

8. Complications In Blood Collection

- A. A variety of adverse complications may be encountered during the blood collection process. The following are the most commonly encountered.
1. Fainting (syncope)
 - a. Patient becomes dizzy and faint at the site of blood or due to fasting.
 - b. ASK the patient if they have a tendency to faint, if YES, have them lie down.
 - c. If during the procedure patient states they are faint or appear faint **REMOVE THE NEEDLE** immediately, have patient lower the head and breathe slowly and deeply.
 - d. Signs that patient is about to faint include: blood draining from their face, rapid breathing, restless movement.
 - e. Ask for help to move the patient.
 - f. Talk to the patient calmly, apply a wet towel to the back of the neck, offer juice or water.
 - g. If the patient faints, remove needle and break the fall, request help.
 - h. Do not allow the patient to leave until they have recovered.
 - i. Fill out incident report.
 2. Failure to draw blood may be due to needle inserted incorrectly or vacuum lost in tube
 - a. If you suspect the needle is not properly inserted, gently and carefully reposition. **DO NOT DIG FOR VEINS.** Withdraw slightly, reposition, reinsert.
 - b. If you suspect vacuum in tube is lost, change tubes. Always have extra tubes within reach.
 3. Hematomas occurs when area around puncture site begins to swell indicating that blood is leaking into the tissues which *will result in a bruise.*
 - a. Due to partial insertion into the vein or insertion through the vein.
 - b. If this happens **IMMEDIATELY** remove the needle, apply pressure for 2 minutes and recheck to ensure bleeding has stopped.
 - c. Fill out incident report.
 4. Petechiae
 - a. Prior to blood collection examine potential site. Small red spots on the patients skin may indicate rupture of minute veins below the skin.
 - b. May be due to coagulation problems or abnormalities.
 - c. Phlebotomist must be aware of the fact that the patient may bleed excessively after blood collection.
 - d. Make sure bleeding stops prior to leaving the patient. Notify nurse of excessive bleeding if it occurs.
 5. Excessive bleeding after venipuncture
 - a. Patient on anticoagulants, on aspirin containing medications or has decreased number of platelets
 - b. Do not leave patient until bleeding has stopped

6. Neurologic
 - a. Patient may feel sharp, electric tingling if nerve is hit.
 - 1) Immediately discontinue the venipuncture.
 - 2) Fill out incident report and submit.
 - 3) Patient may need physical therapy.
 - b. Seizures
 - 1) Rare complication, immediately stop the venipuncture.
 - 2) Call for help.
 - 3) Do not place anything in the patient's mouth.
 - c. Fill out incident report.

7. Mastectomy
 - a. Women who have had a breast removed will also have had adjacent lymph nodes removed.
 - 1) This will greatly reduce lymph flow to the arm on the side of the mastectomy.
 - 2) May increase the possibilities of infection or it may result in lymphedema.
 - b. Lymphedema is an accumulation of lymphatic fluid that causes swelling in the tissue of an arm or leg.
 - 1) Accumulation of this fluid can occur after lymph nodes or vessels are surgically removed or damaged.
 - 2) Lymphatic fluid is clear and collected from tissue in all parts of the body.
 - c. Ask patient about arm preference.
 - d. If double mastectomy confer with physician, may need to perform finger stick or perform venipuncture on legs or feet.

8. Edema
 - a. Abnormal accumulation of fluids in intercellular spaces of the body.
 - b. Can be localized or diffuse.
 - c. Avoid collection blood from these sites, usually hands and feet, but arms can be swollen, will contaminate specimen with tissue fluids.

9. Obesity
 - a. Obese patients generally have veins that are very deep and, thus, are difficult to visualize or palpate.
 - b. Any puncture made may have to be made based on phlebotomist's knowledge of venous anatomy.
 - 1) This is essentially a "blind" stick.
 - 2) Should only be made by the most experience personnel.
 - c. If the vein is missed take care not to probe excessively as this will cause rupture of RBCs, increase concentration of intracellular contents and release of tissue clotting factors.
 - d. Consider possibility of finger stick.

10. IV therapy **never** draw above an IV site, consider the following:
 - a. Try opposite arm.
 - b. When there is no other option always draw from site 5 inches below IV site.
 - c. If IV in both hands confer with nurse to determine if blood can be drawn from IV line, the IV is disconnected, syringe attached, first 6ccs discarded, and blood is drawn for testing.
 - d. Proper protocol must be followed which involves having IV turned off waiting appropriate time limit, discard first tube drawn
 - e. Evaluate feet or legs, however if patient has been bedridden for extended periods of time this may increase chance of phlebitis.
 - f. Extended IV therapy may cause veins to damaged or occluded.

11. Damaged, sclerosed or occluded veins
 - a. Sclerosed or hardened veins due to inflammation or disease.
 - b. Patients whose veins have been repeatedly punctured often become scarred and feel hard when palpated.
 - c. Blood is not drawn easily, best to avoid these sites.

12. Hemoconcentration
 - a. An increase in concentration of large molecules and formed elements in the blood.
 - b. Some causes are:
 - 1) prolonged tourniquet application
 - 2) massaging, squeezing or probing a site.
 - 3) long term IV therapy
 - 4) sclerosed or occluded veins
 - 5) dehydration
 - 6) certain diseases
 - c. Hemoconcentration may cause false increase in: potassium, magnesium, LDH, phosphorous, ammonia, and total protein.

13. Hemolysis
 - a. When RBCs are ruptured hemoglobin is released and serum appears pink to red.
 - b. If grossly hemolyzed will appear dark red.
 - c. May be due to conditions such as: burns, snakebite or some diseases.
 - d. *Usually* caused by improper technique:
 - 1) needle too small
 - 2) pulling too hard on plunger of syringe
 - 3) expelling blood vigorously into a tube
 - 4) shaking/mixing specimen in tube too vigorously
 - e. *May cause false increase in: potassium, magnesium, iron, LDH, phosphorous, ammonia and total protein.*

14. Collapsed veins
 - a. May be caused by pulling syringe plunger back too quick or too hard, use gentle pressure.
 - b. Vacutainer used on small veins.

15. Allergies
 - a. Patient may be allergic to iodine or other solutions used to disinfect the site.
 - b. Prior to using iodine or betadine ask patient if they are allergic, if the answer is "yes", use alternative method as directed by your site.
 - c. Latex allergy
16. Thrombosis
 - a. Thrombi are solid masses derived from blood constituents in the vessels, ie, a clot.
 - b. Thrombus may partially or fully occlude a vein or artery making venipuncture difficult.
17. Burned or scarred areas should be avoided.
 - a. Burned areas a very sensitive and susceptible to infection.
 - b. Veins under scarred areas difficult to palpate and difficult to insert needle.
18. Infections
 - a. Patient may have transmissible disease, ie, hepatitis, which may be transmitted to phlebotomist.
 - b. ALWAYS FOLLOW THE APPROPRIATE INFECTION CONTROL POLICIES.
 - c. Special infection control measures will be posted on the patient's door.

B. Physical Disposition

1. The **basal state** refers to the patient's physical condition in the early morning hours approximately 12 hours after the last meal. Many factors can affect the basal state.
 - a. Results of lab tests are more reliable because **normal values** are most often determined from specimens collected during this time.
 - b. It is recommended that specimens collected for determination of concentrations of the following analytes be collected during this time:
 - 1) glucose
 - 2) cholesterol
 - 3) triglycerides
 - 4) electrolytes
 - 5) proteins
2. Diet
 - a. To ensure a basal state, overnight fasting is necessary as blood composition is significantly altered after a meal.
 - b. **Fasting** refers to abstinence from food and beverages **except** water.
 - c. Fasting time will vary according to test ordered and it is critical to ask a patient when they last ate.
 - d. If a patient has eaten and the doctor still wants the test drawn write "non-fasting" on the lab requisition.

- e. Phlebotomists may need to instruct patient. It is best to give oral **and** written instructions and emphasize the importance of following these directions:
 - 1) Coffee/tea are not allowed, may cause fluctuation in blood glucose.
 - 2) Water is allowed and encouraged to prevent dehydration which will also alter test results.
 - 3) Specify the time when fasting must start.
 - f. Serum is normally clear, light yellow or straw colored, turbid specimens appear cloudy and milky and may be due to the following:
 - 1) **Lipemia**, excess fats in the blood due to lipids present after eating fatty substances such as meat, butter, cream or cheese.
 - 2) Lipemic specimens may indicate the patient is not in a basal state.
 - 3) Rarely, cloudy specimens may indicate presence of bacteria.
3. Exercise
- a. Moderate or excessive exercise has a marked effect of the following lab results: lactic acid, creatinine, fatty acids and some amino acids, proteins and enzymes.
 - b. Most return to normal shortly after exercise except enzymes such as CK, AST and LDH, which will return to normal within 24 hours.
 - c. Some research indicates exercise affects hemostasis.
4. Stress
- a. Patients are often frightened, nervous and overly anxious.
 - b. Anxiety can cause a transient increase in WBCs, albumin, fibrinogen, glucose, cholesterol and insulin, a transient decrease in serum iron, and abnormal adrenal hormone values.
 - c. Violent crying in newborns will have WBC counts 140% above baseline counts. Even mild crying will cause 113% increase, but will return to normal after one hour.
5. Diurnal rhythms and posture
- a. Body fluids fluctuate during the day.
 - b. Certain hormone levels are reduced in the afternoon, while eosinophils and serum iron are increased.
 - c. Posture changes are well known to alter lab results.
 - 1) Important to consider when comparing in-patient versus out-patient results.
 - 2) Changing from supine to sitting or standing causes water to shift from intravascular or interstitial compartments.
 - 3) Certain large molecules are not filterable to the tissues.
 - 4) Enzymes, proteins, lipids, iron and calcium significantly increase with position changes.
6. Tourniquet Interference and Fist Pumping
- a. May cause false increase or decrease in certain analytes in the blood.
 - 1) Some analytes leak *from blood into the tissues* causing false increase in: plasma cholesterol, iron, lipid, protein and potassium.
 - 2) Certain enzymes may be falsely increased or decreased.
 - 3) Tourniquets interference can occur within 3 minutes.

- b. Avoid having the patient excessively pump their fist as this may lead to a false increase in potassium, lactate, and phosphate.

C. Other Factors Affecting the Patient and Laboratory Results

1. Age, gender and pregnancy will influence lab results.
 - a. Reference ranges (normal values) often listed according to age as there may be dramatic differences.
 - b. Gender - many normal values are different based on gender, esp hematology.
 - c. Pregnancy normal values established for OB-GYN clinics.
2. Geographical location - altitude, temperature and humidity - will affect normal baseline values.
 - a. It is essential that each lab establish normal values for their particular patient population and location.
 - b. Protocols are in place to establish normal values on new equipment as well as periodically through out the year to verify the machine is still in proper calibration.

D. Interferences of Drugs and Other Substances in Blood

1. Very complex and depends on the type of analysis used.
2. Drug interference is decreasing due to the development of more sensitive and specific procedures.
 - a. Drugs may affect one or more of the following systems: hepatic, hematologic, hemostatic, muscular, pancreatic and renal, which may obscure the true clinical diagnosis.
 - b. Drugs can cause *falsely* elevated or decreased values in the analyte being measured.
3. IV medications and dyes used for certain x-ray procedures may affect results of lab tests.
4. The phlebotomist can aid the clinical laboratory by notating on the lab requisition whether the patient has had certain procedures or drugs which may affect lab tests.