Newborn Screening Program Annual Report

G.S. 130A-125(e)

Report to the

House Appropriations Committee on Health and Human Services

Senate Appropriations Committee on Health and Human Services

Fiscal Research Division

By

North Carolina Department of Health and Human Services

March 19, 2024

Reporting Requirement

North Carolina General Statute 130A-125(e) requires the Department of Health and Human Services (DHHS) to annually report on March 1 to the House Appropriations Committee on Health and Human Services, the Senate Appropriations Committee on Health and Human Services, and the Fiscal Research Division on the DHHS Newborn Screening Program.

The report shall include the following information for the preceding fiscal year:

(1) A description of the services funded by the Newborn Screening Program, including a description of the Department's activities with respect to each of the services listed in GS § 130A-125(a).
(2) A detailed budget and list of expenditures for the Newborn Screening Program, including all positions funded.
(3) Fees and other receipts collected for the Newborn Screening Program.
(4) Projected fees and other receipts for the Newborn Screening Program for the current and upcoming fiscal year.
(5) Any condition the Department anticipates will be listed on the RUSP within the current or upcoming fiscal year and a description of the following:
    a. Any laboratory instruments or equipment the Department will need to purchase in order to perform screening for that condition.
    b. Any additional positions the Department will need to establish in order to perform screening for that condition.
(6) The balance in the Newborn Screening Equipment Replacement and Acquisition Fund as of the preceding June 30.
(7) Amounts credited to the Fund.
(8) Amounts expended from the Fund and the purposes of the expenditures.
(9) Proposed expenditures of the monies in the Fund for the current and upcoming fiscal year.
(10) Any other information the Department deems relevant to maintaining the Newborn Screening Program as a fee-supported program.

Introduction and Background

Newborn screening (NBS) is a comprehensive, coordinated system consisting of education, screening, follow-up contact, diagnosis, treatment and management, and program evaluation designed to identify newborns at risk for rare and potentially fatal conditions that aren't otherwise apparent at birth. NBS for biochemical and genetic disorders involves a small heel prick to collect a few drops of blood on a filter paper card within the first 24-48 hours of life. This card is sent to a laboratory where scientists look for signs of these serious conditions.

In North Carolina, the newborn screening program began in 1966 as a voluntary effort, testing for only one disorder, phenylketonuria (PKU). The state’s program became a legislative mandate in 1991 with the passage of "An Act to Establish a Newborn Screening Program."

Through the screening test and subsequent diagnostic evaluation, physicians can determine whether newborns have certain conditions or disorders that eventually could cause health problems. Although these conditions are rare, and most babies have normal screening results, early diagnosis

and proper treatment can make the difference between life-long impairment and healthy development.

(1) Services Funded by the Newborn Screening (NBS) Program

The following are services funded by the NBS Program and activities completed by the DHHS Division of Public Health (DPH) and Division of Child and Family Well-Being (DCFW) for each program component listed in G.S. 130A-125(a):

- *Development and distribution of educational materials regarding the availability and benefits of newborn screening*
    - The brochure "A Test to Save Your Baby's Life" describes the newborn metabolic screening program, and is translated into English, Spanish, Hmong, Mandarin, and Arabic. It is available online and is distributed at the time of birth.
    - The flyer "North Carolina Newborn Screening Program" describes the NBS program. It is available online and is disseminated via targeted distribution to obstetric/prenatal practices.
    - Syndrome-specific information is provided in conjunction with the reporting of abnormal results to parents and providers. Examples include education pamphlets for Cystic Fibrosis and Severe Combined Immunodeficiency (SCID).
    - The brochure "My Baby's Hearing Screening" describes what to expect from newborn hearing screening, and is translated into English, Spanish, Arabic, Chinese, French, Hmong, Korean and Vietnamese. It, too, is available online and distributed by birthing facilities.

- *Provision of laboratory testing*

The State Laboratory of Public Health (SLPH) provides all laboratory services for the newborn screening (NBS) program for conditions on the North Carolina Newborn Screening Program Panel, in accordance with the Recommended Universal Screening Panel (RUSP) from the Secretary of the United States Department of Health and Human Services.

As of this report, SLPH provides screening for the following core conditions on the RUSP:

Amino Acid Disorders
- Argininosuccinic Aciduria
- Citrullinemia, Type I
- Classic Phenylketonuria
- Homocystinuria
- Maple Syrup Urine Disease
- Tyrosinemia, Type I

Endocrine Disorders
- Congenital Adrenal Hyperplasia
- Primary Congenital Hypothyroidism

Fatty Acid Oxidation Disorders
- Carnitine Uptake Defect

- Long-Chain L-3 Hydroxyacyl-CoA Dehydrogenase Deficiency
- Medium-Chain Acyl-CoA Dehydrogenase Deficiency
- Trifunctional Protein Deficiency
- Very Long-Chain Acyl-CoA Dehydrogenase Deficiency

Hemoglobin Disorders
- S, Beta-Thalassemia
- S, C Disease
- Sickle Cell Anemia

Organic Acid Conditions
- 3-Hydroxy-3-Methylglutaric Aciduria
- 3-Methylcrotonyl-CoA Carboxylase Deficiency
- Beta-Ketothiolase Deficiency
- Glutaric Acidemia, Type I
- Holocarboxylase Synthetase Deficiency
- Isovaleric Acidemia
- Methylmalonic Acidemia (Cobalamin Disorders)
- Methylmalonic Acidemia (Methymalonyl-CoA Mutase Deficiency)
- Propionic Acidemia

Lysosomal Storage Disorders
- Glycogen Storage Disease Type II (Pompe)
- Mucopolysaccharidosis Type I (MPS-I)

Other Disorders
- Biotinidase Deficiency
- Classic Galactosemia
- Cystic Fibrosis
- Severe Combined Immunodeficiency
- Spinal Muscular Atrophy due to homozygous deletion of exon 7 in SMN1
- X-linked Adrenoleukodystrophy

As of this report, SLPH provides screening for the following secondary conditions on the RUSP:

Amino Acid Disorders
- Argininemia
- Benign Hyperphenylalaninemia
- Biopterin defect in cofactor biosynthesis
- Biopterin defect in cofactor regeneration
- Citrullinemia, type II
- Hypermethioninemia
- Tyrosinemia, Type II
- Tyrosinemia, Type III

Fatty Acid Oxidation Disorders
- Carnitine Acylcarnitine Translocase Deficiency
- Carnitine Palmitoyltransferase Type I Deficiency

- Carnitine Palmitoyltransferase Type II Deficiency
- Glutaric Acidemia, Type II
- Short-Chain Acyl-CoA Dehydrogenase Deficiency
- Medium-chain ketoacyl-CoA Thiolase Deficiency
- Medium/short-chain L-3-hydroxyacyl-CoA dehydrogenase deficiency

Hemoglobin Disorders
- Various other hemoglobinopathies

Organic Acid Conditions
- 2-Methylbutyrylglycinuria
- 2-Methyl-3-hydroxybutyric aciduria
- 3-Methylglutaconic aciduria
- Isobutyrylglycinuria
- Malonic acidemia
- Methylmalonic Acidemia with Homocystinuria

Other Disorders
- Galactoepimerase deficiency
- Galactokinase deficiency
- T-cell related lymphocyte deficiencies

In accordance with G.S. 130A-125(b), North Carolina's NBS Program is actively working towards a 2024/2025 implementation of the following core conditions on the RUSP for which DHHS does not currently screen:
- Mucopolysaccharidosis Type II (MPS-II)
  - added to RUSP on 8/2/22
- Guanidinoacetate Methyltransferase (GAMT) deficiency
  - added to RUSP on 1/4/23

The process to onboard screening for additional disorders is complex as newborn screening is more than a simple test. The public health laboratory testing is a critical, core component, but it is just one piece of a broader public health system working for families. Every state newborn screening program has six essential parts: screening, follow-up, diagnosis, management, evaluation, and education, and the Department must still ensure that the full system is in place before screening can begin.

- *Development of follow-up protocols to assure early treatment for identified children, and the provision of genetic counseling and support services for the families of identified children*
  - As disorders are added to the NC NBS panel, follow-up protocols are developed from a literature review with subspecialist input and are approved by the NC NBS Advisory Committee.
  - Subspecialist and genetics resource lists are faxed to the provider at the time of an abnormal result report and include test results and recommendations.

- *Provision of necessary dietary treatment products or medications for identified children as medically indicated and when not otherwise available*

- Orders for specialized metabolic formulas are initiated by a tertiary care center in North Carolina caring for individuals without third-party coverage of these products and sent to the DHHS Division of Child and Family Well-Being, Community Nutrition Services Section.
- Specialized metabolic formulas are ordered by Community Nutrition Services Section directly from the manufacturer, shipped to local Special Supplemental Nutrition Program for Women Infants and Children (WIC) agencies, and picked up by families or individuals for whom the products were ordered.

- *For each newborn, provision of physiological screening in each ear for the presence of permanent hearing loss*
  - Medical facilities that provide birthing or inpatient neonatal services are required to physiologically screen each newborn in each ear for the presence of permanent hearing loss before the infant is discharged from the medical facility unless medical complications prevent screening.
  - Any physician that attends a newborn within 30 days of birth and determines that the newborn has not been physiologically screened in each ear for the presence of permanent hearing loss is required to refer the patient for such screening within 30 days of birth or as soon as is practical.
  - All persons performing physiologic hearing screenings for infants less than six months of age and/or diagnostic auditory evaluations and amplification selections for infants less than twelve months of age are required to report the results of these screenings, evaluations, or selections to DHHS within five days.
  - Infants who do not pass the initial newborn hearing screening should receive an outpatient re-screening by one month of age, unless there are known risk factors for permanent hearing loss, and they are referred directly for a diagnostic auditory evaluation.
  - Infants who do not pass the outpatient re-screening should be referred to a pediatric audiologist for diagnostic auditory evaluation no later than three months of age.
  - Infants who are diagnosed with permanent hearing loss should be fitted with amplification devices (if appropriate) and referred to early intervention services no later than six months of age.

- *For each newborn, provision of pulse oximetry screening to detect congenital heart defects*
  - Critical Congenital Heart Defect screening and evaluation of positive or abnormal screens are required before discharge from the care of the attending provider of the neonate or infant.
  - All medical facilities and attending providers of the neonate or infant are required to have and implement a written protocol for evaluation and follow up of positive screenings.
  - Evaluation and follow up should occur as soon as possible (but no later than 24 hours after obtaining a positive screening) and should follow most current published recommendations from the American Academy of Pediatrics and the American Heart Association.

(2) Detailed budget and list of expenditures for the Newborn Screening Program, including all positions funded

Newborn Screening SFY 2022-23										
	State Lab/IT		Follow up Program Children		Equipment Fund		Indirect Cost		Total Newborn Screen Program	
Expenditure Description	**Budget**	**Expended**	**Budget**	**Expended**	**Budget**	**Expended**	**Budget**	**Expended**	**Budget**	**Expended**
Personal Services*	$ 2,638,752.00	$ 2,099,374.76	$ 434,242.00	$ 420,833.19					$ 3,072,994.00	$ 2,520,207.95
Purchased Services**	$ 3,598,648.00	$ 4,128,273.96	$ 11,621.00	5,249.72					$ 3,610,269.00	$ 4,133,523.68
Supplies	$ 2,683,232.00	$ 3,515,492.03	$ 1,759.00	$ -					$ 2,684,991.00	$ 3,515,492.03
Property, Plant & Equipment	$ 28,918.00	$ 4,476.01	$ 786.00	$ -	$ 3,700,000.00	$ 260,726.13			$ 3,729,704.00	$ 265,202.14
Other Expenses & Adj	$ -	$ -							$ -	$ -
Aid & Public Assistance	$ -	$ -	$ 237,558.00	$ 163,933.00					$ 237,558.00	$ 163,933.00
Total Expenditures	**$ 8,949,550.00**	**$ 9,747,616.76**	**$ 685,966.00**	**$ 590,015.91**	**$ 3,700,000.00**	**$ 260,726.13**	**$ -**	**$ -**	**$ 13,335,516.00**	**$ 10,434,425.80**
Revenue Decription	**Budget**	**Collected**	**Budget**	**Collected**	**Budget**	**Collected**	**Budget**	**Collected**	**Budget**	**Collected**
Other License, Fees/Permits****	$ 24,424.00	$ -							$ 24,424.00	$ -
Newborn Screening Fees*****	$ 8,381,245.00	$ 13,555,739.37	$ 622,194.00	$ -	$ 3,700,000.00	$ 4,159,551.14			$ 12,703,439.00	$ 17,715,290.51
Accts Receivable Interest	0.00	$ 13,611.82							$ -	$ 13,611.82
Accts Receivable Penalty	$ -	$ 2,436.40							$ -	$ 2,436.40
DMA Medicaid Title X******	$ 543,881.00	$ 27,154.44	$ 66,548.00	$ -					$ 610,429.00	$ 27,154.44
Total Revenues	**$ 8,949,550.00**	**$ 13,598,942.03**	**$ 688,742.00**	**$ -**	**$ 3,700,000.00**	**$ 4,159,551.14**	**$ -**	**$ -**	**$ 13,338,292.00**	**$ 17,758,493.17**
*Expenditures Incurred for services rendered by permanent employees and the related fringe benefits										
**Expenditures incurred for services required to ensure the ongoing operation of State government facilities and government services, ie. Operational services, maintenance agreements, travel, etc.										
****Fees form workshops										
*****Collected per NC General Statute 147-86.23										
******Medicaid receipts from non-hospital repeat NBS samples										

There are 38 positions in the NBS Program funded in SFY 2022-2023.

Positions Funded SFY 2022-2023	
DPH (State Laboratory)	**Budgeted Salary**
Administrative Supervisor	$43,991
Chemist I	$63,754
Chemist I	$56,752
Chemist I	$57,310
Chemist II	$70,948
Chemistry Manager II	$93,051
Chemistry Supervisor II	$82,300
Chemistry Technician II	$44,820
Laboratory Improvement Consultant	$64,041
Laboratory Improvement Consultant	$60,000
Laboratory Specialist	$65,936
Laboratory Specialist	$61,348
Laboratory Specialist	$62,877
Laboratory Specialist	$76,847
Medical Laboratory Supervisor I	$72,110
Medical Laboratory Supervisor I	$72,110
Medical Laboratory Technician	$37,577
Medical Laboratory Technologist I	$54,990
Medical Laboratory Technologist I	$54,197
Medical Laboratory Technologist I	$54,197
Medical Laboratory Technologist I	$54,197
Medical Laboratory Technologist I	$54,990
Medical Laboratory Technologist II	$57,712

Medical Laboratory Technologist II	$57,712
Medical Laboratory Technologist II	$57,712
Medical Laboratory Technologist II	$60,085
Medical Laboratory Technologist II	$60,771
Medical Laboratory Technologist II	$63,379
Medical Laboratory Technologist II	$66,680
Medical Laboratory Technologist II	$66,680
Public Health Scientist	$85,409
Public Health Scientist	$95,456
DCFW (Follow-up)	**Budgeted Salary**
Public Health Genetic Counselor	$69,297
Public Health Educator II	$52,875
Social Worker	$48,933
Social Worker	$57,064
Social Worker	$56,545
Information Technology	**Budgeted Salary**
Application Systems Specialist	$109,330

(3) Fees and other receipts collected for the Newborn Screening Program, and (4) projected fees and other receipts for the Newborn Screening Program for the current and upcoming fiscal year

Fund	SFY 2023-24 Fees & Other Receipts Received Year-to-Date (as of January 30, 2024)	Estimated SFY 2023-24 Fees & Other Receipts	Projected SFY 2024-25 Fees & Other Receipts
NBS	**$6,457,940.74**	**$9,686,911.50**	**$11,088,000**
NBS Equipment Replacement and Acquisition Fund	**$1,995,997.00**	**$2,993,995.00**	**$4,752,000**
Total	**8,453,937.74**	**$12,680,905.50**	**$15,840,000**

Receipts reflect the change in the NBS fee approved by the General Assembly and increased by the Commission for Public Health at 10A NCAC 42B .0108 to keep the Newborn Screening Program receipt supported. The authorized fee increases in advance of new disorder implementation are critical to build the infrastructure to initiate and ultimately support screening for new conditions. The Department uses these funds to:

- Hire essential staff
    - In the SLPH to develop, validate, and implement testing strategies and provide operation support to identify new disorders,
    - In the follow-up program to enhance follow-up services for existing disorders and provide additional services for new disorders, and

    - On the information technology (IT) team to configure the program's information management system to include new disorders, enable electronic reporting, and support improvements to the Laboratory Information Management Software,
- Acquire, support, and maintain laboratory and IT instrumentation that will support new disorder testing, and
- Upgrade software, equipment, and infrastructure for program quality and process improvement initiatives.

Since the last report to these Committees, the NC NBS Program has continued to provide critical public health services to assure the wellbeing of babies born in the state. In addition to maintaining screening for the conditions mandated by state law including those added in 2023, Glycogen Storage Disease Type II (Pompe) and Mucopolysaccharidosis Type I (MPS-I), the NC NBS Program has completed a needs assessment for the addition of two new conditions added to the RUSP in 2022-2023, MPS-II and GAMT Deficiency.

The needs assessment provided important information to guide the addition of the two new conditions, and the NC NBS Program is now shifting to an implementation phase. Implementation of screening for MPS-II and GAMT Deficiency will require additional laboratory and follow-up staffing, development of new educational material, IT upgrades, new laboratory equipment, expanded testing supplies, renovation of the laboratory facility, and a potential increase in the NBS fee to offset the associated costs. In consultation with the Secretary of NCDHHS, the NBS Program may request that the Commission for Public Health commence rulemaking to amend 10A NCAC 42B .0108 and is in the process of assessing these required costs. Onboarding the testing for these additional RUSP conditions will likely utilize the bulk of the projected receipts that are greater than prior year expenditures for the NBS Program and a substantial portion of the balance of the NBS Equipment Replacement and Acquisition Fund.

NC DHHS is coordinating with colleagues in other states and using national resources like those available from the Association of Public Health Laboratories (APHL) to learn from those states who have already implemented screening for these conditions. In addition, the NC NBS Program is collaborating with RTI International on lessons learned from their ongoing MPS-II pilot study to more quickly develop educational materials and follow-up protocols to expedite mandated screening.

(5) Conditions the Department anticipates will be listed on the RUSP within the current or upcoming fiscal year

The US Department of Health and Human Services (US HHS) Health Resources and Services Administration (HRSA) recently considered adding Krabbe Disease to the RUSP. At their January 30, 2024 meeting, the US HHS Advisory Committee on Heritable Disorders in Newborns and Children (ACHDNC) determined there was sufficient evidence to support population-based screening for Krabbe Disease and recommended adding Krabbe Disease to the RUSP. The Secretary of US HHS will now decide whether to accept or reject the ACHDNC recommendation. If added to the RUSP, the NC NBS Program will immediately begin to work on implementation of this new disorder to attempt to initiate screening for MPS-II, GAMT, and Krabbe simultaneously no later than mid-2025. Screening for Krabbe Disease requires the same instrumentation and equipment as MPS-II and GAMT. In addition, the same laboratory staff who will perform screening

for MPS-II and GAMT can perform testing for Krabbe Disease. Therefore, the additional instruments, equipment, and positions described in the fiscal note for the Commission for Public Health will allow the NC NBS Program to screen for MPS-II, GAMT, and Krabbe.

The next new condition the ACHDNC will consider in May 2024 is Duchenne Muscular Dystrophy. If the ACHDNC recommends the addition of Duchenne Muscular Dystrophy to the RUSP, the NC NBS Program will conduct a needs assessment to determine the instrumentation, equipment, and positions required to add screening for the disorder.

(6) Balance in the Newborn Screening Equipment Replacement and Acquisition Fund as of the preceding June 30

The beginning balance in the Fund from June 30, 2023 was $13,038,606.28. In 2023, G.S. 130-125(d) was amended to allow use of this fund to also support and maintain the equipment procured for the NBS Program. This change will allow a more balanced budget approach and reduce the balance of the fund.

(7) Amount Credited to the Newborn Screening Equipment Replacement and Acquisition Fund

As of January 30, 2024, the amount credited to the Newborn Screening Equipment Replacement and Acquisition Fund for SFY 2023-24 is $1,995,997.

(8) Amounts expended from the Fund and the purposes of the expenditures

For SFY 2023, **$260,726.13** was expended or encumbered on items in the following chart:

Instrument upgrades to support screening for amino acid, organic acid, fatty acid oxidation, and lysosomal storage disorders	$106,459.60
Small equipment to support screening for biochemical and genetic disorders	$141,588.53
IT equipment needed to support screening and for data analysis	$12,678.00
TOTAL	**$260,726.13**

For SFY 2024, as of January 30, 2023**, $1,880,783.42** has been either expended or encumbered on items in the following chart:

Small equipment to support screening for biochemical and genetic disorders	$332,621.73
Laboratory equipment maintenance and service contracts	$1,394,302.00
Information technology support and maintenance	$139,606.88
Information technology equipment	$14,252.81
TOTAL	**$1,880,783.42**

(9) Proposed expenditures of the monies in the Fund for the current and upcoming fiscal year

The SLPH anticipates the following expenditures and approximate costs totaling $15,195,000 from the NBS Equipment Replacement and Acquisition Fund over the current and subsequent state fiscal years (see below).

SFY 2024

Small equipment to support screening for biochemical and genetic disorders	$35,000
Laboratory Equipment Maintenance and Support	$1,230,000
TOTAL PROPOSED Remaining SFY 2024 EXPENDITURES	**$1,265,000**

SFY 2025

Analytical Chemistry Instrumentation in support of screening for new RUSP conditions	$2,500,000
New Nitrogen Generation System to supply Analytical Chemistry Instrumentation in support of screening for new RUSP conditions	$500,000
New specimen preparation and liquid handling instrumentation in support of screening for new RUSP conditions	$600,000
Laboratory instrumentation to support identification of hemoglobinopathies, including Sickle Cell	$50,000
Upgraded liquid handling instrumentation in support of screening for Severe Combined Immunodeficiency (SCID), Spinal Muscular Atrophy (SMA), and Cystic Fibrosis	$600,000
Information Technology upgrades to support new disorder expansion	$200,000
Facility infrastructure upgrades to support new instrumentation	$895,000
IT Maintenance and Support	$250,000
Laboratory Equipment Maintenance and Support	$1,500,000
TOTAL PROPOSED SFY 2025 EXPENDITURES	**$7,095,000**

SFY 2026

New molecular instrumentation in support of screening for Severe Combined Immunodeficiency (SCID) and Spinal Muscular Atrophy (SMA)	$600,000
Facility infrastructure upgrades to support new instrumentation for molecular testing	$785,000
New information management system to support laboratory and follow-up activities	$3,500,000
IT Maintenance and Support	$250,000
Laboratory Equipment Maintenance and Support	$1,700,000
TOTAL PROPOSED SFY 2026 EXPENDITURES	**$6,835,000**

(10) Other information relevant to maintaining the Newborn Screening Program as a fee-supported program

Newborn screening resides in an ever-changing and complicated environment that requires states to constantly adapt to new circumstances, ranging from advances in technology and treatments to new socio-political, economic, or ethical developments. The challenges NC and other states are facing in newborn screening are well documented and may be summarized as follows:

- New technologies will radically change our ability to cost-effectively screen for many conditions at once. Basic science discoveries will continue to identify markers of new disorders. These advances could further add to the list of thousands of known and potentially screen-able disorders.
- Disorder therapies will continue to evolve, transforming previously "untreatable" disorders into conditions that can be treated or cured. New treatments are likely to be highly effective, but very expensive, raising fundamental cost-benefit and cost-efficacy questions. States will have to figure out how to establish care protocols, networks, and reimbursement mechanisms so they can meet the ethical obligation to treat every baby identified through newborn screening.
- Bioethical and medicolegal issues associated with the retention and use of dried blood spots presents risks to the maintenance of a regulatory compliant, high-quality, and efficient screening program that provides accurate results for the newborns in the jurisdiction. Programs need to ensure that statutory language exists to permit appropriate and necessary use of these biospecimens for the long-term growth and stability of this critical public health service.

Newborn screening is a highly successful public health program. However, despite this success, many challenges are emerging that call into question the viability of newborn screening as we know it today. Fortunately, North Carolina has a wealth of public and private partners committed to advancing newborn screening policy and practice; an objective that will require systematic collaboration with the goal of maximizing the health of young children and the well-being of families. In January 2024, the National Academies of Sciences, Engineering, and Medicine established a study committee, Newborn Screening: Current Landscape and Future Directions, to examine the current landscape of newborn screening systems, processes, and research in the United States and consider sustainable adoption of screening for new conditions using new technologies. The Director of the North Carolina State Laboratory of Public Health was selected for this committee to share his expertise and the successful experiences of the NC NBS Program.