

LABORATORY COLLECTION MANUAL	<b>BLOOD COLLECTION ON FILTER PAPER FOR NEONATAL SCREENING PROGRAMS (PKU)</b>
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## I. GOAL OF COLLECTION PROCEDURE

The primary goal of this collection procedure is to improve the quality of the blood specimens collected from newborn infants. When the screening laboratory receives an unacceptable specimen, it must request a second specimen and/or attempt to select a punch area from the poor quality specimen. Unacceptable and poor quality specimens place an unnecessary burden on the screening facility, cause unnecessary trauma to the infant and the infant's parents, potentially delay the detection and treatment of the affected infant, and could contribute to a missed case. In all neonatal screening programs, the turnaround time for analytical results is critical if treatment to prevent the adverse consequences of the condition, such as irreversible mental retardation, is to begin on time.

This collection procedure addresses the collection of blood specimens for neonatal screening and applies to the collection of specimens used to detect congenital disorders such as hypothyroidism, phenylketonuria, (PKU), Galactosemia, etc.

The **PREFERRED** acceptable ages for the infant for the collection are as follows:

- First specimen (baseline) is at 24-48 hours of age.
- Second specimen is preferred at 7-14 days of age. They will accept specimens up to the age of 3 months.

**The specimens are collected onto the Newborn Screening Filter Paper. Collection Kits marked as Medicaid are used for patients with Medicaid. For all other patients, use the non-Medicaid collection kits.**

## II. SOURCE OF COLLECTION

The blood must be collected from the infant's heel using the most medial or lateral portion of the plantar surface of the heel, where "medial" is defined as closest to the midline of the body, "lateral" is defined as away from the midline of the body, and "plantar surface" as the walking surface of the foot. (See appendix A from the NCCLS Approved Standard, July 1991, titled "Blood Collection on Filter Paper for Neonatal Screening Programs -- Second Edition.") (NCCLS is now CLSI) Previous puncture sites or the curvature of the heel must **NOT** be used.

Skin puncture to obtain blood specimens **MUST NOT BE PERFORMED ON** the central area of a newborn's or infant's foot (area of the arch). This may result in injury to nerves, tendons, and cartilage and offers no advantage over puncturing the heel.

Skin punctures **MUST NOT BE PERFORMED ON** the fingers of newborns or infants. The distance from the skin's surface to the bone in the thickest portion of the last segment of each finger of newborns ranges from 1.2 to 2.2 mm, and the available lancets could easily damage the bone. In newborns, local infection and gangrene may be a complication of finger punctures.

## III. TECHNIQUE FOR HEEL-STICK BLOOD COLLECTION ON FILTER PAPER

- A. Preliminary Steps: The required information on the specimen paper must be completely filled in. Before and during collection of the specimen, touching the area within the circles on the filter paper should be avoided. After the specimen has been collected, the blood spots should not be touched. Water, feeding formulas, antiseptic solutions, or other materials should not be allowed to come into contact with the specimen.
- B. Precautions: All appropriate precautions, including wearing gloves, should be taken for handling

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blood and disposing of used lancets in a biohazard container for sharp objects.

- C. Site Preparation: Warming the skin-puncture site can increase blood flow through the site. A heel warmer may be used to cover the site for 3 minutes. This technique increases the blood flow sufficiently and will not burn the skin. In addition, holding the infant's leg in a position lower than the heart will increase venous pressure.
- D. Cleaning the Site: The skin should be cleaned with a 70% alcohol swab. The skin should be allowed to air-dry. Alcohol residue remaining on the skin may dilute the specimen and adversely affect test results.
- E. Puncture: To obtain sufficient flow of blood, the infant's heel should be punctured with a sterile lancet to a depth of <2.0 mm. *A finger lancet is not recommended.* (Please sure Tenderfoot with incision depth of 1.0 mm.) The first drop of blood should be wiped away. Automated lancets are available in the laboratory.
- F. Direct Application: The filter paper should be touched gently against a large drop of blood and, in one step, a sufficient quantity of blood allowed to soak through to fill a preprinted circle on the filter paper completely. The paper must not be pressed against the puncture site on the heel. Blood should be applied only to one side of the filter paper. Both sides of the filter paper should be examined to assure that the blood penetrated and saturated the paper. **Complete one circle at a time.** Three good quality circles are better than 5 poor quality circles. Avoid going back and re-applying additional blood to an incompletely filled circle. This may result in caking or clotting.
- G. Precautions:
1. Milking: Milking or squeezing the puncture may cause hemolysis of the specimen and mixture of tissue fluids with the specimen.
  2. Layering: Layering or application of successive drops of blood in the same printed circle causes caking and/or non-uniform concentrations of blood.
  3. Collection: The required blood spots should be collected so that there is one in each preprinted circle of filter paper. Fill them in one at a time so that the maximum number of circles are completely filled.
  4. Drying: Touching or smearing the blood spots should be avoided. The blood specimen should be allowed to air-dry in suspended horizontal position for at least 3 hours at ambient temperature (15° C - 22° C) and away from direct sunlight (indirect room light is not usually detrimental). Blood spots on the filter paper should not be heated, stacked, or allowed to touch other surfaces during the drying process.
  5. Stacking: When batch stacking cannot be avoided, the following procedure should be used. Before placing the specimen in a paper envelope for mailing, the **DRIED** blood spots on the collection card should be rotated 180° from the blood spots on the cards in the stack immediately above and below.
  6. Mailing: Unless otherwise directed by the screening laboratory, the collection card should be mailed to the laboratory within 24 hours after collecting the specimen. Mailing delays should be avoided.
- H. Completion of Procedure: After blood has been collected from the heel of the newborn, the foot

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should be elevated above the body, and gauze pressed against the puncture site until the bleeding stops. It is not advisable to apply adhesive bandages over skin puncture sites on newborns. If one must be applied, apply a "spot" bandage and instruct the parents to remove it in the next hour.

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***See original policy in the Laboratory for all documented annual reviews.***

**REFERENCES**

NCCLS Document LA4-A2, ISBN 1-56238-157-1 ISSN 0273-3099 titled: "Blood Collection on Filter Paper for Neonatal Screening Programs -- Second Edition" Volume 12, Number 13. W. Harry Hannon, Ph.D. et al.

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