

PROCEDURE NO.: SC.011

SUBJECT: **Infant Heel Puncture**

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Annual Review: _____

Purpose:

Knowledge of the proper techniques to be used when performing a skin puncture is necessary to assure collection of an adequate blood specimen that is suitable for testing with a minimum of trauma to the patient.

Responsibility:

All phlebotomists collecting blood on infants.

Principle:

The heel is the recommended site for collection of skin puncture specimens on infants less than 1 year old or not walking. However, it is important that the puncture be performed in an area of the heel where there is little risk of puncturing the bone. Skin punctures **must not** be performed on fingers of newborns. The distance from skin surface to bone in the thickest portion of the last segment of each finger of newborns varies from 1.2 to 2.2 mm. Local infection and gangrene are potential complications of finger punctures. The plantar surface of the great toe is also not recommended for skin punctures.

Puncture of the bone can cause a painful bone infection (osteomyelitis) as well as inflammation of the bone and cartilage. Punctures through previous sites may spread the infection.

Materials:

Sterile automated skin puncture device Tenderfoot®

70% isopropyl alcohol swab

Sterile gauze pads

Microcollection tubes

Sharps container

Disposable gloves (nonlatex if child is allergic)

Chemical heel warmer or warm washcloth



NCCLS Guidelines: In small premature infants, the heel bone (calcaneus) may be no more than 2.0 mm beneath the plantar heel skin surface and half this distance at the posterior curvature of the heel. Puncture depths for premature neonates should be between 0.65-0.85 mm. Larger infant puncture depths should be 1.0mm. Puncturing deeper than 2.0 mm on the plantar surface of the heel of small infants may therefore risk bone damage. Tenderfoot® Lancets adhere to NCCLS Guidelines.

Procedure:

A. Preparation for Heel Puncture

1. Put on a gown before entering the nursery.
2. Remove any large jewelry (rings, bracelets, etc.)
3. Scrub for 3 minutes from fingertips to elbows with a disposable brush.
4. Check the computer label or lab requisition to see what test is ordered. Obtain and select appropriate equipment for the heel puncture procedure.

5. Properly identify the infant by matching the computer label with the infant's identification number located on the bracelet.
6. Place gloves on hands.
7. Infant should be positioned in the supine position (face up). Allow the foot to hang lower than the torso to improve blood flow.
8. Activate and place a chemical heel warmer on the infant's heel for 3 to 5 minutes. This will increase the blood flow to the area by 7 fold.
9. Assemble all of your equipment. **Do not** lay any equipment in bassinet. Use shelf underneath bed or top of isolette.
10. Grasp the heel firmly. Wrap the index finger around the foot supporting the arch and wrap the thumb around the ankle below the puncture site. Do not hold foot too tightly. This may cause bruising and restriction of blood flow.
11. After stabilizing the infant's foot, cleanse the foot with a 70% alcohol pad and dry with a piece of sterile gauze.

Alcohol residue on the infant's foot may cause a stinging sensation and hemolysis of the red cells.

12. Place your thumb on the inside bottom of the foot and push the skin across the heel toward the outside of the heel.
 - a. With a microtainer safety lancet , puncture the most medial section (outside) of the plantar surface of the heel. **Do Not** puncture heel deeper than **2.0 mm** or the calcaneus of the heel could be punctured and may cause osteomyelitis.

See Figure 1

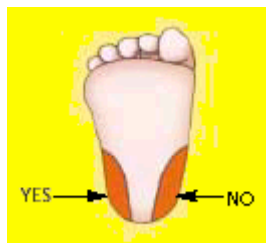


Figure 1

- b. Press down on the top of the lancet until the puncture is made. The microtainer lancet has a retractable spring. Pause briefly before removing the lancet from the finger. This will ensure good blood flow.
- c. This is not to be a quick jab or slice, but a **DELIBERATE PUNCTURE**.
- d. **DO NOT** puncture the center area of the heel.
(See Figure 2 below).
- e. Avoid previous puncture sites.



Figure 2

13. Wipe the first drop of blood with a piece of gauze since this blood has been diluted with tissue fluid and may contaminate the specimen.
14. Draw the free-flowing blood until the amount is desired.

B. Capillary Tubes

1. Touch the capillary tube to the drop of blood formed on the surface of the skin.
2. Allow filling by capillary action.
3. Seal an end of the capillary pipette with clay if it is not already sealed. *See Figure 3*



Figure 3

C. Microcollection Tubes

1. Touch the “scoop” of the microcollection tube to the drop of blood and let the drop of blood run down the walls of the tube.
2. Tap the tube gently occasionally to encourage the blood to settle to the bottom of the tube.
 - a. **DO NOT** use a “scooping” motion against the surface of the skin.
 - b. Scraping against the skin activates platelets and may cause hemolysis.
3. Cap microcollection tubes with the caps provided and mix additive tubes eight to ten times. *See Figure 4*



Figure 4

D. Finalization

1. To facilitate an adequate flow of blood during the blood drawing, the pressure on the heel should be released and the leg and foot lowered periodically to permit the foot to refill with blood.
The pressure should then reapplied to express the blood.
2. When all necessary blood has been drawn, apply pressure to the wound with dry gauze for 10-20 seconds to stop the bleeding.
Do not apply Band Aid or tape.
3. Label specimens before going on to next baby and leaving the nursery.

E. Special Care Nursery

1. The blood drawer performing a heel puncture on an infant in the Special Care Nursery **MUST REQUEST ASSISTANCE** from the nurse taking care of the infant to ensure any special precautions that may be needed.
2. At times it becomes necessary to draw blood from infants who have I.V.'s and/or oxygen. Infants in this category are placed in the Special Care Nursery so that they may be monitored.

F. Precautions:

1. Infants with IV's:
 - a. Special care must be taken because the slightest movement could cause the needle to become dislodged and possible infiltrate (meaning the IV would need to be restarted).
 - b. The infant's veins are very small and fragile and restarting the IV could be very difficult.
2. Infants with Special Monitors:
 - a. Sometimes it is very difficult to maneuver in an isolette when the infant is placed on the vital sign monitor, transcutaneous transduce or receiving oxygen via a head hood and has an IV infusing in an extremity.
 - b. All of this equipment is necessary in caring for an infant with possible respiratory distress and special care must be taken not to loosen equipment.

3. Infants under Bili-Lights or Bili Blankets
 - a. Before drawing for neonate bilirubin test; when infants are placed under the bili-lights, ask the nurse to turn off the light.
 - b. When completed, ask the nurse to turn the bili-lights back on.

G. Blood Volume

Obtaining large quantities of blood from an infant, especially from premature infants, may result in anemia or cardiac arrest. To ensure that maximum volume has not been exceeded, the total volume drawn at one time must be recorded in the infant’s chart.

Table 1 Maximum Amounts of Blood to be Drawn From Patients Younger than 14 Years

Patient’s Weight		Maximum Amount to be drawn at any one time (mL)	Maximum Amount of blood -cumulative to be drawn during a given hospital stay (1 month or less-mL)
Pounds	Kilograms (approx.)		
6-8	2.7-3.6	2.5	23
8-10	3.6-4.5	3.5	30
10-15	4.5-6.8	5	40
16-20	7.3-9.1	10	60
21-25	9.5-11.4	10	70
26-30	11.8-13.6	10	80
31-35	14.1-15.9	10	100
36-40	16.4-18.2	10	130
41-45	18.6-20.5	20	140
46-50	20.9-22.7	20	160
51-55	23.2-25.0	20	180
56-60	25.5-27.3	20	200
61-65	27.7-29.5	25	220
66-70	30.0-31.8	30	240
71-75	32.3-34.1	30	250
76-80	34.5-36.4	30	270
81-85	36.8-38.6	30	290
86-90	39.1-40.9	30	310
91-95	41.4-43.2	30	330
96-100	43.6-45.5	30	350

H. Procedural Notes:

1. You must wash your hands and change gloves between each infant.
2. The infant's heel may be punctured a maximum of two times by the same phlebotomist.
3. Never re-puncture old puncture wounds.
4. Total volume of blood must be recorded. **See Table 1**
5. Never remove an infant from its bassinet.
6. Excessive crying may adversely affect the concentration of some constituents, such as leukocyte count. If possible, a 30 minute waiting period should be observed between the time crying ceases and the time that skin puncture is performed. If the specimen is collected while the infant is crying, note the condition on the report.

References:

1. Heel Puncture of the Newborn; St.Luke Hospital, Florence, Kentucky; Revised 1/89,1/95.
2. Heel Puncture of Newborns and Infants; Jewish Hospital, Cincinnati, Ohio; Revised 8/95.
3. Blood Drawing - Infant Heelstick Puncture; The Christ Hospital, Cincinnati, Ohio Revised 10/92.
4. Table-1: Maximum amounts of Blood to be drawn from patients younger than 14years; Adapted from Becan-McBride K: Textbook of Clinical Laboratory Supervision. New York, Appleton-Century Crofts, 1982.
5. Procedures for the Collection of Diagnostic Blood Specimens by Skin Puncture; Third Ed.; NCCLS Document H4-A3, Vol. 11 No. 11. July 1991.
6. Phlebotomy Handbook, Blood Collection Essentials, Garza & Becan-McBride fifth edition, 1999 "Pediatric Procedures", pp.307-310.

7. Procedures and Devices for the Collection of Diagnostic Blood Specimens by Skin Puncture; Fourth Ed.; NCCLS Document; H4-A4, Vol. 19 No.16 ,9/99
8. Phlebotomy Handbook, Blood Collection Essentials, Garza & Becan-McBride 7th edition, 2005.