

Vacuum Blood Collection

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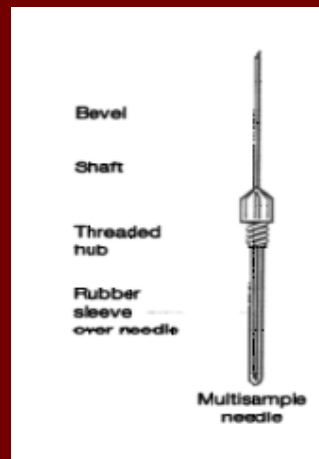
Fall 2005

Introduction

- The vacuum blood collection system consists of a double-pointed needle, a plastic holder or adapter, and a series of vacuum tubes with rubber stoppers of various colors.
- The evacuated tube collection system will produce the **best** blood samples for analysis.
- The blood goes directly from the patient vein into the appropriate test tube.

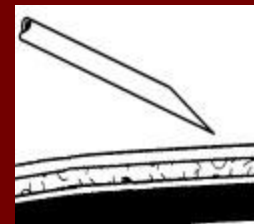
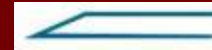
Multi-Sample Needle

- The ***bevel*** is the slanted opening at the end of the needle.
- ***Needle length*** (shaft) ranges from 1 to 1 ½ inches.
- Threaded hub screws into needle holder
- The ***rubber sheath*** makes it possible to draw several tubes of blood by preventing leakage of blood as tubes are changed.



Bevel

- Bevel is slanted opening at end of needle.
- Needle must be oriented so that bevel faces up prior to insertion.



Needle Gauge

- The gauge of a needle is a number that indicates the diameter of its ***lumen***.
- The lumen, also called the bore, is the circular hollow space inside the needle.
- The higher the gauge, the smaller the lumen.
- The most frequently used gauges for phlebotomy are 20, 21 and 22



Holder

- The holder for vacuum blood collection is a plastic sleeve into which the phlebotomist screws the double pointed needle.
- The most current guidelines require that all holders are for single use only.



Vacuum Collection Tubes

- Vacuum collection tubes are glass or plastic tubes sealed with a partial vacuum inside by rubber stoppers.
- The air pressure inside the tube is negative, less than the normal environment.
- After inserting the longer needle into the vein, the phlebotomist pushes the tube into the holder so that the shorter needle pierces the stopper.
- The difference in pressure between the inside of the tube and the vein causes blood to fill the tube.
- The tubes are available in various sizes for adult and pediatric phlebotomies



Additives

- Different blood tests requires different types of blood specimens.
- Most tubes have additives called anticoagulants which prevent clotting/coagulation of the blood.
- Plastic tubes may have an additive to enhance clotting of the blood

Anticoagulants

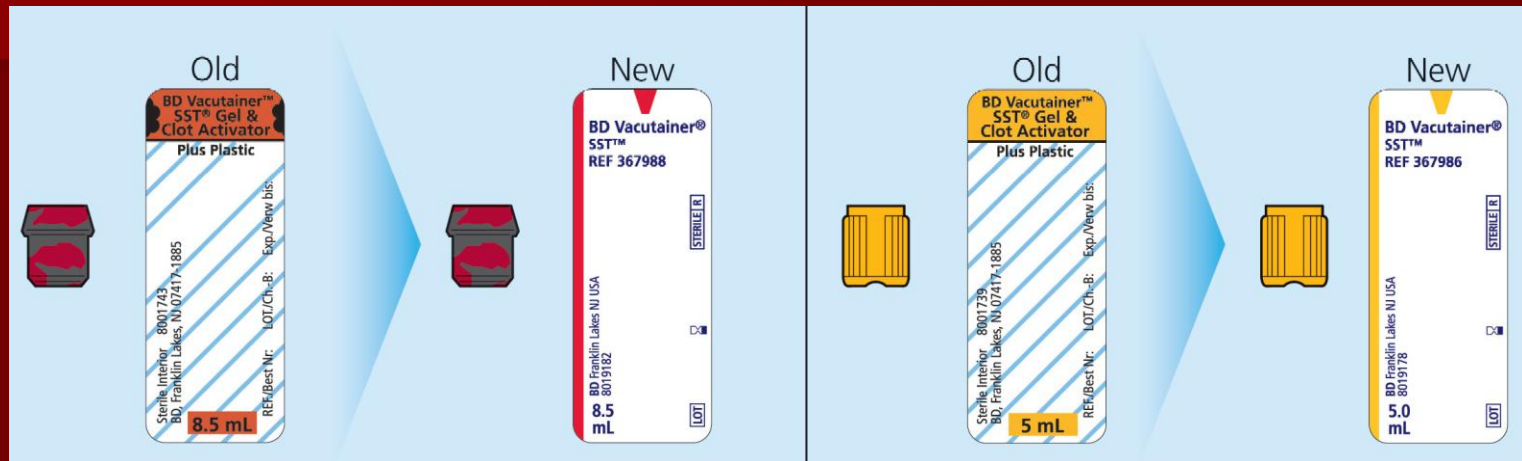
- Anticoagulants are already in the tubes in the precise amount needed to mix with the amount of blood that will fill the tube.
- The color of the stopper on each tube indicates what, if any, anticoagulant the tube contains.
- It is important to completely fill each tube so that the proportion of blood to chemical additive is correct, otherwise, the test results may not be accurate **or** the specimen will be rejected and will need to be recollected.
- It is also important to thoroughly mix the blood with the additive by gentle inversion

Red



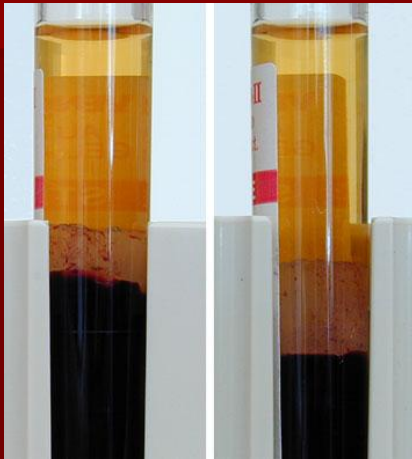
- http://www.austincc.edu/kotrla/phb_red
- No additive in glass tube
- Clot activator in plastic tube
- No anticoagulant present
- Tests using serum which include: most blood chemistries, AIDS antibody, viral studies, serology tests, Blood Bank testing.

Red and black mottled (SST) Hemogard = Gold



- SST = Serum Separator Tube
- silicone/gel (serum separating material)
- All tests using serum **except** Blood Bank

Red and black mottled (SST)



- Using BD SST Tubes
- <http://tinyurl.com/8jznm>
- Purpose of gel is to separate serum from cells permanently

(Light) Blue



- http://www.austincc.edu/kotrla/phb_ltblue
- Additive - Sodium Citrate
- Tests drawn: Coagulation studies: PT, PTT and fibrinogen
- MUST BE FILLED COMPLETELY!!! NO EXCEPTIONS

Lavender Top Tube



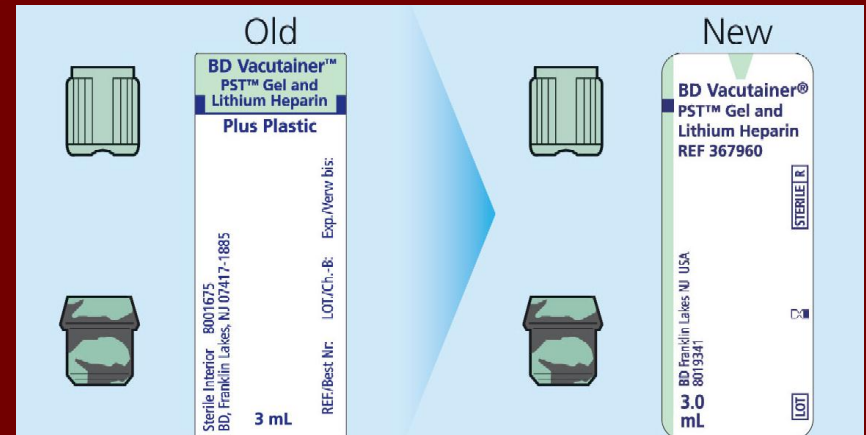
- http://www.austincc.edu/kotrla/phb_purple
- Additive = EDTA (ethylenediaminetetraacetic)
- Hematology studies: CBC, WBC count, Hemoglobin, Hematocrit, Platelet count, Reticulocyte count, differential.

Green



- http://www.austincc.edu/kotrla/phb_green
- **One** of the following: sodium heparin, lithium heparin or ammonium heparin.
- STAT blood chemistries utilizing plasma.

Green PST



- Additive is heparin
- PST = Plasma Separator Tube
- Has gel which, after centrifugation, permanently separates plasma from red blood cells

Gray



- http://www.austincc.edu/kotrla/phb_gray
- Additive (read label):
 - Potassium oxalate and sodium fluoride,
 - or lithium iodacetate and heparin
- Glucose, Blood Alcohol (ethanol) levels, lactic acid

Black

- Buffered Sodium Citrate
- Westergren sedimentation rate determination
- MUST BE FILLED COMPLETELY!!! NO EXCEPTIONS



Royal Blue



- Color of tube label indicates additive, if any:
 - purple - EDTA
 - green - heparin
 - red – none
- Trace metal analysis, nutrients and toxicology studies.
- Antimony Arsenic, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, and Zinc are examples.

Brown/Tan



- Additive = Sodium Heparin or K2 EDTA
- Specifically for lead analysis although royal blue can be used.

Yellow



- Sodium polyanethol sulfonate (SPS)
 - SPS for blood culture specimen collections in microbiology.
 - Tube inversions prevent clotting.
- Acid citrate dextrose additives (ACD)
 - ACD for use in blood bank studies, HLA phenotyping, DNA and paternity testing.

Blood Cultures



- Not for laboratory analysis, special collection to detect bacteria growing in blood.
- Site preparation VERY important.
- Will be covered later.

Order of the Draw

- 1. Sterile/Blood cultures
- 2. Blue coagulation tube
- 3. Red
- 4. Other additives
 - Green
 - Lavender
 - Gray

Patient Identification

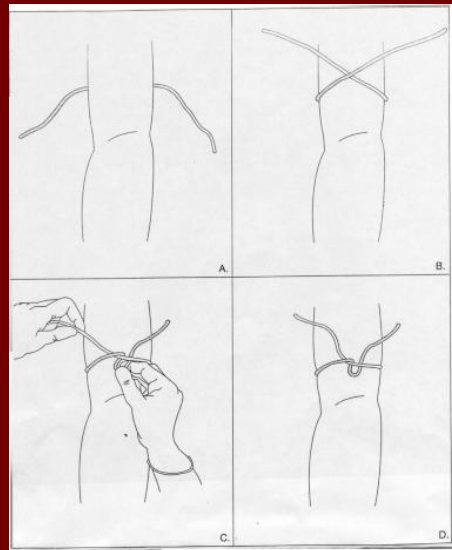
- It is ***vitaly important*** that the phlebotomist correctly identifies the patient.
- ***Do not offer*** the patient a name to respond to.
- All hospitalized patients have an identification arm band with their name, hospital identification number and other pertinent information.
- ***Always*** compare the laboratory test request slip name and ID number with the name and ID number on the patient's hospital arm band.
- If there is ***any*** discrepancy, ***do not draw the patient's blood.***
- For an out-patient, verify the patient's identity by having the patient give you additional identifying information such as a social security number, date of birth or address.

Preparation

- wash or disinfect his or her hands
- Identify patient
- Introduce yourself, state your mission
- "Have you ever had your blood drawn before?"
- If no, explain the procedure
- Choose the appropriate tubes for the tests requested

Tourniquet Application

- Apply approximately 3-5 inches above antecubital fossa.
- If the skin appears blanched above and below the tourniquet it is too tight.
- If your finger can be inserted between the tourniquet and the patient's skin it is too loose.



Palpate

- After tourniquet application have patient clench fist.
- Feel for a vein that rebounds (bounces) when pushed or tapped on.
- ***PALPATE*** any potential vein to help determine size, direction and depth. A slight rotation of the arm may help to better expose a vein that may otherwise be hidden.



Palpate



Vein Selection

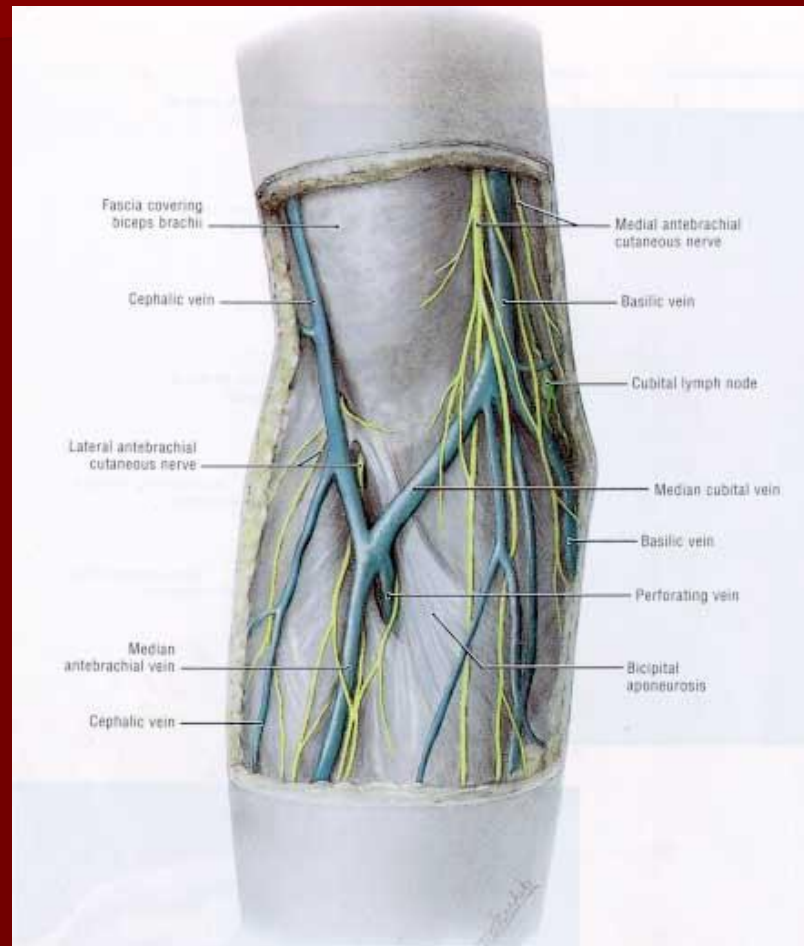
- Choose the veins that are large and accessible.
- Large veins that are not well anchored in tissue frequently roll, so if you choose one, be sure to secure it with the thumb of your nondominant hand when you penetrate it with the needle.
- Avoid bruised and scarred areas.

Can't Feel the Vein?

■ **Tricks to Help Distend Veins:**

- Have the patient "pump" the hand 3 times.
 - Don't overdue it because over-pumping can create hemoconcentration
- Have the patient dangle arm below the heart level for 1-3 minutes.
- Warm the area with a hot pack or warm, moist cloth heated to approximately 42°C.
- If all else fails, consult another technician for their opinion and/or intervention.

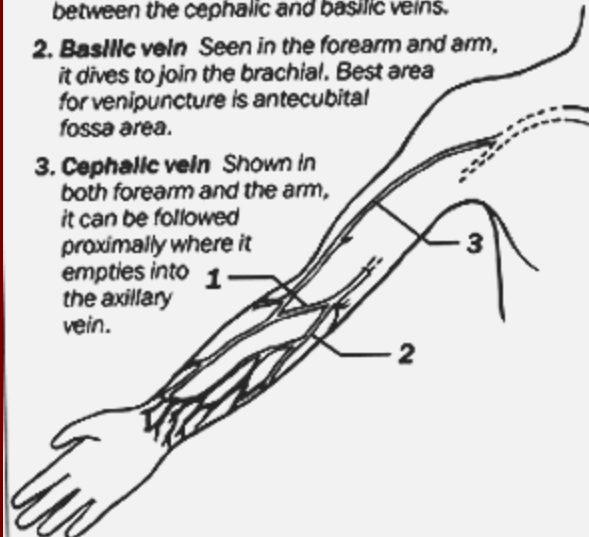
Selection of Vein



Veins for Venipuncture

SUPERFICIAL VEINS OF THE UPPER LIMB

- 1. Median cubital vein** A superficial vein, most commonly used for venipuncture, it lies over the cubital fossa and serves as an anastomosis between the cephalic and basilic veins.
- 2. Basilic vein** Seen in the forearm and arm, it dives to join the brachial. Best area for venipuncture is antecubital fossa area.
- 3. Cephalic vein** Shown in both forearm and the arm, it can be followed proximally where it empties into the axillary vein.



Veins used for drawing blood

1. Median cubital **vein** - first choice, well supported, least apt to roll
2. Cephalic **vein** - second choice
3. **Basilic vein** - third choice, often the most prominent **vein**, but it tends to roll easily and makes venipuncture difficult

Median Cubital – first choice

- This vein is located in the antecubital fossa. (the area of the arm in front of the elbow)
- Well anchored vein, usually large and prominent.
- Very few problems. Offering the best chance for a close to painless puncture, as there are few nerve endings close to this vein.

Cephalic Vein-Second Choice

- Cephalic vein which is located on the upper or shoulder side of the arm.
- This vein is usually well anchored.
- The cephalic vein may lie close to the surface. A low angle of needle insertion must be used to avoid possible spurting or blood forming a drop at the puncture site. (15°)

Basilic Vein-Third Choice

- Located on the under side of the arm.
- In many patients this vein may not be well anchored and will roll, making it difficult to access with the needle.
- Syringe draw should be considered as it gives the phlebotomist more control over a rolling vein. Pooling of blood and hematoma formation possible.
- The basilic vein is close to the brachial artery so there is more risk of hitting an artery. ***Exercise caution when drawing from this area.*** Additionally, this area is often more sensitive, thus a stick is slightly more painful for the patient

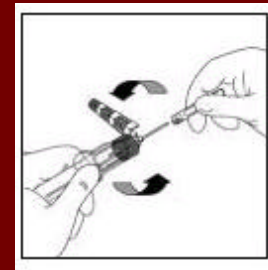
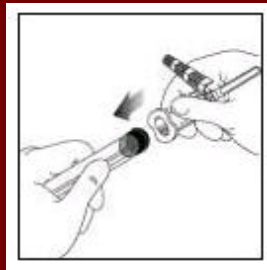
Cleansing the Site

- After selecting a vein, clean the puncture site with a cotton ball saturated with 70% isopropyl alcohol or prepackage alcohol swabs. Rub the alcohol swab ***in a circular motion moving outward from the site*** Use enough pressure to remove all perspiration and dirt from the puncture site.
- Discreetly look at the swab when finished, if it appears excessively dirty repeat the cleansing process with a fresh alcohol swab. After cleansing ***do not touch the site***, if the vein must be repalpated the area must be cleansed again. Some experts allow cleansing of the index finger before repalpating but this technique is debatable.

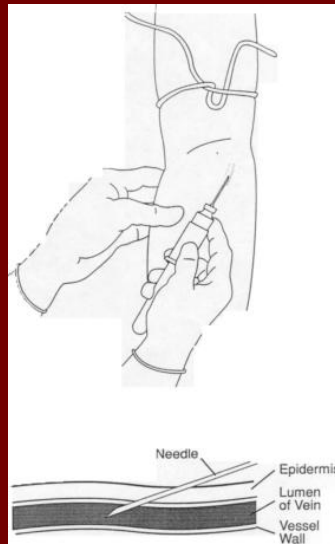


Assemble Equipment

- Twist needle into holder.
- Select appropriate tubes and insert first tube into holder.
- DO NOT remove cap until right before you are ready to stick.



Re-Apply Tourniquet and Prepare to Stick

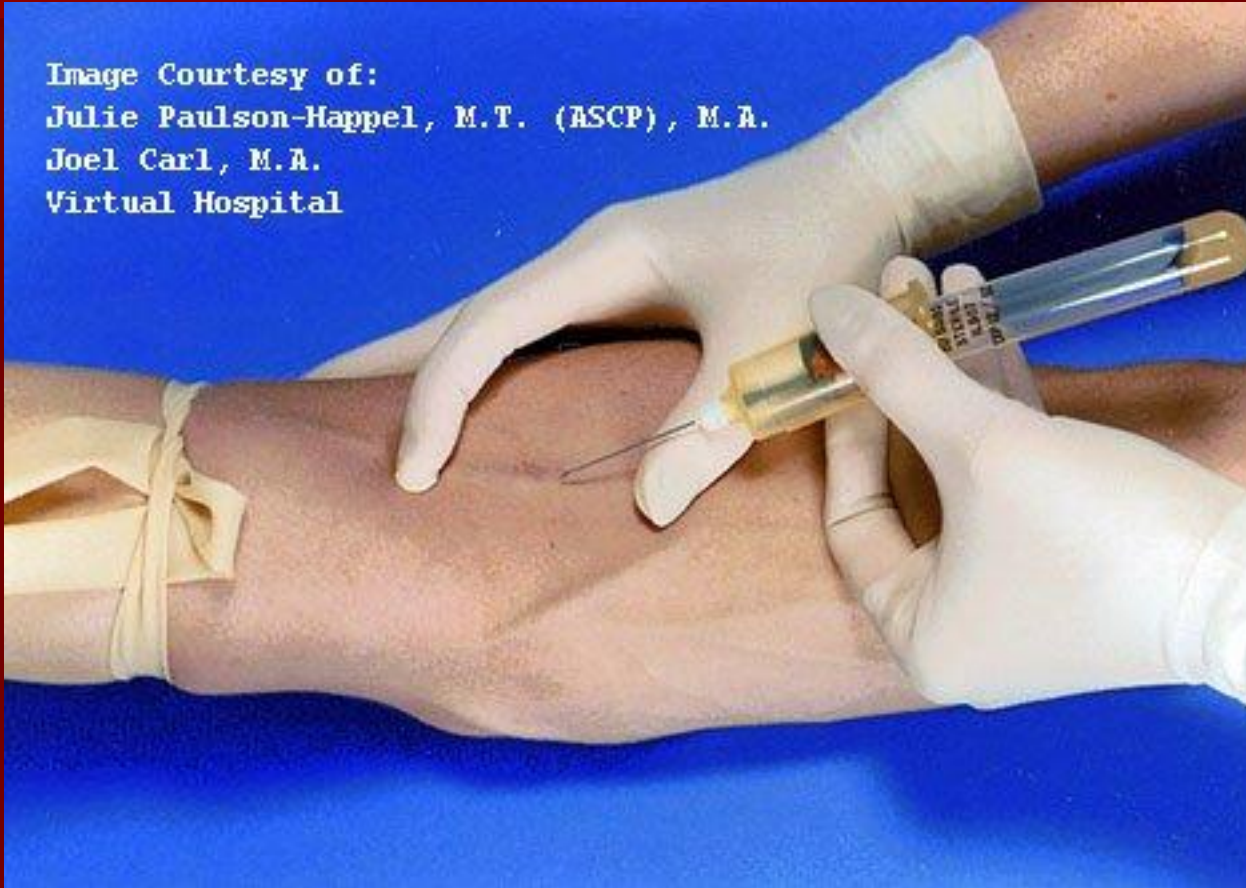


Performing the Stick

- Hold the prepared holder with the bevel up.
- Use the thumb of the nondominant hand below the puncture site to anchor the vein and pull the skin taut.
- The needle entering the site should ***not*** touch the thumb of the phlebotomist.
- Position the needle in the same direction as the vein, enter the skin and penetrate the vein at a 15 degree angle in one swift, smooth motion to decrease the patient's discomfort.
- If you enter too slowly blood will leak out at the puncture site creating a biological hazard as well as obstructing your view of the puncture site. The bevel of the needle should enter and remain in the center of the vein.

Performing the Draw

Image Courtesy of:
Julie Paulson-Happel, M.T. (ASCP), M.A.
Joel Carl, M.A.
Virtual Hospital



Ending Draw - Release Tourniquet

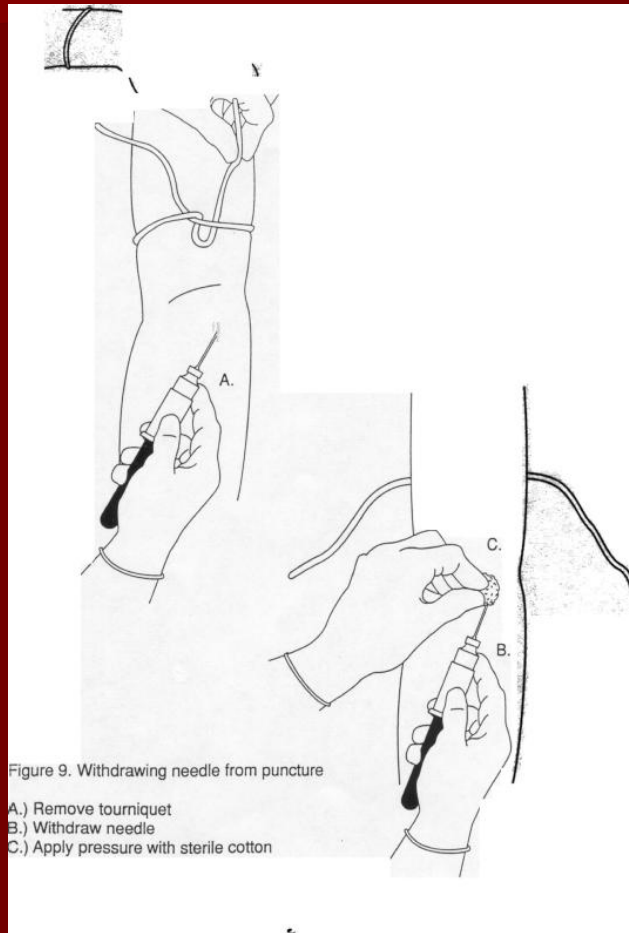
- Tourniquet cannot be in place more than 1 minute.
- Release the tourniquet as the last tube is filling.
- Use one handed method of release.



Ending Draw

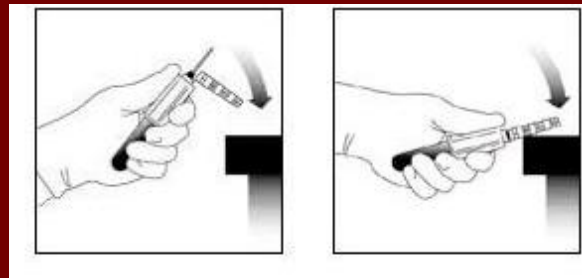
- Release last tube from needle.
- Hold gauze sponge or biowipe above needle.
- Swiftly withdraw needle.
- As soon as needle is withdrawn apply pressure to puncture site.
- If possible, have patient continue to apply pressure.

Ending the Draw TTN



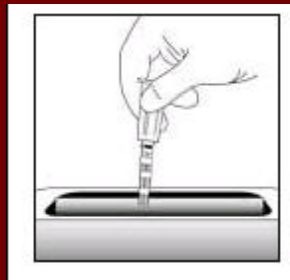
Activating Safety Device

- As soon as you remove needle and apply pressure activate the safety device.
- DO NOT USE YOUR OTHER HAND TO SNAP DEVICE INTO PLACE...EVER!



Needle Disposal

- As soon as needle safety device is activated dispose of entire assembly in a biohazard sharps container.



Labeling Tubes

- Label all tubes appropriately at the patient's side.
- Do not take unlabeled tubes from the patient's presence.
- Minimum information:
 - Patient's full name, last name first
 - ID number
 - Date, time and your initials

Checking Site

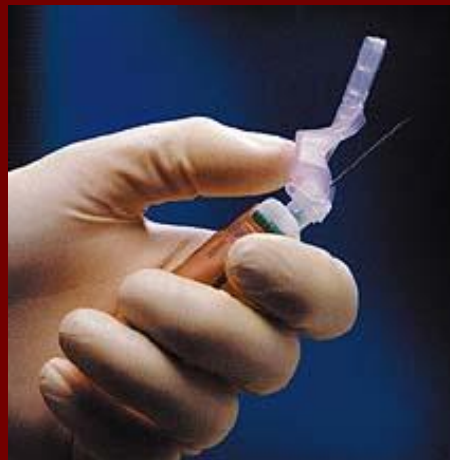
- Gently remove gauze or biowipe.
- Inspect area for continued bleeding or swelling.
- If all ok place bandaid over site.
- Tell patient to remove in 10-15 minutes.
- If patient still bleeding DO NOT leave, continue to apply pressure.

Leaving

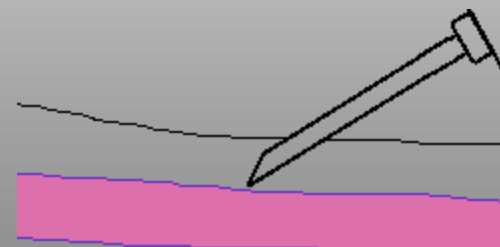
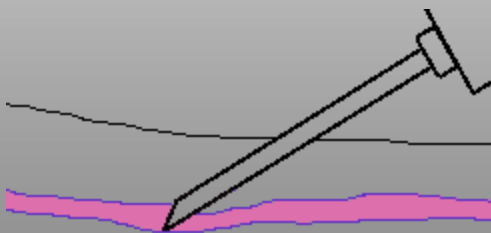
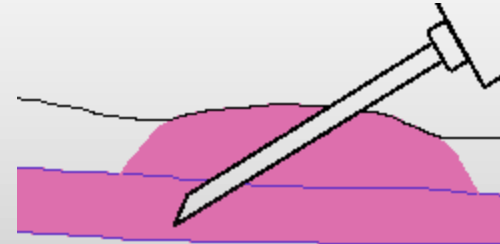
- Discard all used materials – hint- place all wrappers, alcohol swab, needle cap in palm of gloved hand, remove glove.
- Thank patient.
- Wash hands.
- Leave

BD Eclipse

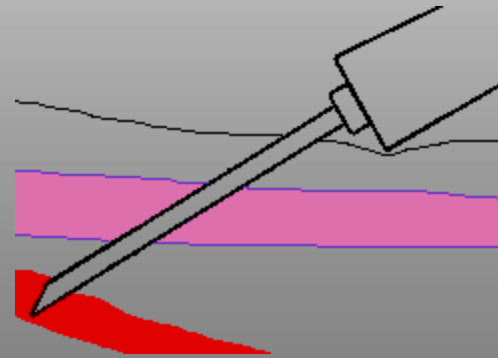
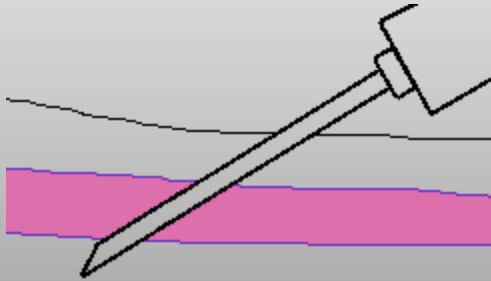
- The BD Vacutainer® Eclipse™ Blood Collection Needle is a safety-engineered multi-sample blood collection needle.
- It features a patented safety shield that allows for one-handed activation to cover the needle immediately upon withdrawal from the vein and confirms proper activation with an audible click
- We will use this device next week.



Problems with Needle Insertion



Problems with Needle Insertion



Safety Devices

- <http://tinyurl.com/9bovf> safety device animation

Sources of Error

1. Failure to insert the needle completely into the vein. The phlebotomist should feel resistance initially following insertion of the needle. The resistance is almost immediately followed by a sensation of free or easier movement as the needle enters the vein. Puncturing the stopper before entering the vein. If the phlebotomist partially pushes the evacuated tube onto the needle before inserting the needle into the vein, he/she risks puncturing the stopper and releasing the vacuum.
2. Not anchoring the vein before inserting the needle. The vein must be held in place for successful needle penetration.
3. "Bouncing" the needle on the skin before guiding it into the vein. During venipuncture, the patient should only be stuck once with the needle.
4. Not keeping the holder stationary, causing the needle to dislodge from the vein.

Rejection of Samples

1. **Hemolysis** - this is usually caused by a procedural error such as using too small of a needle, or pulling back too hard on the plunger of a syringe used for collecting the sample. The red cells rupture resulting in hemoglobin being released into the serum/plasma, making the sample unsuitable for many laboratory tests. The serum/plasma will appear red instead of straw colored.



Rejection of Samples

1. **Clotted** - failure to mix or inadequate mixing of samples collected into an additive tube. The red cells clump together making the sample unsuitable for testing.
2. **Insufficient sample (QNS)** - certain additive tubes must be filled completely. Incorrect blood to additive ratio will adversely affect the laboratory test results. When many tests are ordered on the same tube be sure to know the amount of sample needed for each test.
3. **Wrong tube collected** for test ordered. Always refer to procedure manual when uncertain.
4. **Improper storage** - certain tests must be collected and placed in ice, protected from light, or be kept warm after collection.
5. **Improperly labeled**

First Aid Following Needlestick

Regardless of the disease the patient has, be careful not to stick yourself with a used needle. If an accidental stick does happen, ***immediately***

- Go to the sink, turn on the water, and bleed the site well by alternating squeezing and releasing the area around the site.
- Do this for approximately 3 to 5 minutes.
- Afterwards scrub the site with an alcohol swab.
- Follow with a thorough hand washing.

Report it to your instructor immediately.