

Update on Newborn Hearing Screening



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- I have no relevant financial relationship with the manufacturers of any commercial products and/or provider of commercial services discussed in this CME activity.
- I do not intend to discuss an unapproved/investigative use of a commercial product/device in my presentation.

Learning Objectives

- Discuss the importance / impact of early identification of hearing loss
- Describe the status of newborn hearing screening in states and nationally
- Review universal newborn hearing screening (UNHS) techniques
- State the Primary Care Physician's role in Early Hearing Detection and Intervention (EHDI)
- Describe resources to support patient management and follow up

National Goals for Hearing Screening (1-3-6)^{1, 2}

- All infants will access hearing screening using a physiologic measure
 - no later than 1 month of age
- All infants not passing initial screening and subsequent rescreening should have confirmatory audiological and medical evaluations
 - no later than 3 months of age
- All infants with confirmed permanent hearing loss should receive early intervention as soon as possible
 - no later than 6 months of age

Prerequisites for a Population Screening Program

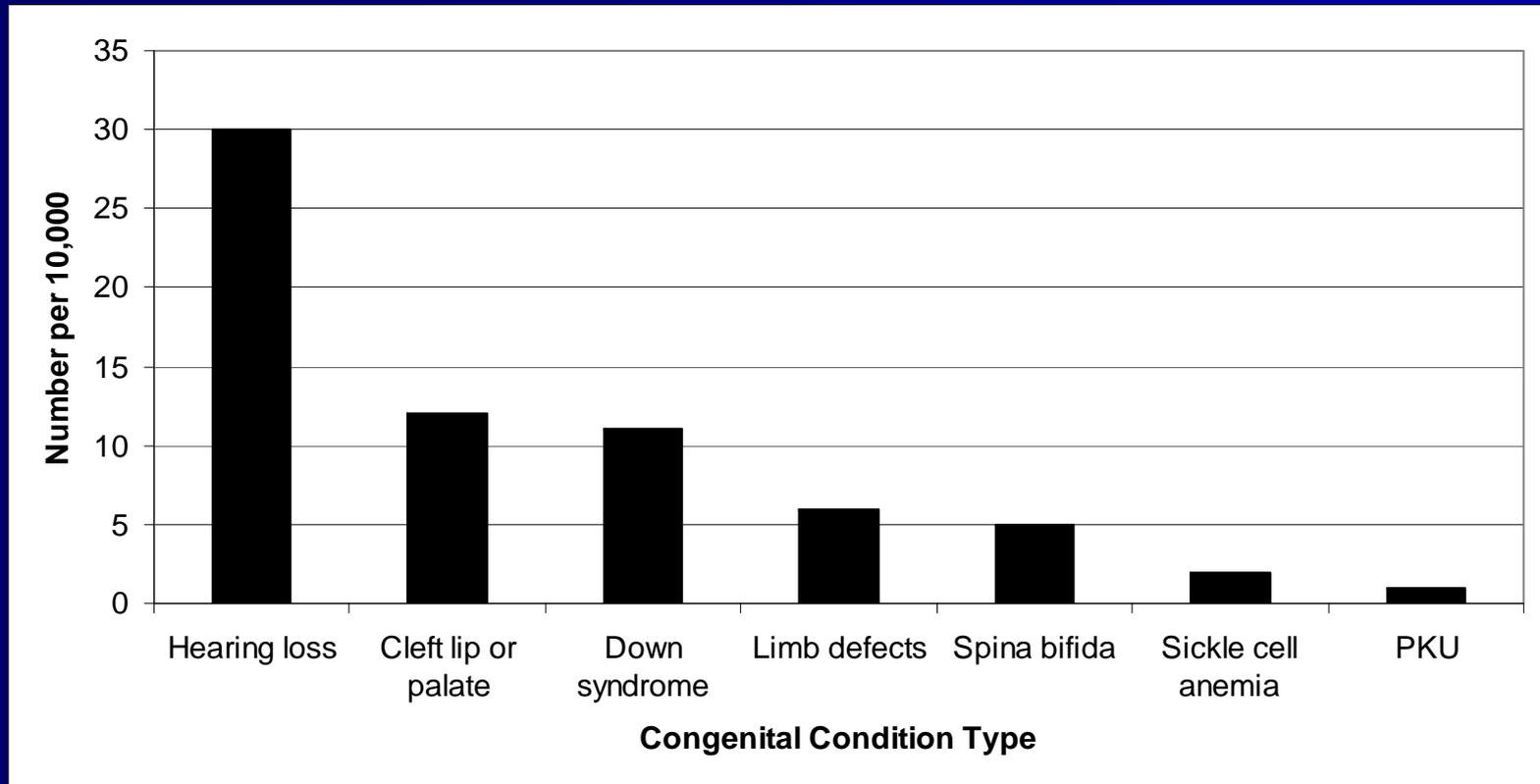
- YES** ■ Condition sufficiently frequent in screened population
- YES** ■ Condition serious or fatal without intervention
- YES** ■ Condition must be treatable or preventable
- YES** ■ Effective follow-up program possible

Why is early identification of hearing loss important?

- Hearing loss is the most common birth condition



Incidence of Congenital Conditions (Per 10,000)



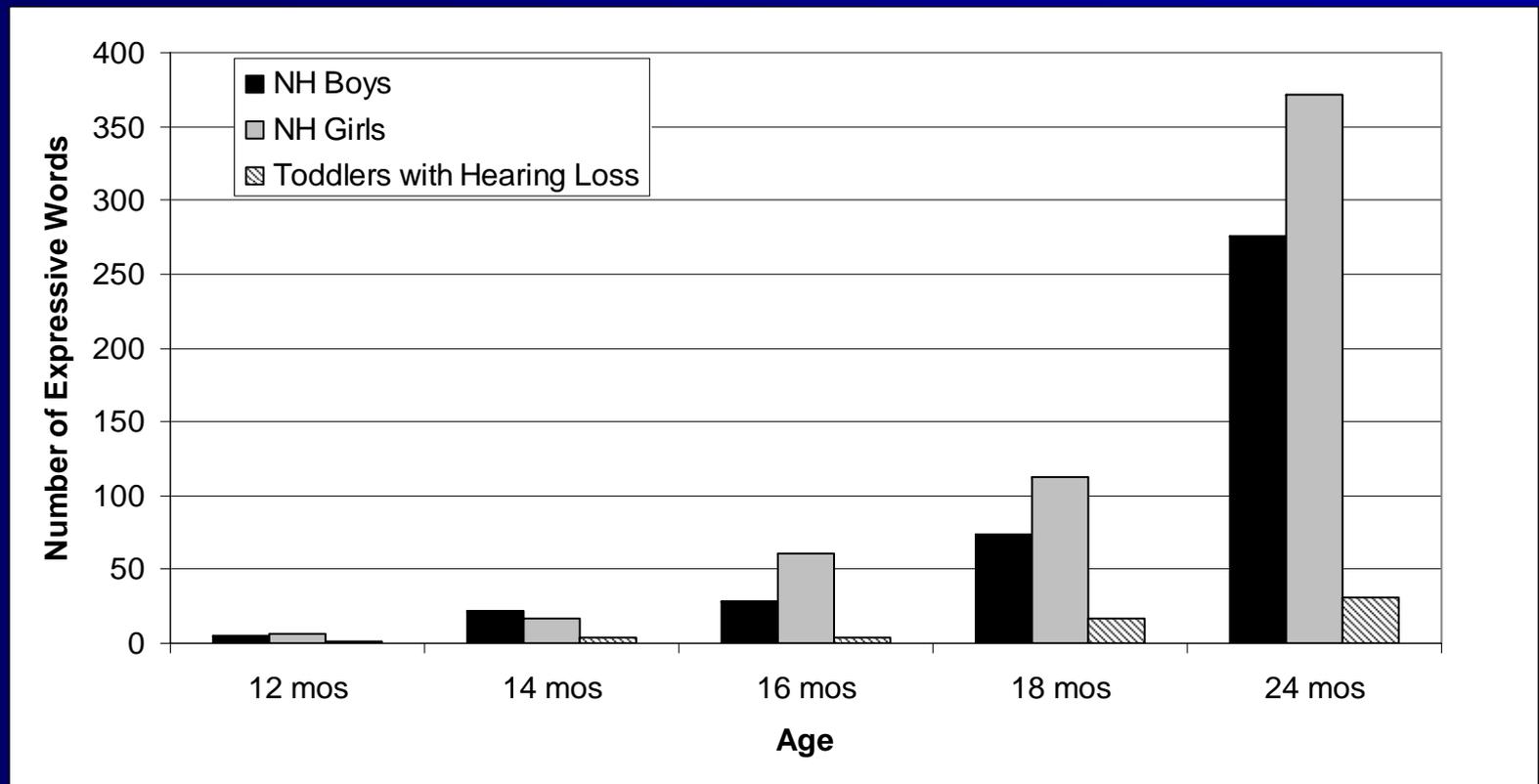
Prevalence of Hearing Loss

- Prevalence estimates vary across studies
- Estimated that 1 to 3 per 1000 infants will have permanent sensorineural hearing loss^{3, 4}
 - 1/1000 from the well baby nursery
 - 10/1000 from the NICU
- Rate increases to 6/1000 by school age⁴
 - Need for surveillance

Why is early identification of hearing loss important?

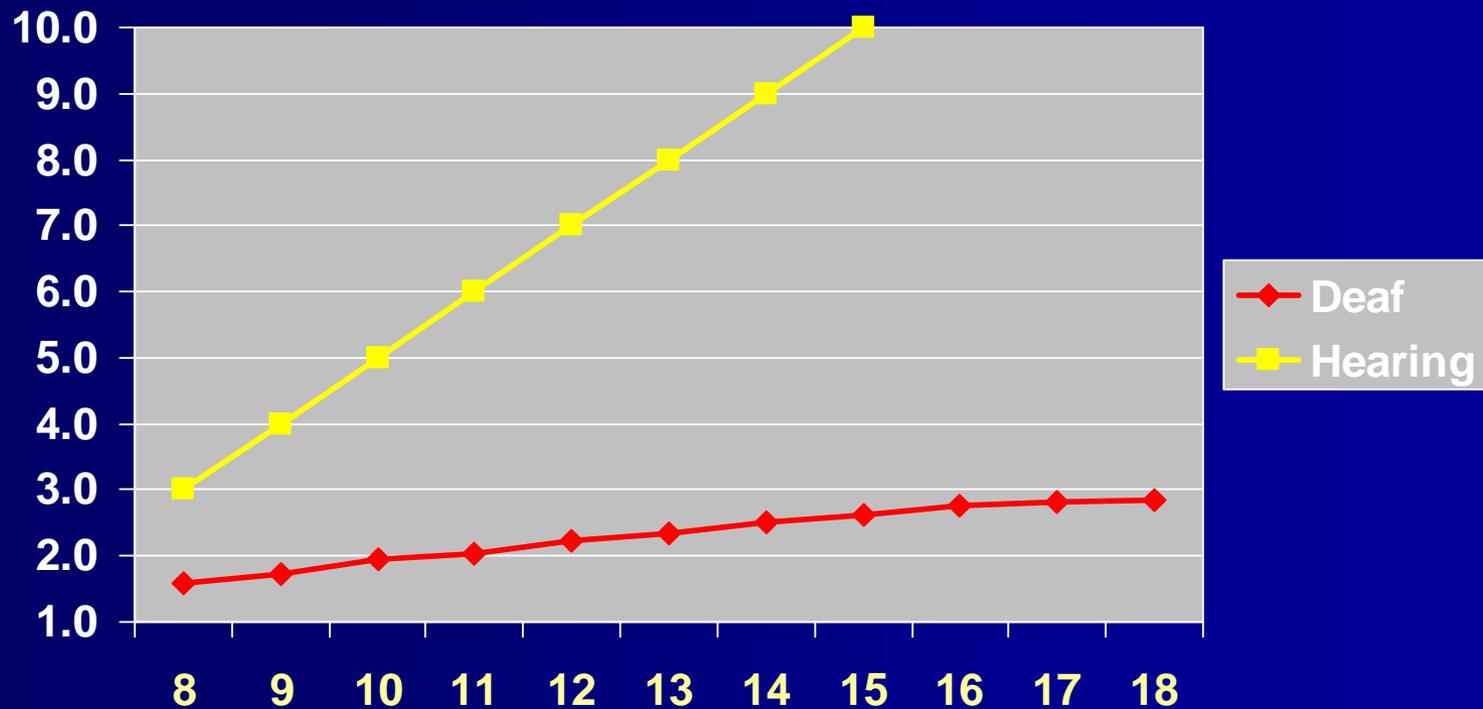
- Previous methods for detecting hearing loss have been ineffective
 - High risk screening failed to identify ~ 50% of the infants with hearing loss
 - Large retrospective cohort study^{5, 6}: mean age of diagnosis 21.6 months
 - Similar findings reported in US^{7,8,9}

Vocabulary Development in Infants^{12, 13}



Delays in babble also observed ^{14, 15}

Reading Comprehension in Children with Mild-Mod Loss ¹⁶



Schildroth, A. N., & Karchmer, M. A. (1986). Deaf children in America, San Diego: College Hill Press.

Why is early identification of hearing loss important?

- Early identification and intervention can make a difference



Effects of Age of Identification on Language Development¹⁷

- Prospective, longitudinal study of early-identified infants
- 30 children with mild-profound hearing loss (HL) compared to 96 normal hearing (NH) controls
- Children identified \leq 3 months had stronger language development at 12-16 months than those identified $>$ 3 months
- Children with HL were delayed compared to NH infants

Vocabulary at Age Five by Age of Intervention¹⁹

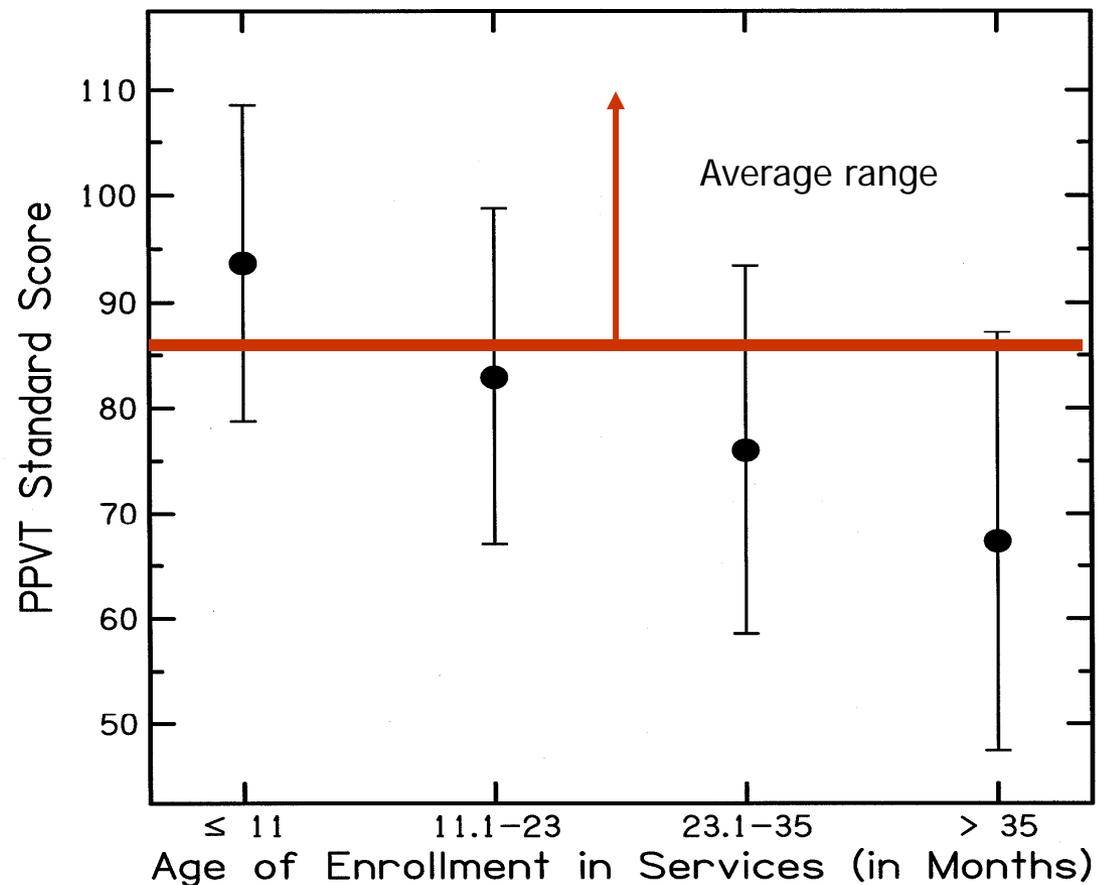
Significant Predictors:

Id Age: 8%

Family

Involvement:

37%



American Academy of Pediatrics (AAP)



- Endorsed implementation of universal newborn hearing screening in 1999
- Defined standards for:
 - Screening
 - Tracking & Follow-up
 - Identification & Intervention
 - Program Evaluation
- Encouraged AAP chapters to provide leadership in physician education and newborn screening in their states

Early Hearing Detection and Intervention (EHDI)

- Endorsed by:
 - AAP, National Institutes of Health, Maternal and Child Health, Centers for Disease Control, Joint Committee on Infant Hearing & in 2008, the USPSTF
- As of 2005, all 50 states implemented statewide EHDI programs
- As of 2006, an average of 95.7% of newborns were screened nationally

Status of Hearing Screening in Missouri



Hearing Screening Techniques

- Otoacoustic emissions (OAE)
- Auditory brainstem response (ABR)
- Two stage screening (OAE + ABR)

Otoacoustic Emissions



- Sounds are presented to the ear canal and a small microphone measures the response in the ear canal
- Average test time is 5-15 minutes/baby

Auditory Brainstem Response



- Sounds are presented and surface electrodes measure brainstem activity
- Average test time 20 min/baby

OAE + ABR

- All babies are screened using OAEs
- Those babies who fail the OAE screening receive an ABR screening prior to leaving the hospital
- Average test time/baby (25-35 min)
- Reduces refer rate; useful when follow up is likely to be difficult or costly
- Initial cost of equipment is higher than OAE or ABR screening alone, but follow-up costs are less

2007 JCIH Position on Screening²

■ NICU

- >5 days in NICU
- ABR should be included to screen for neural loss
- Rescreen BOTH ears, even if only one ear fails
- Non pass – refer to Audiologist
- Readmission – rescreen before discharge

■ Well baby nursery

- Screen with OAE or ABR
- Repeat screen when necessary before discharge
- When using 2 step protocol test order should be OAE then ABR
- Rescreen BOTH ears, even if only one ear fails

Characteristics of a good screening program

- Refer rate of 1.5-5.0% in well baby nursery and slightly lower in the NICU (resulting from 2-stage screening in the hospital)
 - 5.0% = 400 babies per 8000 births
- Ongoing training and monitoring program for personnel
- Structured plan for follow up
- Ability to track program performance (important for quality assurance and for JCAHO requirements)

What if a baby fails UNHS?

- Failure rates range from 1.5-5.0% in good screening programs
- Most babies who fail the initial screening will actually have normal hearing
 - For 10 babies that refer, 1 is expected to have permanent hearing loss

System challenges: Loss to Follow Up²³

- 8 New York hospitals,
 - 28% infants who did not pass in-hospital screening failed to return
 - Loss to follow up is as high as 50% in some states
- Return rates better for in-hospital fails than in-hospital misses

Medical Home: Strategies to Promote Follow Up

- At prenatal visit, encourage families to identify you as follow-up care location
- Inform hospital to facilitate communication of results
- Provide checkbox on newborn well child form/patient chart for hearing screening results & risk factors
- Set up tracking system for infants who do not pass hearing screening or for those infants with risk factors

Counseling Parents

- Effective communication of results to families has an influence on follow up behaviors
- Balance between reassurance and importance of follow up testing
- *"Your child may or may not have a hearing loss...but let's be sure about it. If further testing shows hearing loss, the earlier we get started helping the child, the better."*

Follow Up Testing

- Referral for follow-up testing
 - Repeat OAE and/or ABR screening
- If a hearing loss is still suspected...
 - Referral to a **pediatric** audiologist
 - Experienced in testing infants & children
 - Has appropriate equipment to test infants
 - Frequency specific ABR to estimate degree and configuration of hearing loss
 - Early testing can avoid need for sedation

Importance of Intervention in Outcomes

- Early Identification needs to be paired with early, appropriate and consistent interventions.

JCIH 2007 Follow Up Guidelines²

- EHDI systems should be family-centered
- Families should have:
 - Access to information on all treatment options
 - Counseling regarding hearing loss
- Child and family should have:
 - Immediate access to hearing technologies

Amplification

- Hearing aids can be fitted as young as 1 month of age



Roles of the Medical Home



- Understand testing results at screening and diagnostic phases & implications for follow up
- Assure follow-up screening; refer for diagnostic and medical specialty evaluations (genetics, ophthalmology, etc.)
- Support family in understanding severity & type of hearing loss
- Refer to early intervention
- Offer partnership with parents to identify and develop a plan of health and habilitative care

Medical Workup

- Complete prenatal & perinatal history
- Family Hx of onset of HL < age 30
- Physical for stigmata, ear tabs, cleft palate, cardiac, skeletal, microcephaly
- Refer to ENT – consider CT of temporal bones
- Refer to Genetics and Ophthalmology
- Other: CMV, EKG, Developmental evaluation

Goals of Early Intervention

- Home based services
- Optimally, providers have experience & training with the population and work to:
 - Establish partnerships with families
 - Promote family competence & confidence in parenting child
 - Support family in providing a language-rich environment in everyday routines
 - Support family to become informed decision makers for the child
 - Conduct ongoing assessments of outcomes
 - Adjust interventions as necessary to optimize outcomes
 - Promote family access to formal and informal supports
 - Provide culturally competent services

Resources

- Early Intervention

- Contact State EHDI Coordinator – see www.infanthearing.org

- www.nectac.org

- Parent-to-Parent

- www.handsandvoices.org

- www.beginningssvsc.com

- www.babyhearing.org

- Physician support

- www.aap.org

- www.medicalhomeinfo.org

Physician Resources



The National Center of Medical Home Initiatives for Children with Special Needs

<http://www.medicalhomeinfo.org/screening/hearing.html>

ALSO: hearing loss module on
<http://www.pedialink.org>



Department of Health and Human Services
Centers for Disease Control and Prevention

<http://www.cdc.gov/ncbddd/ehdi/>

Chapter Champion Contact

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Universal Newborn Hearing Screening

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