitis B Core Antibody- IgM
- Hepatitis A Antibody
- Hepatitis C Antibody

Hepatic Function Panel - Liver Function Panel

- Albumin
- Total Bilirubin
- Direct Bilirubin
- Alkaline Phosphatase
- AST (SGOT)
- ALT (SGPT)
- Total Protein

Obstetric Panel / Prenatal Panel

- CBC with Differential,
- Hepatitis B Ag
- RPR
- Rubella
- ABO/RH Type
- Antibody Screen

Renal Function Panel - Kidney Function Panel

- Albumin
- Calcium
- Carbon Dioxide (CO₂)
- Chloride
- Creatinine
- Glucose
- Phosphorus
- Potassium
- Sodium
- Blood Urea Nitrogen