

Needle Know-How

Preventing Repeat Heelsticks

Every phlebotomist dreads the time when they look at the draw list for their shift and see newborns who need blood specimens collected. No one wants to cause such a small, fragile human being pain in any way. To treat and prevent illness, however, it's a necessary discomfort. What isn't necessary, however, is when we have to restick a newborn because of improper technique or errors in the process.

Many babies experience multiple heelsticks. Complications of multiple punctures include nodules at the puncture site that don't resolve for months, and potentially life-threatening infections.¹ Errors that force recollections and potential complications can originate anywhere along the continuum of care from the ordering physician all the way to through specimen testing. Since most errors occur during the preanalytical phase of laboratory testing, it's the phlebotomist who can prevent the necessity for most recollections.

The best way to reduce repeat heelsticks is to obtain a suitable sample the first time. By being attentive and vigilant, we can eliminate unnecessary and painful repeat heelsticks for our smallest patients.

Positioning

How specimen collection personnel position the infant can make a significant difference in how easily the sample is obtained. If possible, position the infant so that the foot is on a plane lower than the heart, recognizing gravity is your friend. This can be accomplished by elevating the head of the bassinet slightly. Before making such an adjustment, check to see if the baby's crib accommodates such repositioning, and that you are permitted to do so by facility policy. Additionally, lowering the foot between the collection of each blood drop can help the capillary beds fill more quickly and completely, making an adequate volume of sample easier to obtain.

Babies tend to wiggle away from things they don't like. Most infants will reflexively pull their foot away from stimulation. To maintain control, firmly encircle the ankle with two fingers, ensuring your grip does not restrict blood flow.

Site Selection and Equipment

Where you choose to puncture the heel is a very important decision. The Clinical and Laboratory

Standards Institute (CLSI) lists the medial and lateral portions of the bottom surfaces of the heels as acceptable.² Cleanse the site first with an alcohol prep and allow it to dry completely. Wet alcohol can mix with the sample causing hemolysis and affecting results. The wet alcohol will also cause the baby unnecessary pain when the lancet punctures the skin.

Heel bones in infants are much closer to the skin, so the chosen lancet should puncture less than 2.0 mm deep. Osteomyelitis is an inflammation of the bone that can lead to complications and disability. CLSI also states that a previously punctured non-healed site should be avoided.² The chosen site should also not be bruised, scarred, or show signs of infection.

The order of draw for capillary collections is also important and different from venipunctures. After wiping away the first drop of blood with clean gauze (to prevent tissue fluid from contaminating the sample), the EDTA tube should be collected first, followed by other additive tubes and then non-additive tubes. Placing the EDTA tube later in the order risks platelet clumping, a natural occurrence when skin is punctured. Since this process is not immediate, the first tube filled is less likely to contain clumped platelets than later tubes. Since the EDTA tube is the one used to count platelets as

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part of the complete blood count (CBC), filling it first increases the lab's ability to provide the physician with an accurate platelet count. To ensure proper mixing, gently invert all additive tubes 5-10 times according to the tube manufacturer's recommendations. One inversion is defined as upending the tube 180 degrees, then returning it to an upright position. Each time the tube is overturned, there should be adequate time permitted to allow the air bubble to flow the length of the tube before turning it over again. It is this air bubble that facilitates mixing of the blood with the additive.

Quantity and Quality

Physicians serve their patients best when they have accurate lab results, which can only come from samples that are not compromised during the collection process. Before terminating the draw, make sure the collection meets minimum fill requirements. Short samples cheat the patient out of an accurate test result, and often force testing personnel to request the specimen be recollected. Fill all tubes to their stated volume every time.

Use only gentle pressure to ease blood from the puncture site. After collecting the drop, release the pressure applied to the site and give the capillary bed time to refill. If you find you are constantly squeezing and "milking" the foot to obtain enough blood, be aware that you are likely hemolyzing the sample and contaminating it with tissue fluid. It's also painful to the infant. If excessive squeezing is required, you should terminate the collection; the

likelihood that the specimen will render accurate results decreases proportional to the force being applied to the foot. To make milking unnecessary, prewarm the heel with a warm compress not to exceed 42-degrees Celsius. The flow of blood through the capillary beds will be seven times greater than if the site had not been prewarmed. The result: an adequate flow of blood into the collection tube with minimal or no squeezing.

If the device you use incorporates a scoop into its design, CLSI recommends the device not be scraped across the puncture site in an effort to force blood to the opening.² Forceful scooping is painful to the patient and forces tissue fluid into the sample.

Some samples require special handling during and/or immediately after collection. Make sure you are prepared to protect light-sensitive specimens from exposure using amber light-blocking tubes or a light-tight wrap. If the sample is to be immediately chilled, have an ice slurry available before you begin the procedure. Any delay or improper handling could force the laboratory to request a recollection due to the potential for a mishandled sample to produce erroneous results.

Babies have it rough enough coming into the world. Unnecessary repeat collections only cause additional trauma. Those who draw their blood can have a significant impact in making their new world a more welcoming place.

References

1. <http://dermatlas.med.jhmi.edu/derm/IndexDisplay.cfm?ImageID=1222651563>. DermAtlas, Johns Hopkins University. Accessed 5/11/11.
2. CLSI. *Procedures and Devices for the Collection of Diagnostic Capillary Blood Specimens: Approved Standard - Sixth Edition*. CLSI document H4-A6. Wayne, PA: Clinical and Laboratory Standards Institute; 2008.

For more information on heelstick collections, the Center for Phlebotomy Education offers *Skin Punctures & Newborn Screens*, a video demonstrating the proper technique for performing fingersticks, heelsticks, and newborn screening collections. Available on both DVD and streaming video.

