Guidance for Collection of NBS Dried Blood Spots

Special attention must be paid to the collection, drying, storage and transportation of DBSs used for NBS. Individuals tasked with collecting DBS from newborns must be properly trained and assessed. It is recommended that the quality of DBSs is checked by a supervisor or experienced individual before submission of the NBS collection card. Improperly collected or inadequately dried blood samples may be unsatisfactory for testing necessitating recollection and delayed testing or may lead to erroneous results. Storage of samples in an environment with elevated temperatures and humidity increases the risk of false positive screening results. Contamination of the filter paper and use of collection devices containing blood anticoagulants (e.g., EDTA, citrate, or heparin tubes, capillaries, or syringes) to collect blood can also interfere with NBS test methods.

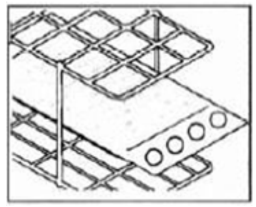
Guidance on the proper technique for collection of DBSs for NBS is given immediately below and in the *Neonatal Screening: Blood Specimen Collection and Handling Procedure* at the end of this document. Additional guidance and onsite training can be provided to Oklahoma birthing centers and practitioners by contacting the OSDH NBS Program at (405) 426-8310.

1. Collect the necessary supplies for blood collection:
   - OSDH Newborn Screening Form (ODH 450); do not touch any of the filter paper circles before, during or after collection, and ensure form is not expired.
   - 70% isopropanol wipes
   - Gauze
   - Soft cloth moistened with warm water (up to 41°C or 105°F)
   - Sterile, disposable lancet or heel incision device
   - Drying rack
2. Warm the infant's foot with a soft cloth, moistened with warm water for 3 to 5 minutes.
3. Select the puncture site, cleanse with 70% isopropanol and allow the heel to air-dry. Black areas on the image (above right) indicate safe areas for the puncture site.
4. While keeping the heel in a horizontal position (heel-down) at or below the heart level, use a sterile, disposable lancet or heel incision device to perform a swift clean puncture to the infant's heel.
5. Use sterile gauze to wipe away the first blood drop.
6. Allow a second LARGE blood drop to form.
7. Gently, touch the filter paper against the large drop of blood, allowing enough blood to completely fill the pre-printed circle on the filter paper and soak through to the other side (see figure to right).

   Note: *Do not touch the heel to the filter paper. Do not apply multiple drops of blood to the same circle. Apply blood only to one side of the filter paper.*
8. Continue filling the other circles with successive single large drops of blood.

9. Allow both sides of blood spots to air-dry at room temperature for at least 3 hours in a horizontal position. Fold the cardboard cover to hold the blood spots off of any surface or place the filter paper form on a rack to dry (see figure to right). Be sure the attached coverslip does not come into contact with the blood spots until they are completely dry.

   Note: *Do not use artificial heat (lamps, incubators, etc.) to dry the samples. Keep away from direct sunlight. Do not stack wet specimens. Insufficient drying will adversely affect the test results.*



10. Replace the coverslip over the blood spots when they are completely dry.
11. Check the quality of the DBSs (see *Simple Spot Check* illustration below). Depending on the experience of the person collecting the specimen, DBSs should be checked by an additional experienced individual (e.g., supervisor) before submission to the OSDH PHL. All specimens are judged for acceptability at the OSDH PHL, and those not acceptable are reported as "Unsatisfactory". But do not delay submissions.
12. When completely dry, place filter paper forms in a sealed paper envelope or container that will provide protection from moisture, light, heat, and contact with other materials. **Never place filter paper specimens in plastic bags.**
13. Ensure that specimens are transported to the OSDH PHL as soon as possible after drying.

Additional Collection Notes

- Collect specimens as early as possible after 24 hours of age or immediately prior to discharge or prior to blood transfusion, whichever comes first.
- If an infant is screened at ≤ 24 hours of age, repeat the screen at 3-5 days of age.
- If an infant is premature or sick, repeat the screen at 7-14 days of age.
- If an infant is being transferred, the transferring facility must collect the NBS specimen before transfer, unless the baby is so unstable that it cannot be done safely. If the screen is not done before transfer, the transferring facility must ensure the receiving facility is aware of the need for screening.
- When collecting screens for multiple births (twins, triplets, etc.), take extra care in completing the demographic information; this is vital to linking abnormal NBS screen results to the correct infant.
- If an infant is on heparin, note on the demographics form that the newborn is 'On Medications'.
- If an infant has been transfused, repeat the screen at age 7-14 days of age and collect a third specimen 3 months post-transfusion or when the RBCs are considered those of the infant.
- The NBS panel is optimized for newborn infants; screening of older children may miss or misidentify some of the newborn screened conditions.
- When possible, collect NBS specimens before initiating total parenteral nutrition (TPN). If the screen is not collected prior to TPN, collect at 24-48 hours. If an infant is on TPN, please note this on the demographic form.

Commented [SD1]: Correct? What if normal results? A premature infant with <u>abnormal screening results</u> should be re-screened at the time of discharge or when requested by the NBS Follow-up Program (whichever comes first).

Commented [MB2R1]: Yes that is correct. NBS-follow up doesn't do anything with the normal results so it is reliant on the submitter/physician to ensure a repeat collection is sent in.

Alternative Methods for Collection of Blood for a Newborn Screen

Heel-stick is the *preferred* method for optimal laboratory results for NBS. Use of capillaries, venipuncture or umbilical catheter collection are alternative methods that may be use but only in *extraordinary circumstances when a heel-stick absolutely cannot be performed*. These methods often result in an unsatisfactory specimen and the need for redraw and delays in testing. Do not use any collection devices (capillaries, tubes, syringes) containing anticoagulants (EDTA, citrate, heparin, etc.) since these will interfere with analyses. For venous collection, avoid areas where an IV is inserted, use a butterfly blood collection kit and let blood flow onto circles on filter paper.

UNACCEPTABLE Methods for Collecting a Newborn Screen

- From umbilical cord
- From the arch of the infant’s foot
- From a newborn’s fingers
- From the infant’s earlobe
- From an area that is swollen or has been previously punctured
- From uncleared IV lines

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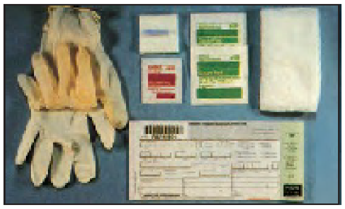
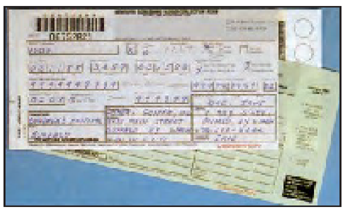
Neonatal Screening

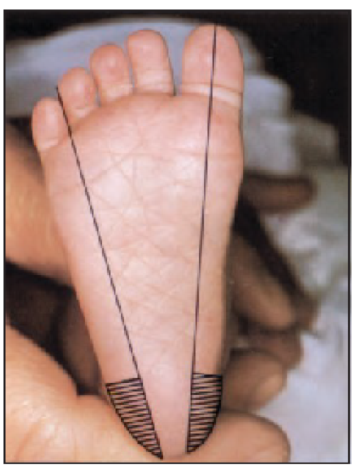
Blood Specimen Collection and Handling Procedure



1 Necessary equipment: sterile lancet with tip approximately 2.0 mm, sterile alcohol prep, sterile gauze pads, soft cloth, blood collection form, gloves.

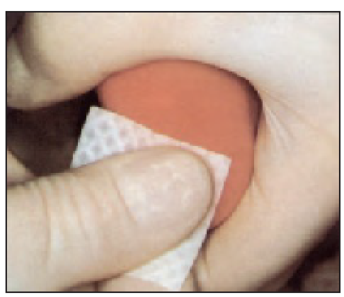


2 Complete ALL information. Do not contaminate filter paper circles by allowing the circles to come into contact with spillage or by touching before or after blood collection. Keep "SUBMITTER COPY" if applicable.



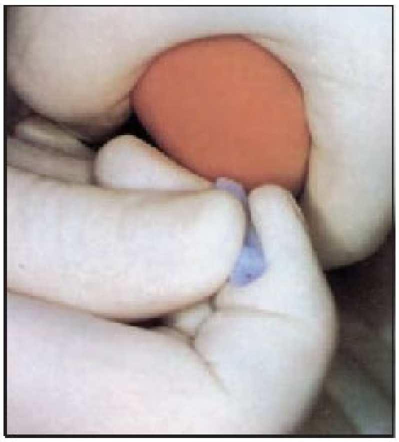
3 Hatched area (////////////) indicates safe areas for puncture site.

4 Warm site with soft cloth, moistened with warm water up to 41° C, for three to five minutes.

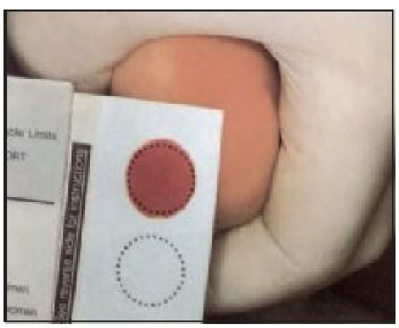


5 Cleanse site with alcohol prep. Wipe DRY with sterile gauze pad.

Over

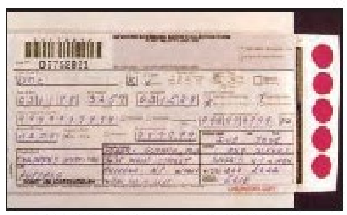


6 Puncture heel. Wipe away first blood drop with sterile gauze pad. Allow another LARGE blood drop to form.



7 Lightly touch filter paper to LARGE blood drop. Allow blood to soak through and completely fill circle with SINGLE application of LARGE blood drop. (To enhance blood flow, VERY GENTLE intermittent pressure may be applied to the area surrounding the puncture site). Apply blood to one side of filter paper only.

8 Fill remaining circles in the same manner as step 7, with successive blood drops. If blood flow is diminished, repeat steps 5 through 7. Care of skin puncture site should be consistent with your institution's procedures.



9 Dry blood spots on a dry, clean, flat, non-absorbent surface for a minimum of four hours.

10 Mail completed form to testing laboratory within 24 hours of collection.

Information provided by The New York State Department of Health.

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Simple Spot Check

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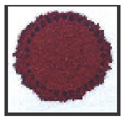
Valid specimen:



Allow a sufficient quantity of blood to soak through to completely fill the preprinted circle on the filter paper. Fill all required circles with blood. Do not layer successive drops of blood or apply blood more than once in the same collection circle. Avoid touching or smearing spots.

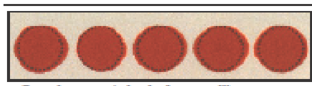
Invalid specimen: / Possible causes:

1. Specimen quantity insufficient for testing.

- Removing filter paper before blood has completely filled circle or before blood has soaked through to second side.
- Applying blood to filter paper with a capillary tube.
- Allowing filter paper to come into contact with gloved or ungloved hands or substances such as hand lotion or powder, either before or after blood specimen collection.

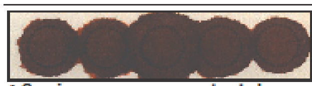
2. Specimen appears scratched or abraded.

- Applying blood with a capillary tube or other device.



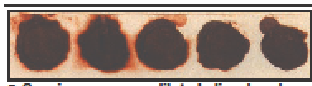
3. Specimen not dry before mailing.

- Mailing specimen before drying for a minimum of four hours.



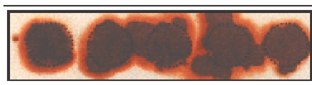
4. Specimen appears supersaturated.

- Applying excess blood to filter paper, usually with a device.
- Applying blood to both sides of filter paper.



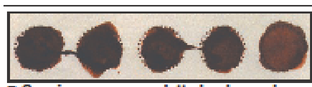
5. Specimen appears diluted, discolored or contaminated.

- Squeezing or "milking" of area surrounding the puncture site.
- Allowing filter paper to come into contact with gloved or ungloved hands or substances such as alcohol, formula, antiseptic solutions, water, hand lotion or powder, etc., either before or after blood specimen collection.
- Exposing blood spots to direct heat.



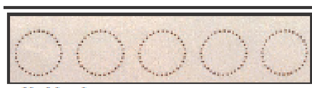
6. Specimen exhibits serum rings.

- Not wiping alcohol from puncture site before making skin puncture.
- Allowing filter paper to come into contact with alcohol, hand lotion, etc.
- Squeezing area surrounding puncture site excessively.
- Drying specimen improperly.
- Applying blood to filter paper with a capillary tube.



7. Specimen appears clotted or layered.

- Touching the same circle on filter paper to blood drop several times.
- Filling circle on both sides of filter paper.



8. No blood.

- Failure to obtain blood specimen.

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Information provided by The New York State Department of Health.