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| **Capillary Specimen Collection** |
| **Purpose** | This procedure provides instructions for collecting blood samples by capillary puncture, according to the current standard of care for phlebotomy. Obtaining blood by skin puncture may be an alternative to venipuncture in patients for whom venous access is difficult, and when small quantities of blood are sufficient for testing. In comparison to venipuncture, capillary collections pose fewer risks to patients. When proper techniques for blood specimen collection are followed, the risks of pre-analytical errors and injury to patients and/or employees are reduced. |
| **Policy Statements** | * This procedure is to ensure the proper collection of capillary blood specimens for laboratory analysis.
* Heel puncture samples are obtained from infants from birth to 6 months of age and weigh less than 10kg.
* Fingertip puncture samples are obtained from patients 7 months of age and older and weigh more than 10kg.
* This procedure applies to all laboratory and hospital staff responsible for collecting capillary blood specimens.
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| **Materials** |

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| **Supplies and Equipment** |
| 70% isopropyl alcohol prep pads (CHC# 718) | 3M® Kind Removal Blue Silicone Tape (CHC# 25998) |
| Prevantics® [Chlorhexidine Gluconate (3.15%) and Isopropyl Alcohol (70%)] Antiseptic (CHC# 20367) | Phillips® *Heel Snuggler* Infant Heel Warmer, REF 99047 (CHC# 12602) |
| Swabsticks®, Povidone-Iodine Antiseptic 10% (CHC# 268) | Safety Lancets of various depths and sizes |
| Gauze pads, 2 X 2 (CHC# 128) | Micro-collection containers |
| Antimicrobial IV Sponge 2x2 (CHC# 1651) | Newborns screening forms |
| Latex-free bandages or tape | Point-of-care (POC) testing supplies and equipment |
| Latex-free gloves | Sunquest® Collection Manager with stylus |
| Other personal protective equipment, as required | Zebra QL 220 plus printers and labels |
| Sharps container | Biohazard transport bag |
| Webril®  |  |

* Ensure the integrity and quality of all supplies and equipment before use.
* Items dropped on the floor should not be used on a patient even if sterility has not been compromised, due to the perception of contamination to the patient or family.
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| **Special Safety Precautions** | * Patients who are dehydrated or have poor peripheral circulation may not yield a satisfactory representative blood specimen, especially by skin puncture.
* All patient specimens are to be treated as potentially infectious, and handled according to [*Children’s Policy 1201.01 Standard Precautions for Infection Prevention and Control*](http://intranet.childrensmn.org/references/policy/1200/1201.01-standard-precautions-for-infection-prevention-and-control.htm)*.*
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| **Procedure** | Follow the activities in the table below for CAPILLARY SPECIMEN COLLECTION.

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| **Step** | **Action** |
| 1 | Perform hand hygiene upon entering the patient’s room. Refer to [*Children’s Policy 1201.08 Hand Hygiene, Fingernails and Jewelry for Infection Prevention and Control*](http://khan.childrensmn.org/references/policy/1200/1201.08-hand-hygiene-fingernails-and-jewelry-for-infection-prevention-and-control.htm) |
| 2 | Exercise Standard Precautions. Don gloves. If the patient is in isolation, refer to the following policies:[*Children’s Policy 1201.02 Airborne (Transmission-Based) Precautions*](http://intranet.childrensmn.org/references/policy/1200/1201.02-airborne-%28transmission-based%29-precautions.htm)[*Children’s Policy 1201.03 Droplet (Transmission-based) Precautions*](http://intranet.childrensmn.org/references/policy/1200/1201.03-droplet-%28transmission-based%29-precautions.htm)[*Children’s Policy 1201.04 Contact (Transmission-based) Precautions*](http://intranet.childrensmn.org/references/policy/1200/1201.04-contact-%28transmission-based%29-precautions.htm)[*Children’s Policy 1201.05 Empiric Use of Transmission-Based Precautions*](http://intranet.childrensmn.org/references/policy/1200/1201.05-emperic-use-transmission-based-precautions.htm)*Children’s 1201.05* [*Appendix I Isolation Precautions by Disease or Symptom*](http://intranet.childrensmn.org/references/policy/1200/1201.05-appendix-i-precautions-by-disease-or-symptom.pdf) |
| 3 | Identify the patient by scanning the patient’s identification (ID) band with a Sunquest® collection manager device or Clinical Collect. During downtime match the patient’s ID band with the Sunquest® test request or label using at least two patient identifiers (ie. full legal name, date of birth or medical record number).Resolve all discrepancies in patient identification prior to collection. Proceed with sample collection only when patient identification is properly verified.Refer to Laboratory Policy [*SCM 1.20 Patient Identification – Specimen Collection*](http://khan.childrensmn.org/Manuals/Lab/SOP/Gen/SpecCol/205656.pdf)and Children’s Policies[*376.00 Patient Identification Bands and Allergy Alerts*](http://khan.childrensmn.org/references/policy/350/376.00-patient-identification-bands-and-allergy-alert.htm) and [*958.00 Latex Safe Precautions*](http://khan.childrensmn.org/references/policy/900/958.00-latex-safe-precautions.htm). |
| 4 | Select the puncture site.  |
| **If** | **Then** |
| an infant’s heel is to be puncturedNOTE: Heel sticks should be no deeper than 2.4 mm. | Heel diagram 1the site shall be on the plantar surface medial to a line drawn posterior from the middle of the great (big) toe to the heel, or lateral to a line drawn posterior from between the 4th and 5th toes to the heel.In most infants the heel bone is not located beneath these areas.Do not puncture the posterior curvature of the heel, the area of the arch, edematous tissue or previous puncture sites.  |
| the site is bruised, edematous, or traumatized | select another site. Notify the nurse of the situation. |
| the infant’s heel has become macerated due to multiple heel stick procedures; or there is evidence of infection or hematoma; or the patient is experiencing poor peripheral circulation or hydration | consult the patient’s caregiver for permission to perform the procedure. |
| a patient’s finger is to be puncturedNOTE: Finger sticks should be no deeper than 1.5 mm for a child older than age 6 months and younger than age 3 years and no deeper than 2.4 mm for a child older than age 8 years. | use the palmar surface of the index, middle, or ring finger, or medial aspect of the great toe.Fingerstick sitesSkin punctures must be done with care on the fingers of infants. The distance from the skin surface to bone in the thickest portion of the last segment of each finger varies from 1.2 mm in an infant to 2.2 mm in an adult, so the bone can be easily injured. (For toe poke use same procedure as if you were to do a finger stick.) |
| 6 | Select the appropriate size lancet using the following guide: |
| Site of puncture | Size of patient | Description | Photo | Incision (gauge/depth)or (depth/length) |
| Finger, Point of Care (POC) |  | Lancet, finger POC testing (medium blood flow) | 366593 | 21G/1.8mm |
| BD 366593 |
| CHC# 24558 |
| Finger, POC |  | Lancet, finger POC testing (low blood flow) | bdm_ca_lancet_180 | 30G/1.5mm |
| BD 366592 |
| CHC# 12659 |
| Heel, POC |  | Lancet, heel POC testing  | Lancet, Heel Poct | 26G/1.0mm |
| Hawaii Medical SugarPlum® 1040043 |
| CHC# 23752 |
| Finger | 7 months to 8 years **AND** greater than 10 kg | Capiject® Safety Lancet, finger (low blood flow) | IMG_1068 | 1.0mm/1.5mm |
| Terumo 200101A |
| CHC# 20521 |
| Finger | Greater than 8 years | Capiject® Safety Lancet, finger (high blood flow) | IMG_1069 | 2.0mm/1.5mm |
| Terumo 200103 |
| CHC# 23382 |
| Heel | Less than 1000 grams | GentleHeel® Micro-preemie  | IMG_1070 | 0.65mm/1.40mm |
| GHMP10X50 |
| CHC# 24465 |
| Heel | 1000 to 2000 grams | GentleHeel® Preemie  | IMG_1072 | 0.85mm/1.75mm |
| GHP10X50 |
| CHC# 13800 |
| Heel | 2000 to 6000 grams | GentleHeel® Newborn  | IMG_1071 | 1.00mm/2.50mm |
| GHN4X250 |
| CHC# 13799 |
| 7 | For heel punctures, prewarm the intended puncture site for 3 to 5 minutes (10 minutes for capillary blood gas) using an infant heel warmer at no higher than 42ºC. If the procedure has not been started within 10 minutes, discard the infant heel warmer, and reassess the area. If the area has cooled, rewarm with a new heel warmer. |
| 8 | Verify test request, and assemble supplies and equipment within reach.NOTE: **Recommended maximum volume for skin puncture is approximately 1.5 mL.** |
| 9 | Position the patient. Utilize age appropriate Comfort Promise techniques. Refer to [*SCM 1.11.a1 Children’s Comfort Promise*](http://khan.childrensmn.org/Manuals/Lab/SOP/Gen/SpecCol/209480.pdf)*.* |
| 10 | In outpatient areas and non-neonatal units, cleanse the site with a 70% isopropyl alcohol wipe, unless contraindicated. In the neonatal units, use a Chloroprep® Chlorhexidine Gluconate (CHG) pad. Allow to air dry. Residual alcohol or CHG may contaminate and/or hemolyze the sample, as well as create a burning sensation felt by the patient when the skin is punctured. Blowing on the site is not recommended. **Directions for CHG use**: Clean the site with Chloroprep® (CHG) pad for a minimum of 30 seconds using friction in a back and forth, vertical, horizontal, and diagonal pattern. Allow antiseptic to remain at site and **completely air dry** (approximately 30 seconds). Refer to [*Children’s Policy 1230.00 Skin Antisepsis*](http://khan.childrensmn.org/references/policy/1200/1230.00-skin-antisepsis.pdf).**NOTE:** The Chloroprep® (CHG) pad package instructions state “15 seconds”, however *Children’s Policy 1230.00 Skin Antisepsis* states “30 seconds”. Follow Children’s policy. |
| 11 | Open a new sterile device within view of the patient or family. |
| 12 | In the NICU/SCN: If additional cushioning is indicated, apply Webril® to the infant’s ankle. |
| 13 | Hold the finger or heel firmly to prevent sudden movement, position the device on the skin, and notify older children and adults of imminent puncture.  |
| 14 | Place device against the heel or finger with minimal skin compression. **NOTE:** Pressing the device forcefully against the skin dangerously closes the distance between the tissue and bone, and risks injury to the patient. It may result in an incision that is too deep, possibly hitting the calcaneus (heel bone) and can lead to osteomyelitis and/or osteochondritis. |
| 15 | Activate the release mechanism on the device. Dispose in sharps container.**NOTE:** An immediate repeat puncture (double sticking) at the same site **must not** be performed. |
| 16 | Orient the puncture site vertically toward the floor and below the plane of the heart, if possible. |
| 17 | Wipe away the first drop of blood with a clean, dry gauze pad (unless testing the first drop is required by the manufacturer of a point-of-care device), since the first drop is likely to contain tissue fluid. |
| 18 | Follow the capillary order of draw for filling tubes/devices. Refer to procedure [*SCM 3.05 Order of Draw*](http://khan.childrensmn.org/Manuals/Lab/SOP/Gen/SpecCol/212316.pdf)and [*SCM 3.21 Capillary Blood Gas Collection*](http://khan.childrensmn.org/Manuals/Lab/SOP/Gen/SpecCol/205658.pdf)for specific instructions on how to collect capillary blood gases. |
| 19 | Allow well-formed drops of blood to flow into the collection device(s) by gravity and/or capillary action. Provide gentle squeezing only as necessary to promote blood flow.Holding the puncture site downward and gently applying intermittent pressure to the surrounding tissue enhances blood flow from the puncture. Strong repetitive pressure (milking) should not be applied; it may cause hemolysis or contamination of the specimen with tissue fluid.Do not use a “scooping” motion to collect blood or allow the blood to pool on the skin surface, as these actions cause hemolysis. If excessive squeezing is necessary due to insufficient blood flow, terminate the procedure. Prewarm another site and repeat the procedure using a new lancet device. |
| 20 | Mix samples collected into additive tubes periodically during collection to prevent clotting of the specimen. |
| 21 | Observe minimum fill requirements for additive tubes. |
| **If** | **Then** |
| * additive tubes are underfilled
 | * the proper blood-to-anticoagulant ratio is disrupted, diluting the specimen and/or causing excessive anticoagulation. Fill tubes according to manufacturer’s instructions, ie. 2mL EDTA needs at least 1mL blood for appropriate blood/anticoagulant ratio.
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| * additive tubes are overfilled
 | * clot formation may result.
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| 22 | Once an adequate volume of blood has been obtained, cover the puncture site with a clean gauze pad and apply direct pressure until the bleeding has stopped. Elevate the puncture site to lessen blood flow through the area. |
| 23 | Seal and mix additive tubes by gentle inversion. Mix capillary gas tubes according to [*SCM 3.21 Capillary Blood Gas Collection*](http://khan.childrensmn.org/Manuals/Lab/SOP/Gen/SpecCol/205658.pdf) procedure. |
| 24 | Label all samples collected while still at the patient’s bedside using the labels generated from the collection manager device, or the Sunquest request label while matching the patient’s full name and medical record number at a minimum.**NOTE:** Never pre-label micro-collection tubes before the sample is obtained.Refer to Children’s Policy [*630.00 Laboratory Specimen Labeling*](http://khan.childrensmn.org/references/policy/600/630.00-laboratory-specimen-labeling.htm)*.* |
| 25 | Evaluate the puncture site for evidence of continued bleeding. Bandage or cover the puncture site as appropriate. |
| **If** | **Then** |
| * the collection was performed in the neonatal units
 | * dress the puncture site, using 3M® Kind Removal Blue Silicone Tape and Antimicrobial IV Sponge 2x2 or gauze.
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| * the patient is less than two (2) years of age and not in a neonatal unit
 | * do not bandage the puncture site. Bandages pose a choking/ingestion hazard should they become dislodged. Hold pressure until bleeding has stopped.
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| 26 | Evaluate the patient for signs of dizziness, nausea, hyperventilation, perspiration, pallor, etc. If there is any indication the patient did not tolerate the procedure well, do not release the patient from your care until signs/symptoms subside. Refer to [SCM 3.50 Phlebotomy Adverse Reactions](http://khan.childrensmn.org/Manuals/Lab/SOP/Gen/SpecCol/205660.pdf). |
| 27 | Inspect the area, remove and dispose of all supplies. For inpatients, take extra care to return the room to its previous arrangement. Ensure all bedrails or cribs are returned to their original, upright positions. |
| 28 | Remove gloves and perform hand hygiene. |

**Procedure notes:**1. Significant discrepancies between hematocrits of capillary blood and venous blood have been noted when the extremities have been cold or blood flow is slow.
2. Statistically and/or clinically important differences in the concentrations of glucose, potassium, total protein, and calcium have been reported. Except for glucose, the concentration of these analytes is lower in skin puncture blood.
3. Hemolyis may occur in skin puncture blood for the following reasons:
	1. There is residual alcohol or CHG at the site.
	2. Patients have increased red blood cell fragility.
	3. “Milking” of the puncture site.
	4. Excessive and aggressive mixing of the specimen in the tube after collection.
4. Excessive crying may adversely affect the concentration of some constituents, especially blood gases and WBC counts. Allow the patient to calm before attempting the skin puncture.
5. Unacceptable tests collected by capillary puncture:
	1. Ammonia
	2. Coagulation Studies
	3. Blood Cultures
	4. ESR
6. Lactate testing may be collected via capillary puncture as a last option using proper warming techniques and by minimizing trauma to the collection site.
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| **References** | 1. CLSI. *Procedures and Devices for the Collection of Diagnostic Capillary Blood Specimens; Approved Standard – Sixth Edition, H04-06*. Clinical and Laboratory Standards Institute, Wayne, PA. 2008.
2. *Phlebotomy Handbook*, 8th edition.
3. Center for Phlebotomy Education, Inc.
4. Lippincott Procedures. *Finger and Heel Sticks, Pediatrics,* revised July 10, 2015. [www.procedures.lww.com](http://www.procedures.lww.com).
5. *WHO Guidelines on Drawing Blood: Best Practices in Phlebotomy*, Geneva, Switzerland, 2010. World Health Organization.
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