Timeliness of EHDI Benchmarks in NICU Infants

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The University of Iowa | The Pediatric Audiology Lab

Disclosures

- No relevant personal disclosures to make

- No financial disclosures to make

Introduction

- Pediatric audiologist
- Clinical supervisor in the University of Iowa's Au.D. training clinic
- Ph.D. student in the Pediatric Audiology Lab under Dr. Elizabeth Walker

I’m also closely involved in the Early Hearing Detection and Intervention (EHDI) program.

EHDI

Iowa's Early Hearing Detection & Intervention Program

My goals for this presentation:

- You'll know some of the biggest pertinent findings from the OCHL project.
- Be aware of the risk of hearing loss and EHDI delays in NICU babies.
- Recognize the possibilities of partnering with state EHDI departments for population-level research.

What I'll Cover

PART I

OCHL Background

Part 2

Current research on NICU babies

Part 3

Future Research

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Future Research

The Outcomes of Children with Hearing Loss project is a three site longitudinal research study that spans sixteen states.

Our research:

Outcomes of Children with Hearing Loss

Outcomes of School Age Children who are Hard of Hearing

Supported by National Institutes of Health R01 DC009560, R01 DC013591, R21DC015832, American Speech and Hearing Foundation

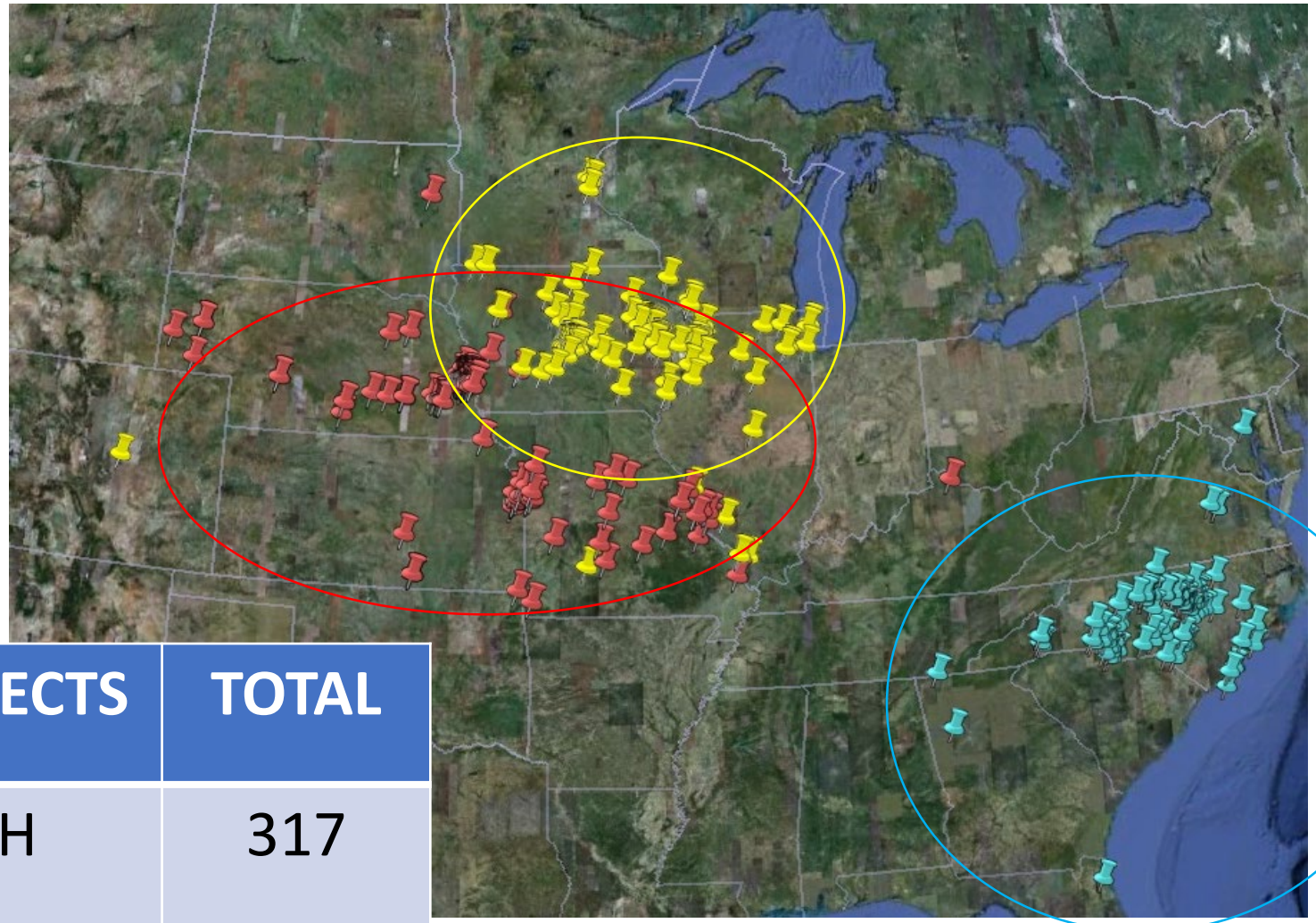
What guided the research goals of the Outcomes of Children with Hearing Loss Project?

New generation of children who are hard of hearing

Are these children at risk for delays?

What are factors that lead to success?

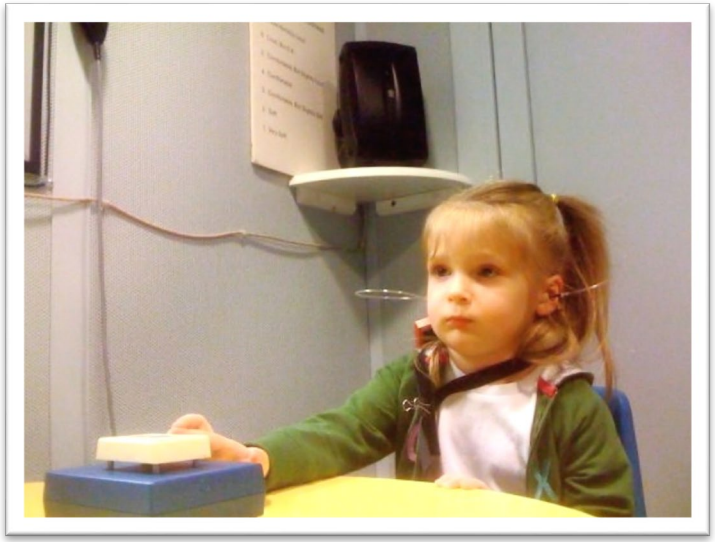
The OCHL study is a multicenter, longitudinal study focusing on outcomes of children with mild-severe hearing loss



SUBJECTS	TOTAL
HH	317
NH	117

Study participants

	CHH (mild-severe bilateral HL)	CNH	Both Groups
Number	317	117	No major secondary disabilities
Gender	173 male, 144 female	54 male, 63 female	English is first language
Hearing	*M*= 48.88 dB HL 76% identified from NHS Age of ID = 7.32 months	< 20 dB HL	Matched on income & maternal education Higher than typical US sample



Types of data included:

OCHL

- Speech and language skills
- Hearing and hearing aid information
- Academics: pre-literacy, nonverbal cognitive assessments, etc.
- Measures of psychosocial development

OSACHH expands on:

- Academic achievement
- Working memory
- Classroom performance and teacher feedback
- Characteristics of classroom acoustics

What I'll Cover

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OCHL Background

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Essential OCHL Findings

Part 3

Current research on NICU babies

The Outcomes of Children with Hearing Loss Project: Essential Findings

- The provision of well-fit hearing aid reduces the risk of language delay in children who are HH (CHH) and provides ongoing protection against delay; and greater audibility through hearing aids is a positive predictor for language in preschool (Tomblin et al., 2015).

The Outcomes of Children with Hearing Loss Project: Essential Findings

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- Low parental education levels and more mild degrees of hearing loss present risk for low hearing aid use (Walker et al., 2015).

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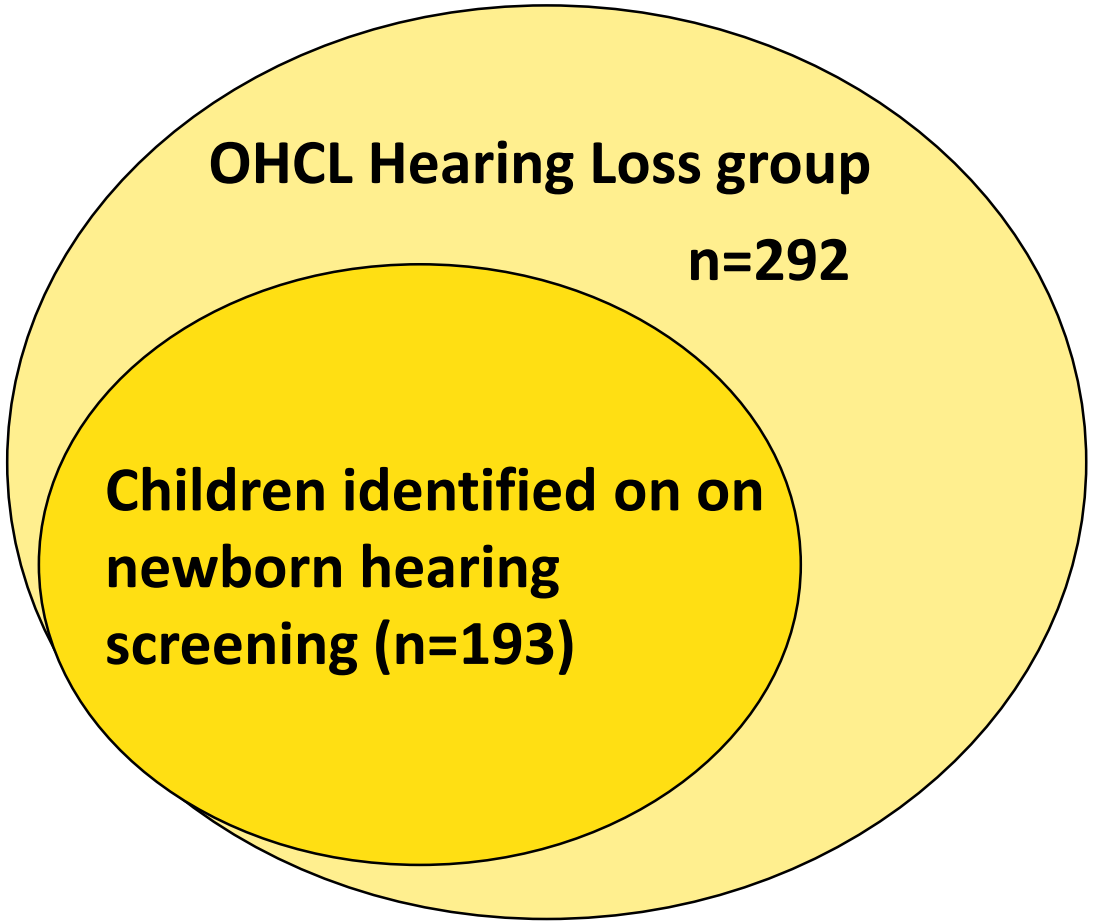
- Low parental education levels and more mild degrees of hearing loss present risk for low hearing aid use (Walker et al., 2015).
- Caregivers of CHH tend to use more directive language than those of children with normal hearing (CNH). Quality of child directed speech in young childhood is related to later child language (Ambrose et al., 2015)

Factors Influencing Follow-Up to Newborn Hearing Screening for Infants Who are Hard of Hearing

1. What family and child factors affect follow up after not having passed the newborn hearing screening?

2. How consistently are children hitting follow up timing benchmarks?

3. Qualitatively, what reasons do families cite for delays?

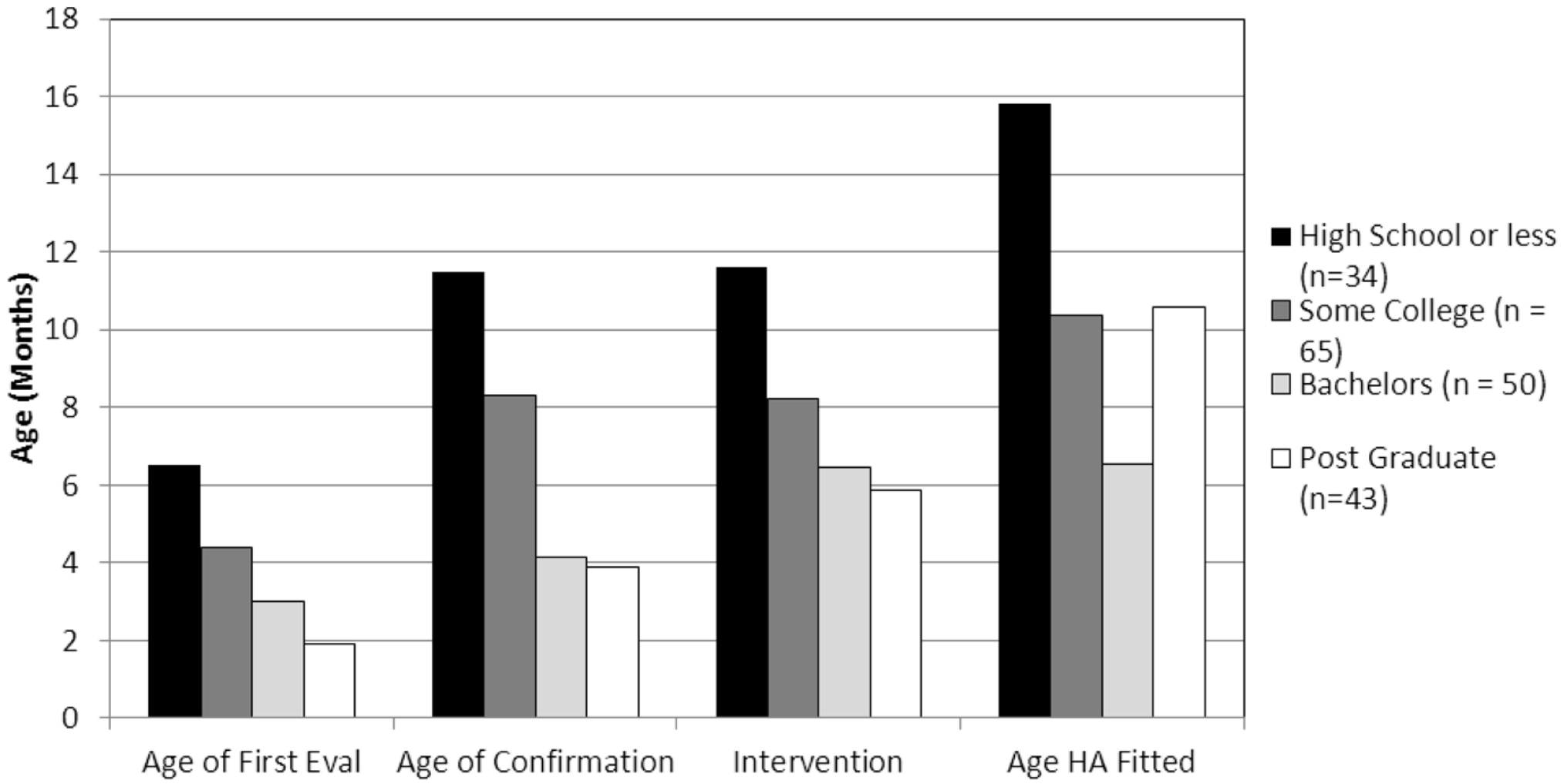


What family and child factors affect follow up after not having passed the newborn hearing screening?

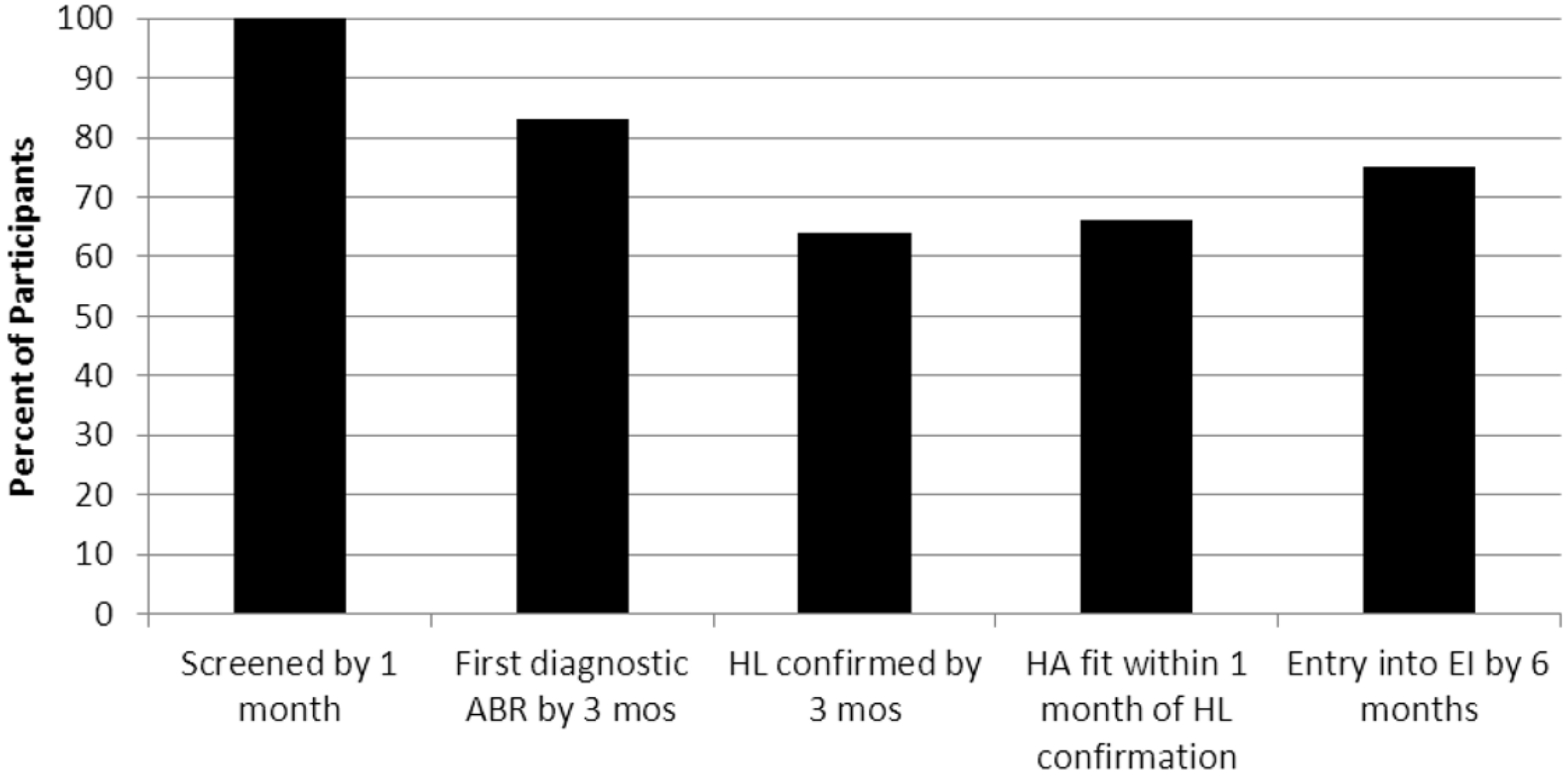
A number of demographic variables were considered as **predictors for follow up**:

- Sex
- Test site
- Socioeconomic status
- Hearing loss severity

What family and child factors affect follow up after not having passed the newborn hearing screening?



How consistently are HH children hitting follow up timing benchmarks?



What reasons do families cite for delays when they happen?

Delays between screening and diagnostic assessment

- Multiple re-screenings (n=33)
- Difficulty getting an appointment quickly (n=6)
- Other (n=15)

Delays between confirmation and hearing aid fitting

- Family decided not to proceed right away (n=12)
- Hearing aids were not initially recommended (n=11)
- Difficulty obtaining appointment (n=10)
- Other (n=16)

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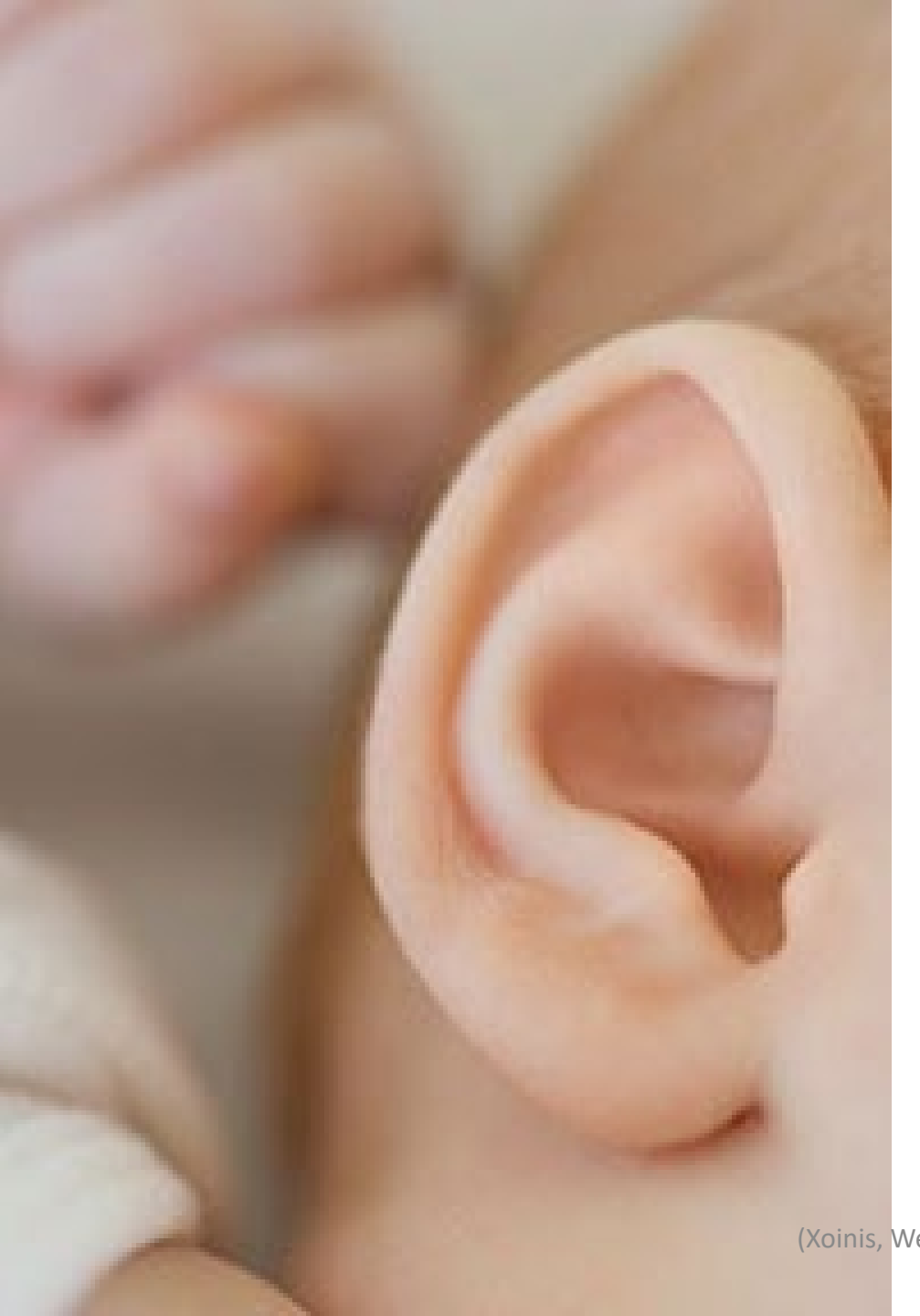
Why should we study NICU babies and EHDI benchmarks?



NICU babies are at the highest risk for permanent childhood hearing loss, including sensorineural hearing loss (SNHL) and Auditory Neuropathy Spectrum Disorder (ANSD).

(Xoinis, Weirather, Mavoori, Shaha, & Iwamoto, 2007);(Veen et al., 1993)

More babies are spending time in the NICU, regardless of birthweight and gestational age.

(Harrison & Goodman, 2015)

Improved survival for the very earliest babies has improved, and can mean very long admissions to the NICU as they learn to eat, breathe, and grow.

When are babies getting the newborn hearing screening?

Are any specific recommendations needed for the teams that care for them?

(Chan et al., 2001)

NICU Infants and EHDI Benchmarks

The current investigation has two main research questions:

1. Do infants with lengthy NICU stays experience delays in meeting EHDI benchmarks compared with non-NICU peers?

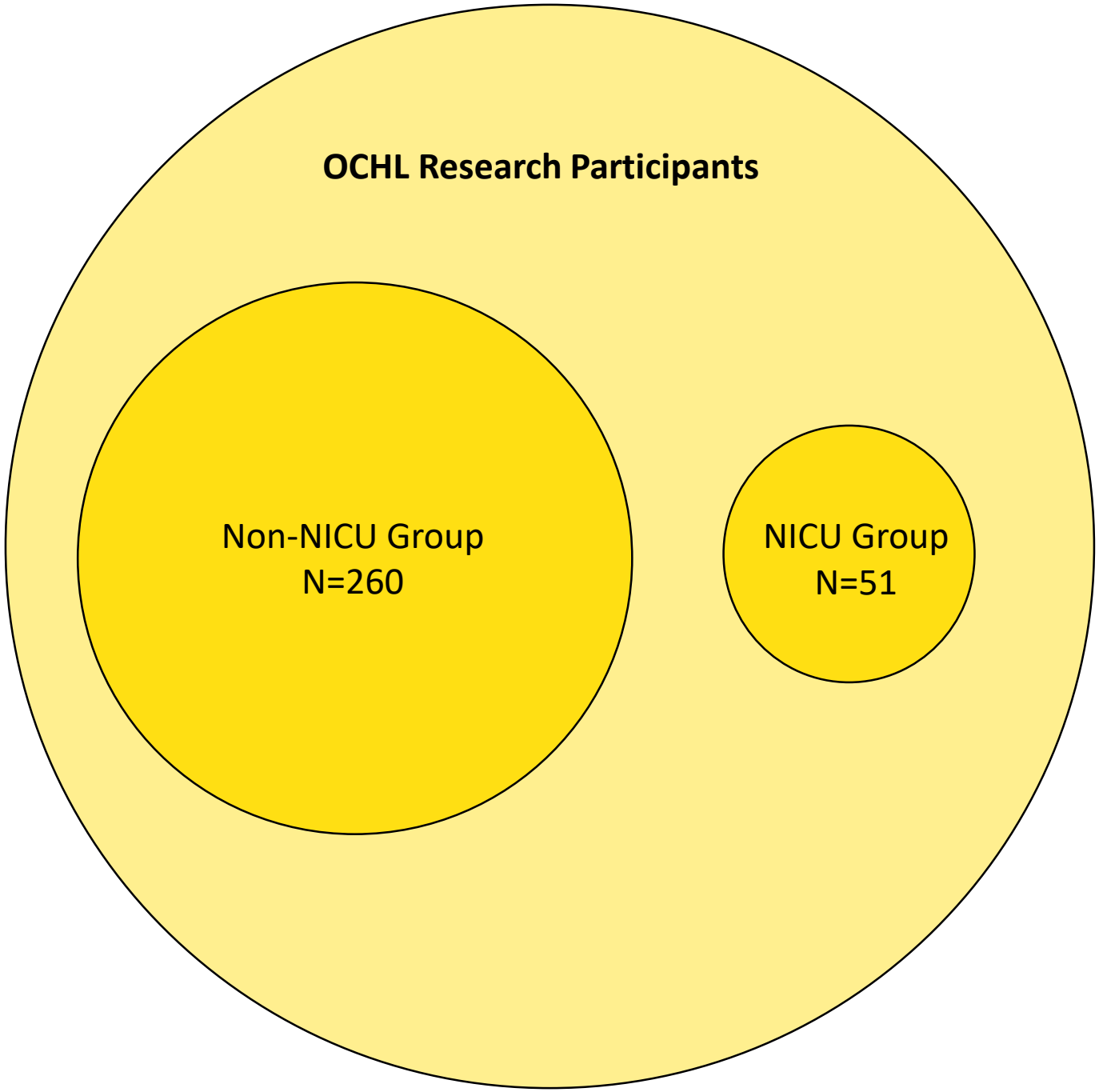
2. How can we characterize the timing of early hearing healthcare in infants with lengthy NICU stays? Is it compatible with general JCIH recommendations?

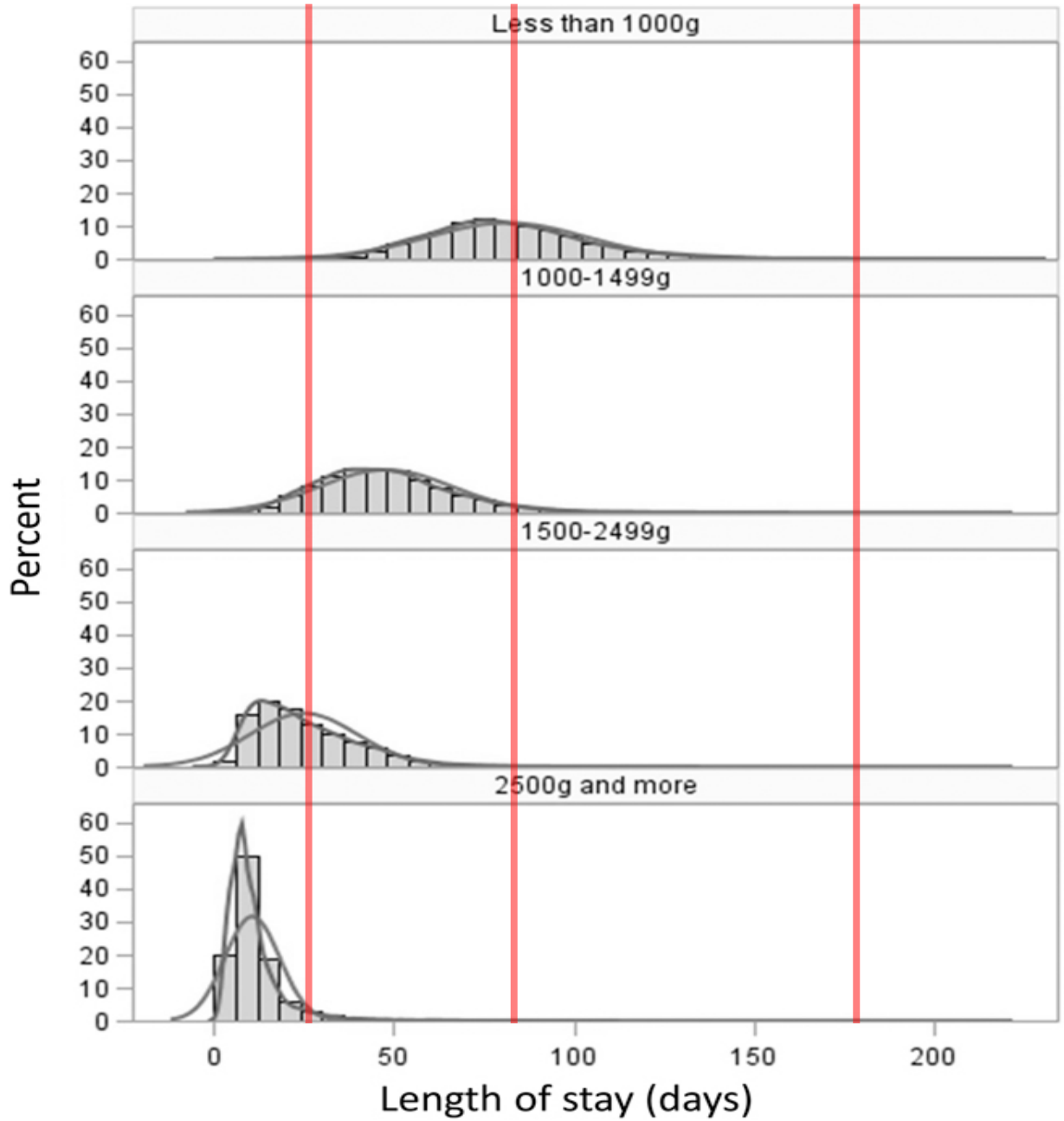
Can we use participants from OCHL to answer these big NICU questions?

Methods:

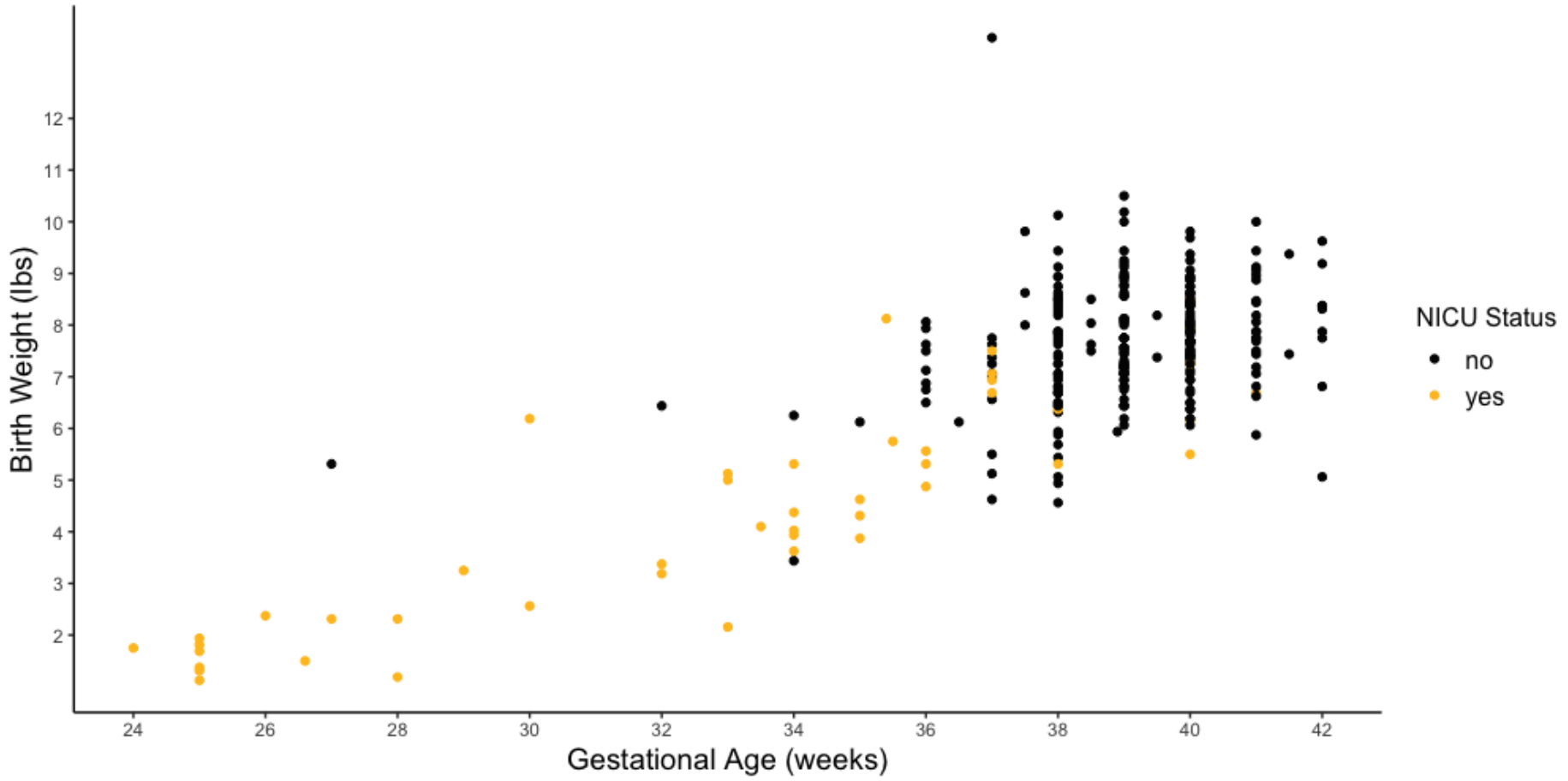
Subset of OCHL participants were selected for group comparisons:

- Congenital hearing loss, identified on newborn hearing screening
- **NICU group**: 5+ days in the NICU
- **Non-NICU group**: fewer than 5 days or no NICU stay

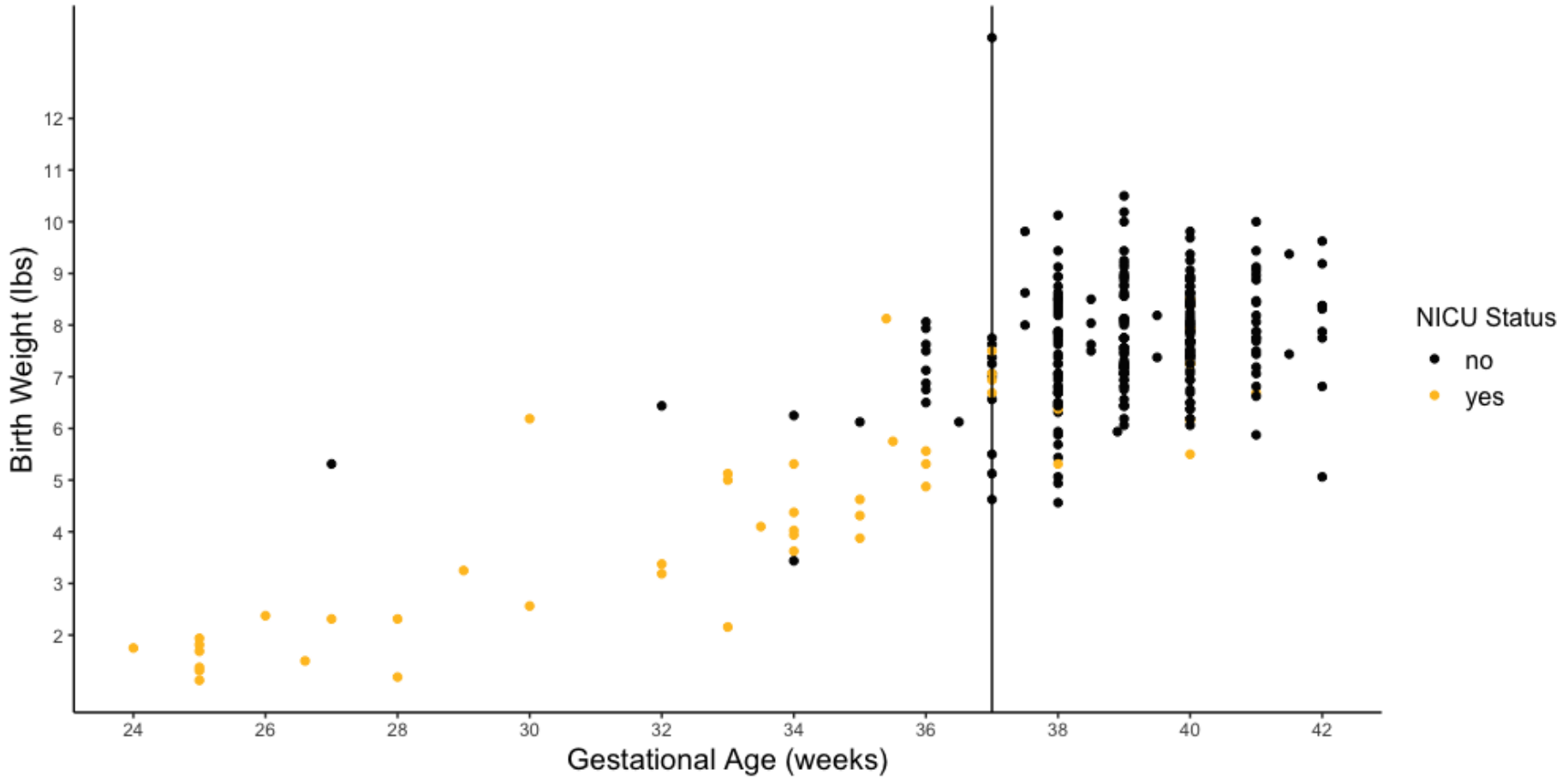



Less than 1000g
1000-1499g
1500-2499g
2500g and more
Percent
0
10
20
30
40
50
60
0
50
100
150
200
Length of stay (days)

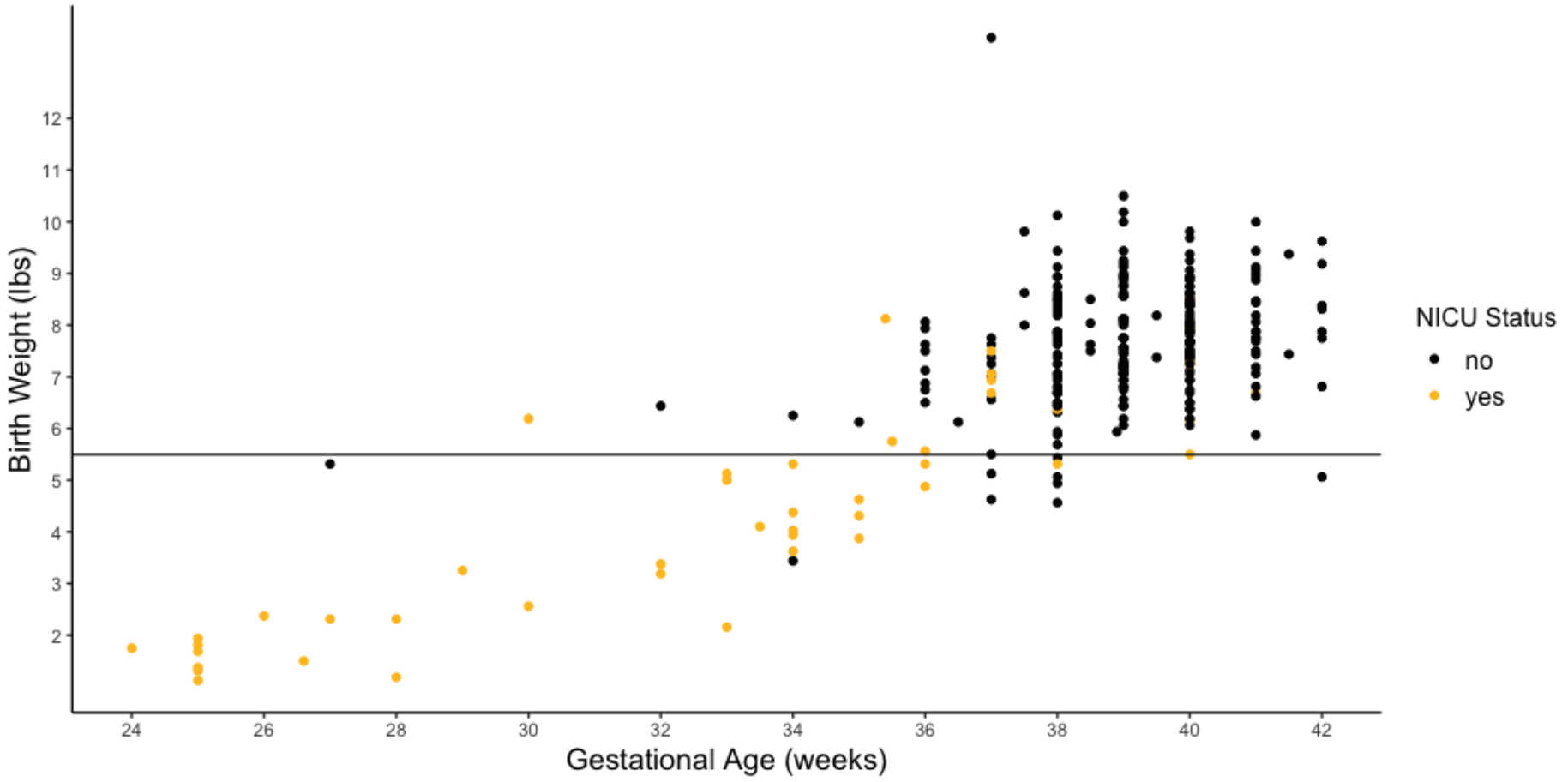
OCHL NICU babies



OCHL NICU babies



OCHL NICU babies



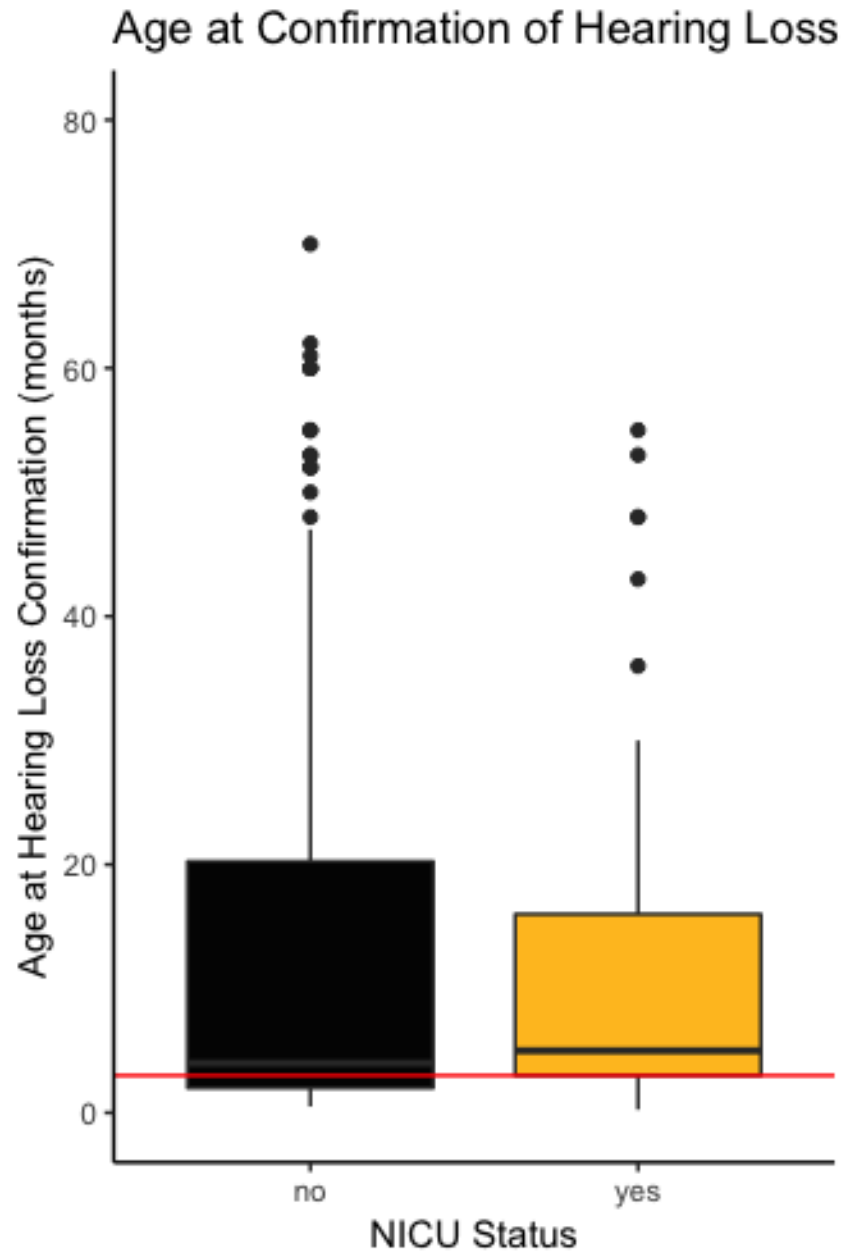
When are NICU babies meeting EHDI Benchmarks?

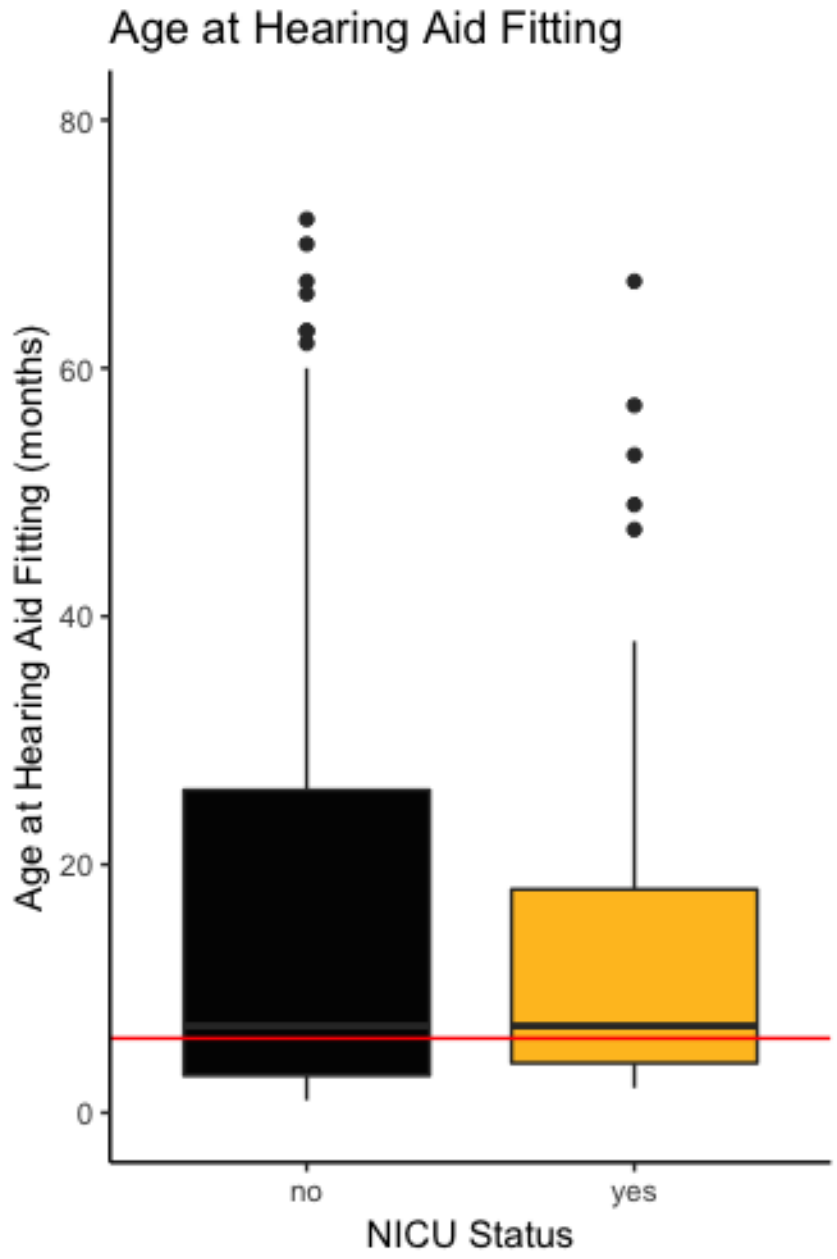
Courtesy Iowa Department of Public Health

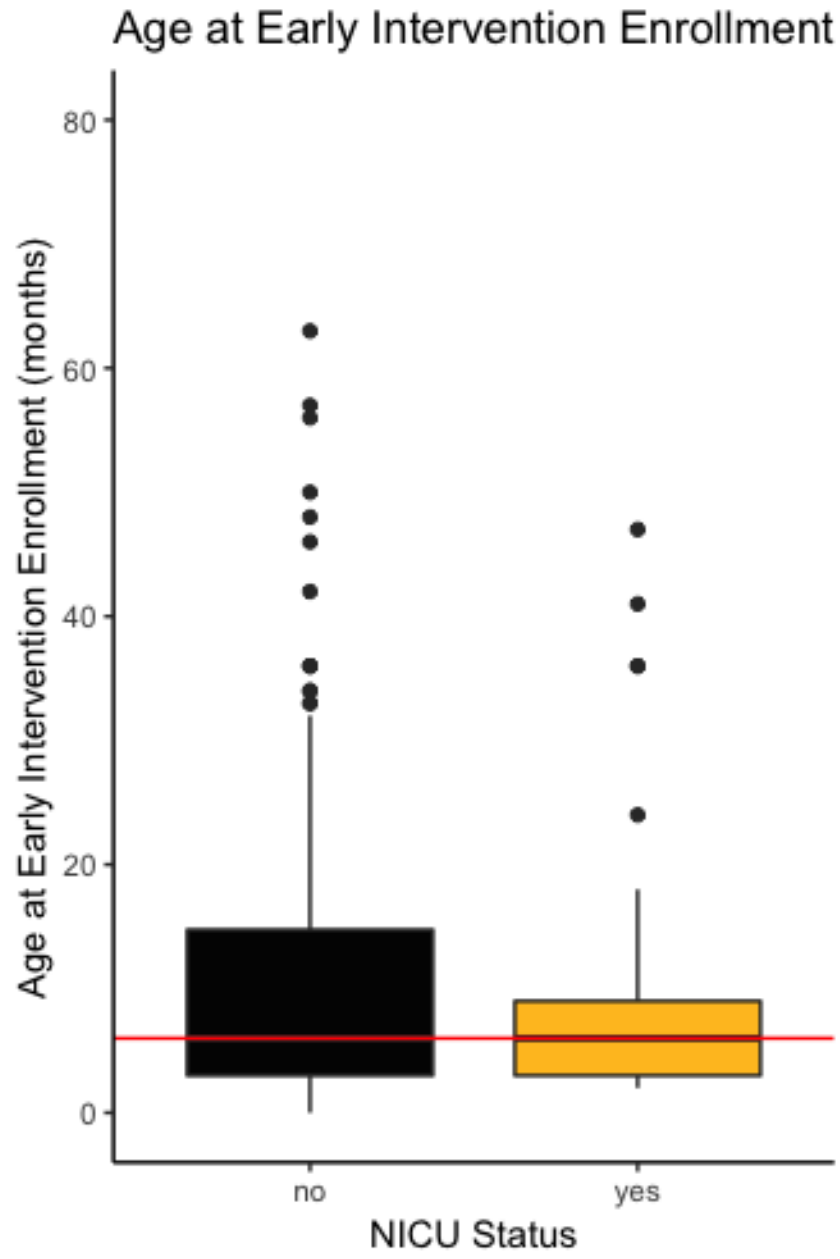
Turnaround: the fourth EHDI benchmark

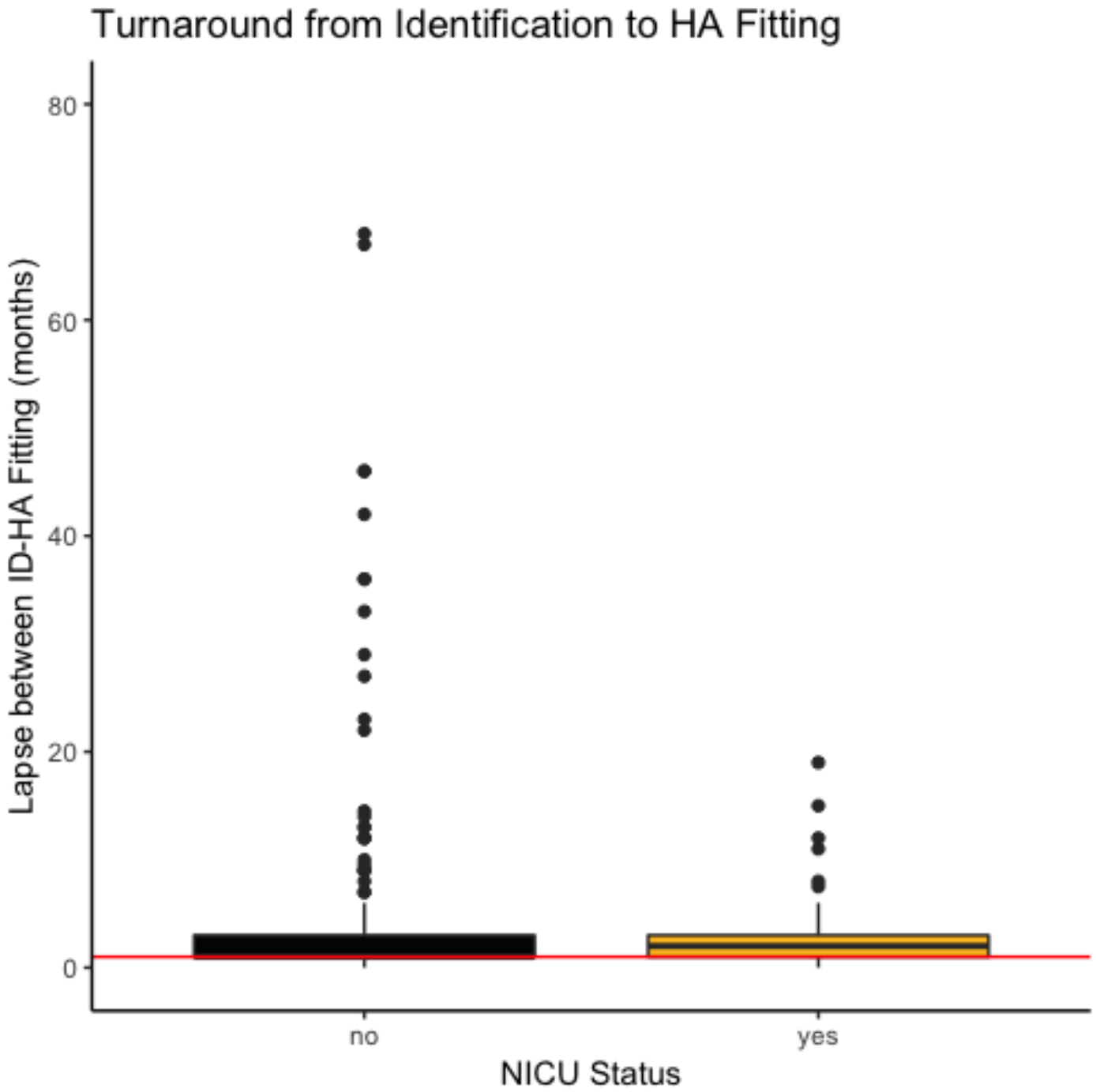
Our goal is that hearing aids are fit within one month of confirmation of hearing loss. We call this benchmark ”turnaround”.

Thanks to https://www.instagram.com/sierradawn0/

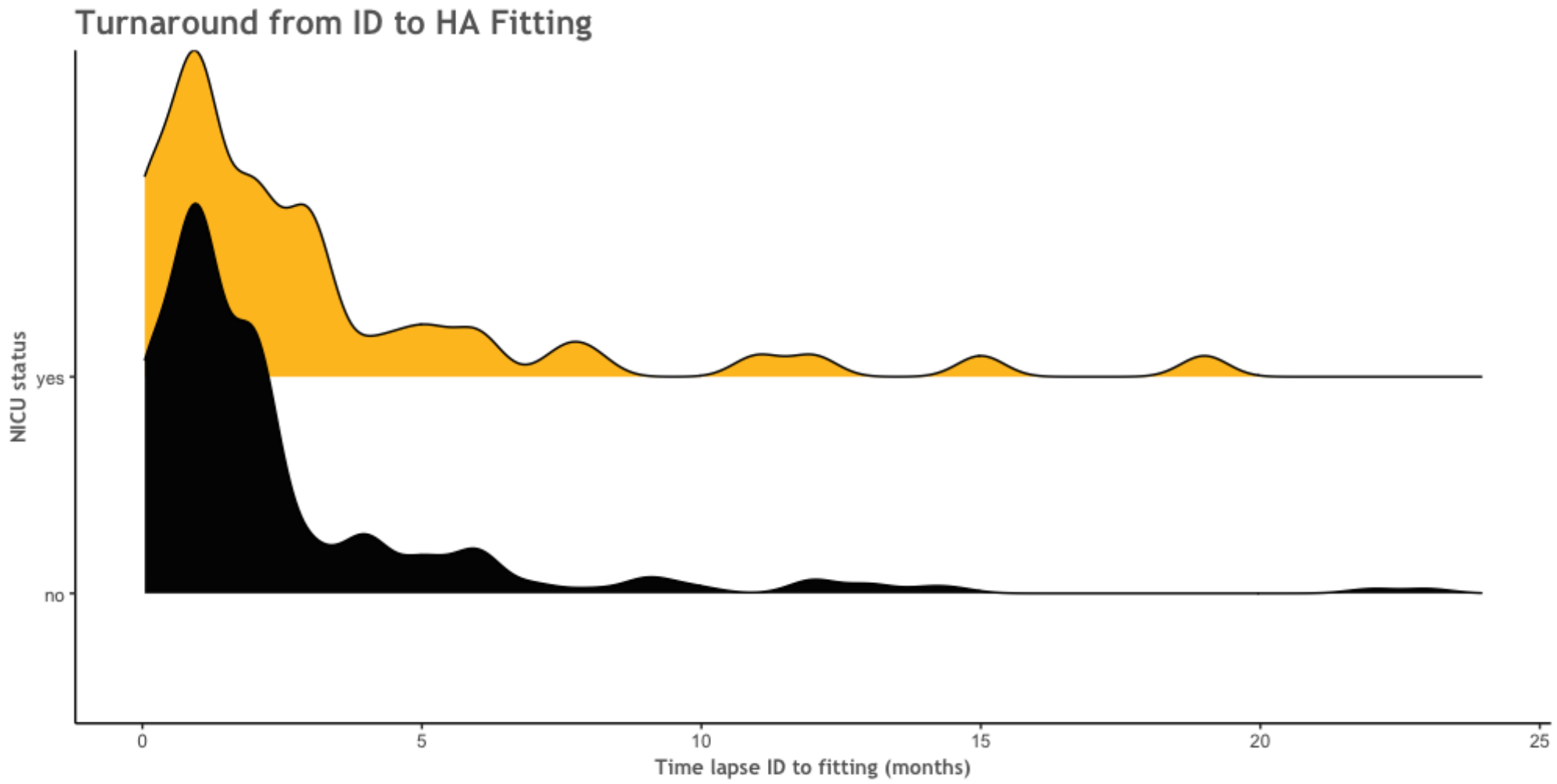

Age at Confirmation of Hearing Loss
Age at Hearing Loss Confirmation (months)
80
60
40
20
0
no
yes
NICU Status


Age at Hearing Aid Fitting
Age at Hearing Aid Fitting (months)
80
60
40
20
0
no
yes
NICU Status

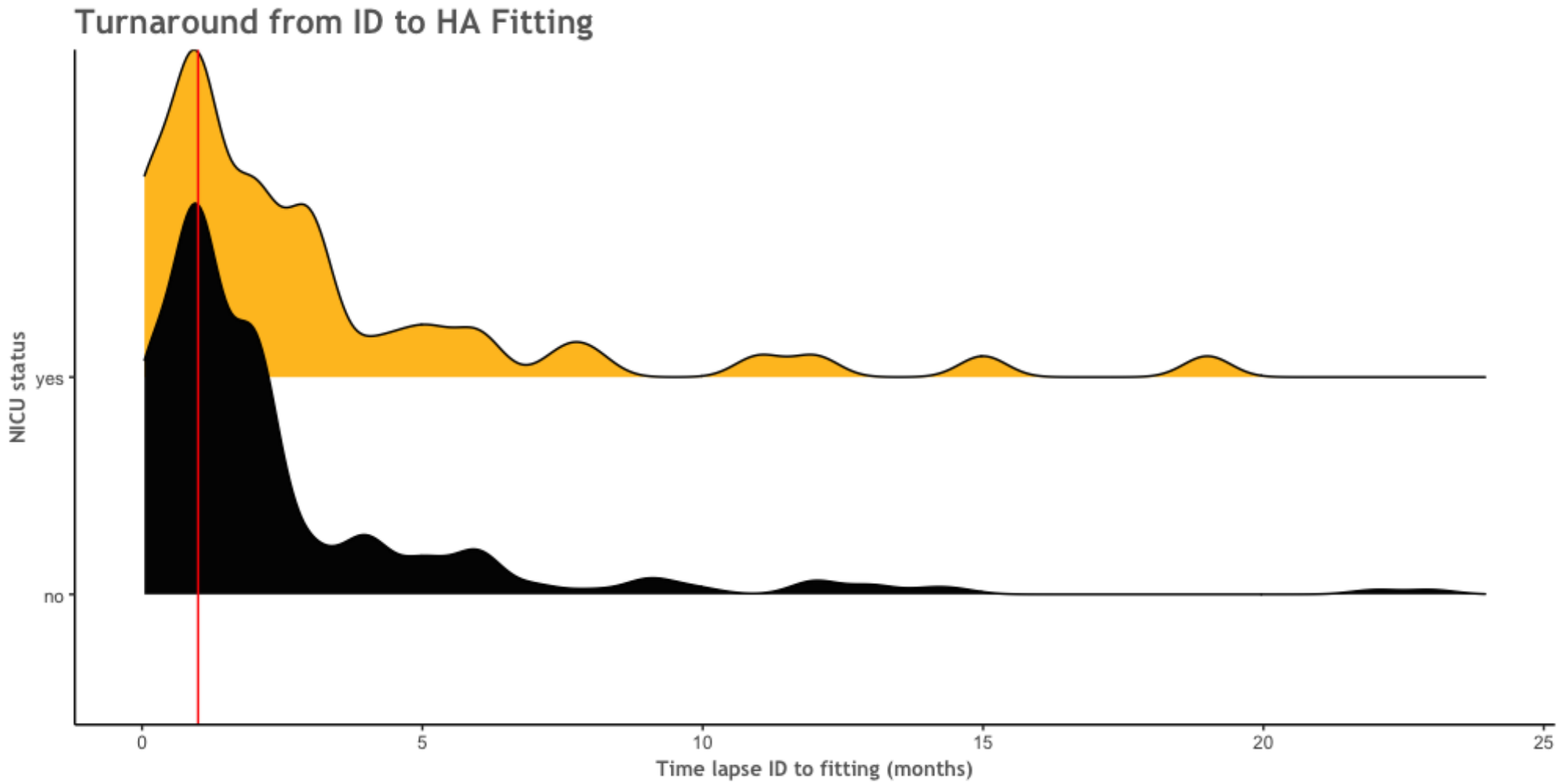

Age at Early Intervention Enrollment
Age at Early Intervention Enrollment (months)
80
60
40
20
0
no
yes
NICU Status


Turnaround from Identification to HA Fitting
Lapse between ID-HA Fitting (months)
80
60
40
20
0
no
yes
NICU Status

EHDI Benchmark: Turnaround



EHDI Benchmark: Turnaround



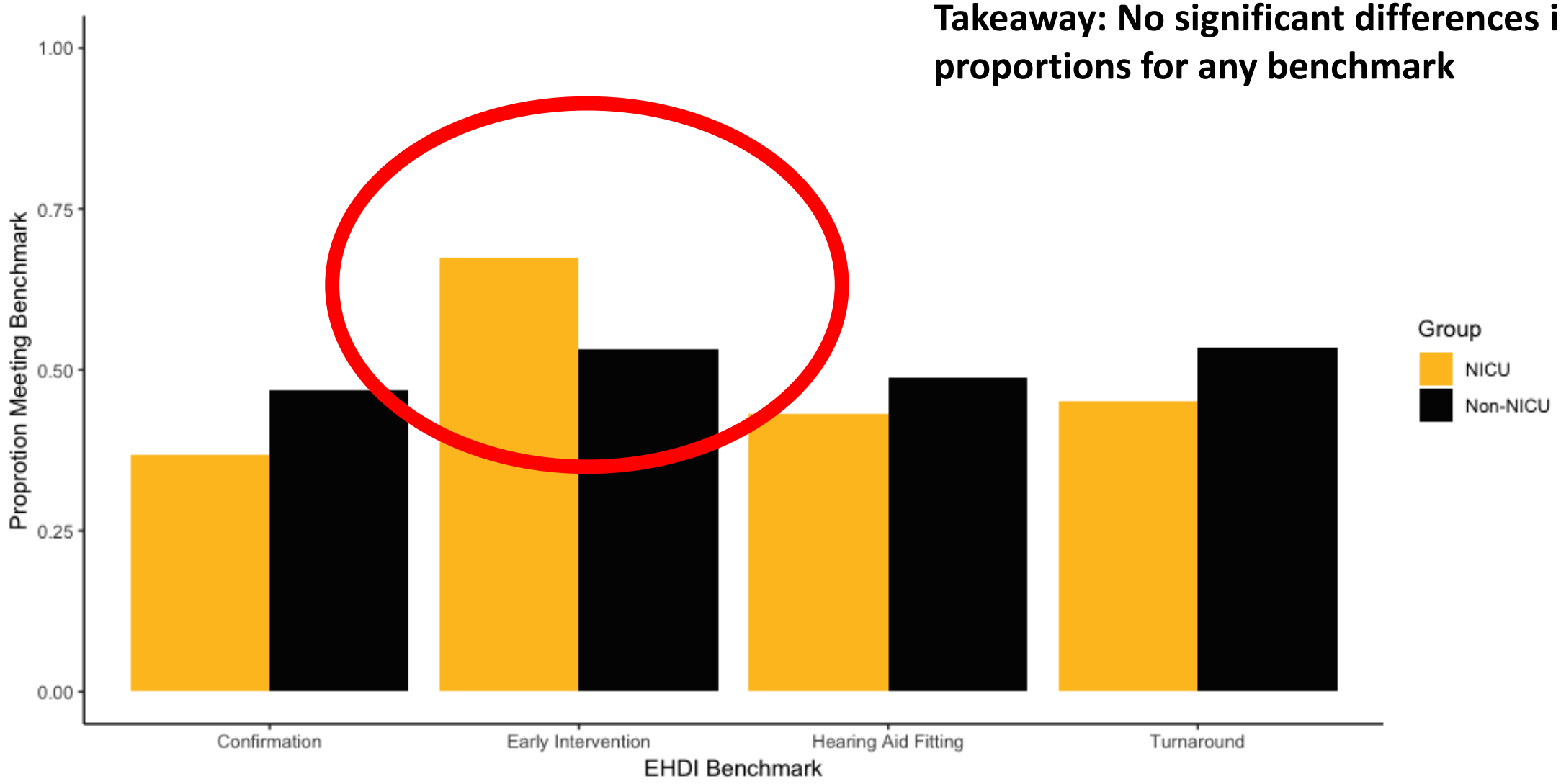
EHDI Benchmarks

Boy it seems like a lot of kids in BOTH groups are taking a long time to meet benchmarks!

Can we just see a breakdown of what percentage DID meet our EHDI benchmarks?

OCHL NICU Babies

Takeaway: No significant differences in proportions for any benchmark



Limitations

Several limitations limit effective use of OCHL data for these questions.

- Children with hearing loss only
- Only kids whose families chose listening and spoken language
- No additional developmental disabilities
- English speaking only
- Data is ten years old
- *No information on age at first screening.*

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Alternate Approach: Partnering with IDPH

Iowa's EHDI Program is administered by the Iowa Department of Public Health, under direction of Tammy O'Hollearn, LSW.

EHDI

Iowa's Early Hearing Detection & Intervention Program

Administrative Data

Research with administrative data entails answering a research question using data that was collected or compiled for a different purpose.

Examples:

- Billing data
- Public Health tracking
- Electronic Medical Record (can be de-identified)

Administrative Data: Tradeoffs

- Advantages:
  - Widely available for researchers
  - Large numbers allow for high statistical power
  - Datasets can be linked
- Drawbacks:
  - Because it wasn’t collected for research purposes-take it like it is
  - May miss data that would have been prospectively included
  - Missing data is missing
  - For EMR data, need validated algorithms for identifying cases

We will apply those same research questions to the de-identified state newborn hearing screening and follow up records.

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Examples of Iowa EHDI Research Partnerships

- Publications:
  - Dumanch, K. A., Holte, L., O'Hollearn, T., Walker, E., Clark, J., & Oleson, J. (2017). High risk factors associated with early childhood hearing loss: A 3-year review. *American journal of audiology*, *26*(2), 129-142.
- Posters:
  - Carlson, A, Holte, L, O'Hollearn, T (2014). Prevalence of Risk Factors Associated with Congenital and Delayed Onset Hearing Loss in Iowa's Children. Poster presented to National EHDI Conference, April 2014.
  - Sapp, C, Holte, L, O'Hollearn, T (2014). Extending newborn hearing screenings to homebirth populations in Iowa. Poster presented to National EHDI Conference, April 2014.

Iowa EHDI


39,0000 Births per year
2000/ year need follow up
Data will span 2014-2017
We expect to review
about 8000 records

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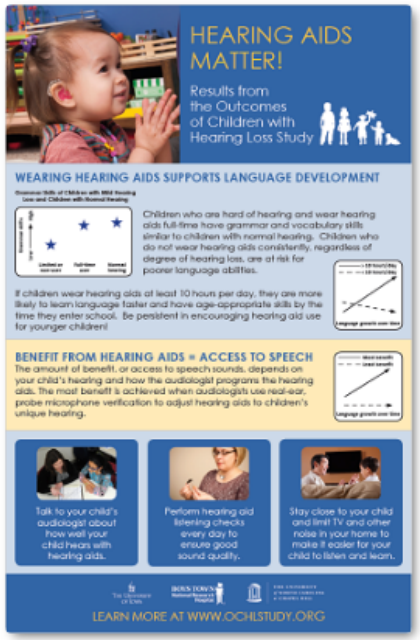
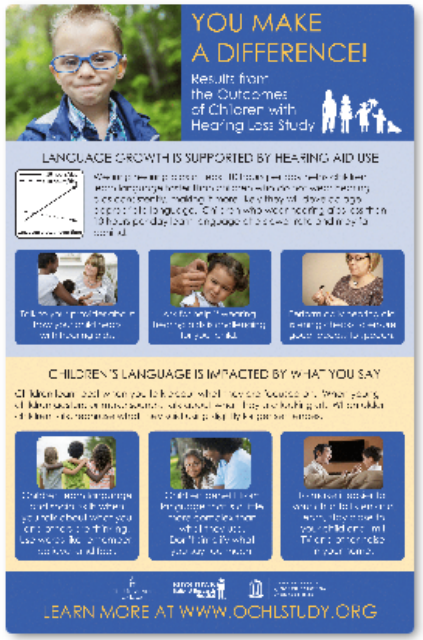
your child + our research = improved outcomes for children with hearing loss

We are proud to release the new OCHL posters and brochures!

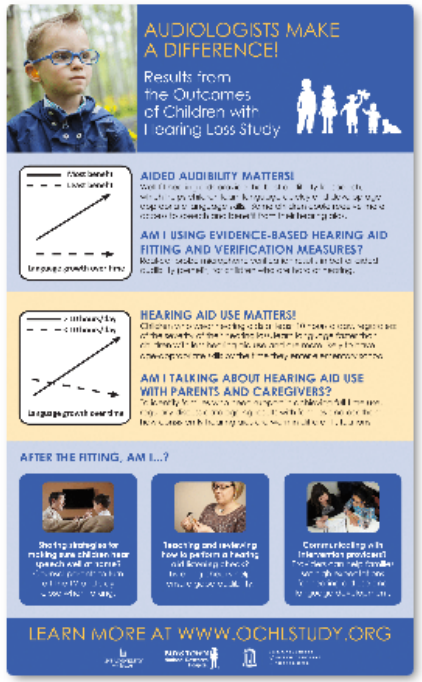
Click image to view or download as a .pdf



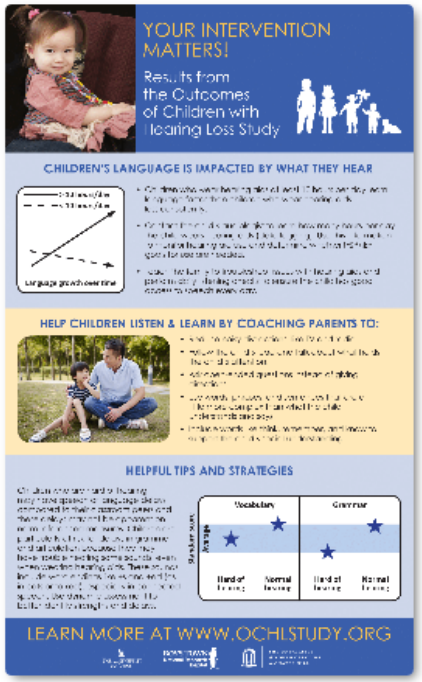
"Hearing Aids Matter"
Poster (11" x 17")
Spanish Version
French Version
Greek Version



"You Make a Difference"
Poster (11" x 17")
Spanish Version
French Version
Greek Version



"Audiologists Make a Difference"
Brochure (8.5" x 14")
Spanish Version
French Version



"Your Intervention Matters"
Brochure (8.5" x 14")
Spanish Version
French Version

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Thank you!