

Special Collection Procedures

A. Therapeutic Drug Monitoring (TDM)

1. Complex endeavor; requires coordination between lab, nursing and pharmacy
2. Used to evaluate the concentration of certain drugs for various reasons
 - a. Drugs that are highly toxic
 - b. For drugs with a narrow therapeutic range, and over or under dosing can have serious consequences
 - c. If the use of multiple drugs may alter the action of the drug being measured
 - d. When different patients metabolize drugs at different rates
 - e. If the patient's compliance with the medication regimen is questionable
3. Specimens are collected and evaluated for trough and peak levels
 - a. **Trough** – lowest level; specimen to be **drawn 15 minutes before next dose**
 - b. **Peak** – highest level; specimen **drawn 30 minutes after a dose**
 - c. Timing of collection critical – do NOT collect immediately after dose is given
 - d. Time it takes to peak varies with mode of infusion (IM vs. IV) and rate of infusion.
4. Time is more critical for drugs with short half-life such as gentamicin or tobramycin, than those with longer half-life such as phenobarbital or digoxin.
5. Random level appropriate for continuous infusion.
6. Confirm the following information prior to collection; some information may need to be included when labeling the tube or noted on paperwork
 - a. Whether order is for peak, trough, continuous infusion or random sample specimen
 - b. Date and time of last dose
 - c. Date and time of next dose
 - d. Mode of collection: venipuncture, central venous catheter collection, etc.
 - e. Nurse's verification that dose was administered

7. Type of specimen may vary with test methodology, verify correct tube for specific test ordered
8. Follow facility policy for correct handling and transport.

B. Collection for Trace Metals

1. Usually collected in Royal Blue stopper tubes, which are acid washed during manufacturing to be free of trace metals.
2. May be able to place Royal Blue tube in order of draw based on additive, but some test(s) may require a separate draw.
3. Testing may be performed at a reference lab.
4. Special collection AND handling guidelines must be established and followed.

C. Genetic Molecular Testing

1. Test are performed for a variety of reasons
 - a. Identify if the patient has a specific gene related to a disease or condition (examples: Cystic Fibrosis, BRCA)
 - b. Identify if a patient has a viral disease or to follow the progress of a disease or treatment (examples: HIV, HPV, Hepatitis)
 - c. Identify a patient or donor for possible organ or tissue transplant
 - d. Paternity testing
2. Testing may be performed on both blood and non-blood specimens.
3. Some tests require informed consent and counseling prior to testing.
4. Collection tube requirements and handling will vary with type of test ordered and testing methodology used. ie: ACD (yellow): transplant donor compatibility and paternity testing
5. Molecular testing is constantly expanding; always double check and follow specimen requirements and facility policy.

D. QuantiFERON TB (QFT)

1. Test is used as a screening tool for individuals at risk of exposure to TB, such as health care workers, and in the evaluation of the Tuberculosis status of patients suspected of having TB.
2. Test requires 1 ml of blood into each of 4 special tubes – gray, green, yellow & purple.

3. Unique collection requirements must be followed

- a. Collection **may not** follow the standard order of draw – follow package insert directions carefully.
- b. The 1 ml tubes are low pressure and will fill slowly; each tube should be kept on the needle 2-3 seconds after the tube appears to have finished filling to allow the correct volume to be collected.
- c. Tubes **must** be **shaken 10 times** just firmly enough to coat the entire inner surface of the tube.

4. If the samples are collected using a butterfly needle assembly, a discard tube is required to ensure the first tube will fill correctly.

5. Tubes must be maintained at room temperature for transport to the lab.

E. Blood Cultures

- 1. Indicated for patients with Fever of Unknown Origin (FUO), they are used by the physician to rule out or confirm bacteremia or septicemia.
- 2. Review the Objectives, Notes and Study Questions from the Blood Culture lab.

F. Glucose Testing

- 1. A variety of glucose testing protocols are used to screen and diagnose diabetes.
- 2. Review the Objectives, Notes and Study Questions from the Point of Care Glucose Testing lab.

G.. Lactose Tolerance Test

- 1. Patients who have problems digesting lactose, a milk sugar, lack a mucosal enzyme which breaks down lactose.
- 2. This results in gastrointestinal (GI) discomfort and diarrhea which goes away when milk is eliminated from the diet.
- 3. Breath hydrogen content
 - a. The preferred, non-invasive method
 - b. Requires drinking a liquid that contains high levels of lactose
 - c. Breath samples are collected as the patient exhales
 - d. Exhaled gases tested for hydrogen, a by-product of bacteria that breaks down lactose but is not absorbed
- 4. Lactose Tolerance Procedure – very similar to the Glucose Tolerance Procedure

- a. A fasting glucose level is drawn
- b. Patient is given 50 grams of lactose
- c. Specimens are drawn similar to GTT
- d. Specimens tested for glucose
- e. A less than 20 mg/dL increase in glucose over the fasting level, with gastrointestinal symptoms after a lactose load is considered abnormal and consistent with lactose deficiency.
- f. The patient must have convenient access to the restroom throughout the test.

H. Kit Draws

1. Patients in the outpatient setting will come in with a “kit” of blood tubes; these kits may be used for a variety of reasons, such as clinical trials or special testing.
2. The tubes in the kit may not have the standard tube colors; read the package insert carefully to determine the correct order of the draw, and other special collection and handling instructions.

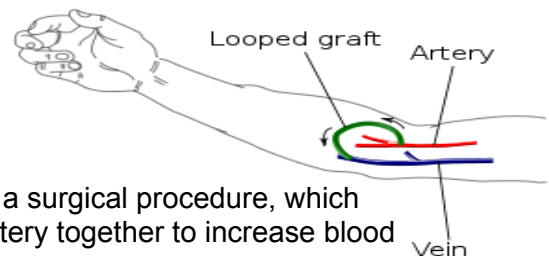
I. Vascular Access Devices (VAD)

1. A vascular access device (VAD) consists of tubing inserted into a vein, or in the case of a newborn in the umbilical cord.
2. VAD's are primarily used for administering fluids and medications.
3. Phlebotomists may NEVER use any type of VAD for blood collection.
4. Nurses or other specially trained personnel may use certain types of VADs for blood collection, flushing of the tubing or discard of the first blood collected is required.
5. Phlebotomists may be present when nurses perform these draws and may assist, such as correct order of draw, tube inversions, and labeling.
6. Any blood sample collected from VADs must be documented as such.
5. Types of VADs
 - a. An Intravenous (IV) line is the most commonly encountered type.
 - 1) The IV is inserted into the patient's vein, typically in the back of the hand, lower arm or antecubital area, by nursing personnel.
 - 2) The IV tip is usually about 1 inch above the point of insertion.

- b. Heparin lock or saline lock
 - 1) IV connected to extension tubing fitted with a positive pressure cap.
 - a) Saline or heparin is used to flush and then “lock” the line and prevent clotting when the line is not in use.
 - 2) Can be used for blood draws and medications.
- c. Central Venous Catheter (CVC)
 - 1) Sometimes called a Central Venous Line
 - 2) The CVC is a tube inserted into a large vein in the neck or upper chest. The tubing is threaded through the vein with the tip located near the patient's heart.
- d. Peripherally Inserted Central Catheter (PICC)
 - 1) Inserted into the vein of the upper arm, may have multiple access ports extending out of the upper arm.
 - 2) Tip is in the Vena cava just above the heart.
- e. Port-a cath or PORT
 - 1) A small chamber that is surgically placed under the skin in the upper chest by a doctor.
 - 2) PORT does not extend outside of the body, and is accessed through the skin.
 - 3) Tip is in the Vena cava above the heart.
 - 4) For chemo and medications, special needles are required for blood draws

f. Fistula

- 1) A fistula (or shunt) is created by a surgical procedure, which permanently fuses a vein and artery together to increase blood flow rates.
- 2) Fistulas are used for dialysis and should not be used for phlebotomy procedures.





g. Cannula

- 1) A tubular device that extends to the outside of the lower arm.
- 2) Used primarily for dialysis, may be used for blood collection by specially trained personnel.

J. Blood Donor Collections

1. Donor interview and physical *serves two purposes*
 - a. To protect donors by ensuring that the donation will not endanger their health.
 - b. To protect potential recipients from blood transmitted diseases.
2. Donor interview
 - a. Uses a nationally standardized questionnaire to inquire about medical history, medications and past or present risky behavior.
 - b. Must be done in a respectful manner that ensures privacy.
 - d. Deferrals may be temporary or permanent based on medical history. Deferral time and reasons are subject to change.
 - 1) Permanent deferral: hepatitis, most cancers, heart disease, IV drug abuser, AIDS, certain medications, high risk behaviors
 - 2) Temporary deferral (12 months or more): transfusion of blood or blood components, sexually transmitted disease (STD), recent inmate of penal institution, certain medications, accidental needle exposure
 - 3) Temporary deferral (less than 12 months): immunizations, pregnancy, surgery that does not require blood transfusion, recent blood donation, symptoms of cold or active allergy, aspirin, other medications
3. Donor physical
 - a. Confirms that the donor is healthy and meets donation requirements.

- a. Weight – minimum is 110 lbs (in Austin area, minimum weight is 123 lbs. due to larger volume collection bag)
 - b. Temperature – cannot exceed 99.5° F
 - c. Pulse – must be strong, regular, and between 50 and 100 beats per minute (bpm)
 - d. Blood pressure – cannot exceed 180 mm Hg systolic and 100 mm Hg diastolic
 - e. Hematocrit – minimum of 38%
 - f. Hemoglobin – minimum of 12.5 g/dL
 - g. Phlebotomy site must be free of lesions. Both arms should be examined for signs of drug abuse.
 - h. General appearance of donor – not excessively nervous or appear to be under the influence of drugs or alcohol
4. Collection of donor's blood
- a. Donors should be encouraged to eat 4 to 6 hours prior to donation to minimize dizziness, fainting or other reactions.
 - b. Donors must always be in a reclining position during donation.
 - c. Blood for donation should be collected using **sterile** technique, similar to blood culture collection technique.
 - d. A 15 to 18-gauge needle is used to collect the blood quickly and without damage to RBCs.
 - e. Donor remains in reclining position for approximately 5-10 minutes after donation, then moves to seated position in lounge area for refreshments for additional 10-15 minutes.
5. Autologous donation
- a. Donation of blood by the patient to be given back to the patient during elective surgeries where anticipation of excessive blood loss is high.
 - b. Must be ordered by the Doctor
 - c. Donor requirements are not as strict as this blood will only be used for this patient.
 - d. Safest transfusion possible.
6. Directed donors

- a. Friends and relatives donate blood for use by a specific patient.
- b. Expensive and the least safe type of blood to use. Social pressure to donate may compromise reliability of donor's answers to health-history questions.
- c. Exception is the rare time when only specific individuals are compatible with the patient.

7. Therapeutic phlebotomy

- a. Procedure where removal of blood is beneficial to the patient, i.e., polycythemia or hereditary hemochromatosis
- b. Physicians must provide a written request.
- c. Depending on the physical condition of the patient, performed at a blood center or hospital.

K. Blood Collection in the Emergency Room (ER)

- 1. Phlebotomist's role will vary from state to state, hospital to hospital
- 2. Atmosphere is unique depending on the trauma level status of the ER
 - a. Some ERs are chronically filled with people in pain, ranging from minor illnesses or injuries to major trauma.
 - b. Family members who accompany the patient may be very emotional and vocal.
- 3. Upon arrival, patients are **triaged**, the process where they are evaluated and prioritized according to severity of illness or injury..
- 4. Stress level may be very high
 - a. It is vital that the phlebotomist follow orders exactly and not require extensive, time consuming directions.
 - b. Phlebotomist must be able to handle the sight and sound of traumatically injured patients in pain, profuse bleeding, and disfigurement due to injuries.
 - c. All ER personnel must resolve and quickly dismiss irritations and loss of temper which may interfere with patient care.
 - d. Requires a mature, responsible personality.
 - e. The ER is not for everyone. Some work for a short time and cannot handle it. Others thrive on the stress and excitement and would not work anywhere else.

L. Arterial Blood Gases (ABG)

1. Collection of arterial specimens is NOT an entry level procedure. Additional training and observation is required. This topic is included for informational purposes.
2. Traditionally, this test was performed in the Chemistry department, but most hospitals have moved this collection and testing to the Respiratory Therapy Department.
3. Arterial blood gases are used for the diagnosis and management of respiratory disease, providing valuable information about a patient's oxygenation, ventilation and acid-base balance. This test is always a STAT test.
4. ABG includes the following laboratory tests: pH, pCO₂ and pO₂.
5. ABG are collected in a syringe with a barrel that has been coated with heparin just prior to use. The samples will pulse into the syringe due to arterial pressure.
6. The radial artery in the wrist is the first choice for a collection site. The second choice is the brachial artery of the wrist.
7. A Natelson tube is used to collect capillary blood gases from the heels of babies or the fingertips of small children. Capillary samples may also be collected from the umbilical or scalp arteries of infants.
8. The Modified Allen Test is used to check for collateral circulation to the hand prior to arterial puncture.
9. Hazards of ABG
 - a. Hematomas are more likely, due to higher arterial pressure; the risk increases in patients on anticoagulants and the elderly.
 - b. Arteriospasm, an involuntary reflex condition caused by needle insertion into an artery, may cause the patient pain or discomfort and may interfere with the collection.

M. Bleeding Time

1. The Bleeding Time is used to assess platelet function and capillary integrity.
2. Duration of bleeding time depends upon:
 - a. Quantity of platelets
 - b. Quality of platelets
 - c. Ability of blood vessel wall to constrict

3. The bleeding time test dates to the early 1900's and its use has decreased in recent decades in favor of better, more specific coagulation tests.
4. Prior to the procedure, the patient interview should include the following:
 - a. A brief explanation of procedure - it may take 15-30 minutes to complete.
 - b. There may be discomfort from the blood pressure cuff and the incision
 - c. Patients may have a small scar from the incision.
 - d. Ask if they have taken any of the following medications in the last two weeks:
 - 1) Aspirin or aspirin containing products
 - 2) "Blood thinners" such as heparin or Coumadin
 - 3) Other drugs, such as dextran, streptokinase, ethyl alcohol, or mithramycin
5. A brief overview of the bleeding time procedure
 - a. Proper patient identification and patient interview
 - b. A blood pressure cuff is applied to the upper arm of the patient.
 - c. An appropriate testing site on the lower forearm is cleansed and allowed to dry.
 - d. **The blood pressure cuff is inflated to 40 mmHg.**
 - e. A minor incision is made with the aid of a Bleeding Time Device **at the same time** a stopwatch or other timing device is initiated
 - f. Every 30 seconds, the edge of a piece of filter paper is carefully brought in contact with the edge of the drop of blood; the blood is wicked onto the paper
 - g. Timing stops when bleeding has completely stopped and no more blood wicks onto the filter paper OR 15 minutes have elapsed.
 - i. If bleeding does not cease within 15 minutes, the procedure is discontinued and is repeated on the other arm.
 - j. If bleeding on the second arm also does not cease within 15 minutes, discontinue the test; report these results as "Bleeding Time Greater than 15 minutes."
6. There are a few doctors in the Austin metro area who still order the Bleeding Time test. Facilities where this test is still performed provide on the job training for this procedure.