

SPECIMEN PROCUREMENT and HANDLING

Specimen Acceptability Policy

All specimens must be labeled with two positive patient identifiers, the patient's first and last name, plus a unique numerical identifier. This number can be the patient's Medical Record Number, Social Security Number, or birth date. Tubes should also be labeled with Collection Date/Time and Initials of person collecting the specimen.

Testing will not be performed on specimens that are not labeled as described above. Unlabeled specimens will be rejected; the physician office notified and the test will be credited.

This policy does permit the Relabeling of the following irretrievable specimens only:

- Neonatal specimens
- All fluids (CSF, amniotic fluid, peritoneal, etc)
- Bone Marrow
- Needle aspirates
- Timed blood/urine specimens
- Tissue/biopsy
- Pap Smear
- Microbiology specimens collected through invasive procedures

The individual who re-labels the specimen must take responsibility for confirming the identity of the patient and must sign a Specimen Exception Form.

Order of draw:

Blood collection tubes must be drawn in a specific order to avoid cross-contamination of additives between tubes. The recommended order or draw is:

1. Blood culture bottle (Blue – Aerobic and Burgundy – Anaerobic)
2. Non-additive tube (red stopper)
3. Coagulation tube (light blue stopper). A light blue stopper (sodium citrate) tube is always the first tube drawn, unless a Blood Culture is requested. If a coagulation assay is the only test ordered, a discard tube is no longer required with a single draw needle. However, due to the air displacement in the tubing, when using a butterfly needle a discard tube (either non-additive/red or light blue) should be drawn first and then draw the light blue stopper tube for the testing.
4. Last draw – additives* in this order:

4.1 SST (with or without clot activator and gel)

4.2 Heparin (Lithium or Sodium / with or without gel / dark green stopper)

4.3 EDTA (lavender / pink stopper)

4.4 Oxalate/fluoride (light gray stopper)

*Note: Tubes with additives must be thoroughly mixed. Erroneous test results may be obtained when the blood is not thoroughly mixed with the additive.

Venipuncture site selection:

Although the larger and fuller median cubital and cephalic veins of the arm are used most frequently, wrist and hand veins are also acceptable for Venipuncture.

Certain areas are to be avoided when choosing a site:

- Intravenous therapy (IV) / blood transfusions - fluid may dilute the specimen, so collect from the opposite arm whenever possible.
- Extensive scars from burns and surgery - it is difficult to puncture the scar tissue and obtain a specimen.
- The upper extremity on the side of a previous mastectomy - test results may be affected because of lymphedema.
- Hematoma - may cause erroneous test results. If another site is not available, collect the specimen distal to the hematoma. Perform the Venipuncture. Draw 5 ml of blood and discard before drawing the specimen tubes for testing.
- Cannula/fistula/heparin lock - hospitals have special policies regarding these devices. In general, blood should not be drawn from an arm with a fistula or cannula without consulting the attending physician.
- Edematous extremities - tissue fluid accumulation alters test results.

Additional considerations:

To prevent a hematoma:

- Puncture only the uppermost wall of the vein
- Remove the tourniquet before removing the needle
- Use the major superficial veins
- Make sure the needle fully penetrates the upper most wall of the vein. (Partial penetration may allow blood to leak into the soft tissue surrounding the vein by way of the needle bevel)
- Apply pressure to the venipuncture site for 2-3 minutes. If the specimen is bright red, and it is suspected that it was collected arterially, pressure should be maintained for a minimum of 5 minutes.

To prevent hemolysis (which can interfere with many tests):

- Mix tubes with anticoagulant additives gently 5-10 times
- Avoid drawing blood from a hematoma
- Avoid drawing the plunger back too forcefully, if using a needle and syringe, and avoid frothing of the sample
- Make sure the Venipuncture site is dry
- Avoid a probing, traumatic Venipuncture

Indwelling Lines or Catheters: *Potential source of test error*

- Most lines are flushed with a solution of heparin to reduce the risk of thrombosis
- Discard a sample at least three times the volume of the line before a specimen is obtained for analysis.

Hemoconcentration: An increased concentration of larger molecules and formed elements in the blood may be due to several factors:

- Prolonged tourniquet application (no more than 2 minutes).
- Massaging, squeezing, or probing a site.
- Long-term IV therapy.
- Sclerosed or occluded veins

Prolonged Tourniquet Application:

- Primary effect is hemoconcentration of non-filterable elements (Le. proteins). The hydrostatic pressure causes some water and filterable elements to leave the extracellular space.
- Significant increases can be found in total protein, aspartate aminotransferase (AST), total lipids, cholesterol, and iron.
- Affects packed cell volume and other cellular elements.

Patient Preparation Factors:

- Therapeutic Drug Monitoring: different pharmacologic agents have patterns of administration, body distribution, metabolism, and elimination that affect the drug concentration as measured in the blood. Many drugs will have "peak" and "trough" levels that vary according to dosage levels and intervals. Check for timing instructions for drawing the appropriate samples.
- Effects of Exercise: Muscular activity has both transient and longer lasting effects. The creatine kinase (CK), aspartate aminotransferase (AST), lactate dehydrogenase (LDH), and platelet count may increase.
- Stress: May cause transient elevation in white blood cells (WBC's) and elevated adrenal hormone values (cortisol and catecholamines). Anxiety that results in hyperventilation may cause acid-base imbalances, and increased lactate.
- Diurnal Rhythms: Diurnal rhythms are body fluid and analyte fluctuations during the day. For example, serum cortisol levels are highest in early morning but are decreased in the afternoon. Serum iron levels tend to drop during the day. You must check the timing of these variations for the desired collection point.

- Posture: Postural changes (supine to sitting etc.) are known to vary lab results of some analytes. Certain larger molecules are not filterable into the tissue, therefore they are more concentrated in the blood. Enzymes, proteins, lipids, iron, and calcium are significantly increased with changes in position.

Other Factors: Age, gender, and pregnancy have an influence on laboratory testing. Normal reference ranges are often noted according to age