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The Y's of Phlebotomy

Phlebotomy:

The act or practice of opening a vein by incision or puncture to remove blood as a therapeutic treatment or the drawing of blood for laboratory analysis.

Blood is usually collected into plastic tubes (or rarely glass tubes) that contain a vacuum to assist fillings the tubes. Usually blood is collected by venipuncture using a needle. On some occasions, blood may be collected by puncturing the skin with a retractable lancet device. A detailed description of the art of phlebotomy may be obtained by using the CAP web site (www.cap.org) and searching on "So you're going to collect a blood specimen, an introduction to phlebotomy."

The analytic phases of laboratory testing

All laboratory testing consists of three phases:

1. Pre-analytic (pre-testing)
2. Analytic (testing)
3. Post analytic (reporting phase)

All of the above phases have great impact on the laboratory test result. Specimen collection and specimen integrity are included in the pre-analytic phase.

The pre-analytic phase includes:

- The test order from the physician.
- The transport of specimens.
- Phlebotomy:
 - Proper selection of equipment
 - Proper identification of the patient
 - Proper Specimen collection
 - Proper tube labeling
- Preparation of test samples that will be sent to a reference laboratory
- Laboratories with laboratory computer control must be concerned with data accessioning.
- Prior to testing, the blood sample must be examined to assure that it has been collected in the proper tube in a manner that does not harm that sample.

Y is phlebotomy an important part of the laboratory result?

70% of laboratory error occurs in the pre-analytic phase of laboratory testing.
A few examples are:

- *Hemolysis* (the release of hemoglobin into the serum or plasma due to ruptured red blood cells) can be caused by many factors and can affect results such as an increase in such tests as potassium, LDH, AST, ALT, Phosphorous, Magnesium,

Ammonia and a decrease in RBC and Hgb/Hct. Hemolysis can also cause a dilution effect on all other analytes.

- Leaving the tourniquet on longer than 1 minute can cause hemoconcentration.
- Short sampling can result in excessive anticoagulation and red cell shrinkage, affecting HCT values.
- Pumping the fist to make veins visible can induce changes in the blood, particularly potassium and ionized calcium.

The collection of blood samples should be undertaken gently and with great care to insure an accurate test result.

Y should you be concerned about preparing the patient prior to obtaining the blood specimen?

The patient should be approached in a friendly and relaxed manner. Phlebotomy can be preformed gently and relatively painlessly when performed in a caring manner. Proper patient identification is of the utmost importance. The Joint Commission has established patient safety goals for hospital accreditation. Many of these are appropriate for the physician office laboratory. One of those is as follows:

- Goal 1: Improve the accuracy of patient identification.
- Goal 1A: Use at least two patient identifiers when providing care, treatment or services.

Always be certain that you are drawing the correct specimen from the correct patient and label all collection containers with the patient name and record or chart number, as well as, date and time of collection. Specimens should never be pre labeled.

Y should you collect the blood tubes in a certain order?

Additive carryover from one tube to the next was observed independently at two hospitals, St. Barnabas Medical Center in Livingston, NJ, and Hillcrest Medical Center in Tulsa, OK in 1977. The National Committee for Clinical Laboratory Standards (NCCLS) instituted an order of draw designed to prevent erroneous results due to additive carryover.

The recommended order of draw and fill (with syringe or Vacutainer method) is as follows:

- Blood Culture bottles
- Coagulation tube (baby blue top)
- Serum gel separator tube with serum separator (gold, tiger top, speckled top) and/or Non additive *serum* tube (red top, plain tube)
- Heparin tube (green top)
- EDTA tube (purple top)
- Fluoride tube (gray top)
- Miscellaneous tubes (heavy metal dark blue top, ACD yellow top)

What should you do if you need to draw blood from an infant?

Infants present a particular challenge for the phlebotomist. Remember that an infant has the same circulatory anatomy as an adult. They are just smaller. Use smaller equipment. Butterflies and syringes work well. Keep in mind the less pressure used during the draw the better the sample. Generally, blood is collected from neonates and infants less than 20 lbs by capillary puncture of the heel. Prewarming the infant's heel greatly increases blood flow.

The following guideline may be followed when collecting blood from pediatric patients:

- Calculate the amount of blood that may be taken from a patient based on the patient's weight when volumes of blood required to perform the tests ordered are excessive.
- Use the following calculation:
1.7 ml/kg of weight
2.2 lbs. = 1.0 kg
Example: 11 lb/ 2.2 = 5.0 kg
5.0 x 1.7= 8.5 ml
- An 11 lb baby can have 8.5 mls of blood drawn

This volume of blood can be drawn safely during an office or clinic visit, drawing a larger amount, or drawing this volume on consecutive days may cause anemia.

Finger and heal vs. vein

Adult blood draws are usually performed by venipuncture. It is important to note that there are factors that will affect the test results. The tourniquet should not be left in place for an extended length of time. The fist should not be pumped during the draw. If a syringe is used, excess pressures during the draw will affect the quality of the sample. Always use the order of the draw.

There are situations that necessitate drawing the sample by skin puncture. When performing this procedure we are tempted to pressure the finger or heal and scoop the blood as it exits the wound. This must be avoided because it will create hemolysis and tissue fluid contamination of the specimen. Always collect the hematology specimen first, followed by the chemistry specimens. This order of the draw minimizes the clotting of the specimen and is the opposite of that used for venipuncture.

The venipuncture will produce a better quality specimen free of clots and contaminations found in heal and finger collection.

References:

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