Specimen Collection – Dermal Puncture

I. Collecting and Processing of Specimens
   A. Blood
      1. Dermal/Skin Puncture

         Blood collected by dermal puncture comes from capillaries, arterioles, and venules, = mixture of arterial and venous blood, with small amounts of tissue fluid.

         Alternating between dermal puncture and venipuncture should not be done when results are compared. Dermal punctures should be noted on requisition/computer.

         Patient ID

         Must have requisition with same information as for venipuncture, for complete ID. Verbal, verified with ID band.

         Nursery – must have ID band on infant, not just bassinet.

         Explanation and Reassurance

         Patient

         Child

         Have child sit on parents lap

         Parent

         Adults

      Capillary Blood Specimen

      a. When to Use:
         Small amount of blood needed
         Apprehensive patient – child
         POC testing – very common now
         Patients –
            Burned, scarred
            On chemotherapy
            With thrombotic tendencies
            Geriatric, or those with fragile veins
            With inaccessible veins

      b. Sites:
         Earlobes – no longer used routinely
         Fingertips – 3rd or 4th finger
         Heels – infants
         Toes – dependent on institution
Fingerstick Procedure

Correct collection techniques are critical because of the smaller amount of blood that is collected and the higher possibility of specimen contamination, microclots, and hemolysis.

Excessive squeezing of the puncture site to obtain enough blood is often the cause of hemolysis.

a. Wash hands, put on gloves

b. Assemble equipment
   lancet – controlled puncture device
   To prevent contact with bone, depth of puncture is critical
   CLSI (NCCLS) recommends a depth of 2.0 mm, maximum
   To produce adequate blood flow, width of incision is more important than the depth
   There are various types of safety lancets, with varying lengths, depending upon what is needed; a drop for glucose testing or more for microtainer tube
   Institutions should designate their preference
   gloves
   gauze pads or cotton balls
   disinfectant – alcohol swab/pad
   collection device -
   microcollection tubes – microtainer, variety of anticoagulants
   capillary tube – microhematocrit, small diameter, heparinized or plain
   need to be sure all are adequately and properly mixed
   marking pen
   discard bucket – biohazard

c. Identify patient
   Wrist band or ankle band

d. Reassure patient – explain procedure

e. Choose site
   Finger – 3rd or 4th, if child is older than 1 year
   Palmer side of non-dominant hand
Heel – medial or lateral areas of plantar (bottom) surface of heel
Avoid –
   Calluses, scars, bruised, edematous, cold, cyanotic, or infected sites previous puncture sites – easily introduce organism and allow them to reach bone

f. Massage the finger – warm if cold
   May need to pre-warm heel or site with warm moist towel, for 3-5 minutes

g. Cleanse finger – with alcohol wipe

h. Dry finger with gauze or cotton
   promotes droplet formation
   prevents hemolysis from alcohol contamination
   prevents interference in test results
   prevents stinging sensation
   prevents specimen dilution

i. Remove safety lancet from package
   Grasp between the thumb and forefinger
   Newer ones are shaped to help you line up with finger/heel prints

j. Grasp patient’s finger
   Grasp patient’s finger between the fingers and thumb of left hand (Right handed person)
   Put thumb should be on top of patient’s finger nail with fingers supporting patient’s finger

k. Puncture patient’s finger
   Puncture halfway between the center of the ball of the finger and its side lateral to ball of finger; this area contains less nerves
   Slightly indent skin with lancet, press firmly
   Cut should be perpendicular to the lines in the fingerprint – promotes droplet formation

l. Squeeze lightly to stimulate blood flow
m. Wipe away first drop
   Use clean gauze
   First drop may be contaminated with tissue fluid and/or
   hemolyzed by alcohol

n. Fill collecting device
   Wipe with gauze frequently to disturb platelet plug formation
   Work fast to produce drops at a steady rate
   Capillary tube/pipet:
   Hold capillary pipette almost horizontal — and upward to avoid
   air bubbles to blood sample
   Do not allow pipette to touch the finger/heel
   Microtainer:
   Allow drops to flow into device; do not scrape against skin
   Avoid hard pressure; tissue fluid may contaminate blood and
   affect test results

o. Place a clean, dry gauze pad over the site
   Have patient press down with the thumb on the same hand
   until bleeding has stopped
   Bandage is optional for adults
   No bandage on babies and small children under 2 years

p. Dispose of contaminated equipment properly
   Use biohazard waste bucket for bloodied gauze and sharps container for
   lancets

q. Label all specimens
   Wrap labels around tubes or capillaries

r. Initial and date request slips

Advantages of Capillary Puncture

Less frightening than a venipuncture
Safer method for some patients

Disadvantages of Capillary Puncture

Only a small quantity of blood is obtained
Hemolysis - greater chance of
More nerve endings in fingertips — more painful than venipuncture
Greater risk of disease transmission since procedure can be messy
Cannot use for coagulation studies, ESR, blood cultures, and many others

Pediatric Blood Collection

Reasons
Fragile veins – more chance of injury to vein
Minimize blood loss – hospital-acquired (older term, nosocomial) anemia

Selection of Heelstick Site

Avoid sites of previous puncture
Puncture medial or lateral sides of planter surface

NEVER USE POSTERIOR CURVATURE (CROWN) OF THE HEEL

Heel bone (calcaneus) is very close to the skin surfaces at the back of the heel and could be damaged by a puncture in this area; this could lead to an infection of the bone called Osteomyelitis/Osteochondritis

Heelstick Phlebotomy Equipment

a. Safety Lancet
   Puncture no deeper than 2.0 mm
   Never use surgical blades

b. Blood Collection Containers
   Microcontainers, capillary tubes
   Heparinized capillary tubes containing metal “fleas” for blood gas determinations

Heelstick Site Preparation

a. Warming the Heel
   5-10 minutes prior to puncture with warm (no more than 42°C) moist towel
   Arteriolization: increases blood flow to area up to seven-fold
   MUST BE DONE FOR Capillary ABGs since it increases arterial blood flow

b. Cleansing the Puncture Site
   High risk newborns – extremely thin skin; alcohol may not be best
   Antiseptic contact for at least one minute
Rub off antiseptic with dry sterile gauze

c. Holding the Infant’s Foot
   Position baby on back (APPROVAL OF NURSE)
   Hold with thumb on sole of foot and first two fingers wrapped around ankle; this allows application of gentle pressure to the bottom of the foot in order to increase blood flow to the puncture site

d. Control of Post-Puncture Bleeding
   Hold foot above level of infant’s heart.
   Press sterile swab against puncture until bleeding from puncture stops
   Never use bandage of any kind; danger of swallowing

Sample Heelstick Procedure

a. Thoroughly scrub your hands and arms to the elbow with soap and water

b. Properly gown for strict isolation if in nursery. Positively identify the patient by verifying name band, ID numbers, requisition, or phlebotomy label.

c. Thoroughly cleanse the plantar surface of the foot with 70% alcohol. Note: Vigorous scrubbing of the entire foot bottom helps promote circulation near the skin surface. Warming the foot to 42°C with a warm cloth will increase blood flow significantly (seven-fold).

d. Dry the alcohol scrubbed area with a sterile gauze or allow to air dry.

e. Puncture skin at 45-60° angle at a site near the medial and lateral margins of the posterior plantar surface. Note: The “crown” portion of the heel should not be used. It is too close to the calcaneus.

f. Wipe away the first drop of blood.

g. Gently and progressively rub thumb from toes to ankle to produce droplets. Collect minimum amount of blood necessary.

h. Place a sterile gauze over the puncture site after collection until the puncture wound seals. Bandaid should not be used because of the
sensitive nature of neonatal skin, and danger of infant swallowing if bandage comes off.

i. Watch for any signs of distress from the patient that are unusual or appear to impair cardiopulmonary function. Be careful not to displace any lines or monitoring devices attached to the patient.

Psychological Preparation of the Pediatric Patient

a. Birth to 1 year (infants)
   Explain procedure to parent
   Calm parent
b. 1-3 years (toddlers)
c. 3-6 years (pre-school)
d. 6-12 years (school age)
e. 12-18 years (adolescent)

Tests Not Done from Capillary Puncture

Blood cultures –
   non sterile technique
   not enough blood obtained

Coagulation studies
   Platelet clumping
   Increased tissue fluid-squeezing

Tests that require large volumes of serum or plasma
   Blood Gases for Adults
   ESR

Order of draw for dermal punctures

1. Platelets evaluations (as they tend to accumulate at site) –
   blood smear (made first), platelet count, CBC
2. EDTA
3. Other anticoagulated tubes
4. Serum tubes