Early Hearing Detection and Intervention (EHDI): The Role of the Medical Home

A PRESENTATION FROM THE AMERICAN ACADEMY OF PEDIATRICS
Early identification and intervention for a child who is Deaf or Hard of Hearing (D/HH) will support the development of good communication, language, and social skills.

Delayed identification and intervention can be associated with speech, language, and communication delays that impede the ability for a child to reach his/her full potential.
Comparison of Select Congenital Conditions

Incidence per 10,000 of Congenital Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleft lip or palate</td>
<td>17</td>
</tr>
<tr>
<td>Down Syndrome</td>
<td>14</td>
</tr>
<tr>
<td>Limb defects</td>
<td>5</td>
</tr>
<tr>
<td>Sickle Cell Anemia</td>
<td>5</td>
</tr>
<tr>
<td>Spina bifida</td>
<td>4</td>
</tr>
<tr>
<td>PKU</td>
<td>1</td>
</tr>
<tr>
<td>Hearing loss</td>
<td>30</td>
</tr>
</tbody>
</table>

National EHDI Goals

- All infants will receive a hearing screening before 1 month of age
- Infants not passing the screening will receive appropriate audiologic and medical evaluation before 3 months of age
- All infants identified as D/HH will begin receiving early intervention services before 6 months of age
Developmental Emergency

An infant who does not pass his/her newborn hearing screening has a potential developmental emergency.

However...

Early identification of impact to hearing can result in positive language outcomes for children who are D/HH.

Language of Early- and Late-Identified Children With Hearing Loss

*Adjusted mean: expressive and receptive language

Early Hearing Detection & Intervention

Why early diagnosis and intervention matters

Effects of Age of Identification on Language Development

Moeller, 2000
State EHDI Programs

- Every state and territory in the United States has now established an Early Hearing Detection and Intervention (EHDI) program.

- All 50 states and the District of Columbia have a law, regulation, or documented legislative intent about hearing screening and/or hearing screening guidelines.

- EHDI program staff are responsible for creating, operating, and continuously improving a system of services which assures that the national EHDI goals are met.

State EHDI Goals

- State EHDI Laws and Regulations
  [Link](http://www.aap.org/en-us/Documents/pehdic_ehdi_%20state_requirements.pdf)

- NCHAM State Resource Page
  [Link](http://www.infanthearing.org/states_home/)
EHDI Program Components

- Universal Newborn Hearing Screening
- Medical Home
- Diagnostic Audiology
- Specialty Referrals
- Early Intervention
- Family Support
- Tracking and Data Management
National EHDI Data

Universal Newborn Hearing Screening

Percent of Infants Receiving Hearing Screening: 2004-2014

Year

Percent of Infants Screened

91.8 94.2 95.2 96.9 97 97.4 97.9 97.9 96.6 97.2 97.9


CDC, 2014
National EHDI Data

Incidence of Children who are Deaf or Hard of Hearing (D/HH)

Prevalence of infants identified with hearing loss and loss to follow-up/documentation, United States, 2007-2014

Source: CDC EHDI Hearing Screening and Follow-up Survey (2014)
2014 National CDC EHDI Data

- % Screened: 97.9% (n=3,877,851)
- Prevalence of children who are D/HH: 1.6 per 1,000 screened
- % of those with documented referral for Early Intervention: 87.9% (n=5,419)
- % Screened before 1 month of age: 96.1% (n=3,724,684)
- % Diagnosed before 3 months of age: 71.3% (n=26,002)
- % Receiving Intervention before 6 months of age: 67.9% (n=2,717)
- % Loss to Follow-up or Documentation for early intervention: 23.8% (n=1,467)

- Data Source: 2014 CDC EHDI Hearing Screening & Follow-up Survey (HSFS)
Consider inserting a slide with information about the data and laws in your state.
<table>
<thead>
<tr>
<th></th>
<th>Otoacoustic Emissions (OAE)</th>
<th>Automated Auditory Brainstem Response (AABR)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technique</strong></td>
<td>Probe with microphone placed in the ear canal. Acoustic stimuli presented.</td>
<td>Earphone placed in the ear canal, electrodes placed on baby’s scalp. Acoustic stimuli presented.</td>
</tr>
<tr>
<td><strong>Measurement</strong></td>
<td>OAEs are measured in the ear canal. With outer/middle ear and/or cochlear problems, no OAEs are detected.</td>
<td>Neural activity of cochlea, auditory nerve and brainstem is measured. Problems with peripheral auditory and/or auditory nerve and/or brainstem result in abnormal or absent measurements of auditory neural activity.</td>
</tr>
<tr>
<td><strong>Advantage</strong></td>
<td>Is easier and quicker.</td>
<td>Can indicate auditory nerve or auditory brainstem pathway dysfunction.</td>
</tr>
<tr>
<td><strong>Disadvantage</strong></td>
<td>Will NOT identify auditory nerve or auditory brainstem dysfunction.</td>
<td>May require sedation after 4 months of age.</td>
</tr>
</tbody>
</table>
Common Newborn Hearing Screenings

Automated OAE Screening Video
Common Newborn Hearing Screenings

Automated Auditory Brainstem Response (AABR) Screening Video
Newborn Hearing Screening Methods

OAE versus AABR

- The two screening methods are reliable and can be used separately or together based on:
  - Whether the baby needs intensive (AABR) or routine newborn care (OAE and/or AABR)
  - The hospital’s choice
  - State EHDI guidelines

- Both OAE and AABR may miss very mild hearing thresholds and frequency-specific hearing thresholds
- OAE will miss auditory nerve or auditory brainstem pathway dysfunction, such as auditory neuropathy spectrum disorder
- Babies who do not pass the first OAE screen can be given a second screen using either an OAE or the AABR
- Babies screened for hearing with an AABR in the hospital and resulted in an identified low threshold should not be rescreened in the office with an OAE they should be referred for diagnostic audiological evaluation.
About the Medical Home

The patient and family are the focal point of the medical home
- Includes partnerships with primary providers, specialists and support from the community

Medical home guidelines:
- Accessible
- Continuous
- Comprehensive
- Coordinated
- Compassionate
- Culturally effective
- Family-centered
The medical home plays a key role in the success of EHDI programs.

A medical home can help families understand the EHDI process.

The medical home ensures that appropriate and timely steps are taken to identify children who are D/HH and ensure they are connected with an early intervention program.

The medical home serves as the primary coordinating entity which can help significantly reduce loss to follow-up/documentation.
Early Hearing Detection and Intervention (EHDI) Guidelines for Pediatric Medical Home Providers

The Role of the Medical Home

If there is any suspicion that an infant is Deaf or Hard of Hearing (D/HH)...

- Do listen to parents concerns and refer immediately for full audiology evaluation for any parental worries about hearing or language development.
- Encourage prompt follow-up with rescreens and diagnostic evaluations
- Make sure diagnostic evaluations are done by an audiologist who has experience with infants
- Set up electronic medical record (EMR) system to include results of auditory screening
- Flag all patient charts for children that require follow-up for hearing screens
- Flag all patient charts for children that are at risk for late onset hearing loss
Infants identified as D/HH

- Address the family’s concerns
- Ensure the family is seeing an experienced pediatric audiologist
- Refer the family to appropriate specialists
- Otolaryngology, Genetics, Ophthalmology
- Help the family obtain early intervention services
- Monitor developmental milestones and ear infections
Reducing Loss to Follow-up/Documentation (LTF/D)

- LTF/D rates following diagnosis: 34.4% (CDC, 2014)
- Medical home providers play a key role in helping reduce the rate of LTF/D
- LTF/D resources available under the Loss to Follow-up heading at the AAP EHDI web page
Reducing Loss to Follow-up/Documentation (LTF/D) Resources

- Glossary of EHDI Terms
- Guidelines for Medical Home Providers
- Reducing LTF/D Provider Checklist

Conducting an In-Office Hearing Screening or Re-screening

Key Highlights

- In general, medical homes should NOT conduct the initial newborn hearing screening and re-screening should be limited to OAE screening.

- It is very important that the medical home know what screening equipment is used at local birth facilities.

- If you are conducting a re-screening, you are obligated to report the results to the state EHDI program.

Timely and appropriate diagnostic and intervention services are associated with communication/language development that matches typically developing/hearing peers.

If diagnostic audiologic assessment is indicated, complete before 3 months of age.

The diagnostic audiologic evaluation should be performed by a pediatric audiologist.

The audiologist should perform a series of screens to determine:

- If a hearing loss exists
- Type
- Degree
- Configuration of the loss
Types of Hearing Evaluation

(Screening and Diagnostic)

- Case History Documentation
- Automated Auditory Brainstem Response (AABR)
- Auditory Steady State Response (ASSR)
- Otoacoustic Emission (OAE)
- Behavioral Audiometry
- Audiological Monitoring
- Hearing aids, if needed, may be prescribed at any age, and should be fit before 6 months of age.

- Routinely monitor the effectiveness of hearing aids.

- Routine assessment by audiologist after hearing aids are fit should be completed and new ear molds or hearing aids prescribed if needed.

- Hearing should be retested on a regular basis to assess levels of hearing change and to identify any issues.
EHDI-PALS is a web-based link to information, resources, and services for children who have been identified as Deaf or Hard of Hearing (D/HH)

A national web-based directory of facilities that offer pediatric audiology services to children less than five years of age

The medical home can use EHDI-PALS to help refer families to the most appropriate diagnostic facility and services

http://www.ehdipals.org/
Otolaryngology
- Assess integrity of ear canal and middle ear
- Order appropriate diagnostic screening such as temporal bone CT, MRI, etc.
- Discuss possible surgical interventions
- Counsel family and follow for success of intervention

Genetics
- Evaluate for possible genetic causes of hearing change
- Counsel family and patient

Ophthalmology
- Assess integrity of visual system
- Evaluate for visual problems known to be associated with hearing changes
Early Intervention (EI) services are provided to children and families under the Individuals with Disability Education Act (IDEA) of 2004, Part C

- All families of infants who have been identified as D/HH regardless of degree or bilaterality/unilaterality, should be considered eligible for early intervention services.

- Children identified as D/HH who begin services before 6 months old develop language (spoken or signed) on a par with their hearing peers (Yoshinaga et al., 1998).

- Access several early intervention tools by visiting www.infanthearing.org/earlyintervention/
Physician and Family Collaboration

- The physician’s role as supporter to families to meet the 1-3-6 model is critically important.

- Families feel supported by professionals when they perceive the relationship to be a collaborative partnership built on trust and respect.

- This process takes time and involves mutual respect, honest and clear communication, understanding, cultural awareness and sensitivity and empathy.
Organizations Supporting Children who are D/HH and their Families

- Hands & Voices

- Alexander Graham Bell Association

- Family Voices

- American Society for Deaf Children
  [http://deafchildren.org/](http://deafchildren.org/)
The success of these programs depends on reporting, tracking, and follow-up!

According to the Joint Committee on Infant Hearing, information management is used to:

- Improve services to infants and their families
- Assess the quality and timeliness of screening, evaluation, and enrollment into early intervention services
- Facilitate collection of demographic data on neonatal and infant hearing status
The Role of the Medical Home in Tracking and Reporting

- Medical home providers confirm
  1. That newborn hearing screening has been conducted
  2. Which technique (OAE or AABR) was used
  3. Screening results are reported to the state EHDI program

- If conducting an in-office screen, providers **must** report the results directly to the state EHDI program

- It is important that medical homes learn their unique state reporting system

- AAP State EHDI Laws and Regulations Resource:
  
Helpful Resources from the National Center for Hearing Assessment and Management (NCHAM)

- NCHAM Interactive Web-based Newborn Hearing Screening Training Curriculum
- Educational and Training Videos
- Slideshow Presentations

*All materials can be found on the NCHAM website under the “Resources” heading:
http://www.infanthearing.org/resources_home/
Useful Web sites

- American Academy of Pediatrics (AAP) EHDI page

- Joint Committee on Infant Hearing (JCIH)
  http://www.jcih.org/

- Boys Town National Research Hospital
  http://www.boystownhospital.org/
Acknowledgements

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