

2023 Michigan Newborn Screening Program Annual Report

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The Newborn Screening (NBS) Annual Report provides an overview of the Michigan NBS Program, screening performance metrics, and quality assurance information. Since the program began in 1965 with screening for phenylketonuria, more than 50 disorders have been added to the screening panel. Through 2023, more than 7.8 million infants have been screened with more than 8,300 diagnosed with diseases included in the NBS blood spot panel. Of the 96,914 infants screened in 2023, the vast majority were Michigan residents and 316 (0.3%) were diagnosed with a disease. Overall, one infant out of 307 screened was diagnosed with one of the disorders included in the NBS panel (see Page 5 for list of disorders).

Developments occurring in 2023:

Michigan continued to disseminate findings at both the state and national level:

- The findings from different studies and analyses related to NBS were presented at the Association of Public Health Laboratories (APHL) Newborn Screening and Genetic Testing Symposium.

Michigan continued to conduct NBS-related trainings:

- The NBS Follow-up Program held two virtual educational conferences for hospital staff. A total of 119 people, representing 55 birth hospital and six Michigan homebirth attendants, attended.
- The NBS Follow-up Program conducted 21 virtual hospital site visits.

NBS follow-up staff presented or participated as an exhibitor at numerous educational events including:

- Six MDHHS Virtual Baby Fairs.
- American Academy of Pediatrics Michigan Chapter 73rd Annual Conference.
- Partners in Pediatric Care (PIPC) 2023.
- 2023 Maternal Infant Health Submit.
- Cristo Rey Community Center Baby Fair.
- 2023 Women, Infants, and Children (WIC) Conference.

NBS laboratory personnel and follow-up staff continued to serve on national NBS committees, including:

- Education and Training workgroup for the Advisory Committee on Heritable Disorders in Newborns and Children.
- The Clinical Laboratory Standards Institute Document Development Committee.
- Health Information Technology (HIT) Association of Public Health Laboratories (APHL) subcommittee.
- Quality Assurance/Quality Control APHL workgroup.
- Higher-Tier Testing workgroup.

Continuing work:

- The Michigan NBS Program began screening for Guanidinoacetate methyltransferase (GAMT) deficiency in September 2023. More information about GAMT deficiency can be found on the [GAMT family fact sheet](#).

Disorders included on the Newborn Screening Blood Spot Panel, 2023

Amino Acid Disorders

- 1. Argininemia
- 2. Argininosuccinic acidemia
- 3. Citrullinemia
- 4. Citrullinemia Type II
- 5. Homocystinuria
- 6. Hypermethioninemia
- 7. Maple syrup urine disease
- 8. Phenylketonuria
- 9. Benign hyperphenylalaninemia defect
- 10. Biopterin cofactor biosynthesis defect
- 11. Biopterin cofactor regeneration defect
- 12. Tyrosinemia Type I
- 13. Tyrosinemia Type II
- 14. Tyrosinemia Type III

Fatty Acid Oxidation Disorders

- 15. Carnitine acylcarnitine translocase deficiency
- 16. Carnitine palmitoyltransferase I deficiency
- 17. Carnitine palmitoyltransferase II deficiency
- 18. Carnitine uptake defect
- 19. Dienoyl-CoA reductase deficiency
- 20. Glutaric acidemia Type II
- 21. Long-chain L-3-hydroxyl acyl-CoA dehydrogenase deficiency
- 22. Medium/short-chain L-3-hydroxyl acyl-CoA dehydrogenase deficiency
- 23. Medium-chain acyl-CoA dehydrogenase deficiency
- 24. Medium-chain ketoacyl-CoA thiolase deficiency
- 26. Trifunctional protein deficiency
- 27. Very long-chain acyl-CoA dehydrogenase deficiency

Lysosomal Storage Disorders

- 28. Pompe Disease
- 29. Mucopolysaccharidosis I

Organic Acid Disorders

- 30. 2-Methyl-3-hydroxy butyric aciduria
- 31. 2-Methylbutyryl-CoA dehydrogenase deficiency
- 32. 3-Hydroxy 3-methylglutaric aciduria
- 33. 3-Methylcrotonyl-CoA carboxylase deficiency
- 34. 3-Methylglutaconic aciduria
- 35. Beta-ketothiolase deficiency
- 36. Glutaric acidemia Type I
- 37. Isovaleric acidemia
- 38. Methylmalonic acidemia (Cbl A, B)
- 39. Methylmalonic acidemia (Cbl C, D)
- 40. Methylmalonic acidemia (mutase deficiency)
- 41. Multiple carboxylase deficiency
- 42. Propionic acidemia

Hemoglobinopathies

- 43. S/Beta thalassemia
- 44. S/C disease
- 45. Sickle cell anemia
- 46. Variant hemoglobinopathies
- 47. Hemoglobin H disease

Endocrine Disorders

- 48. Congenital adrenal hyperplasia
- 49. Congenital hypothyroidism

Other Disorders

- 50. Biotinidase deficiency
- 51. Galactosemia
- 52. Cystic fibrosis
- 53. Severe combined immunodeficiency
- 54. T-cell related lymphocyte deficiencies
- 55. X-linked adrenoleukodystrophy
- 56. Spinal muscular atrophy
- 57. Guanidinoacetate methyltransferase (GAMT) deficiency

Notes: Highlighted disorders have never been detected in Michigan through NBS. The following disorders are reported together because the same analyte(s) is used for screening: #3/4, #5/#6, #8-11, #13/#14, #15/#17, #21/#26, #31/#37, #32-34/#41, #38-#40/42, and #30/#35.

Screening Performance Indicators

Indicator	Description
Newborns (N)	The total number of screened live births among in-state residents.
Total + (% NICU)	Total number of positive screens among in-state residents (the percentage of infants with positive screens who were admitted to the NICU among all infants with positive screens).
Positive	Screening value exceeds cutoff.
Strong +	Strong positive screen (in most cases considered a medical emergency and referred immediately for diagnostic testing).
Borderline +	Borderline positive screen (not a medical emergency and repeat screen requested).
Confirmed +	A diagnosis of a disorder that has been confirmed.
False +	A positive screen that is not confirmed as a case of a disease included in the NBS panel.
Detection Rate	The number of infants having a confirmed disorder out of the total number of infants screened, depicted as a ratio. One case per 'X' number of infants screened depicted as 1: 'X'.
FPR	False positive rate: the number of infants with false positive screens divided by the total number of infants screened, expressed as a percentage.
PPV	Positive predictive value: the number of infants confirmed with a disorder divided by the number of infants having positive screens, expressed as a percentage.

Screening performance metrics included in subsequent tables are shown above. These indicators are commonly used to assess the performance of screening tests and allow for comparisons both over time and with other screening programs. Ideal screening tests have a high positive predictive value (perfect = 100%) and a low false positive rate (perfect = 0%). A perfect screening test correctly identifies all cases of a disorder with no false positives. Detection rates, the total number of cases identified out of the total number of newborns screened, are based on the total number of screens for in-state residents. Cases are defined as newborns identified with disorders via NBS. Maternal disorders and carriers identified by NBS are not included as confirmed cases in the performance metrics, though they are presented in this report.

Screened Newborns

The Michigan NBS Program screened 98.7% of the live births occurring in Michigan in 2023, as determined by the linkage of NBS records to preliminary live births records received from the Vital Records & Health Data Development Section and follow-up of unmatched records (Figure 1). Of the 98,225 live births that occurred in 2023, 269 were listed as deceased on their birth certificate. Many of these infants are not screened due to their short life spans, so they are excluded from the linkage calculations. Of the 97,956 remaining live births, the linkage algorithm successfully matched newborn screens for 96,414 infants (98.4%). The 1,542 unmatched records were sent to NBS follow-up program technicians for further investigation. This more in-depth follow-up revealed that 293 (19.0%) of the unmatched records were screened in Michigan. For these infants, the linkage algorithm failed to create the match for a variety of reasons, including data recording errors, data entry errors, name changes due to adoptions, and misplaced or missed screens that were not completed until after follow-up by NBS follow-up program staff.

Overall, 1,249 infants (1.3%) with a Michigan birth certificate were not screened in Michigan. Of those 1,249 infants, 204 were screened out-of-state. Of the remaining 1,045 infants, 616 were not screened due to parents not permitting the collection of the screen, 27 were not screened due to palliative care or a death after the birth certificate was filed, five were screened at a private lab, nine were transferred before screening, and the reason the screen was not completed is unknown for 388 infants. For all infants without a newborn screen, NBS follow-up staff either contact the NBS coordinator for hospital births or send a parental notification and midwife notification letter for home births.

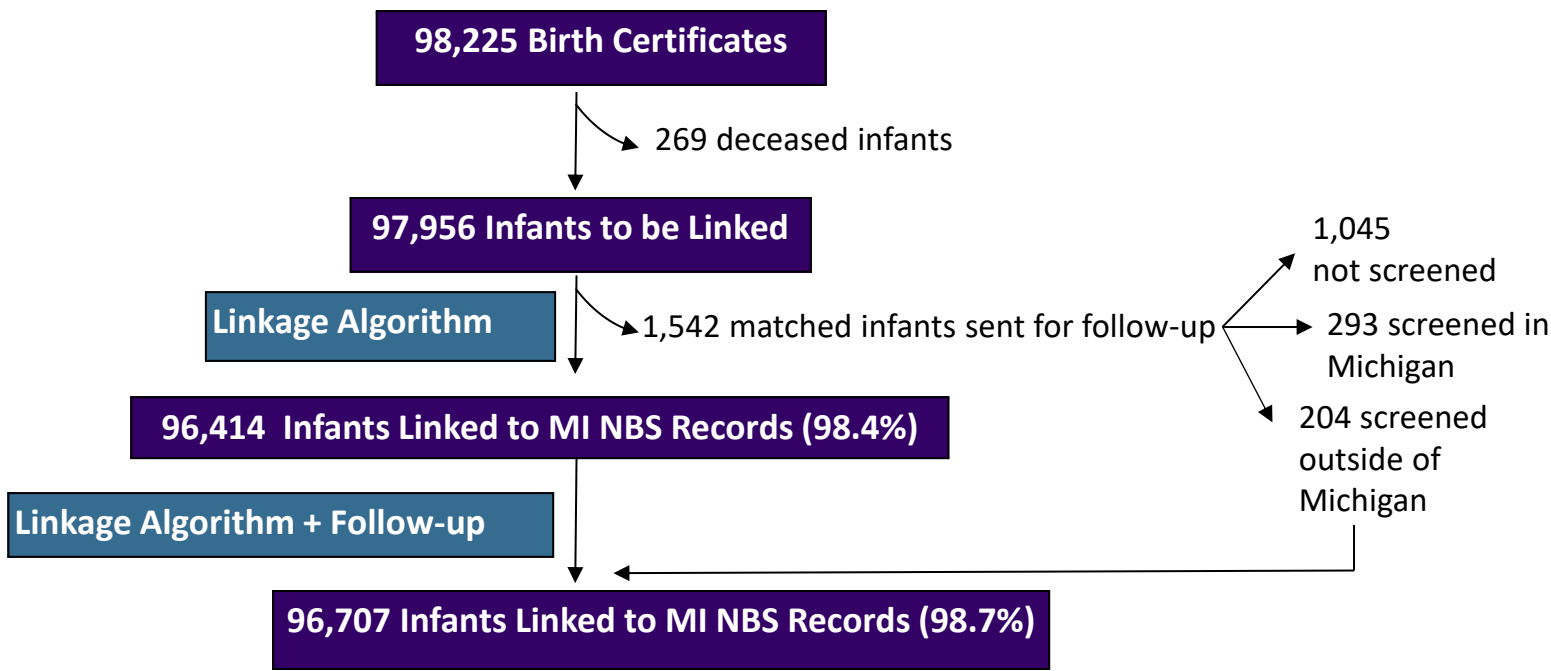


Figure 1. Newborn Screening and Live Births Records Linkage, Michigan, 2023

Screening Outcome Information

In the following subsections, outcome information is provided for the disorders included in the NBS panel in 2023. The total numbers of cases detected both in and through 2023 are presented along with screening performance metrics.

Table 1 reports the cumulative detection rate of disorders identified via NBS by classification both in and through 2023. The year the condition was added to the Michigan NBS panel is included in parentheses next to the disorder name in the table. The metabolic disorders detected by Tandem Mass Spectrometry (MS/MS) are grouped by category (amino acid, organic acid and fatty acid oxidation disorders). Two metabolic disorders, galactosemia and biotinidase deficiency, are detectable by enzyme assay screening rather than MS/MS and are listed separately. The galactosemia cumulative detection rate includes both duarte compound heterozygotes (D/G) and classic galactosemia (G/G). However, only D/G cases that have been detected since 2004, the year that the Children’s Hospital of Michigan Metabolic Clinic (CHMMC) began short-term treatment of this disorder, are included in the cumulative detection rate. Similarly, the biotinidase deficiency cumulative detection rate includes both partial and profound biotinidase deficiency. Treatment of partial biotinidase deficiency did not begin until 2000.

Table 1: Disorders Identified in Newborns via Newborn Screening, Michigan, 1965-2023

Disorder Type	Cases in 2023 (N)	Cases Through 2023 (N)	Detection Rate (1:X) ¹
Galactosemia (1985) ²	2	236	20,215
Biotinidase Deficiencies (1987)	16	418	10,768
Amino Acid Disorders (1965)	7	831	20,075
Organic Acid Disorders (2005)	6	127	15,919
Fatty Acid Oxidation Disorders (2003)	10	327	6,979
Congenital Hypothyroidism (1977)	128	3,122	1,442
Congenital Adrenal Hyperplasia (1993)	3	193	18,791
Sickle Cell Disease (1987)	60	2,317	1,943
Hemoglobin H Disease (2012)	3	29	40,793
Cystic Fibrosis (2007)	24	410	4,082
Primary Immunodeficiencies (2011)	43	231	5,607
Lysosomal Storage Disorders (2017)	10	54	10,394
X-Linked Adrenoleukodystrophy (2019)	4	13	25,150
Spinal Muscular Atrophy (2020)	0	33	9,639
Total	316	8,341	-

¹Data interpretation: The detection rate reflects the number of infants screened per confirmed case. For example, one in every 20,215 infants screened for galactosemia between 1985 and 2023 have the disorder.
²The year in parentheses next to the disorder name is the year Michigan began screening for the disorder. For example, screening for Galactosemia began in 1985.

Screening Performance Indicators

Table 2 reports screening performance metrics for all disorders in 2023. Screening performance metrics include the detection rate, false positive rate (FPR), and positive predictive value (PPV).

Table 2: Screening Results and Performance Metrics, Michigan, 2023, Screened N=96,612

Disorder Type	Positives (N)	Confirmed cases (N)	Detection Rate (1:X) ¹	FPR (%)	PPV (%)
Galactosemia	5	2	48,306	0.00	40.0
Biotinidase Deficiencies	43	16	6,038	0.03	37.2
Amino Acid Disorders	22	7	13,802	0.02	31.8
Organic Acid Disorders	25	6	16,102	0.02	24.0
Fatty Acid Oxidation Disorders	76	10	9,661	0.07	13.2
Congenital Hypothyroidism	1,591	128	755	1.51	8.0
Congenital Adrenal Hyperplasia	110	3	32,204	0.11	2.7
Sickle Cell Disease	75	60	1,610	0.02	80.0
Hemoglobin H Disease	3	3	32,204	0.00	100.0
Cystic Fibrosis ²	270	24	4,026	0.25	8.9
Primary Immunodeficiencies	74	43	2,247	0.03	58.1
Lysosomal Storage Disorders	18	10	9,661	0.01	55.6
X-Linked Adrenoleukodystrophy	16	4	24,153	0.01	25.0

¹ Data interpretation: The detection rate reflects the number of infants screened per confirmed case. For example, one in every 48,306 infants screened in 2023 for galactosemia have the disorder.

² Nine CF related metabolic syndrome (CRMS) cases were also detected through screening; these cases are not included in case counts.

A breakdown of amino acid, organic acid, and fatty acid oxidation disorders are found in Tables 3, 4, and 5, respectively. A breakdown of sickle cell and lysosomal storage disorders can be found in Tables 6 and 7, respectively.

For some disorders, infants receive further classification upon diagnosis. Of the two cases of galactosemia, one confirmed with classic galactosemia, and one confirmed with duarte galactosemia. Of the 16 cases that confirmed with biotinidase deficiency, 15 confirmed with partial biotinidase deficiency and one confirmed with profound biotinidase deficiency. Three cases of congenital adrenal hyperplasia confirmed, all three were salt wasting cases. Of the 43 newborns with primary immunodeficiencies, two confirmed with severe combined immunodeficiency (SCID), seven confirmed with syndromes of T-cell impairment, and 34 confirmed with T-cell lymphopenias. No cases of adenosine deaminase (ADA) SCID were detected in 2023.

Screening Performance Indicators

Table 3: Amino Acid Disorders Screening Performance Metrics, Michigan, 2023, Screened N= 96,612

Disorder	Positives (N)	Confirmed Cases (N)	Detection Rate (1:X) ¹	FPR (%)
Phenylketonuria (PKU) Total	7	5	19,322	0.002
Medically treated PKU	-	3	32,204	-
Hyperphenylalaninemia	-	1	96,612	-
Biopterin cofactor regeneration defect	-	1	96,612	-
Citrullinemia (CIT)/CIT II	1	0	-	0.001
Tyrosinemia I (TYR I)	1	0	-	0.001
Tyrosinemia II/III (TYR II/III)	5	0	-	0.005
Maple Syrup Urine Disease (MSUD)	3	0	-	0.003
Homocystinuria (HCY)	1	1	-	0.000
Argininemia	2	0	-	0.002
Argininosuccinic acidemia	2	1	96,612	0.001

¹ Data interpretation: The detection rate reflects the number of infants screened per confirmed case. For example, one in every 19,322 infants screened for phenylketonuria in 2023 have the disorder.

Table 4: Organic Acid Disorders Detected Screening Performance Metrics, Michigan, 2023, N= 96,612

Disorder Type	Positives (N)	Confirmed cases (N)	Detection Rate (1:X) ¹	FPR (%)	PPV (%)
3-Methylcrotonyl-CoA Carboxylase Deficiency (3MCC) ²	8	2	48,306	0.006	25.0
2-Methyl-3-hydroxy butyric aciduria/Isovaleric acidemia (2MBG/IVA)	1	1	96,612	0.000	100.0
Glutaric acidemia Type I	4	0	-	0.004	0.0
Propionic Acidemia/Methylmalonic acidemia (PA/MMA)	12	3	32,204	0.009	25.0

¹ Data interpretation: The detection rate reflects the number of infants screened per confirmed case. For example, one in every 48,306 infants screened for 3MCC in 2023 have the disorder.

²Positives (N)' include presumptive positive for 3MCC/MCD/HMG/3MGA

Table 5: Fatty Acid Oxidation Disorders Screening Performance Metrics, Michigan, 2023, N= 96,612

Disorder Type	Positives (N)	Confirmed cases (N)	Detection Rate (1:X) ¹	FPR (%)	PPV (%)
Carnitine uptake defect (CUD)	53	0	-	0.055	0.0
Carnitine palmitoyltransferase II deficiency (CPT II)	4	0	-	0.004	0.0
Glutaric acidemia Type II (GA II)	2	0	-	0.002	0.0
Long-chain L-3-hydroxyl acyl-CoA dehydrogenase deficiency (LCHAD)	4	0	-	0.004	0.0
Medium-chain acyl-CoA dehydrogenase deficiency (MCAD)	11	9	10,735	0.002	81.8
Very long-chain acyl-CoA dehydrogenase deficiency (VLCAD)	2	1	96,612	0.001	50.0

¹ Data interpretation: The detection rate reflects the number of infants screened per confirmed case. For example, one in every 10,735 infants screened for MCAD in 2023 have the disorder.

Table 6. Hemoglobinopathy Screening Performance Metrics, Michigan, 2023, N= 96,612

Disorder	Total Confirmed Cases	Total Confirmed Cases among Black Populations	Detection Rate (1:X) ¹	Detection Rate among Black Populations (1:X) ²
Sickle Cell Anemia	36	32	2,684	499
SC Disease	15	10	6,441	1,598
SE Disease	1	0	96,612	-
Sickle β thalassemia	8	7	12,077	2,283
Total	60	49	1,610	326

¹ Data interpretation: The detection rate reflects the number of infants screened per confirmed case. For example, one in every 1,610 infants screened for sickle cell disease in 2023 have the disorder.

² Data interpretation: The detection rate among Black populations reflects the number of Black infants screened per confirmed case. In 2023, there were 15,980 Black infants screened. For example, one in every 326 Black infants screened for sickle cell disease in 2023 have the disorder.

Note: The following cases were also detected: 2 C disease, 1 C / beta thalassemia, 1 D disease, 1Beta zero thalassemia, and 1 E / beta zero thalassemia.

Table 7: Lysosomal Storage Disorders, Screening Performance Metrics, Michigan, 2023, N= 96,612

Disorder	Positives (N)	Confirmed cases (N)	Detection Rate (1:X) ¹	FPR (%)	PPV (%)
Pompe Disease	13	10	9,661	0.003	76.9
Mucopolysaccharidosis I (MPS1)	5	0	-	0.005	0.0

¹ Data interpretation: The detection rate reflects the number of infants screened per confirmed case. For example, one in every 9,661 infants screened for pompe disease in 2023 have the disorder.

Carriers and Maternal Disorders

Although the overarching goal of NBS is to detect disorders in newborns, carriers and maternal disorders are also identified. For disorders in the NBS panel, carriers have one normal gene and one variant gene and typically do not display any clinical symptoms. On a routine basis, the NBS Follow-up Program refers all newborns with positive screens to the appropriate medical management coordinating center that will follow up to determine the final diagnosis: no disease, disease, carrier, or maternal disorder. NBS will only detect carriers or maternal disorders following an abnormal screen. Thus, NBS will not identify all carriers or all maternal disorders.

In 2023, a total of 2,666 infants were identified as carriers of a disease included in the NBS panel, following an abnormal screen (Table 8). Besides confirmatory diagnostic testing for infants, medical management centers also offer diagnostic testing for mothers. Since mothers may have the disease rather than the infant, they could possibly be identified through NBS for a few disorders. In 2023, two mothers were identified with CUD following their infants positive screen (Table 9).

Table 8: Carriers Identified from Newborn Screening, Michigan, 2023

Disorder	Carriers (N)
Hemoglobin Traits	2,436
Cystic fibrosis (CF)	227
Pompe Disease	1
Long-chain L-3-hydroxyl acyl-CoA dehydrogenase deficiency (LCHAD)	1
Congenital Adrenal Hyperplasias (CAH)	1

Table 9: Maternal Disorders Identified from Newborn Screening, Michigan, 2023

Maternal Disorder	N
Carnitine uptake defect (CUD)	2

Time to Treatment

Turn-around time in NBS refers to the time from birth to initiation of treatment. The target turn-around time for initiating treatment for the early-onset life-threatening disorders (CAH, galactosemia and disorders detected by MS/MS) is no later than the seventh day of life. The goals for other disorders vary. Table 10 reports the time to treatment for disorders other than hemoglobinopathies, cystic fibrosis, X-Linked adrenoleukodystrophy, and SCID. As indicated in Table 10, time to treatment ranged from zero to 102 days among all disorders. Since borderline positive screens require one or more retests before being referred for confirmatory testing, congenital hypothyroidism (CH) is presented separately by initial screening result (strong or borderline) in the table.

Table 10: Time to Treatment, Michigan, 2023

Disorder	Total confirmed	Treated on 1-7 days of Life	Treated on 8-14 days of life	Treated >14 days of life	Treatment Time Range (days)
Classic Galactosemia	1	1			2
Biotinidase Profound	1		1		8
Biotinidase Partial	15	4	3	8	4 - 102
Medically treated (PKU)	3	2		1	4 - 22
Homocystinuria (HCY)	1		1		11
Argininosuccinic acidemia	1	1			4
Propionic Acidemia (PA)	3	3			3 - 7
2-Methyl-3-hydroxy butyric aciduria/Isovaleric acidemia (2MBG/IVA)	1			1	21
3-Methylcrotonyl-CoA Carboxylase Deficiency (3MCC)	2	2			4 - 5
Medium-chain acyl-CoA dehydrogenase deficiency (MCAD)	9	9			2 - 6
Very long-chain acyl-CoA dehydrogenase deficiency (VLCAD)	1	1			2
Congenital Hypothyroidism (CH)– Strong	67	35	10	22	6 - 60
Congenital Hypothyroidism (CH)– Borderline	61	9	14	38	4 - 73
Congenital Adrenal Hyperplasias (CAH)– Salt Wasting	3	3			0 - 5
<i>Total</i>	<i>169</i>	<i>70</i>	<i>29</i>	<i>70</i>	<i>0 - 102</i>

Table 11 reports the time to treatment among newborns with hemoglobinopathies. The target is to initiate penicillin prophylaxis by four months of life (120 days).

Table 11: Time to Penicillin Initiation for Sickle Cell Disorders, Michigan, 2023

Disorder	Total Confirmed	Penicillin Prophylaxis Initiated < 120 days	Penicillin Prophylaxis Initiated 120-149 days	Penicillin Prophylaxis Initiated > 150 days
Sickle cell disorder	60	55	1	4

NBS Performance Measures

The Michigan NBS Program prepares quarterly hospital reports to evaluate how hospital are performing on key NBS indicators and highlight areas for improvement. During 2023, the hospital quarterly reports included six indicators related to blood spot screening. Those indicators are displayed below:

Late Screens:	Less than 1% of screens collected greater than 36 hours after birth.
Appropriate Day:	Greater than 90% of screens arrive in state laboratory on or before the appropriate day.
Unsatisfactory Screens:	Less than 1% of screens are unsatisfactory.
NBS Card Number:	Greater than 95% of electronic birth certificates have the correct NBS card number recorded.
Returned BioTrust Consent Forms	At least 90% of specimens have a returned consent form that is completed appropriately.
NBS card with incorrect dates/times:	Less than 2% of specimen have errors in their birth date/ time and/or collection date/time on the NBS card.

Table 12 lists the statistics for each performance measure and whether the goal was met by nursery type. Nursery type includes regular baby nurseries, the neonatal intensive care and special care nurseries (NICU/SCN), and non-hospital births.

Table 12: Measures for Newborn Screening, by Nursery Type, Michigan, 2023

Measure by Nursery Type	N	%	Met Goal?
Late Screens: Regular	334	0.4	Yes
Late Screens: NICU/SCN	116	1.1	No
Late Screens: Non-hospital	873	57.7	No
Appropriate Day: Regular	78,344	93.1	Yes
Appropriate Day: NICU/SCN	9,700	89.3	No
Appropriate Day: Non-hospital ¹	NA	NA	NA
Unsatisfactory Screens: Regular	1,454	1.7	No
Unsatisfactory Screens: NICU/SCN	256	2.4	No
Unsatisfactory Screens: Non-hospital	69	4.6	No
NBS Card Number: Regular	81,244	96.5	Yes
NBS Card Number: NICU/SCN ²	9,599	88.6	N/A
NBS Card Number: Non-hospital	1,036	79.8	No
Returned BioTrust Consent Forms: Regular	74,762	88.8	No
Returned BioTrust Consent Forms: NICU/SCN	7,157	65.7	No
Returned BioTrust Consent Forms: Non-hospital	1,146	75.6	No
NBS card with incorrect dates/times: Regular	2,086	2.5	No
NBS card with incorrect dates/times: NICU/SCN	303	2.8	No
NBS card with incorrect dates/times: Non-hospital	89	5.9	No

¹Receipt by appropriate day is not calculated for non-hospital births because they do not have a designated courier pick-up time for each day like birthing facilities have.

²Recording of NBS card number is not a performance measure for NICUs since the birth hospital is asked to draw the NBS specimen before transferring the infant to the NICU.

Conclusion

NBS is a critical public health program that protects the lives of our state’s newest residents. The NBS Laboratory screened 96,914 infants born in 2023, and the NBS Follow-up Program tracked approximately 5,700 positive, isolated elevation, unsatisfactory, early, and transfused specimens. Newborns with strong positive screening results were immediately referred to the appropriate NBS follow-up coordinating center for evaluation. A total of 316 newborns were identified with a disorder by NBS in 2023, as well as 2,666 carriers. Since blood spot screening began in Michigan in 1965, 8,341 newborns have been diagnosed and treated. We are continuing to both expand and refine the NBS Program in order to better protect the health of infants born in Michigan.

The Michigan Department of Health and Human Services (MDHHS) does not discriminate against any individual or group on the basis of race, national origin, color, sex, disability, religion, age, height, weight, familial status, partisan considerations, or genetic information. Sex-based discrimination includes, but is not limited to, discrimination based on sexual orientation, gender identity, gender expression, sex characteristics, and pregnancy.