HRSA
Health Resources & Services Administration

State Newborn Screening as a Public Health Program

Next-Generation Screening – The Promise and Perils of DNA Sequencing at Birth

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Vision: Healthy Communities, Healthy People

Disclosures

- No relevant disclosures or conflicts of interest

Whose Odyssey Is It? Where Does It Lead?

- 5-year-old boy “Joey” and family came to our interdisciplinary clinic
- Seen by child neurology and clinical genetics
  - Variant of Charcot-Marie-Tooth disease by whole genome sequencing
- Rarely spoke, slow learning in school, and had no friends
- He didn’t sleep through the night, use the potty, or feed himself.
- Lashed out at his grandmother when she tried to feed him.
  - *“Who’s helping you with his behavior, working to improve his communication and independent function?”*

Brosco JP. Whose Odyssey Is It? Family-Centered Care in the Genomic Era. Hastings Cent Rep. 2018 Jul;48 Suppl 2:S20-S22.

MCHB Role in Supporting State NBS Programs

- State NBS programs: “NBS is a system, not a test”
  - ✓NBS Propel (state grants)
  - ✓NBS Excel (national coordinating center)
  - Implementing new RUSP conditions
  - Short-term follow-up (“NewSTEPS”)
  - Long-term follow-up
- Logistical support to the Advisory Committee on Heritable Diseases in Newborns and Children (ACHDNC)
  - Evidence review, public health assessment, committee meetings
  - Recommended Uniform Screening Panel (RUSP)

How Will Newborn Sequencing Change the Trajectory of Precision Health?

- Discuss how genetic information ascertained at birth could be used across the lifespan and how this could help or hinder efforts to address health disparities.
- Discuss potential legal and ethical issues that should be addressed (e.g., informed consent, data privacy, regulatory landscape)

Some Issues We Likely Discussed Already Today

- What is the role of government in health care for individuals?
  - State NBS programs are atypical; U.S. health care system is "individualistic"
- Do we know enough about the proposed plan to be sure that it will benefit the population?
  - Isn't there still a lot of uncertainty in the results about who should be treated and how?
- How do we ensure that the proposed plan is fair to every child?
  - Will it leave anyone out of the benefits?
- Given limited resources, is this the best way to try to improve public health?

Issues When NBS for PKU Started in the 1960s

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Issues When MS/MS for NBS Started in the late 1990s

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- Do we know enough about the proposed plan to be sure that it will benefit the population?
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- Given limited resources, is this the best way to try to improve public health?

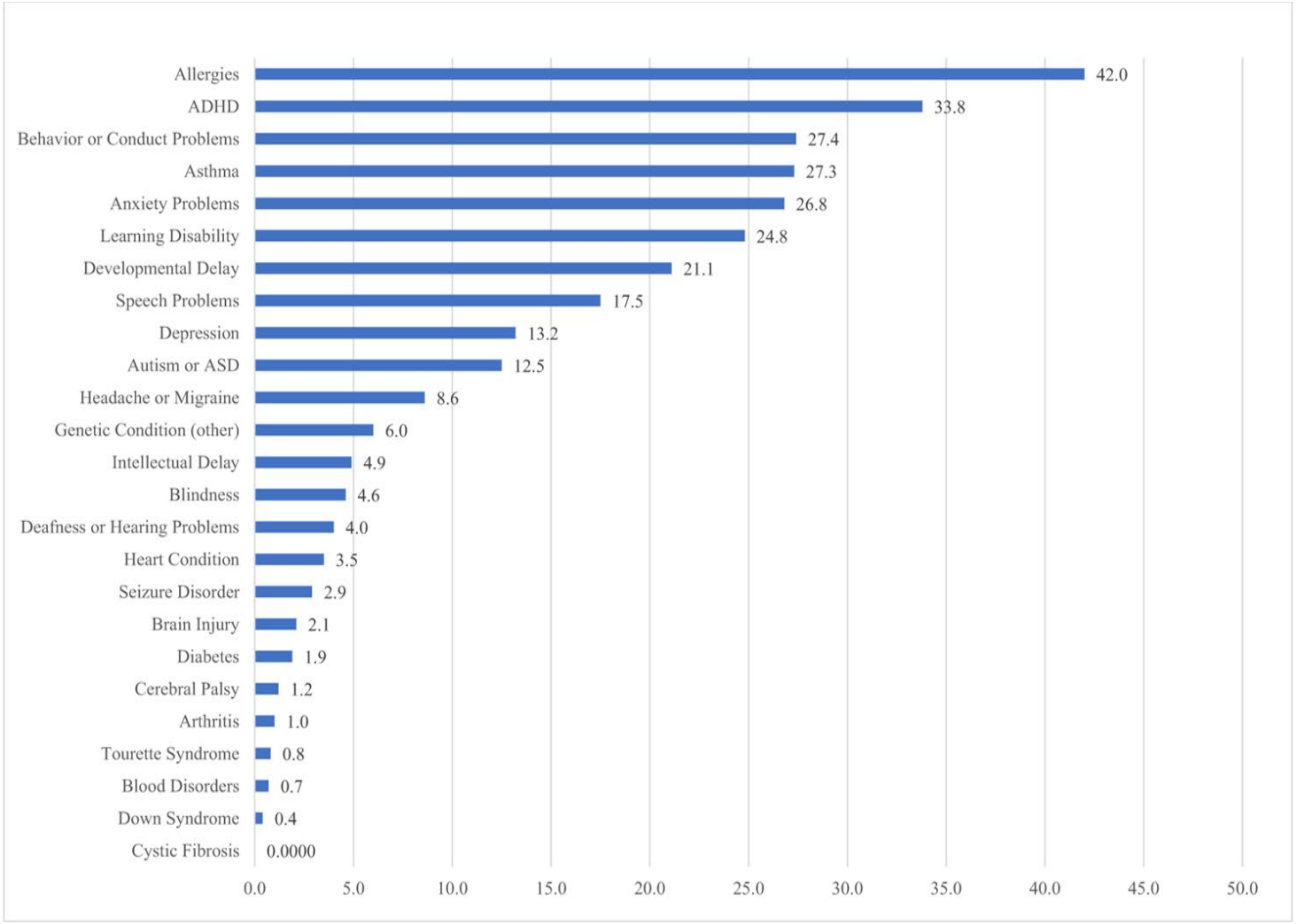
The “PKU Paradigm” for State NBS Programs

- Involvement of the government (state NBS programs) in the health care of newborns is justified in the case of PKU (Phenylketonuria) and similar conditions (e.g. MCAD deficiency) because
  - Conditions are difficult/impossible to diagnose clinically in the first few days of life
  - Treatment before onset of symptoms saves lives and protects health
  - It would be ethically inappropriate for caregivers to refuse treatment for conditions such as PKU or hypothyroidism
  - Helps ensure that every infant is tested

Will Next-Generation Screening Disrupt the PKU Paradigm?

- One possibility: **Yes,** some, *but the basic PKU paradigm will hold.*
  - State NBS programs will employ Next-Gen techniques
  - Focus remains on identifying conditions requiring treatment in newborns and infants to prevent death and serious morbidity
  - Next-Gen presents extraordinary technical and logistical challenge
    - ✓Large number of potential conditions; lab capacity; etc.
- 2nd possibility: **Yes, a lot.** *State NBS programs provide information.*
  - Clinical utility of probabilistic information derived from broad next-gen sequencing will continue to grow
  - Benefit to every family will be worth the deep investment needed to overcome legal, ethical, practical, and cost issues

Prevalence of Selected Conditions in US Children



National Survey of Children's Health, 2016-19. Pediatrics. 2022;149(Supplement 7). doi:10.1542/peds.2021-056150D

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Promise of NBS? Sickle Cell Disease as Example

- Early diagnosis of SCD coupled with comprehensive care has saved lives and improved health outcomes
- Limited guideline implementation (2019)
  - Transcranial doppler screening
    - ✓47% of 2-9 year-olds
    - ✓38% of 10-16 year-olds
  - Hydroxyurea
    - ✓38% of 2-9 year-olds
    - ✓53% of 10-16 year-olds
- Lack data on epidemiology, health care use, access, outcomes

ARTICLES

https://publications.aap.org/pediatrics/issue/149/Supplement%207

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Blueprint for Change: A National Framework for a System of Services for Children and Youth with Special Health Care Needs

Treeby W. Brown, MA, Sarah E. McLellan, MPH, Marie Y. Mann, MD, MPH, FAAP, and Joan A. Scott, MS, CGC, Guest Editors

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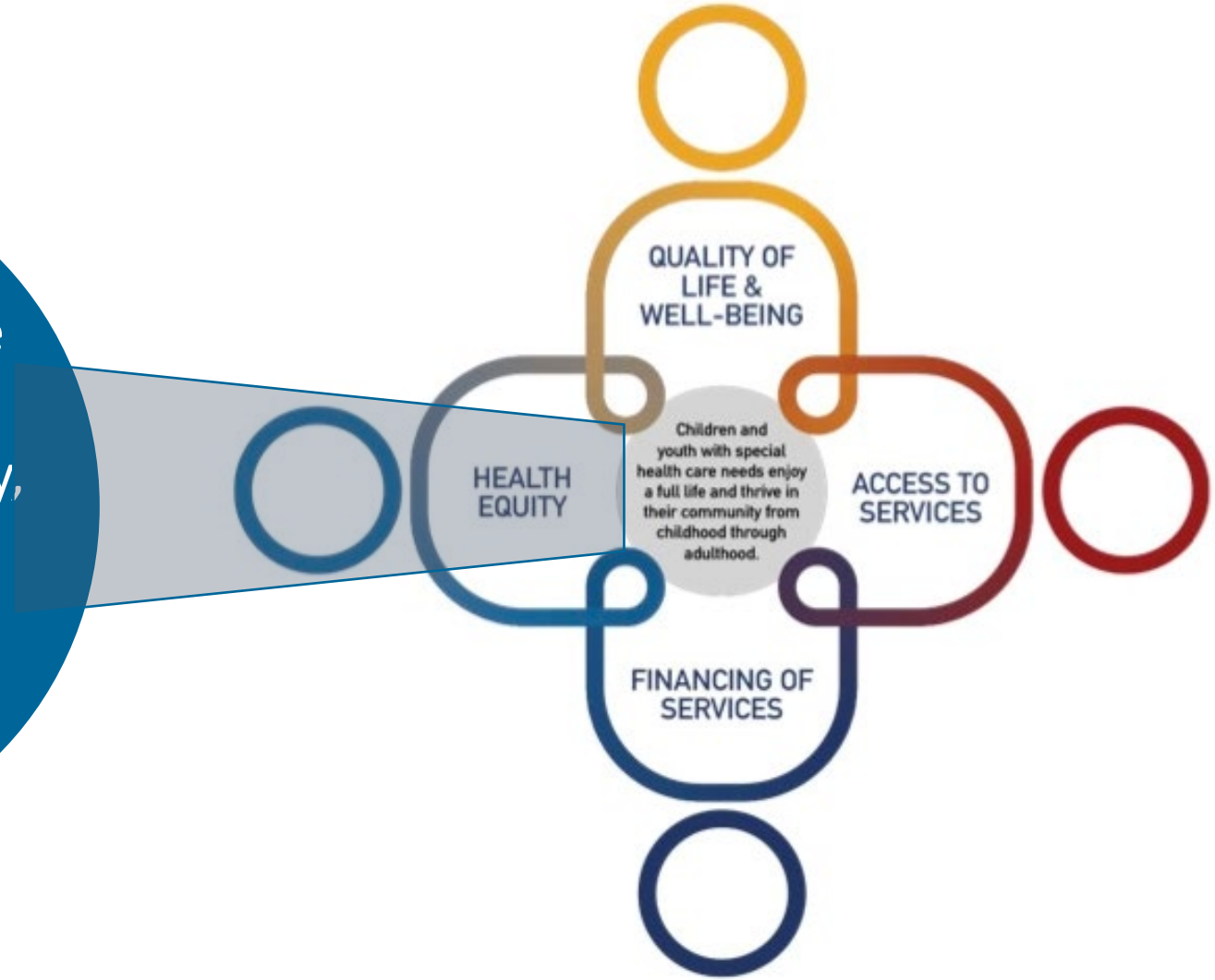
MCHB *Blueprint for Change for CYSHCN*

Every child gets the services they need, so that they can play, go to school, and grow up to become a healthy adult.



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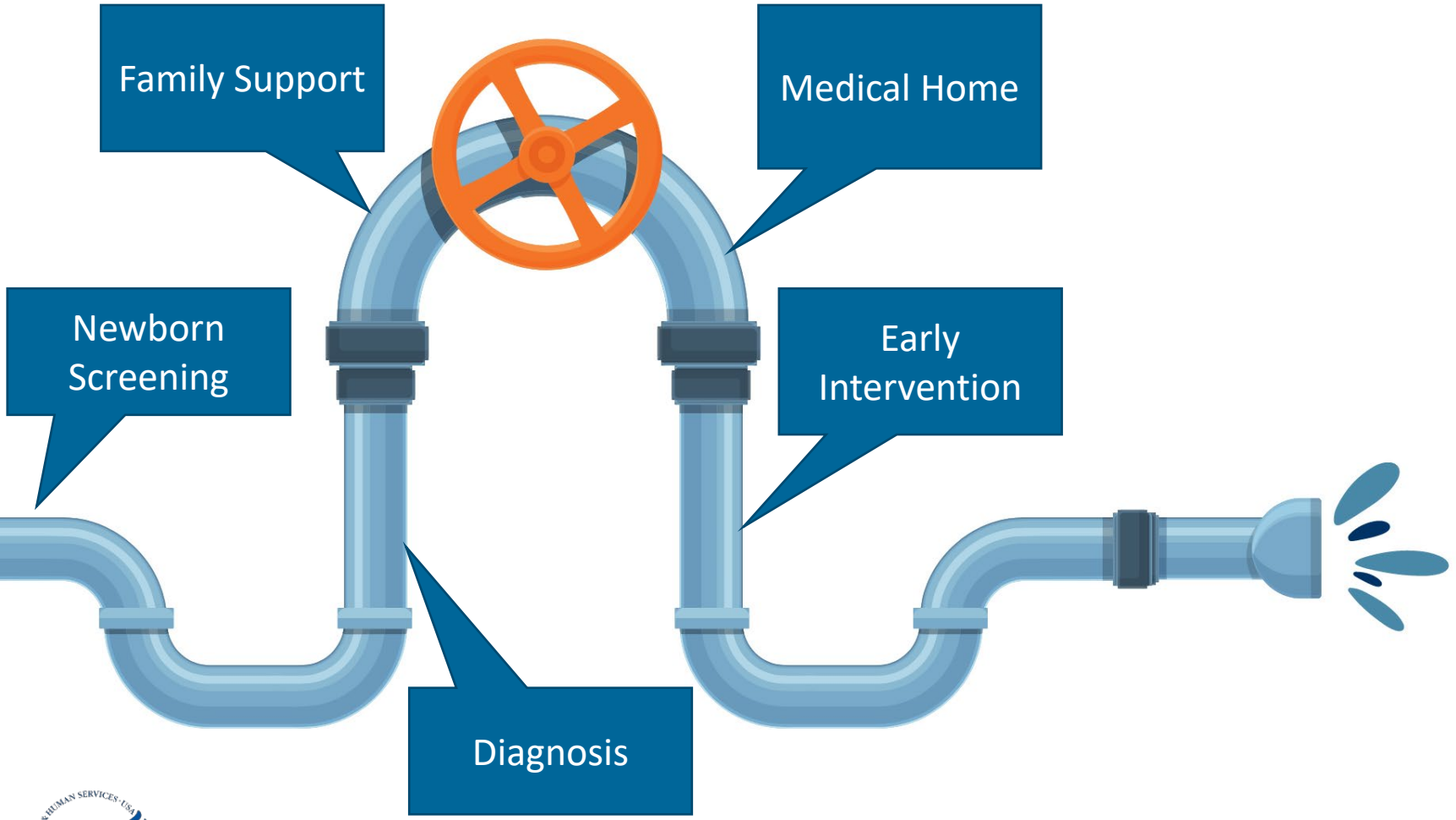
EXAMPLE: NBS for Deaf/Hard-of-Hearing Infants



Children achieving language acquisition milestones

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Calls for Long-term/Longitudinal Follow-up for NBS

Long-term follow-up after diagnosis resulting from newborn screening: Statement of the US Secretary of Health and Human Services' Advisory Committee on Heritable Disorders and Genetic Diseases in Newborns and Children

Alex R. Kemper, MD, MPH[1], Coleen A. Boyle, PhD[2], Javier Aceves, MD[3], Denise Dougher
James Figge, MD, MBA[5], Jill L. Fisch[6], Alan R. Hinman, MD, MPH[7], Carol L. Greene, MI
Christopher A. Kus, MD, MPH[9], Julie Miller, BS[10], Derek Robertson, MBA, JD[11], Brad Th
Michele Lloyd-Puryear, MD, PhD[13], Peter C. van Dyck, MD, MPH[13], and R. Rodney How

2008

A framework for assessing outcomes from newborn screening: on the road to measuring its promise☆

Cynthia F. Hinton [a,*], Charles J. Homer [b], Alexis A. Thompson [c], Andrea Williams [d], Kathryn L. Hassell [e], Lisa Feuchtbaum [f], Susan A. Berry [g], Anne Marie Comeau [h], Bradford L. Therrell [i], Amy Brower [j], Katharine B. Harris [k], Christine Brown [l], Jana Monaco [m], Robert J. Ostrander [n], Alan E. Zuckerman [o], Celia Kaye [p], Denise Dougherty [q], Carol Greene [r], Nancy S. Green [s], the Follow-up and Treatment Sub-committee of the Advisory Committee on Heritable Disorders in Newborns and Children (ACHDNC):

2016

What questions should newborn screening long-term follow-up be able to answer? A statement of the US Secretary for Health and Human Services' Advisory Committee on Heritable Disorders in Newborns and Children

Cynthia F. Hinton, PhD, MPH[1], Lisa Feuchtbaum, DrPH, MPH[2], Christopher A. Kus, MD, MPH[3], Alex R. Kemper, MD, MPH[4], Susan A. Berry, MD[5], Jill Levy-Fisch, BA[6], Julie Luedtke, BS[7], Celia Kaye, MD, PhD[8], and Coleen A. Boyle, PhD, MS[1]

2011

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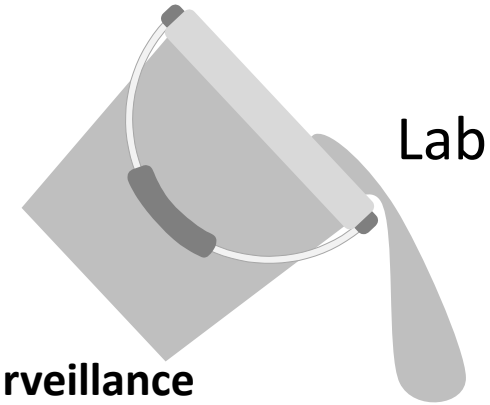
GOAL: Three Connected Buckets of Data



Data sources:
Lab results, clinical information, public health data, etc…

Public Health Surveillance

Bucket 1: NBS Lab result analysis.
Pre-diagnostic risk assessment of state NBS lab data.
e.g. ED3N (CDC)

Bucket 2: Notification/ confirmation.
Short-term follow-up, including timeliness, with families/clinicians.
e.g. NewSTEPS (HRSA)

Bucket 3: Longitudinal clinical care.
NBS-identified children receive treatment.
e.g. Propel (HRSA), SCDC (CDC), Clinical research (NIH)

Conclusion: Federal Role in State NBS Programs

- MCHB/HRSA (with federal partners)
  - Support ACHDNC and RUSP process
- Support state NBS programs
  - Implementing new conditions
  - Short-term follow-up
  - Long-term follow-up
- Public Health Ideal
  - **If we are going to screen infants in a state program, we have an obligation to ensure that every child with a condition gets treatment**
  - Integrated data approach to reaching that ideal

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Blueprint for Change:

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