It's Time to Re-Invent the Wheel:

A Report on Quality Improvement Efforts in a Newborn Hearing Screening Program

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CHILDREN'S HEARING PROGRAM

Contributors

- Chrisanda Sanchez, AuD
  - —Pediatric audiologist
  - —Director of the Children’s Hearing Program

Disclosures

- Employed by the University of Miami Ear Institute

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Background Information

- University of Miami Children's Hearing Program within the Ear Institute
  - Outpatient clinic for the pediatric population
- Neighboring birthing hospital is one of the largest children's hospital in the Southeastern United States
  - Level IV NICU
  - Average of 480-500 births per month

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The Guidelines

Screening

1

All infants should undergo hearing screening prior to discharge from the birth hospital and **no later than one month of age**, using physiologic measures with objective determination of outcome.

Intervention

6

Early intervention services should be offered through an approach that reflects the family's preferences and goals for their child, and should begin as soon as possible after diagnosis but **no later than six months of age.**

Diagnosis

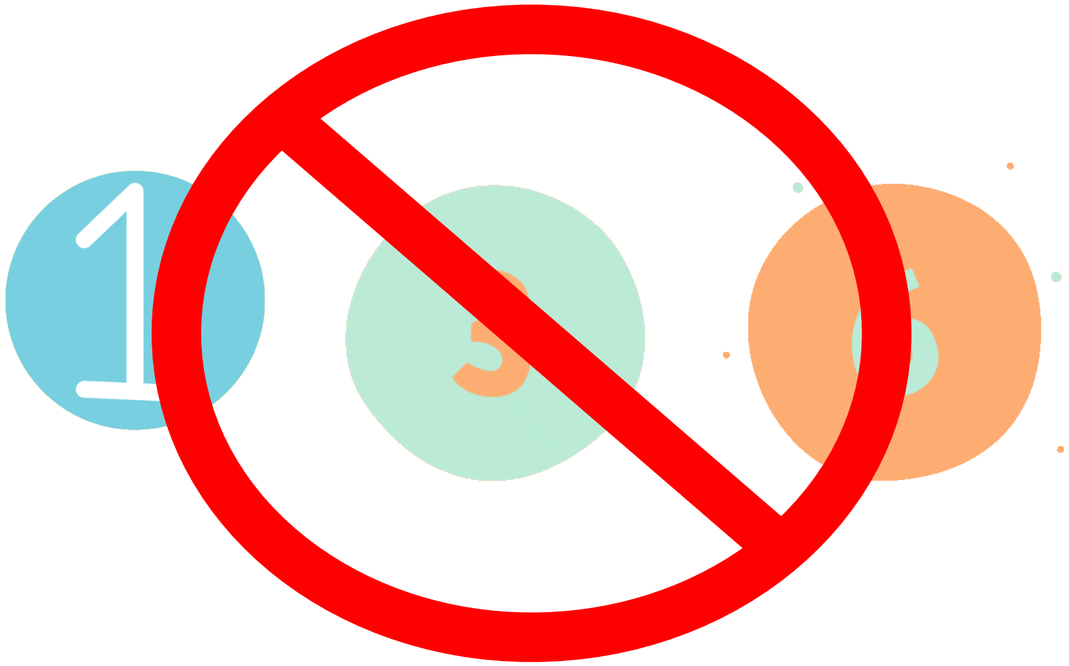
3

All infants whose initial birth-screen and any subsequent rescreening warrant additional testing should have appropriate audiologic evaluation to confirm the infant's hearing status **no later than 3 months of age.**

JCIH 2019 Position Statement

National Newborn Hearing Screening and EHDI

- In 2022, 6,272 infants identified with hearing loss
  - ~60% diagnosed after 3 months of age
  - Only 40.9% enrolled in EI services by 6 months of age



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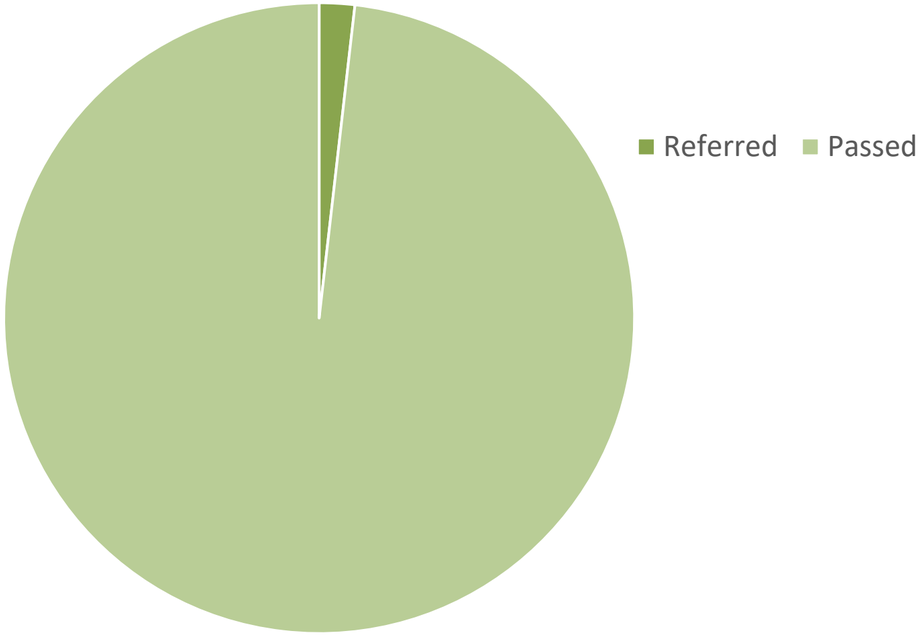
Florida Newborn Hearing Screening and EHDI

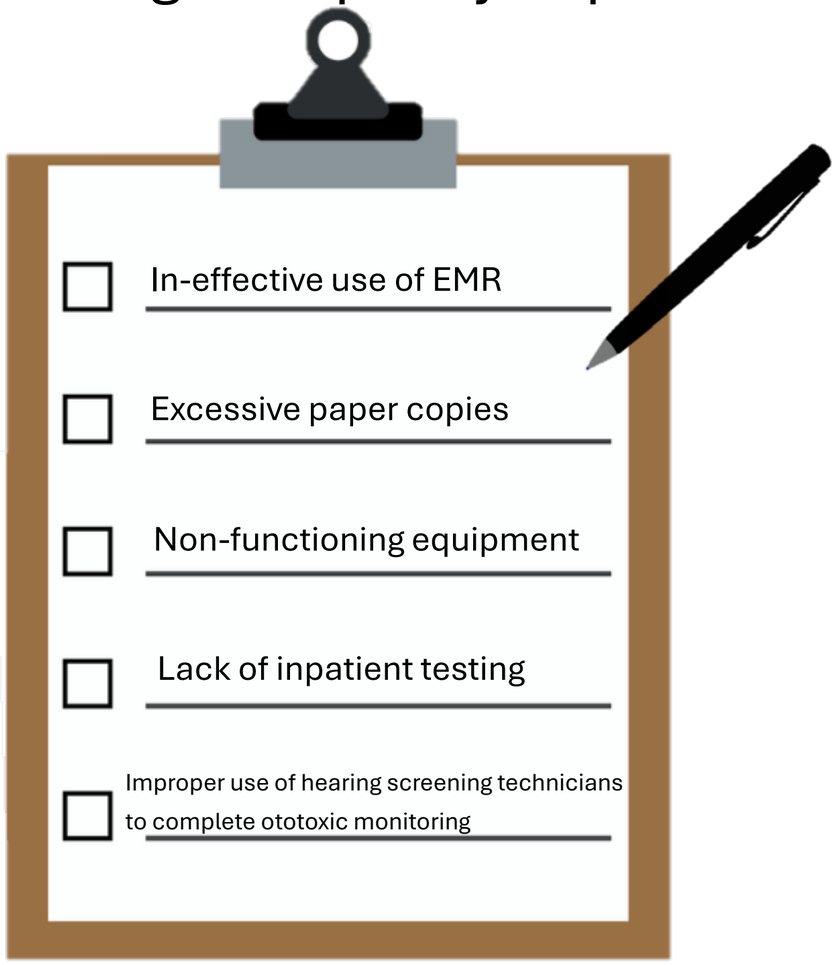
- 222,461 live births
  - –99% received NBHS
- 4,037 referred NBHS



- Prevalence of infant hearing loss in FL: 1.4 / 1000 live births

Our Timeline and Goals

- UM CHP and birthing hospital collaboration began in February of 2024
- Push for efficient screening and quality improvement



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Unplanned Issues…

- **About 1 ½ months without any newborn hearing screeners**

Current equipment issues	→	Loaner from the state
New equipment issues	→	Months of equipment trials
Supply shortage	→	New vendors
Staffing shortage	→	Created referral process for missed babies

But what about the babies?

Outpatient Testing

- **Began planning for outpatient newborn hearing screenings**
  - Utilized audiology externs and audiology assistants
  - LEND audiology externs created a testing protocol
    - AABR: utilized a loaner from the state
    - DPOAEs: utilized clinic equipment with modified protocols

- **Continued to make changes to the inpatient infrastructure**

Inpatient Efforts

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Inpatient Efforts

- **Per Florida state guidelines- not technically out of compliance**

Section 1: Chapter 383, Florida Statutes: Maternal and Infant Health Care

383.145: Newborn and infant hearing screening

(1) LEGISLATIVE INTENT:

The intent of this section is to provide a statewide comprehensive and coordinated interdisciplinary program of early hearing impairment screening, identification, and follow-up care for newborns. The goal is to screen all newborns for hearing impairment in order to alleviate the adverse effects of hearing loss on speech and language development, academic performance, and cognitive development.

(a) Each licensed hospital or other state-licensed birthing facility that provides maternity and newborn care services shall provide that all newborns are, prior to discharge, screened for the detection of hearing loss, to prevent the consequences of unidentified disorders.

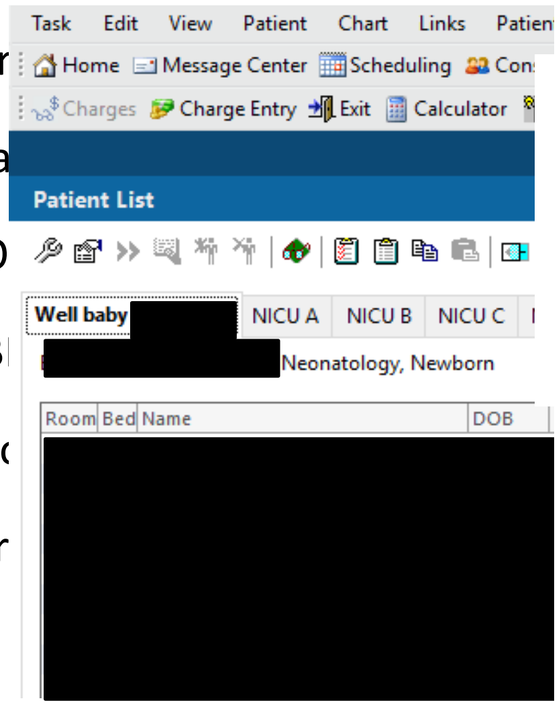
(b) Each licensed birth center that provides maternity and newborn care services shall provide that all newborns are, prior to discharge, referred to a licensed audiologist, a physician licensed under Chapter 458 or Chapter 459, Florida Statutes, or a hospital or other newborn hearing screening provider, for screening for the detection of hearing loss, to prevent the consequences of unidentified disorders. The referral for appointment shall be made within 30 days after discharge. Written documentation of the referral must be placed in the newborn's medical chart.

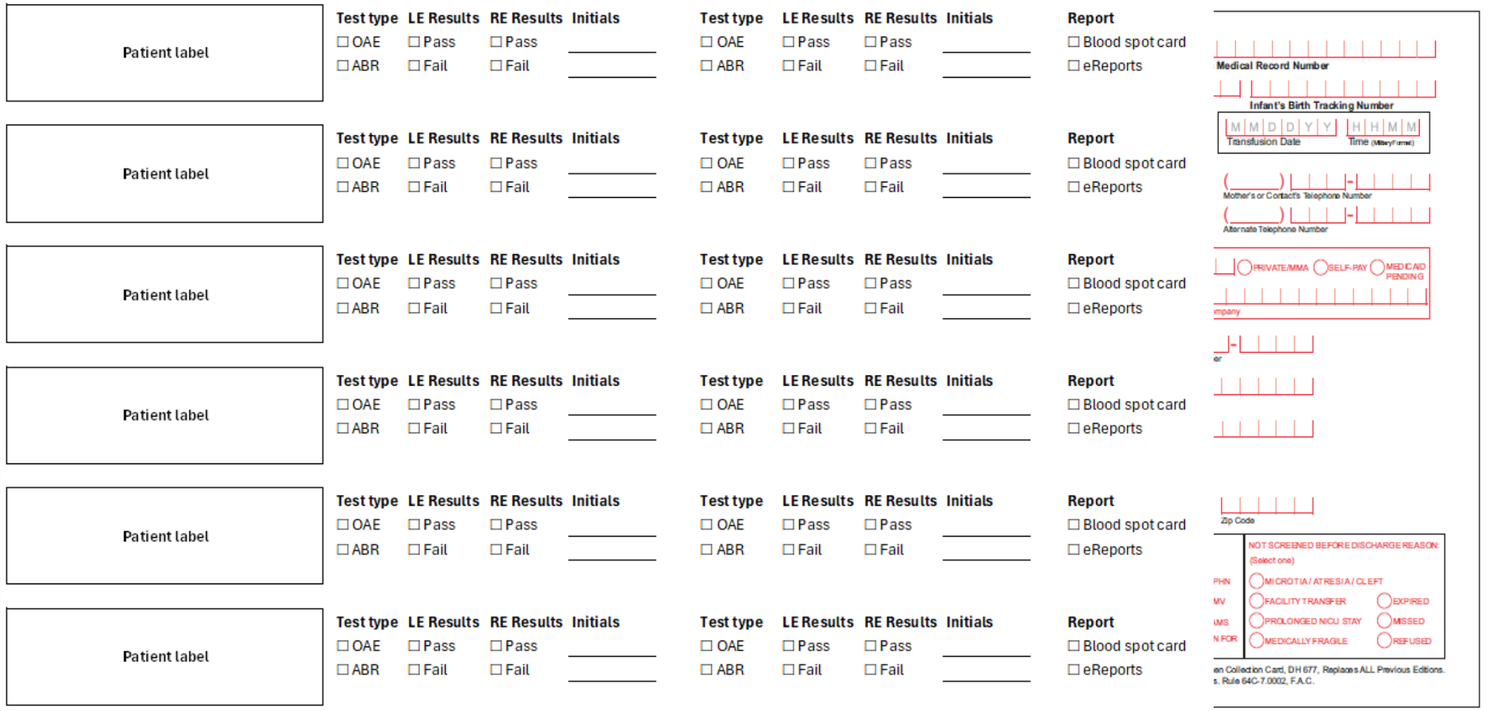
Hospitals where maternity or newborn care services are provided, shall complete the newborn hearing screening prior to discharge, unless:

- A parent objects. When a parent refuses a hearing screening:
    - Education material regarding hearing loss and potential delays in speech and oral language milestones should be provided.
    - Documentation of the refusal must be signed by the parent and included in the newborn's medical record.
    - Hearing screening refusals must be reported to the state Newborn Hearing Screening (NBHS) and Early Hearing Detection and Intervention (EHDI) Program.
- There are temporary staffing limitations. When this occurs, the screening must be completed within 30 days after discharge.

Inpatient Efforts

- ✓ Optimized use of EMR to track babies for initial/repeat testing
- ✓ 2 step scr
  - Well ba
    - DPO
    - AAB
- ✓ Use of blo
- ✓ Patient tr





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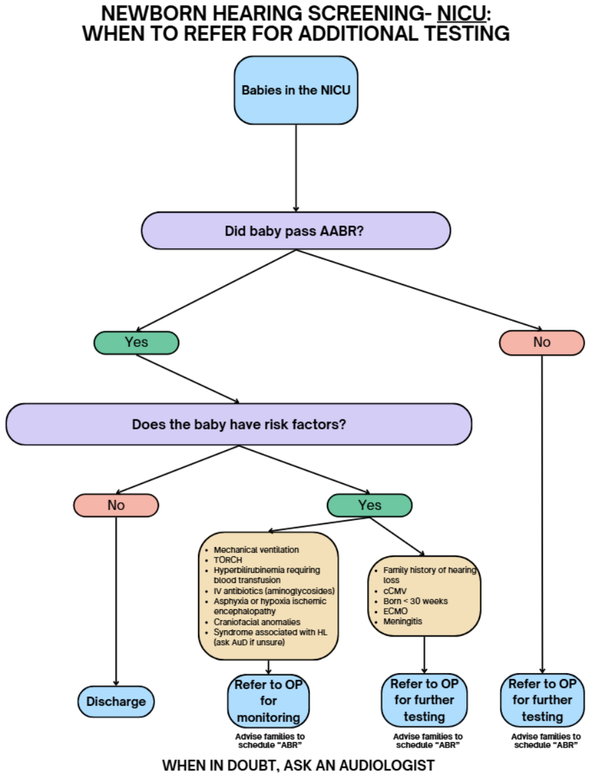
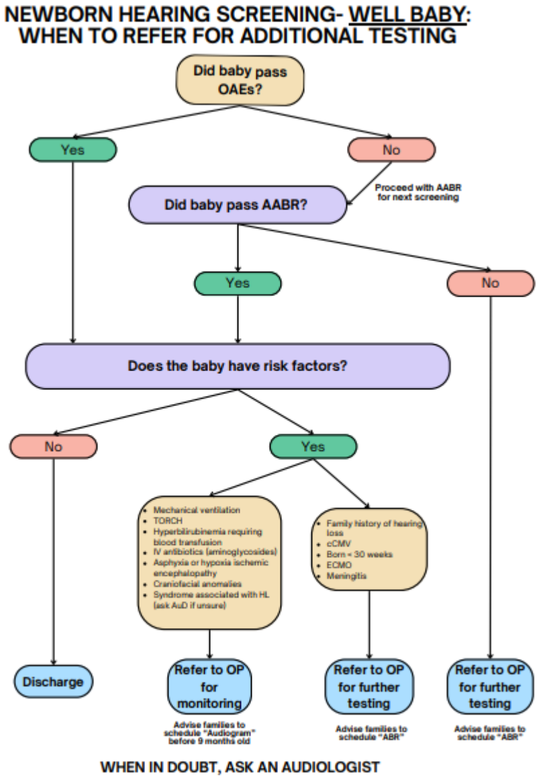
Inpatient Efforts

- ✓Inpatient ototoxic monitoring
- ✓ Improved inpatient training process
- ✓ Risk factor referral system





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Motivation for Improvement

- Decrease loss to follow up
- Decrease unnecessary referrals
- State compliance
- Psychosocial impact due to late/missed IDs

Still in Progress

- Working with stakeholders to identify what needs improvement
- Training current staff on proper protocols
  - thorough training process that includes didactic training, observation, and competency checks
- State reporting
- There are many major stakeholders in this process, everyone has similar goals, but priorities may be different

Everyone Wants the Babies Screened

Birthing Hospital

Screen the babies, remain within state compliance

Families

Get discharged quickly

Screeners

Get babies to pass prior to discharge

State

Babies are screened, reported, and referred to EI

Inpatient Care Team

Ensure babies are healthy

Audiologist

Identify at risk babies

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Everyone Wants the Babies Screened

Need to Find Common Ground
Education is Key!

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Outpatient Efforts

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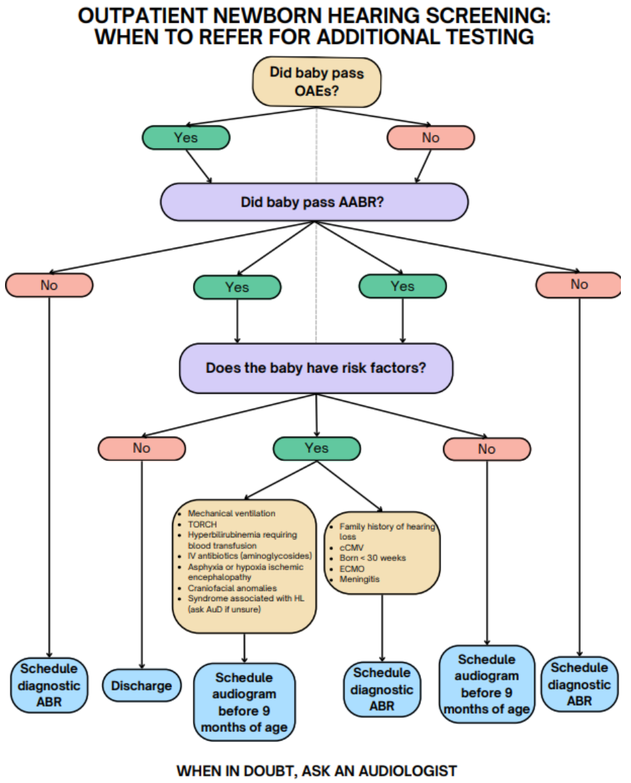
Current Protocol

- Initially began with our LEND audiology externs
- Independent schedule
- DPOAEs and AABR
- Tympanometry when necessary
- Referred for additional testing depending on risk factors



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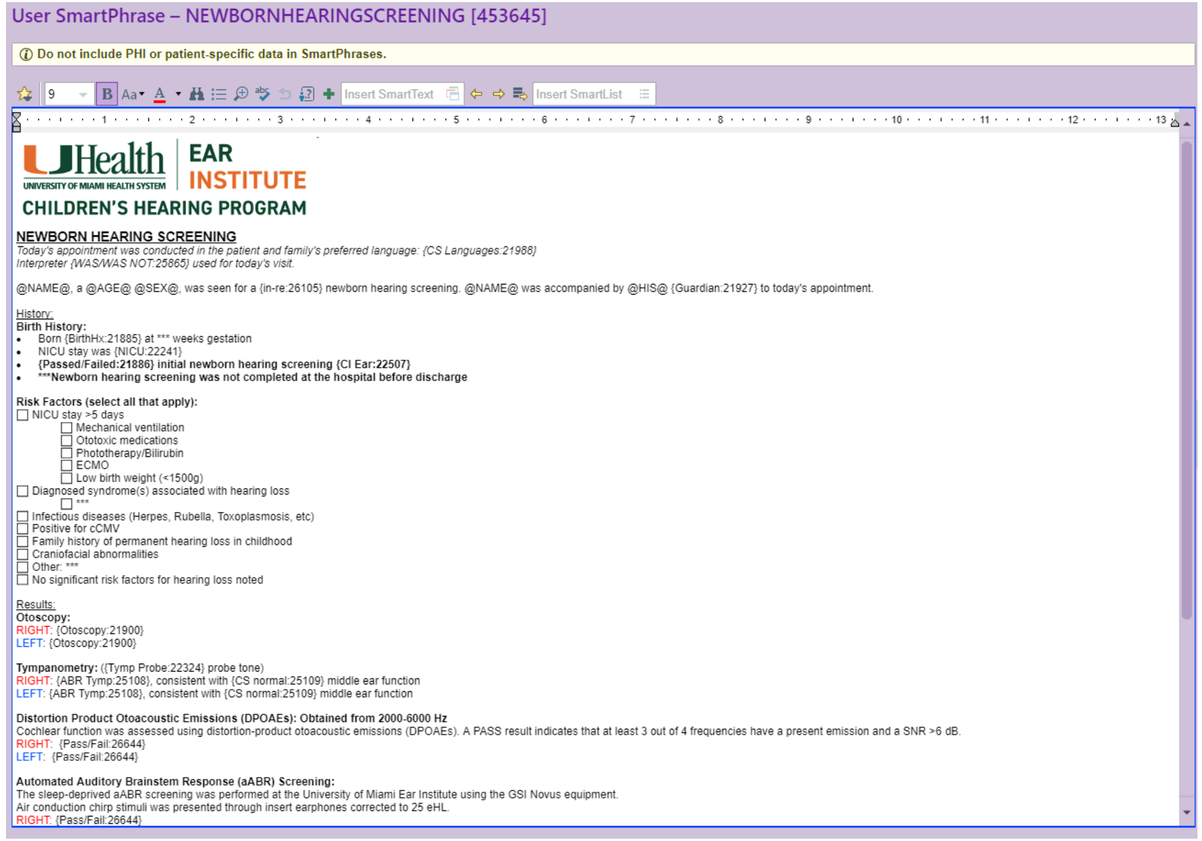
Outpatient Barriers

- Equipment
  - Loaner equipment
  - Purchased NBHS equipment
- Scheduling all the babies
- Family Navigator and Social work team get families in the door
  - Transportation, insurance concerns for follow-up testing
  - General support

Documentation

- Note in EMR
- Cover sheet
- State documentation



User SmartPhrase – NEWBORNHEARINGSCREENING [453645]

Do not include PHI or patient-specific data in SmartPhrases.

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NEWBORN HEARING SCREENING

Today's appointment was conducted in the patient and family's preferred language: {CS Languages:21988}
Interpreter {WAS/WAS NOT:25865} used for today's visit.

@NAME@, a @AGE@ @SEX@, was seen for a {in-re:26105} newborn hearing screening. @NAME@ was accompanied by @HIS@ {Guardian:21927} to today's appointment.

History:
Birth History:
- Born {BirthHx:21885} at *** weeks gestation
- NICU stay was {NICU:22241}
- **{Passed/Failed:21886} initial newborn hearing screening {CI Ear:22507}**
- ***Newborn hearing screening was not completed at the hospital before discharge**

Risk Factors (select all that apply):
☐ NICU stay >5 days
- ☐ Mechanical ventilation
- ☐ Ototoxic medications
- ☐ Phototherapy/Bilirubin
- ☐ ECMO
- ☐ Low birth weight (<1500g)

☐ Diagnosed syndrome(s) associated with hearing loss
- ☐ ***

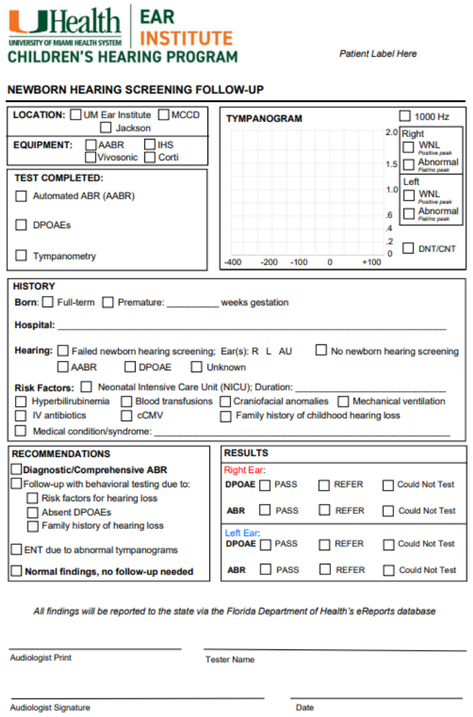
☐ Infectious diseases (Herpes, Rubella, Toxoplasmosis, etc)
☐ Positive for cCMV
☐ Family history of permanent hearing loss in childhood
☐ Craniofacial abnormalities
☐ Other: ***
☐ No significant risk factors for hearing loss noted

Results:
Otoscopy:
RIGHT: {Otoscopy:21900}
LEFT: {Otoscopy:21900}

Tympanometry: ({Tymp Probe:22324} probe tone)
RIGHT: {ABR Tymp:25108}, consistent with {CS normal:25109} middle ear function
LEFT: {ABR Tymp:25108}, consistent with {CS normal:25109} middle ear function

Distortion Product Otoacoustic Emissions (DPOAEs): Obtained from 2000-6000 Hz
Cochlear function was assessed using distortion-product otoacoustic emissions (DPOAEs). A PASS result indicates that at least 3 out of 4 frequencies have a present emission and a SNR >6 dB.
RIGHT: {Pass/Fail:26644}
LEFT: {Pass/Fail:26644}

Automated Auditory Brainstem Response (aABR) Screening:
The sleep-deprived aABR screening was performed at the University of Miami Ear Institute using the GSI Novus equipment.
Air conduction chirp stimuli was presented through insert earphones corrected to 25 eHL.
RIGHT: {Pass/Fail:26644}



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Patient Label Here

NEWBORN HEARING SCREENING FOLLOW-UP

LOCATION: ☐ UM Ear Institute ☐ MCCD ☐ Jackson
EQUIPMENT: ☐ AABR ☐ IHS ☐ Vivosonic ☐ Corti

TEST COMPLETED:
☐ Automated ABR (AABR)
☐ DPOAEs
☐ Tympanometry

TYMPANOGRAM ☐ 1000 Hz
2.0 / 1.5 / 1.0 / .6 / .4 / .2 / 0
-400 -200 -100 0 +100
Right: ☐ WNL (Positive peak) ☐ Abnormal (Flat/no peak)
Left: ☐ WNL (Positive peak) ☐ Abnormal (Flat/no peak)
☐ DNT/CNT

HISTORY
Born: ☐ Full-term ☐ Premature: _____ weeks gestation
Hospital: _____
Hearing: ☐ Failed newborn hearing screening; Ear(s): R L AU ☐ No newborn hearing screening ☐ AABR ☐ DPOAE ☐ Unknown
Risk Factors: ☐ Neonatal Intensive Care Unit (NICU); Duration: _____
☐ Hyperbilirubinemia ☐ Blood transfusions ☐ Craniofacial anomalies ☐ Mechanical ventilation ☐ IV antibiotics ☐ cCMV ☐ Family history of childhood hearing loss
☐ Medical condition/syndrome: _____

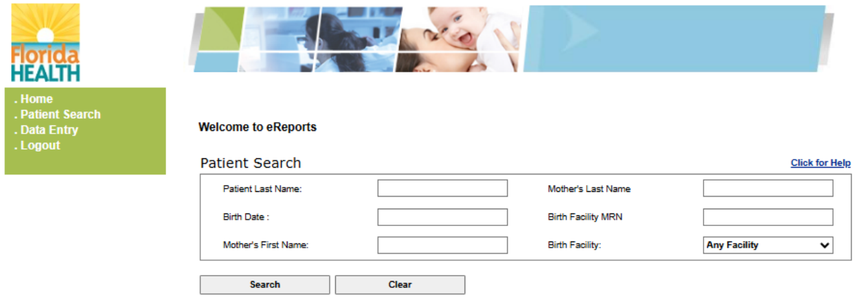
RECOMMENDATIONS
☐ **Diagnostic/Comprehensive ABR**
☐ Follow-up with behavioral testing due to:
- ☐ Risk factors for hearing loss
- ☐ Absent DPOAEs
- ☐ Family history of hearing loss

☐ ENT due to abnormal tympanograms
☐ **Normal findings, no follow-up needed**

RESULTS
Right Ear:
DPOAE ☐ PASS ☐ REFER ☐ Could Not Test
ABR ☐ PASS ☐ REFER ☐ Could Not Test
Left Ear:
DPOAE ☐ PASS ☐ REFER ☐ Could Not Test
ABR ☐ PASS ☐ REFER ☐ Could Not Test

All findings will be reported to the state via the Florida Department of Health's eReports database

Audiologist Print _____ Tester Name _____
Audiologist Signature _____ Date _____



Florida HEALTH

. Home
. Patient Search
. Data Entry
. Logout

Welcome to eReports

Patient Search — Click for Help

Patient Last Name:		Mother's Last Name	
Birth Date :		Birth Facility MRN	
Mother's First Name:		Birth Facility:	Any Facility

Search Clear

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Training Endeavors

- Transitioned to include audiology assistants
  - Have trained 7 screeners total
- Provides screeners with a sense of independence
- Career advancing opportunities

Welcome to Newborn Hearing Screening Bootcamp!

Created and presented by Dr. Samantha Espinal

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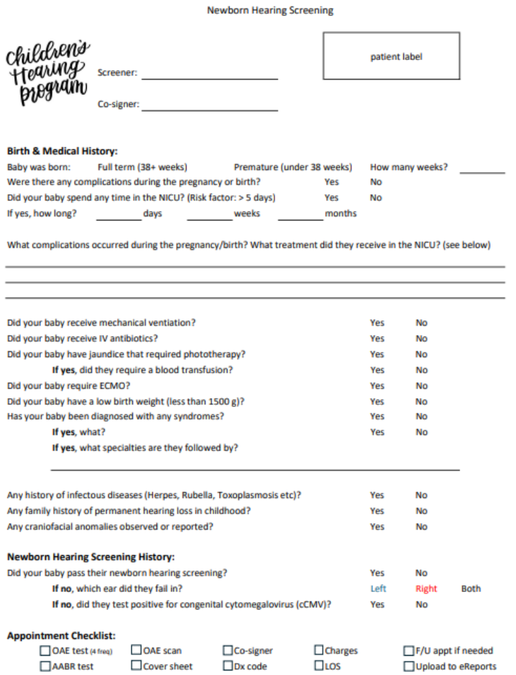


Newborn Hearing Screening

Children's Hearing Program

Screener: _____

Co-signer: _____

patient label

Birth & Medical History:

Baby was born: Full term (38+ weeks) Premature (under 38 weeks) How many weeks? _____

Were there any complications during the pregnancy or birth? Yes No

Did your baby spend any time in the NICU? (Risk factor: > 5 days) Yes No

If yes, how long? _____ days _____ weeks _____ months

What complications occurred during the pregnancy/birth? What treatment did they receive in the NICU? (see below)

Did your baby receive mechanical ventiation? Yes No

Did your baby receive IV antibiotics? Yes No

Did your baby have jaundice that required phototherapy? Yes No

If yes, did they require a blood transfusion? Yes No

Did your baby require ECMO? Yes No

Did your baby have a low birth weight (less than 1500 g)? Yes No

Has your baby been diagnosed with any syndromes? Yes No

If yes, what? Yes No

If yes, what specialties are they followed by?

Any history of infectous diseases (Herpes, Rubella, Toxoplasmosis etc)? Yes No

Any family history of permanent hearing loss in childhood? Yes No

Any craniofacial anomalies observed or reported? Yes No

Newborn Hearing Screening History:

Did your baby pass their newborn hearing screening? Yes No

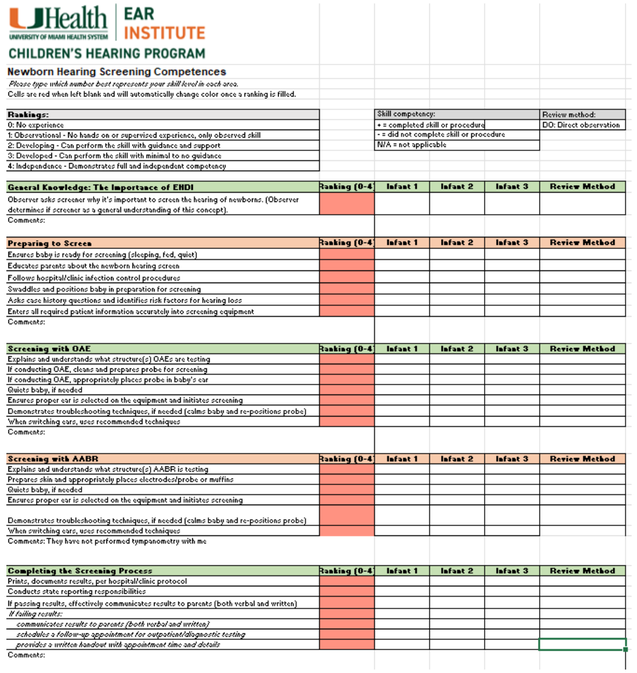
If no, which ear did they fail in? Left Right Both

If no, did they test positive for congenital cytomegalovirus (cCMV)? Yes No

Appointment Checklist:

☐ OAE test (4 freq) ☐ OAE scan ☐ Co-signer ☐ Charges ☐ F/U appt if needed

☐ AABR test ☐ Cover sheet ☐ Dx code ☐ LOS ☐ Upload to eReports



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Newborn Hearing Screening Competences

Please type in/circle number that represents your skill level in each area.
Cells are red when left blank and will automatically change color once a ranking is filled.

Rankings:	Skill competency:	Review method:
0: No experience	+ = completed skill or procedure	DO: Direct observation
1: Observational - No hands on or supervised experience, only observed skill	- = did not complete skill or procedure	
2: Developing - Can perform the skill with guidance and support	N/A = not applicable	
3: Developed - Can perform the skill with minimal to no guidance		
4: Independence - Demonstrates full and independent competency		

General Knowledge: The Importance of EHDI	Ranking (0-4	Infant 1	Infant 2	Infant 3	Review Method
Observer asks screener why it's important to screen the hearing of newborns. (Observer determines if screener has a general understanding of this concept).					
Comments:					

Preparing to Screen	Ranking (0-4	Infant 1	Infant 2	Infant 3	Review Method
Ensures baby is ready for screening (sleeping, fed, quiet)					
Educates parents about the newborn hearing screen					
Follows hospital/clinic infection control procedures					
Swaddles and positions baby in preparation for screening					
Asks case history questions and identifies risk factors for hearing loss					
Enters all required patient information accurately into screening equipment					
Comments:					

Screening with OAE	Ranking (0-4	Infant 1	Infant 2	Infant 3	Review Method
Explains and understands what structure(s) OAEs are testing					
If conducting OAE, cleans and prepares probe for screening					
If conducting OAE, appropriately places probe in baby's ear					
Quiets baby, if needed					
Ensures proper ear is selected on the equipment and initiates screening					
Demonstrates troubleshooting techniques, if needed (calms baby and re-positions probe)					
When switching ears, uses recommended techniques					
Comments:					

Screening with AABR	Ranking (0-4	Infant 1	Infant 2	Infant 3	Review Method
Explains and understands what structure(s) AABR is testing					
Prepares skin and appropriately places electrodes/probe or muffins					
Quiets baby, if needed					
Ensures proper ear is selected on the equipment and initiates screening					
Demonstrates troubleshooting techniques, if needed (calms baby and re-positions probe)					
When switching ears, uses recommended techniques					
Comments: They have not performed tympanometry with me					

Completing the Screening Process	Ranking (0-4	Infant 1	Infant 2	Infant 3	Review Method
Prints, documents results, per hospital/clinic protocol					
Conducts state reporting responsibilities					
If passing results, effectively communicates results to parents (both verbal and written)					
If failing results:					
communicates results to parents (both verbal and written)					
schedules a follow-up appointment for outpatient/diagnostic testing					
provides a written handout with appointment time and details					
Comments:					

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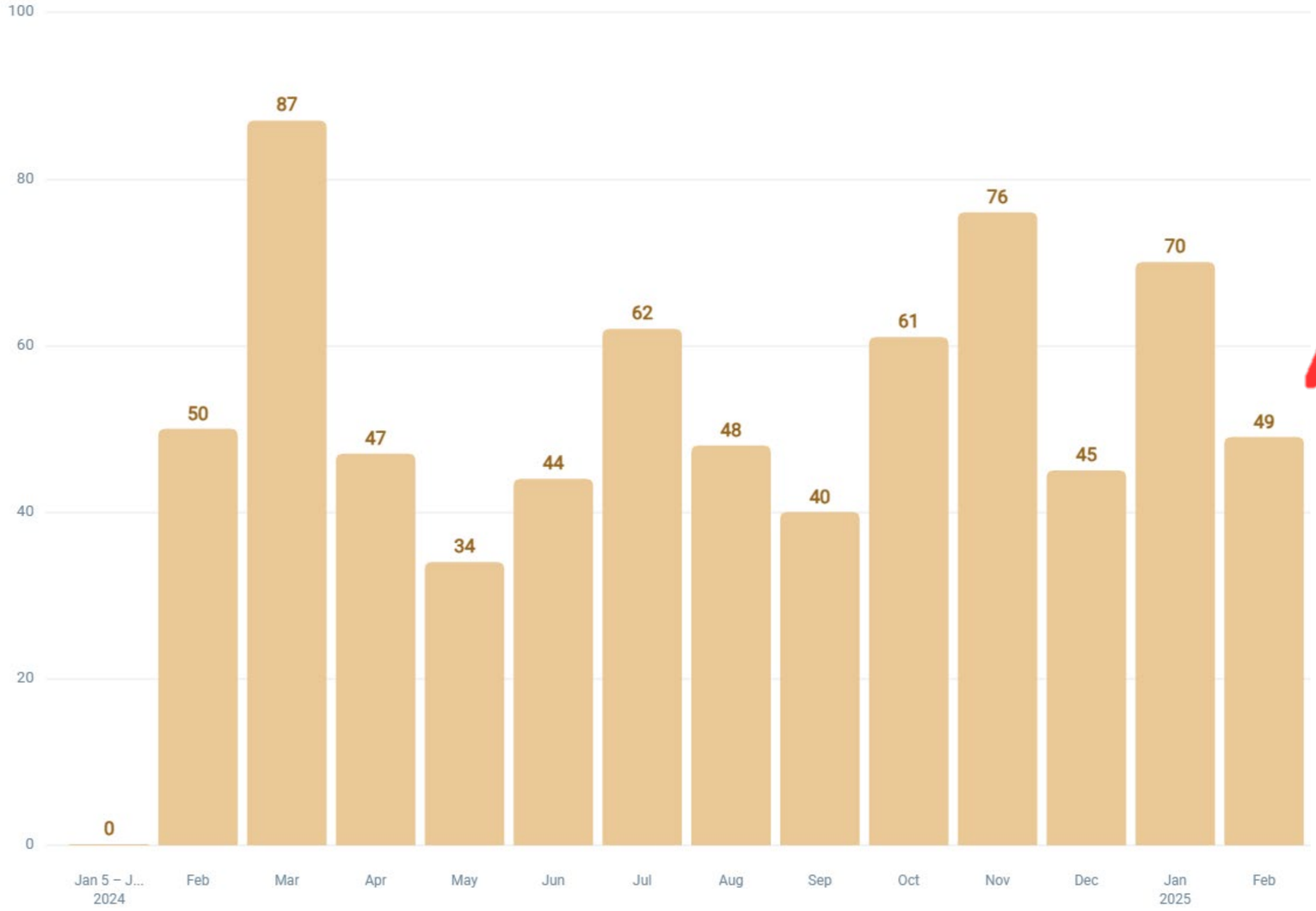
Outpatient- NBHS Follow-Up Appointments



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Outpatient Clinic Prior to NBHS

- Tertiary referral center
  - We cannot control how soon kids come through our doors
- Previous model, we may see children with hearing loss anywhere from 16 months – 2 years to start the process
- Still experiencing no-shows for initial screenings, babies will be missed
- Refine risk factor follow up protocol

Case Study 3

Screening

2 months

Diagnosis

3 months

Intervention

6 months

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Case Study 4

Screening

10 days

Diagnosis

2 weeks

Intervention

7 weeks

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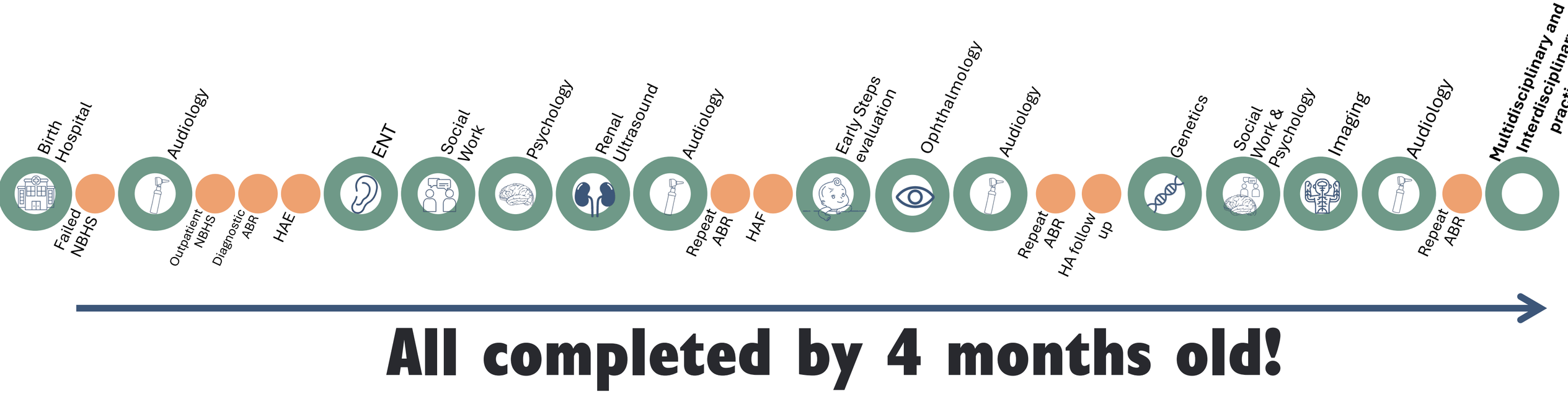
Intervention Goes Beyond Audiology



All completed by 4 months old!

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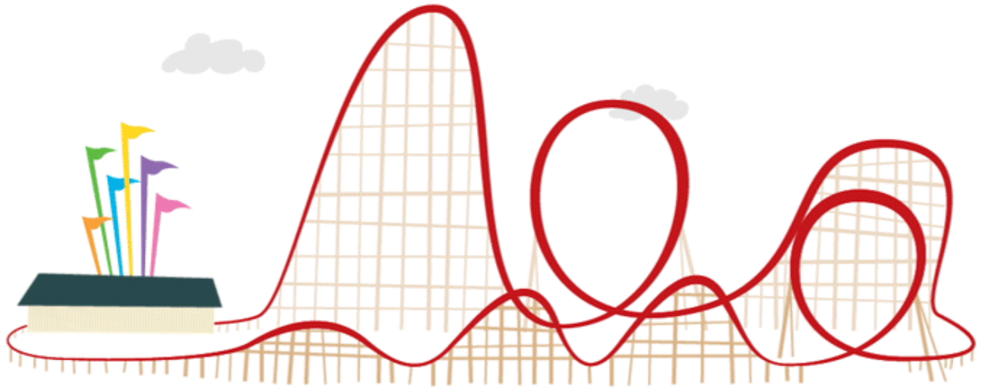
Unexpected Outcomes

- Inpatient delays
- Outpatient outcomes
- Influx of ototoxic monitoring requests
- NICU ABRs

What We Learned

- NBHS programs are not easy
- Just because something has been done a certain way for a long time, doesn't mean it shouldn't be changed
- Growth is possible with a willing team
- Things may get worse before they get better



Excited for what's to come ☺

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Thank

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Learn about CHP!

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