MICHIGAN NEWBORN SCREENING PROGRAM

RESULTS OF THE HOSPITAL QUESTIONNAIRE 2012

LEAN Group: Target Unsatisfactory Newborn Screening Specimens

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RESULTS OF THE HOSPITAL QUESTIONNAIRE

This report provides an overview of the results from the Michigan Newborn Screening (NBS) Program's Hospital Questionnaire, which was distributed to NBS coordinators. Following a marked increase in the number of unsatisfactory NBS specimens (Figure 1), staff from the NBS Laboratory and Follow-up Program created a workgroup to explore possible reasons for the increase and devise quality improvement strategies to address the issues identified. This survey was conducted: 1) to determine how many hospitals follow the recommendations found in the Clinical Laboratory and Standards Institute (CLSI) publication *Blood Collection on Filter Paper for Newborn Screening Programs; Approved Standard—Fifth Edition* and 2) to identify potential practice differences between hospitals with low rates of unsatisfactory specimens and hospitals with higher rates.

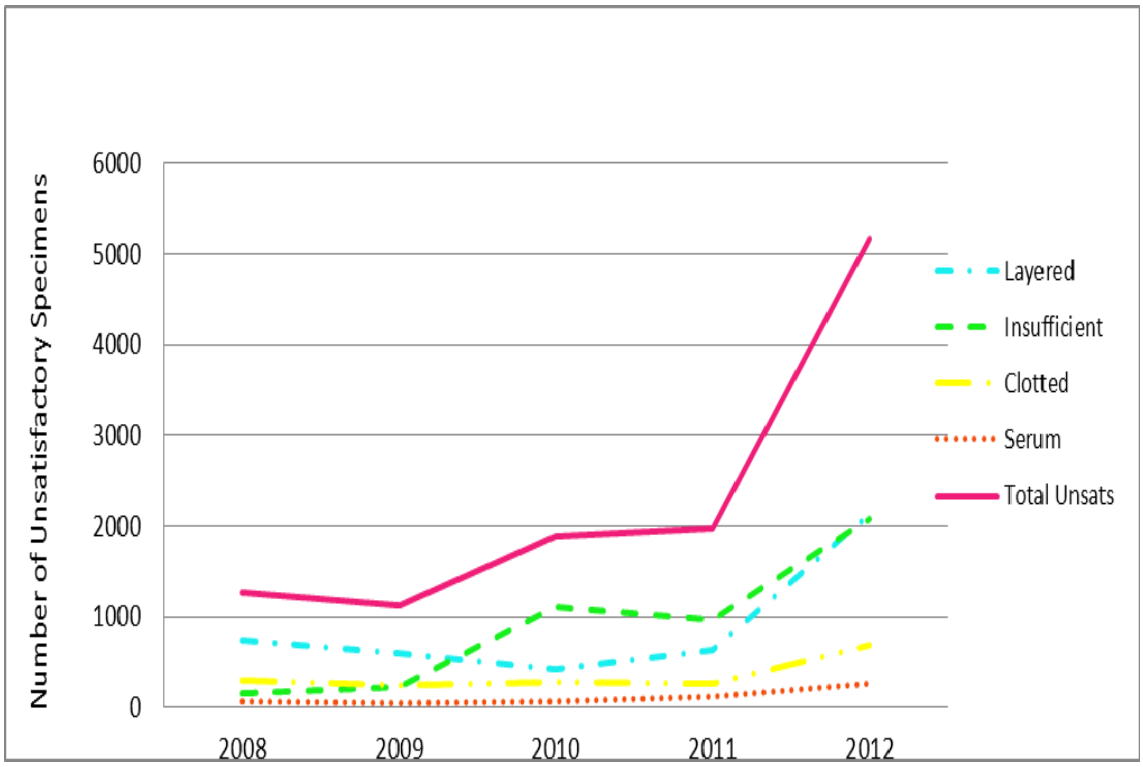

Figure 1. Number of Unsatisfactory Specimens, by Type, Michigan, 2008-April 2012

Out of 118 regular nurseries, neonatal intensive care units (NICUs), and special care nurseries (SCNs) in Michigan, 52 had a staff member complete the survey, resulting in a 44% response rate. The response rate varied directly with nursery size; the largest hospitals (more than 309 births per quarter) had a 67% response rate compared to a 25% response rate among the smallest hospitals (fewer than 73 births per quarter). The nurseries were also categorized based on their unsatisfactory specimen rate from the second quarter of 2012. Of the 31 nurseries that met the goal of unsatisfactory specimen rate less than or equal to 1%, 12 responded to the survey (39%). Of the 55 nurseries with an unsatisfactory specimen rate between 1 and 5%, 25 responded (45%). Lastly, of the 32 nurseries with an unsatisfactory specimen rate greater than 5%, 15 responded (47%).

The survey was divided into several sections including: storage and handling of NBS cards, entering demographic information, blood collection-before specimen collection, blood collection-during specimen collection, drying of blood, and preparation for transport. For each section, we present the CLSI recommendations, the survey responses for all respondents corresponding to those recommendations, and key differences identified between hospitals with the lowest unsatisfactory rates (less than or equal to 1%) and hospitals with the highest rates (greater than 5%).

STORAGE AND HANDLING OF NEWBORN SCREENING CARDS

CLSI Recommendations

NBS cards be stored[1]:

- In their original, unopened wrapping
- Away from direct sunlight
- So filter paper is not compressed

Survey Results

- No hospitals store their NBS cards in the refrigerator, direct sunlight, or by a heat source.
- Approximately 44% of hospitals store their packages of NBS cards stacked on top of each other.

Key Differences between Hospitals with ≤1% Unsatisfactory Rate and Hospitals with >5% Unsatisfactory Rate

Hospitals with the lowest unsatisfactory rates were:

- Less likely to store unopened packages in a drawer (8% compared to 33%)
- Less likely to store opened and unopened packages in the same place (17% compared to 47%)

[1] CLSI Manual. 6.1.4 Shelf Life and Storage, page 9.

ENTERING DEMOGRAPHIC INFORMATION

CLSI Recommendations

When the demographic information is entered[2]:

- Gloves should always be worn
- The yellow flap should be covering the filter paper

Survey Results

- Only one respondent indicated that gloves are worn all the time when the demographic information is entered. Approximately 75% of respondents indicated that gloves are never worn when the demographic information is entered.
- Nearly all respondents (98%) reported that the yellow flap covers the filter paper when the demographic information is entered.

Key Differences between Hospitals with ≤1% Unsatisfactory Rate and Hospitals with >5% Unsatisfactory Rate

Hospitals with the lowest unsatisfactory rates were:

- More likely to have one type of staff complete the demographic portion of the NBS card (73% compared to 47%)
- More likely to have staff verify that demographic information is complete prior to sample collection (91% compared to 80%)

BLOOD COLLECTION – BEFORE COLLECTION

CLSI Recommendations

Before blood is collected[3]:

- A heel warmer be applied for 3 minutes prior to and removed immediately before blood collection
- Alcohol is used to cleanse the incision site and skin is allowed to air dry before the incision is made

Survey Results

- The majority of hospitals (84%) reported using a heel warmer before blood collection.
- Over two-thirds of respondents (72%) indicated that the heel warming device is kept on the heel for 3-5 minutes.

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[2] CLSI Manual. 5.1.1 Preliminary Steps, page 3; 7.2.3 Contamination, page 11; and 8.1 Contamination, page 12.

[3] CLSI Manual. 4.1 Heel, page 2; 5.1.3 Site Preparation, page 3; 5.1.4 Cleaning the site, page 3; 5.1.5 Puncture, page 4; 5.1.6 Direct Application, page 4; and 5.1.7 Collection, page 4.

- All respondents reported that the heel warming device is removed either immediately or 1-3 minutes before blood collection.
- All hospitals use alcohol to clean the incision site.
- Of the hospitals that reported using alcohol, 96% allow the skin to air dry before the incision is made.

Key Differences between Hospitals with ≤1% Unsatisfactory Rate and Hospitals with >5% Unsatisfactory Rate

Hospitals with the lowest unsatisfactory rates were:

- More likely to use a heel warmer before blood collection (91% compared to 73%)
- More likely to keep the heel warmer on the infant's heel for at least 3 minutes (80% compared to 64%)

BLOOD COLLECTION – DURING COLLECTION

CLSI Recommendations

When blood is collected[4]:

- The blood collection method is a heel stick with blood applied directly to the filter paper
- An incision device be used
- The infant's leg should be positioned lower than the heart
- The first drop of blood be wiped away
- Only the blood droplet touches the filter paper
- Slight pressure be applied to the foot
- Blood be applied within the preprinted circles on the filter paper
- Only one drop of blood be applied to each preprinted circle
- Blood be applied to only one side of the filter paper
- The yellow backing is kept away from the filter paper when the blood is applied

Survey Results

- Approximately 92% of respondents indicated that their blood collection method is a heel stick with blood applied directly to the filter paper.
- Of the 50 respondents who selected the medical implement used for blood collection, 90% selected an incision device and 10% selected a lancet.
- Just over half of survey respondents (54%) reported that the infant's legs are positioned lower than the heart during blood collection.
- Nearly 70% of respondents wipe away the first drop of blood.

[4] CLSI Manual. 4.1 Heel, page 2; 5.1.3 Site Preparation, page 3; 5.1.4 Cleaning the site, page 3; 5.1.5 Puncture, page 4; 5.1.6 Direct Application, page 4; and 5.1.7 Collection, page 4.

- Three-quarters of hospitals reported that only the blood droplet touches the filter paper.
- Three-quarters of hospitals reported that slight pressure is applied to the foot.
- Just over 90% of survey respondents reported that blood is applied within the preprinted circles.
- Of concern, approximately 37% of survey respondents reported that only one drop of blood is applied to each preprinted circle.
- Just under 80% reported that blood is applied to only one side of the filter paper.
- Approximately 65% of respondents indicated that the yellow backing is kept away from the filter paper when blood is applied.

Key Differences between Hospitals with ≤1% Unsatisfactory Rate and Hospitals with >5% Unsatisfactory Rate

Hospitals with the lowest unsatisfactory rates were:

- More likely to have only one type of staff perform the blood collection for the NBS card (73% compared to 57%)
- More likely to use an incision device (100% compared to 87%)
- Less likely to milk the area surrounding the puncture site (42% compared to 60%)
- Less likely to apply multiple drops of blood to each preprinted circle (58% compared to 73%)

DRYING OF BLOOD

CLSI Recommendations

Specimens should be[5]:

- Dried for at least 3 hours
- Air dried
- Dried out of sunlight
- Dried horizontally
- Dried on a nonabsorbent open surface
- Supported or propped by the protective flap

Survey Results

- Seven hospitals (14%) reported drying specimens less than 3 hours.
- Approximately 92% of respondents indicated that specimens are allowed to air dry.
- Twenty-nine hospitals (56%) reported that specimens are dried out of sunlight.
- Nearly two-thirds of respondents said that specimens are dried horizontally.

[5] CLSI Manual. 5.5.2 Drying, page 7.

- Of concern, only four hospitals (8%) reported that specimens are dried on a nonabsorbent open surface.
- Just over 20% of respondents indicated that the protective flap was used to support or prop the specimen.

Key Differences between Hospitals with ≤1% Unsatisfactory Rate and Hospitals with >5% Unsatisfactory Rate

Hospitals with the lowest unsatisfactory rates were:

- More likely to dry specimens for at least 3 hours (100% compared to 67%)
- More likely to dry specimens on a nonabsorbent open surface (25% compared to 0%)
- More likely to have the protective flap support or prop the specimen (33% compared to 13%)
- Less likely to use a blood spot drying rack (17% compared to 60%)

PREPARATION FOR TRANSPORT

CLSI Recommendations

Specimens should be transported[6]:

- Within 24 hours of specimen collection
- In appropriate envelopes provided by the NBS Program at no cost
- With the yellow flap covering the blood spots or with each specimen rotated 180° from the card above and below if the yellow flap is removed

Survey Results

- Half of the survey respondents indicated that specimens are transported within 24 hours of collection.
- Nearly 90% of respondents reported that specimens are transported in envelopes provided by the NBS Program. No one reported using an airtight, sealed container or facility envelope for transport.
- Approximately 44% of hospitals selected that specimens are transported with the yellow flap covering the blood spots or each specimen rotated 180° from the card above and below if the yellow flap is removed.

Key Differences between Hospitals with ≤1% Unsatisfactory Rate and Hospitals with >5% Unsatisfactory Rate

Hospitals with the lowest unsatisfactory rate were:

- More likely to have only one type of staff preparing the NBS specimens for transport (100% compared to 67%)

[6] CLSI Manual. 5.5.2 Stacking, page 7; and 5.5.3 Timing and Transport, page 7.

- More likely to assess the quality of the blood sample and completeness of demographic information prior to shipment (100% compared to 67%)

SUMMARY AND RECOMMENDATIONS

Overall, the majority of the CLSI guidelines are followed. The most frequently followed guidelines are: the yellow protective flap covers the filter paper while the demographic information is entered; the heel warmer is removed immediately before blood collection; and alcohol is used to cleanse the incision site, which is then allowed to air dry.

The following opportunities for improvement were identified: hospital staff should wear gloves when entering demographic information to avoid specimen contamination; heel warmers should be used routinely and kept in place for at least three minutes to promote adequate blood flow and reduce the likelihood of collecting an insufficient quantity of blood; and, only one large drop of blood should be applied to each preprinted circle to avoid layering.

Following all of the guidelines in the CLSI manual should reduce the burden of unsatisfactory specimens on both hospital staff and families.

For a more detailed summary of the responses for each survey question, please visit the NBS website (www.michigan.gov/newbornscreening) and click on “Documents, Forms, and Reports”.