Specimen Collection – Venipuncture Procedure

I. Collecting and Processing of Specimens

A. Blood

1. Venipuncture Procedure (arm + dorsal/hand) – vacutainer, syringe, butterfly

a. Approaching the Patient

Correct patient identification
- Wash hands
- Have patient recite his/her name
- Wrist identification – mandatory
  - must match requisition
  - check ankle on babies and peds
- Out-patients – ask patient to spell name
- In-patients – see wrist ID
- Unconscious patient – see wrist ID
- Unidentified patient –
  - emergency – use temporary I.D. band
  - non-emergency – wait for I.D.

Explanation and Reassurance –
- Inspire confidence
- Conversation

Ensure that patient has complied with test requirements, such as fasting (only water), NPO (nothing per oral), etc.

Check for any allergies, such as to latex, adhesive bandages, etc.

b. Positions

Positioning the patient
- Vein accessibility
- Sitting vs. lying down

Phlebotomist position – always in front in case of fainting.

c. Applying the Tourniquet

See previous lecture

d. Veins Used - Antecubital Fossa

Cephalic
Median Cephalic
Median
Basilic
Median Cubital Vein – vein of choice, anchored best
Other Structures – avoid
- Brachial artery – apply pressure 5 minutes
- Cutaneous nerve – very painful
- Tendon for the biceps muscle – always draw below crease

e. Other Vein Sites

Wrist (never palm side)
Hand
Ankle
Foot

f. Preparing Equipment

Syringes
- Assembly – always work plunger before procedure.
- Plunger position – must be fully compressed

Evacuated tube system
- Needle
- Safety needle guard
- Safety holder
- Vacuum tube position
- Preventing blood leakage

Butterfly
- Appropriate size
  - too small – hemolysis
  - too big – rupture vein
- Adaptor – syringe
  - tubes

g. Selecting the Vein

Apply tourniquet
- Palpate area
- Patient clenches fist – no pumping

Both arms – check if nothing in first arm
Application time – less than 1 minute

Vasodilation
Tourniquet
Fist clenched
Lower arm – hang down
Warm towel – arteriolization

Differentiating veins from arteries
Arteries – pulse
Veins – bounce back
Sclerosed – hard
"elastic tubes"

h. Cleansing the Puncture Site

Use 70% isopropyl alcohol wipe
Circular motion, starting at the inside of the venipuncture site and working outward

Let air dry 30-60 seconds –
Do not blow (or fan) on site!
Do not wipe with cotton/gauze

Re-disinfect, if necessary

Caution: If vein needs to re-palpate the vein, wipe tip of gloved finger first with alcohol, and palpate above the point of needle insertion

* Blood cultures – special iodine scrub procedure
* Alcohol levels – Do not use alcohol to cleanse site!

i. Performing the Venipuncture (Right-handed Person)

Re-cleanse puncture site, if necessary

Inspect needle

Hold syringe or vacutainer in right hand; thumb on top, fingers underneath

Point needle in parallel direction to the vein
Anchor (plant) vein
Left thumb one inch below puncture site
Left index-finger above site
Left thumb and index finger – stretch skin

Introduce needle into vein; bevel up, at 15-30^{o} angle

Back of fingers of right hand should rest on patient's arm as an anchor while needle enters vein. May have small drop of blood on top of skin. This sometimes

occurs with large veins that are close to skin. Do NOT change this hand; always have it be an anchor.

Syringe – pull back gently on the plunger and release to allow blood to fill syringe. Do not alter the position of the needle in the vein.

Evacuated tube system – push vacutainer tube into holder. Place first and second fingers of left hand against the top of the base of the holder and the thumb against the bottom of the tube. Hold tightly to holder to prevent movement. Do not push holder – may force needle through the vein.

Release tourniquet – when last tube is ½ filled.

Cover puncture site with dry cotton or gauze (do not press) and quickly withdraw the needle from the vein. Immediately apply pressure to the puncture site. Activate safety device on needle.

Instruct patient to apply pressure to the area, preferably with arm held above head for 2-3 minutes, or apply pressure yourself if necessary.
DO NOT BEND ARM.

Apply pressure bandage –

Fold 2" gauze into quarters, place over wound, and apply bandage tightly over gauze.

If artery is accidentally stuck (as indicated by bright red blood the spurts into tube), phlebotomist applies pressure for 10 minutes.

j. Transferring Blood - Syringe to Collection Tube

Puncture diaphragm of stopper; DO NOT PUSH ONTO PLUNGER
Allow blood to run gently down the side of the tube
Invert gently – 10 to 12 times (if tube contains anticoagulant)

Alternate method – use BD blood transfer device

k. Identifying Specimen

Label after collection

Patient's first and last names (printed)
Patient's ID number

Name or initials of phlebotomist
Date of blood collection
Time of blood collection

DO NOT PRE-LABEL TUBES

If you don't get the specimen, then the tubes are wasted
Computer printed labels are to be applied after obtaining specimens.

l. Disposing of Used Equipment

Paper, plastic wrappers - discard in waste basket in patient's room
Discard used needles and syringes discard in special sharps disposal containers
NEVER RECAP!
Discard contaminated gauze or cotton in biohazard waste container
Remove gloves, and WASH HANDS!!

m. When leaving

Thank the patient for his/her cooperation
Check to be sure that no items are left on the bed or table
Do not adjust the bed, if asked to do so; just let the nurse know of the patient's request
Leave the room as it was found (bed and bed rails)

n. Collecting of Multiple Samples

While holding vacutainer holder with right hand and anchoring the back of the fingers on the patient's arm, switch vacutainer tubes with left hand

DO NOT ATTEMPT TO SWITCH HANDS ON THE HOLDER!
It presents a risk of injury to patient, or movement of needle out of vein

To help make the removal to tubes easier, twist the tube as its being taken out of the holder

Order of draw (CLSI/NCCLS, per Strasinger) –
1. Sterile specimens (yellow stopper, blood culture)
2. Glass red stopper (plain, non-additive)
3. Light blue stopper (Na citrate)
4. Plastic red stopper (clot activator)
5. Red/gray, gold stopper (serum separator)
6. Green stopper (heparin)

7. Light green stopper (plasma separator)
8. Lavender or Pink stopper (EDTA)
9. Gray stopper (oxalate/fluoride)
10. Yellow/gray or orange stopper (thrombin clot activator)

DO NOT DEVIATE FROM THIS ORDER

If affiliates do different, follow this order anyway

NOTE: Handling of Routine Specimens

All tubes should be gently inverted 8-10 to ten times as soon as they are drawn, especially plastic red top

Vigorous mixing may cause hemolysis and should be avoided

Potassium, magnesium, and certain enzyme tests are examples of tests that cannot be performed on hemolyzed specimens

Inadequate mixing of gel separation tubes may prevent the additive from functioning properly and clotting may be incomplete

Common Tests Affected by Additive Contamination

Contaminating Additive	Tests Potentially Affected
Citrate	Alkaline phosphatase Calcium Phosphorus
EDTA	Alkaline phosphatase Calcium Creatine kinase Partial thromboplastin Potassium Protime Serum iron Sodium
Heparin (all formulations)	Activated clotting time Acid phosphatase Calcium (some test methods) Partial thromboplastin Protime

	Sodium (sodium formulations) Lithium (lithium formulations)
Oxalates	Acid phosphatase Alkaline phosphatase Amylase Calcium Lactate dehydrogenase Partial thromboplastin Potassium Protime Red cell morphology
Silica (clot activator)	Partial thromboplastin time Protime
Sodium fluoride	Sodium Urea nitrogen
(from McCall R, Tankersley C. Phlebotomy Essentials. 4th ed. Baltimore, Md.: Lippincott Williams & Wilkins. 2008.)	

RATIONALE FOR COLLECTION ORDER:

Order of Draw	Tube Stopper Color	Rationale for Collection Order
Blood cultures (sterile collections)	Yellow SPS Sterile media bottle	Minimizes chance of microbial contamination
Glass non-additive tubes	Red	Prevents contamination by additives in other tubes
Coagulation tubes	Light blue	The first additive tube in the order because all other additives affect coagulation tests
Plastic clot activator tubes Serum separator tubes (SSTs)	Red Red and gray rubber Gold plastic	Filled after coagulation tests because silica particles activate clotting and affect coagulation tests (carry-over of silica into subsequent tubes can be overridden by anticoagulant in them)
Plasma separator tubes (PSTs) Heparin tubes	Green and gray rubber Light-green plastic	Heparin affects coagulation tests and interferes in collection of serum

	Green	specimens; causes the least interference in tests other than coagulation tests
EDTA tubes Plasma preparation tubes (PPTs)	Lavender Pink Pearl top	Responsible for more carry-over problems than any other additive: elevates Na^+ and K^+ levels, chelates and decreases calcium and iron levels, elevates PT and PTT results
Oxalate/fluoride tubes	Gray	Sodium fluoride and potassium oxalate affect sodium and potassium levels, respectively, after hematology tubes because oxalate damages cell membranes and causes abnormal RBC morphology. Oxalate interferes in enzyme reactions.
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This 'Order of Draw' has been set forth by CLSI (Clinical and Laboratory Standards Institute), and is the standard for best practice in the laboratory.
