

COLLECTION OF BLOOD SPECIMENS BY SKIN PUNCTURE

I. PRINCIPLE:

Skin Puncture technique is used to obtain blood specimens when venipuncture or other collection methods are not appropriate. Blood specimens obtained by skin puncture are especially important in pediatrics, because small but adequate amounts of blood for laboratory tests can be obtained with this technique. It is also advantageous to obtain skin-puncture blood specimens from some adult patients. Skin puncture is especially applicable for severely burned patients, extremely obese patients, patients with thrombotic tendencies, geriatric patients, patients in whom superficial veins are either not accessible or are very fragile, and point of care testing.

II. SPECIMEN COLLECTION AND HANDLING: N/A

III. REAGENT: N/A

IV. CALIBRATION: N/A

V. QUALITY CONTROL:

A. Accessioning:

Specimen request forms are generated by order entry into SCM. These include the following information: patient name, age, medical record number, ordering physician, laboratory test requested, required collection tube type, and department or unit where patient is located. SCM orders interface with LIS generating a barcode label for each laboratory test that is not collected by lab personnel (i.e. non-blood specimens, outpatient orders). SCM orders interface with LIS to generate orders in Sunquest Collection Manager for specimens to be collected by lab personnel. These orders include: patient name, age, sex, medical record number, laboratory test requested, required collection tube type, and department, unit, or room number where patient is located, specific test accession number, date, and time of order. For further explanation of accessioning process, refer to Computer Services Manual.

B. Properly identify the patient:

Refer to Patient Care Services (PCS) Policy # 0715 for proper patient identification. For Pathology employees, this policy is in the Pathology Department General Policy Manual. For employees of other departments, the policy would be in their department specific policy manual or accessible on the Facility's Intranet site.

For Blood Bank specimens, refer to Blood Bank Policy Manual for acceptable protocol of patient identification.

C. Verify the patient diet restrictions, as appropriate (e.g. fasting glucose).

D. If patient has any type restraint that would hinder blood collection, do not remove restraints and contact nursing personnel before performing phlebotomy procedure. Restraint removal/reapplication can only be done by trained nursing personnel.

E. Wash hands and put on gloves and any other personal protective equipment that is necessary to follow the hospital's biohazard and infectious disease policies.

- F. Assemble the necessary specimen procurement supplies (correct type of microtainer collection tubes, alcohol pads or gauze pads and bandage if applicable) within reach in preparation for blood collection.
- G. Select the correct type of skin puncture device according to the patient's physical characteristics. Regular skin puncture devices can be used on the majority of patients. However, in small or premature infants, the heel bone (calcaneus) may be no more than 2.0 mm beneath the plantar heel skin surface and no more than half this distance at the posterior curvature of the heel. Puncturing deeper than 2.0 mm on the plantar surface of the heel of small infants may therefore risk bone damage, thus only puncture devices that are 2.0 mm or less should be used on these patients.

H. Preparing the Patient for Skin Puncture:

In order to gain the patient's confidence, the phlebotomist should at all times maintain a helpful and professional manner. The phlebotomist should identify themselves and their purpose. The phlebotomist should explain that although the skin puncture will be slightly painful, it will be of short duration. Always prepare the patient by saying, "There will be a stick." The phlebotomist should never tell the patient that skin puncture will not hurt.

If the patient is semiconscious or comatose, the phlebotomist must take special care to anticipate any unexpected movements or jerks while performing the skin puncture.

Assistance is always necessary for performing skin punctures on small children. Always stabilize the child's hand. *Under no circumstances should a puncture be attempted on an infant or child without the assistance necessary to immobilize intended puncture site and to protect the patient and collector from injury.*

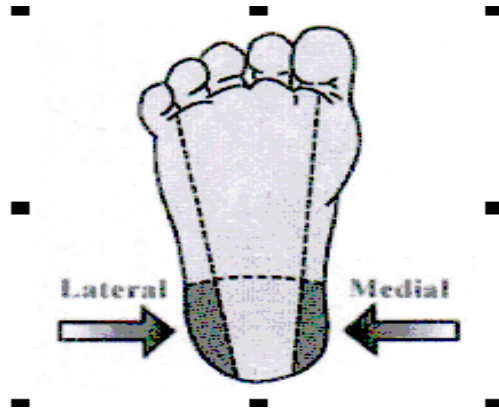
If the patient questions what tests are being ordered, the phlebotomist should suggest the patient refer to the nurse or ordering physician for clarification.

If the patient objects to having the procedure, the phlebotomist must not proceed to draw blood against the patient's wishes. The objections should be reported to a member of the patient's care team.

I. Choose the puncture site:

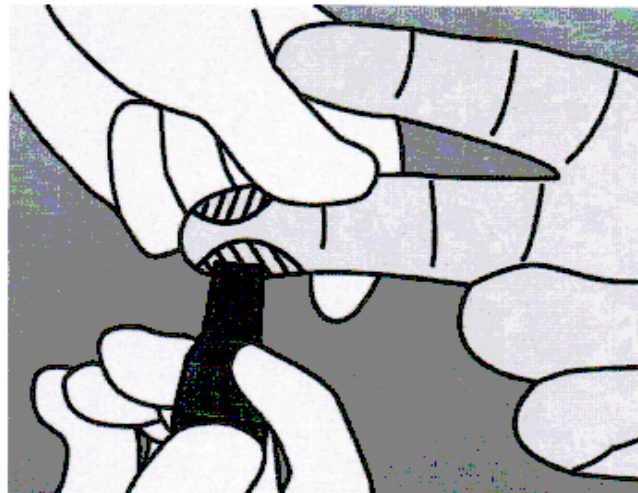
1. For infants up to 12 months, the site must be on the plantar surface medial to a line drawn posteriorly from the middle of the great toe, or lateral to a line drawn posteriorly from between the fourth and fifth toes to the heel. The puncture **must not** be made at a previous puncture site that may be infected. Skin punctures **must not** be performed on the central area of an infant's foot (area of the arch), because this may result in injury to nerves, tendons, and cartilage. The arch area offers no advantage over puncturing the heel and must not be used.

Skin punctures **must not** be performed on the 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. With punctures, the bone could easily be injured. In newborns, local infection and gangrene are potential complications of finger punctures.



Shaded areas indicated by arrows represent recommended areas for infant heelstick puncture.

2. For patients 12 months or older, capillary punctures must be on the palmar surface of the distal phalanx and not at the side or tip of the finger, because the tissue on the side and tip of the finger is about half as thick as the tissue in the center of the finger. The middle and ring fingers are the preferred sites, because the thumb has a pulse and the index finger may be more sensitive or calloused. The fifth finger must not be punctured because the skin is too thin.



Recommended skin puncture site for adults and older children.

J. Position patient:

1. Procedure for seating the patient:

- a. Ask the patient to be seated comfortably in a chair.
- b. Have the patient position his/her arm on the armrest so that their hand is readily accessible.

2. Procedure for having patient lie down or if patient is already lying down:

- a. Ask the patient to lie on his/her back in a comfortable position.
- b. Place a pillow (if additional support is needed) under the arm to be used in drawing the specimen.
- c. Avoid startling the patient unnecessarily, such as awakening suddenly, to prevent changes in test results.

NOTE: No food, chewing gum, or thermometer should be in the patient's mouth at the time the specimen is drawn.

K. Verify paperwork and tubes (if applicable) to ensure no mistakes have been made during the preparation and selection of the tubes:

1. For Outpatient Collections: Compare the identification number on the identification armband with the identification number on the blood request slip/barcode label and ask the patient to state his/her name and DOB. If the information does not match, check further to determine which one is correct and notify the nurse. Do not draw blood until proper identification has been made.
2. For Inpatient Collections: Using the Collection Manager system, scan the patient's armband. The confirmation screen requires verification of patient name and DOB before proceeding with specimen collection. If name and DOB cannot be confirmed, contact the patient's nurse to ensure the proper armband with correct information has been given.
3. Check the tubes to assure that the appropriate kinds have been selected.

L. Warming the skin puncture site:

If the finger or heel is cold to the touch, pre-warming the site for a few minutes with a warm compress or commercial heel warmer will increase the flow of blood through the capillary beds. The site should not be warmed to a temperature higher than 42°C.

M. Cleanse the puncture site:

Cleanse the site with 70% isopropyl alcohol until clean. If the condition of the patient's skin puncture site necessitates excessive cleansing, several alcohol preps may be necessary. Allow the alcohol to dry so that the patient doesn't feel the burning sensation that alcohol can cause when the skin is punctured. Because alcohol dries rapidly, no action may be necessary. Blowing on the site is not recommended. Once the site has been cleansed, do not contaminate it by retouching.

NOTE: Betadine (povidine iodine) must not be used to clean and disinfect skin puncture sites. Blood contaminated with betadine may have falsely elevated levels of potassium, phosphorus, or uric acid.

N. Puncture the skin:

1. Remove the puncture device from its packaging (if applicable).
NOTE: Only auto-disabling single-use fingerstick devices are used. These devices are designated to be used only once, after which the blade is retracted, capped, or otherwise made unusable.
2. If the device has a shield or trigger lock, remove/release the feature according to manufacturer's directions.
3. Hold the device firmly between the fingers following manufacturer's instructions.
4. Hold the patient's heel or finger firmly to prevent sudden movement.
5. Place the puncture device on the cleansed skin with minimum skin compression. Depressing the device forcefully closes the distance between skin and bone, risking bone penetration and the complications that can follow.
6. Notify the patient of the imminent puncture.
7. Release triggering mechanism of the puncture device to puncture the skin.
8. Remove the device from the skin and discard it into an appropriate sharps container.

O. Collecting the specimen:

Wipe away the first drop of blood with gauze to avoid contaminating the specimen with tissue fluid released in the trauma of the puncture. Subsequent drops of blood can then be allowed to freely flow into the collection tube. In the case of a bedside testing device (e.g., glucose meter), apply the specimen to the test strip or the appropriate testing interface. Blood flow from the puncture is enhanced by holding the puncture site downward and gently applying intermittent pressure to the surrounding tissue (or proximal to the puncture site when the blood is obtained from a finger). A scooping motion to collect blood and strong repetitive pressure (milking) **MUST** be avoided, as both procedures may result in hemolysis or tissue-fluid contamination of the specimen.

NOTE: The scooping motion should not be confused with the accessories of micro-collection devices commonly referred to as Ascoops®. The accessories should be used according to manufacturer's directions.

If excessive squeezing is necessary, the procedure should be terminated and an attempt made on another site after pre-warming.

If a drop of blood becomes lodged inside the collector top, a gentle tap on the tube on a hard surface is sufficient to move it to the bottom of the tube.

P. Order of draw for capillary punctures:

1. Purple top (EDTA) tubes
2. Tubes with other additives
3. Tubes without additives

Tubes with additives should be periodically mixed during collection with a gentle tap of the finger to prevent coagulation. This technique, however, if excessively employed, can create aerosols to escape from some collection devices. Therefore, proper face protection

should be worn. Observe minimum fill requirements for all tubes that contain anticoagulants according to the manufacturer's recommendations. When collecting an anticoagulated specimen, the specimen should be adequately mixed (according to manufacturer's instructions) by gentle inversion after the closure is placed on the tube.

Q. Post specimen collection:

Once the necessary volume of blood has been collected, apply pressure with gauze to the puncture site. If performing a heel stick, the foot should be elevated above the body and a clean gauze pad pressed against the puncture site until bleeding stops. If a child over 2 years old or an adult, bandaging the patient can be left up to the patient or patient's parents. However, neonates, infants, and children less than 2 years old should not be bandaged since their skin is much more sensitive to the effects of the adhesive over time and because of the risk of ingestion and/or airway obstruction should the bandage become dislodged.

R. Labeling the specimens:

1. It is imperative that specimens be labeled properly and in the patient's presence. Specimens must not be removed from patient's presence until they have been properly labeled. Under no circumstances should specimen tubes be labeled *before* they are filled.
2. With the Collection Manager system, barcodes are printed at the patient's bedside. These labels include the phlebotomist's tech code and collection time.
3. If preprinted barcoded labels are utilized in labeling specimens, the phlebotomist must also make a handwritten entry on the tube of the actual time of collection and their initials and/or personal identification number.
4. If there is no preprinted barcode label, then the phlebotomist must label each specimen tube with the patient's first and last names, unique identification number (e.g. medical record number), date and time of collection and their initials and/or personal identification number. Any other identifying items, such as patient's age, sex, laboratory test requested, department, unit, or room number where patient is located should also be included on the label.

S. Special collection conditions:

Some tests require that blood specimens be cooled or warmed immediately after collection. Instant warmers and ice transporters are available to warm or cool specimens.

T. Transport to the laboratory:

All specimens should be placed in a biohazard bag and properly transported to the laboratory with consideration given to the effect that time, temperature, and delays in processing will have on test results.

U. Recovering the failed skin puncture:

Never attempt a skin puncture more than twice. If unable to obtain an adequate specimen after two attempts, have another health care professional attempt to obtain the specimen. If their attempts are also unsuccessful, then supervisory personnel should be notified.

V. Problems with the Patient:

1. All health professionals should always be watching for signs that the patient might faint during or after a skin puncture. Always observe for signs of vertigo (dizziness), syncope (fainting), or unexpected non-responsiveness. This is especially important for outpatient draws. Pallor, perspiration, anxiety, light-headedness, hyperventilation, and nausea can preempt a loss of consciousness. Make it a habit to ask patients if they feel all right, but don't rely on their answers totally, especially in the presence of any of the above symptoms. If the patient demonstrates any of these signs, do not attempt to walk the patient to a bed. Where practical, lower the patient's head to increase the supply of oxygenated blood to the brain and loosen tight clothing. Ammonia inhalants should be used conservatively as its use can induce an asthma attack if the patient is asthmatic. For Pathology Department at NMMC-Tupelo and Women's Hospital, refer to Patient Care Services Policy Advanced Lifesaving Emergency Response Team (ALERT) and dial 60 to issue the alert.
2. In dealing with a patient with nausea, make the patient as comfortable as possible, instruct them to breathe deeply and slowly, apply cold compresses to their forehead, and for Pathology Department at NMMC-Tupelo and Women's Hospital, refer to Patient Care Services Policy Advanced Lifesaving Emergency Response Team (ALERT) and dial 60 to issue the alert.
3. If a patient is vomiting, give the patient an emesis basin or carton, and have tissues ready. Give them water to rinse out his/her mouth and for Pathology Department at NMMC-Tupelo and Women's Hospital, refer to Patient Care Services Policy Advanced Lifesaving Emergency Response Team (ALERT) and dial 60 to issue the alert.
4. If a patient begins having convulsions, for Pathology Department at NMMC-Tupelo and Women's Hospital, refer to Patient Care Services Policy Advanced Lifesaving Emergency Response Team (ALERT) and dial 60 to issue the alert. Try to prevent the patient from injuring himself/herself. Do not restrain the movements of the patient's extremities completely, but try to prevent him/her from being injured.

W. Special situations:

1. Time intervals: Some specimens need to be taken at timed intervals due to medications, fasting requirements, and/or biological variations (circadian rhythms). It is important that collection of specimens for timed tests be obtained at the precisely specified interval. Appropriate directions should be given to obtain these specimens accurately.
2. Isolated patients: Follow the facility's universal precaution procedures.

X. Leaving the room:

1. Upon leaving the room of the patient, take extra care to return the room to its previous arrangement. If bedside trays, chairs, wastebaskets, bedside rails, and other items were moved, return them for the convenience and safety of the patient. If the patient has to stretch or get out of bed to retrieve an item that has been displaced, a fall or injury could occur.
2. If the patient is an outpatient, escort the patient from the drawing room.

3. It is imperative that collectors take extra precautions to retrieve all papers, supplies, and equipment from the crib or bed of a child. Small items can easily be ingested and cause suffocation; used sharps can inflict serious injury. A complete accounting of all items used in the area must be performed before leaving the room.

VI. CALCULATIONS: N/A

VII. REPORTING RESULTS: N/A

VIII. PROCEDURE NOTES:

1. Hemolyzed specimens may cause inaccurate chemical determinations. Even though it has been reported that plasma containing 20 mg/dl of hemoglobin appears faintly pink and 100 mg/dl of hemoglobin appears red, other studies have found that as much as 190 mg/dl of hemoglobin may not always be visually apparent. Elevated bilirubin in the plasma may mask hemoglobin, and a hemoglobin concentration of 200 mg/dl may not be detected by the unaided eye if the plasma contains 20 mg/dl of bilirubin. This is of particular significance since many newborns requiring blood chemical determinations have an elevated bilirubin concentration.

Hemolysis may occur in skin puncture blood for the following reasons:

- A. There is residual alcohol at the skin puncture site.
 - B. Patients have increased red blood cell fragility and high packed cell volume (e.g. newborns and infants).
 - C. Milking of the puncture site.
 - D. Excessive and aggressive mixing of the specimen in the tube after collection.
2. If a patient is dehydrated or has poor peripheral circulation from other causes (e.g. shock), it may be impossible to obtain a representative blood sample, especially by skin puncture.
 3. Excessive crying may adversely affect the concentration of some constituents (e.g. 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.

IX. LIMITATIONS OF PROCEDURE: N/A

X. REFERENCES:

Procedures for the Collection of Diagnostic Blood Specimens by Skin Puncture, 6th Edition, National Committee for Clinical Laboratory Standards, 2008, pp. 1-18.

Ernst, Dennis J and Catherine, Phlebotomy for Nurses and Nursing Personnel, Health Star Press, 2001, pp. 83-95.

Phlebotomy Workbook for the Multi-skilled Healthcare Professional, F.A. Davis Company, Philadelphia, PA, 1996, pp. 266-271.