Newborn Blood Spot Collection and Screening
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Three types of newborn screening

- Bloodspot
- CCHD/pulse ox
- Hearing

GOAL of Newborn Screening: Diagnose and treat disorders before they cause permanent harm- we screen because we can treat!
What clinicians need to know about bloodspot newborn screening

Why it’s important:

- Prevents death and/or disability
- Babies may look and act healthy at birth
- The disorders are not very common
- The disorders we screen for have treatments
- It’s not just the “PKU” test!
Blood Spot

- Cystic Fibrosis
- Endocrine disorders
- Congenital hypothyroidism
- Fatty Acid disorders
- Amino Acid disorders
- Organic Acid disorders
- Immune disorders
- Galactosemia
- Hemoglobin disorders
- **LSD** (lysosomal storage disorders, currently screened for in Oregon)
Detecting Disorders Saves Lives

- About 1:900 babies will be diagnosed with a treatable disorder.
- About 90% are detected on the first screen, but some disorders are routinely detected on the 2nd screen.
- Newborn Screening is one of the most effective public health campaigns ever in terms of cost and prevention-comparable to vaccination.
- Screening is mandated in all 50 states, though what is screened for is legislated individually by each state.
Newborn Screening Process - 1st Screen

DRIED BLOOD SPOTS: THE HEEL POKE

Birth → Collection @24hrs → Shipping ASAP → Lab testing → Results

GOALS:
Critical Results - called out by 5 days of life
All other results: complete by 7 days of life

Newborn Blood Spot Screening 503-693-4174
Newborn Screening Process - 2nd Screen

Hospital discharge → Collection @2 weeks of age with PCP → Shipping ASAP → Lab testing → Results
Timing of Specimen Collection

- Normal newborns should be tested at 24-48 hours old. Do it as soon as the baby has achieved 24 hours of life, or at hospital discharge if prior to 24 hours.
- The second screen for a normal newborn is collected between 10-14 days of age (typically at the 2 week follow up visit). In states that screen for LSDs, some babies may have a 3rd screen depending on weight.
- NICU infants are screened at 24-36 hours of life (or before transfusion, whichever is first), then between 10-14 days of life (48-72 hours if transfused), and then at 28 days or shortly thereafter— even if they have discharged home.
Parents should be sent home after birth with part 2 of the “kit” and a brochure about testing. They should bring this to their baby’s Doctor for the 2 week check-up.
Laboratory: located in Hillsboro
What to tell parents?

- Know your pediatrician or provider at time of birth
  - *we need to know where to result out to or who to contact. This is so important and often missed!*
- Ask your provider about the results
  - *don’t assume no news is good news*
- Look for the card that is part 2 of the “kit” and bring it to your baby’s doctor
- It is not going to hurt the baby
Dry Blood Spot Collection

• DBS is whole blood collected on filter paper from a heel stick
• Screening infants includes *proper specimen collection, proper handling and packaging, prompt shipment to the state lab for testing, appropriate follow up or re-screening as needed.*
• An issue in any of these areas can result in an unsatisfactory screening attempt! This can delay a life-saving diagnosis!
Step 1: Gather your supplies

You will need:

- Blood collection card (Part 1 or Part 2, depending if this is the first or second screen)
- Gloves
- Alcohol wipe and gauze
- Heel warmer
- Lancet device (one specific for DBS collection!)
Step 2: Choose your collection Site

- A Heel Stick is preferred
- IV and central lines (sometimes used in NICU) not recommended (must be flushed)
- Cord Blood NOT acceptable
Do not use Capillary Tubes or Needles when applying blood to filter paper

-Scratches or tears filter paper
-Causes uneven saturation
-Needles lyse the red cells, which leads to false negative or positive results!
Heel Stick Procedure, step-by-step:

• Fill out the demographic data on the card. It must be complete - every detail counts when we are interpreting the results or need to follow up

• Use appropriate patient identification technique. Make sure you have the right filter paper kit (Part 1 or 2)

• Don’t touch the filter paper - handle properly

• Apply heat pack (only use chemical ones made for this purpose)

• Clean the site on the baby’s heel with alcohol swab and air dry

• Lance the site, and wipe away the first drop of blood (it will be contaminated)

• Allow one large drop to collect, and gently touch drop to the filter paper so that it fills up the circle completely. Continue for each circle

• Apply pressure to heel until bleeding stops

• Allow parent to comfort baby
Important Considerations

- Always use Universal Safety Precautions (as with any other specimen collection)
- Do not touch or contaminate filter paper on the card with hands, gloves, bodily fluids, powder, formula, water, coffee, or anything else
- Be careful not to crush or compress filter paper while it is being stored for use, or by addressograph machines, or put anything on top of the card - it will keep the blood from saturating properly
More to consider…

- Neatness does not count!
- You can use either side of the filter paper to fill, but only fill from one side
- Fill circles completely
- Don’t superimpose or put blood drops on top of each other ("layering")
- Don’t “milk” the heel- you will get serosanguinous fluid and we need whole blood only
- If the blood flow is slow, restick! A warm heel bleeds better…
• OSPHL needs 12 1/8” hole punches from the card to do the full screening battery.
• Each 1/8” needs to have 10 microliters of blood
Proper Handling Post-Collection

- Take care not to touch or smear your blood spots
- Allow to air-dry horizontally for 3-4 hours at room temp
- Do not hang filter paper in a dependent position
- Keep away from direct sunlight
- Do not heat, stack or allow the blood spots to touch other surfaces during the drying process
- Do not cover blood spots with end paper until dry
- Do not store or ship blood spots in plastic bags
And then ship to The Lab

- Place the protective cover over the DBS
- When stacking multiple cards, reverse ends so blood spots don’t touch
- Make sure all demographic data is complete and card is fully filled out. Inspect to be sure the DBS are adequate.
- Prepare a packing list of the specimens
- Put the specimens into their sealable paper envelopes
- Ship the same day by courier or a postal service. Don’t accumulate specimens. Consider weather and holidays.
- **Should be received by OSPHL within 1-2 days of collection- and definitely no later than 5 days under any circumstances!**
Weekends and Holidays

- Keep your specimens in a cool, dry, and at room temperature until able to send out. AVOID sunlight, heat, humidity, hot mail boxes, etc.
- Send by overnight or express mail on the following business day. Even considering holidays, we should get every specimen within 5 days of collection.
A Good Specimen Collection

- The circles are completely filled
- Blood is evenly saturated
- Looks the same on both sides of filter paper
- No contamination evident
- No heat/humidity exposure
Uneven Saturation

- When some parts of the blood spot look darker than others - color of each spot should be uniform throughout.
- When multiple drops are used to fill circle
- Touching filter paper with gloves or hands
- Other contamination or damage to paper
- Hanging them to dry
- You will often notice that the back of the card does not look the same as the front - the blood will often soak unevenly through the card.
Quantity Not Sufficient

- Not enough blood applied to fill circles
- Drop not large enough to soak evenly all the way through the paper - the front and back should look the same
- Compression of filter paper from storage can effect the ability of the filter paper to allow blood to saturate through
- Inadequate blood flow - you need to make sure your blood flow is enough to produce large drops to apply to each circle on the paper. Small drops do not saturate the paper.
- Make sure you inspect your card on both sides after collection
Scratched or Abraded

- Applying blood with a capillary tube or a needle can cause scratches
Odd color, or wet

- Specimen not dried sufficiently
- Specimen contaminated with water/liquid prior to shipment
Clotted, Layered, or super-saturated

- Applying excess blood, usually from a device
- Blood applied from both sides of the filter paper
- Blood applied on top of dried or semi-dried or already-saturated blood—usually when a re-stick should have been done due to insufficient blood flow.
Hemolyzed, discolored, contaminated

- Squeezing or “milking” the heel
- Not wiping away the first drop
- Filter paper compressed or contaminated with other substances
- Blood spots exposed to direct heat (dried in the sun, heater, etc)
Serum Rings

- Not letting alcohol dry
- Contamination
- Milking heel
- Improper drying
- Cap tubes
No blood
I’m happy to help!

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