Who is the Newborn Screening Program staff?

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Newborn Screening Test

- Test for 47 conditions including:
  - PKU
  - Cystic Fibrosis
  - Hemoglobinopathies---Sickle Cell Disease
  - Congenital Hypothyroidism
  - Congenital adrenal hyperplasia---CAH
  - Galactosemia
  - Fatty Acid/Organic Acid Disorders
  - Amino Acid Disorders
  - SCID

Over 20 of the conditions tested for, can kill or maim within the first 2 weeks of life
Idaho State Law

• Idaho State Law (IDAPA 16.02.12) requires that all newborns in the state of Idaho have a dried blood spot screening to identify potential genetic and heritable disorders...that can result in cognitive deficiencies or serious health problems, including death.

• Idaho NBS is a two (2)-part screen, with the first screening being done within 24-48 hours of birth and the second screening being done within 10-14 days of birth (excluding NICU infants).
  • 90% of conditions can be detected by the first screen.
  • Between 6-10 disorders are not apparent in the first week of life which is the primary reason for the 2nd screen.
  • With many of the conditions there is no known family history.
  • This is not a diagnostic test. If the screen indicates an abnormal result confirmatory testing will need to be completed.
Referring to NBS as “the PKU test” implies PKU is the only condition screened for, which may deter parents from having the infant screened— or make them less likely to follow through with the second screen.

NBS is **NOT** a test for “mental retardation”. Many of the conditions can cause severe brain damage if not caught and treated early.
Dried blood-spot collection timing algorithm

- 24-48 hours after birth: Dried blood-spot collected
- Within 24 hours of collection: Specimen sent to lab
- Within 7 days: Lab processes specimen and sends results to healthcare provider
- Within 48 hours of notification: Healthcare provider collects repeat sample
- 3-4 hours: Specimen allowed to dry

Exceptions to the 24 hour rule

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Division of Public Health
Idaho Department of Health and Welfare
Exceptions to the 24 hour rule

• Screen prior to:
  • Transfusion
  • Discharge
  • Transfer to another facility
  • Administration of TPN

• NICU Infants:
  • NICU infants should be screened upon admission to the NICU (before transfusion or administration of TPN), again between 48-72 hrs. of birth and at 28 days of age or prior to discharge.
Gather required materials

- Blood collection form
- Alcohol wipe
- Sterile lancet with a tip not to exceed 2 mm deep (there are special lancets available for premature infants)
- Puncture-site after care per facility protocol
- Gloves
- Heel warmer
- Sterile gauze pad
Blood collection form

• 4 sample circles (3 complete circles is better than 4 incomplete circles)
• Check the expiration date on the card
• Complete all the information with blue or black ballpoint pen
  • Do NOT use gel pens
• Make sure information is complete and legible, or it could lead to delayed diagnosis and treatment
• Birth weight should be entered in grams
Step 1

• Wash your hands, and put on gloves
• Place the infant's leg lower than its heart to increase venous pressure and enhance blood flow
• Warm the site with a heel warmer for 3 to 5 minutes
• Choose the appropriate puncture site. (The shaded areas on the heel)
Step 2

- Cleanse the site with an alcohol prep pad and let it air dry
- Any alcohol left on the skin may cause the specimen to become unsuitable and untestable
Step 3

- Puncture the heel with the lancet on the inside or outside sole of the foot.
- Wipe away the first drop of blood with a sterile gauze pad. This first drop could contain tissue fluid that could contaminate or dilute the specimen.
- Allow another large drop of blood to form; it should be large enough to soak into the filter paper to fill or almost fill the circle.
Step 4

- Lightly touch the filter paper to the large drop of blood (being careful NOT to touch the infant’s skin), allowing it to absorb evenly.
- Allow the blood to soak thru the filter paper, check both sides and fill the circle completely.
- Fill in all the remaining circles following the same procedure as you did the first. If the flow of blood decreases, repeat the collection procedures selecting a different puncture site.
- **Apply blood to only one side of the filter paper**
- Do **Not** use capillary tubes, venous blood or a means other than a heel stick procedure to obtain specimen.
Step 5

• Very gentle, intermittent pressure may be applied to the area surrounding the puncture site, however, do not “milk” or squeeze the area. This could create a serum ring leading to unsuitable specimens.

• If the first drop of blood does not fill the circle completely, or most of the way, you may immediately express another drop and continue to fill the circle. This must be done within a few seconds of the placement of the first drop in order to prevent clotting.

• Alternatively, allow a larger drop to form and move on to the next three circles.

• If more than two drops are required to fill the initial circle, or more than 5 seconds has elapsed between application of the blood to the filter paper, prepare to puncture the heel a second time at a different site.
Step 6

• Once all circles are full, complete puncture site care.
• Your specimen should look like this:
The perfect specimen has

- All of the information legibly recorded on the blood collection form
- Is collected from the infant after the first 24 hours of life
- Has no foreign contaminates on the filter paper
- Has all printed circles completely filled with blood that is applied evenly on one side of the filter paper, free of layering and clots
- Is dried for at least three hours on a horizontally level, non-absorbent, open surface such as a drying rack.
- Is covered by the safety flap before mailing, after drying is complete
Proper handling

• Now that you’ve collected the specimen it’s important to handle it correctly. Even if you used perfect technique to collect the blood, improper handling and transport of the specimen can result in a sample that is unsuitable for testing.
Drying the specimen

- Allow the specimen to air dry completely on a flat non-absorbent surface for at least three (3) hours, away from heat and direct sunlight.
  - Do not allow the protective flap to touch the blood at any time during the three hour drying period.
  - Do not touch or smear the wet blood-spot.
  - Do not refrigerate the specimen.
- While drying, never allow one filter paper to come in contact with another. We recommend using a drying rack.
Common reasons for specimen rejection

• Not wiping away the first drop of blood
• Applying blood to both sides of the filter paper
• Using more than one drop of blood to fill a circle
• Squeezing or milking the foot to enhance blood flow
• Touching the filter paper to a baby’s heel
• Scratching the filter paper with a capillary tube when applying blood
• Contamination of filter paper and/or specimen with substances such as glove powder, lotion, etc.
• Sites that have stringent quality assurance programs have a less than 0.5% rate of unsuitable specimens.
Clotted/layered

Clotting or layering is the most common reason a sample cannot be tested. This can happen when multiple drops of blood are applied to the same circle on the filter paper, or when circles on both sides of the paper were filled. Samples drawn into syringes then spotted onto the collection form often have small clots, causing the sample to be unsuitable.

• **HOW TO PREVENT**: Get good blood flow from the infant and allow a large drop of blood to form prior to application to the filter paper. If blood is running down the heel, try to position the infant so that their heel is facing down.
Quantity of blood insufficient

May be caused by removing the filter paper from the drop before the blood completely fills the circle, or soaks through to the other side. It can also be caused by touching the filter paper to a blood drop that is too small.

• **HOW TO PREVENT:** The best way to check is to look at the filter paper on both front and back. Make sure the back of the filter paper has been completely saturated with blood.
Scratched/abraded

This can be caused by applying blood with a capillary tube, a needle or some other device.

• **HOW TO PREVENT**: Do not use a capillary tube or other device to gather blood. Actions such as “coloring in” the circle, repeated dabbing around the circle, or any technique that may scratch, compress, or indent the paper should not be used.

• Needles lyse the red blood cells leading to false neg/pos results.

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Wet

A specimen that is wet when received will not be tested.

• **HOW TO PREVENT:** Make sure the specimen is dried for a minimum of 3 hours, and do not ship specimens in a plastic bag.
Supersaturated

Caused by applying excessive blood to the filter paper, usually with a device, or by applying blood to both sides of the filter paper. Or if the baby is bleeding quickly, it may be difficult to move from circle to circle on the filter paper.

• **HOW TO PREVENT:** Use a drop of blood that fills, but does not overflow the circle. Apply the blood to the filter paper without pressing it directly against the heel. Fill each circle with a single, large drop of blood.
Contaminated

Diluted, discolored, or contaminated specimens can be caused by milking the puncture or applying excessive pressure after the puncture, or allowing foreign substances to come in contact with the filter paper.

- **HOW TO PREVENT:** Store filter paper in a dry place in a vertical position. Prior to collection, place on a clean, dry surface while completing the required patient information on the filter paper form. Clean infant’s heel with alcohol prep and wipe dry before collecting the sample.
Serum ring

Serum rings can be hard to detect. Look at the edge of the dried blood-spot for a change in color. This can be caused by wet alcohol left on the skin, by milking or squeezing the area around the puncture site, by improper drying or by allowing the filter paper to come in contact with contaminants, and lastly by applying blood to the filter paper with a capillary tube.

- **HOW TO PREVENT**: Gently wipe off the first drop of blood with a sterile gauze or cotton ball after initial heel puncture to avoid diluting the blood sample. Do not apply clotted blood. Air dry specimens in a flat (horizontal) position for at least 3 hours at room temperature.
Step 7

Shipping the specimen

- Place the protective flap over the dried blood spots.
- Stack multiple cards by alternating each end of dried blood spots opposite of one another, to ensure they do not touch.
- List the infant’s primary care physician (PCP), not the birth attending physician, as the person responsible for obtaining re-screens, or if there are any issues identified.
- Confirm all demographic data is complete and accurate.
- Include records/documentation of tests being added to the digital birth registry record.
- Always include birth weight in grams on the form.
- Do not staple or tape anything to the form.
Shipping the specimen

Reminders:

• Blood-spot specimens should be shipped within 24 hours of collection. **Do not bundle or hold specimens to ship multiple days at one time.**

• Do not ship specimens in a plastic bag or biohazard bag. This can alter components of the blood (analytes) and/or enzyme activity.

• Do not expose specimens to extreme temperatures.

• Specimens will not be tested if they are received more than 10 days after collection.
Shipping the specimen

• **Step 1**
  - When completely dry, prepare the specimens for shipping. Specimens are to be shipped as soon as possible and definitely within 24 hours of collection.

• **Step 2**
  - Place the protective cover over the dried bloodspots. Stack multiple cards so the bloodspots are on opposite ends and do not touch.
Shipping the Specimen

• Step 3
  • Place specimens into envelope and attach courier label
  • Pictured are the preferred UPS letter envelopes to order and use.
Shipping the specimen

• Step 4
  • Specimens are now ready for shipment and should be placed in the designated pickup location. Make sure you are aware of the location and time of your daily courier pickups.

• Step 5
  • Specimens should be shipped promptly every day and a log should be kept of samples shipped and the tracking number of each package recorded.
Newborn Screening Process

• Specimen Transit
  • The quicker the specimen reaches the lab, the quicker these conditions can be recognized.
  • Often, the abnormality can be identified before the baby shows symptoms.
    • If testing is delayed until symptoms show, damage can be irreversible.

• We offer UPS courier service Monday – Friday
  • This has drastically decreased transit times, resulting in faster results and treatment.
Newborn Screening Process

- **Normal Results:**
  - Mailed to the hospital and physician-of-record
  - Usually completed in 2-10 working days of specimen receipt

- **Abnormal Results:**
  - **Critical**
    - Immediately reported to the medical consultants who phone the PCP/clinic listed on the NBS card with recommendations for further action.
    - Medical Consultant – specialist that agrees to be contact point for all significantly abnormal NBS results
  - **Non Critical**
    - Immediately reported directly to the PCP/clinic listed on NBS card with a request for retesting.