Implementing Newborn Sequencing at Scale: Public/Health System Challenges & Opportunities

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Disclosures

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Orchard Therapeutics

Multistakeholder expert panels: How to respond to future transformative therapies in the NBS system

- Aims include prioritizing the most impactful barriers and generating potential solutions
- Participants (n=42):
  - NBS researchers or clinicians
  - State NBS directors or program leaders
  - Reps of patient advocacy organizations
  - Reps of pharmaceutical or diagnostic companies
  - Current and former members of federal or state advisory committees

Andrews, Porter, Bailey & Peay. *BMC Pediatrics* (2022)

Results

- Infant wellbeing should be the focal point.
- Decisions about changes to the NBS system should be evidence based.
- Financial support is required but not sufficient.
- Inefficiencies and limitations in the NBS system will threaten the ability to uptake new technologies.
  - Coordination challenges
  - Expertise gaps
- Successful NBS modernization will require the participation and coordination of multiple stakeholders and organizations in the development, implementation, and evaluation of new solutions.

Andrews, Porter, Bailey & Peay. *BMC Pediatrics* (2022)

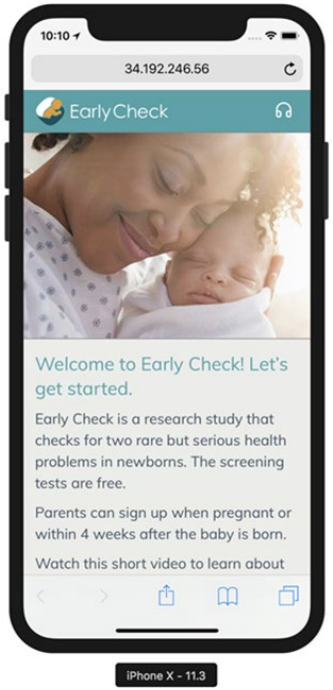
Results, con't

Recommendations:

- **Expand pilot studies to test implementation models**
- Develop expertise-sharing models
- Develop a public-private partnership to increase resources and reduce burden on the NBS system
- Consider a "conditional RUSP" or two-tiered NBS system
- Improve education and public opinion about NBS

Andrews, Porter, Bailey & Peay. *BMC Pediatrics* (2022)

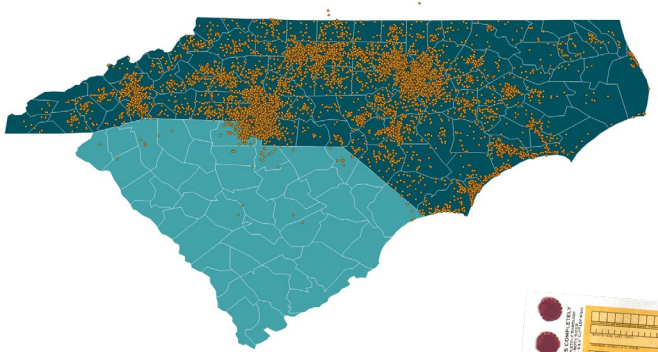
Early Check: A Voluntary Newborn Screening Program



Research Triangle study may help save children's lives

WRAL

June 2021

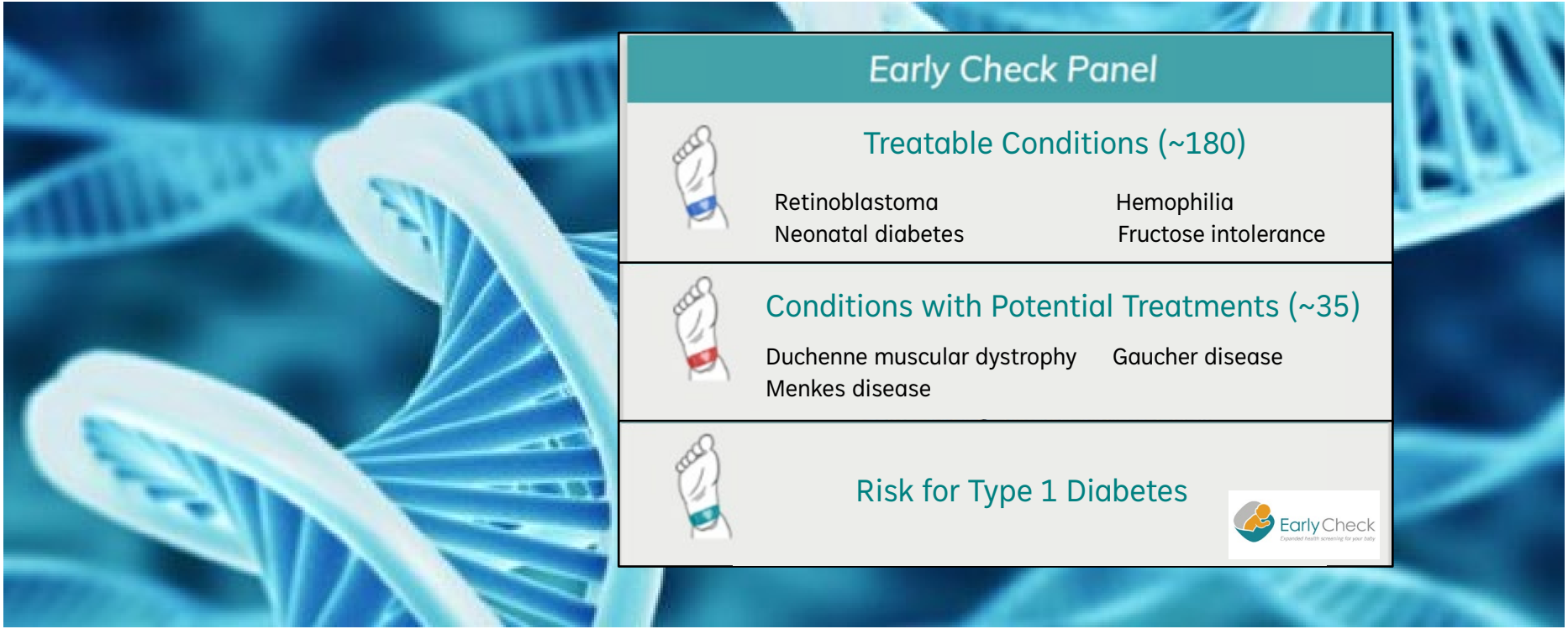


Early Check Panel

- Duchenne Muscular Dystrophy (DMD) and related conditions
- Fragile X Syndrome (FXS)
- Spinal Muscular Atrophy (SMA)

Screening newborns in North Carolina since 2018

Adding Genome Sequencing to Early Check (expected launch late summer 2023)



Some lessons learned preparing for Early Check sequencing

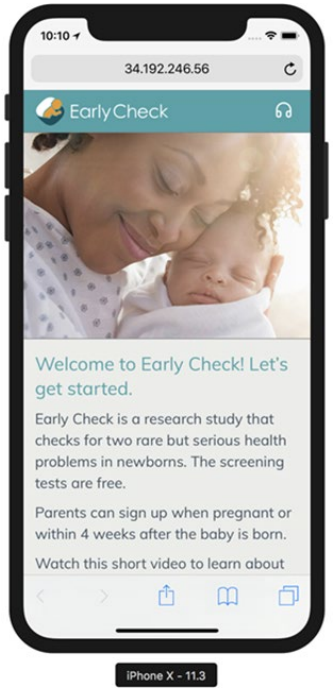
What results are appropriate to return in NBS?

Stakeholders should be engaged to develop a consensus framework and decision-making process to identify gene/condition pairs that are appropriate for sequencing-based newborn screening.

- Genomic experts
- Public health professionals
- Primary care providers
- Bioethics and legal scholars
- Other professional stakeholders
- Members of the public
- People from populations underrepresented in genomics
- People living with genetic disorders
- Parents of children living with genetic disorders
- Other community stakeholders

Engagement, education (and likely consent) are critical.

- The many sources of uncertainty will raise barriers to achieving the best clinical and psychosocial outcomes.
- We must address valid concerns about data security, privacy, and potential for misuse.
- Clinicians, parents, and the public need tailored, targeted education that clearly describes the benefits and limitations.
- Will parental consent be required? If so, how might this impact the NBS programs?
- Insufficient stakeholder engagement increases the risk that the use of sequencing technologies will erode trust in the NBS system.



Timeliness will be a challenge.

Rapid genome sequencing and interpretation will be crucial to conform to NBS timelines and optimize treatment outcomes.

We must begin to envision longer-term precision health outcomes.

Newborn sequencing opens the door to…

- Identify hundreds to thousands of rare genetic conditions
- Advance drug development while supporting the broadest access to treatment and research options
- Incorporate risk for common health conditions into NBS

These types of innovations come with equity-based, ethical, legal, social, financial, and implementation challenges.

Early Check responds to challenges facing state newborn screening programs

How to further incorporate genetic testing and sequencing technologies in public health newborn screening laboratories

Applying precision medicine advances to identify risk for common disorders of childhood

How to prepare for a new and rapidly growing pipeline of transformative therapies that must be administered early (including curative and preventative therapeutics and those that delay onset)

Sequencing study aims (initial 3-year study with plans to continue)

1. Implement and evaluate the use of genome sequencing (GS) to screen up to 10,000 newborns for childhood-onset, monogenic conditions.

2. Determine uptake and acceptability of GS-NBS among parents of eligible newborns.

3. Implement and evaluate short-term follow-up procedures to inform public health application.

4. Assess 12-month outcomes for children with positive results and their caregivers.

Type 1 diabetes aims (initial 3-year study with plans to continue)

1

Conduct formative research among parents, primary care providers, specialists, and public health professionals on using genetic risk scores in NBS for T1D.

2

Prepare for, implement, and evaluate a pilot study to screen at least 5,000 newborns for increased risk for T1D.

3

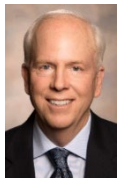
Determine uptake and acceptability of T1D screening among parents of eligible newborns, compared with outcomes from panels of rare monogenic conditions.

4

Assess 12-month outcomes for children with increased risk for T1D and their caregivers.

Early Check Team


Holly Peay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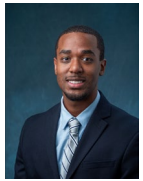
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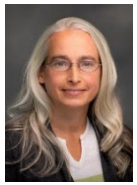
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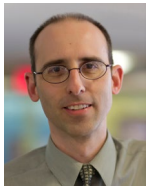
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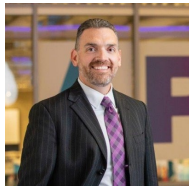
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