Early Hearing Detection and Intervention (EHDI) for Children Who are Deaf or Hard of Hearing

Karl R. White
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www.infanthearing.org
Permanent hearing loss occurs more frequently than any other condition for which we can screen at birth.

Incidence per 10,000 of Congenital Conditions

- Hearing Loss: 30
- Cleft lip or palate: 17
- Down Syndrome: 14
- Limb defects: 5
- Sickle Cell Anemia: 5
- Spina bifida: 4
- PKU: 1
Blindness separates people from things. Deafness separates people from people.

--- Helen Keller
Visual Language

Sign Language

Total Communication

Cued Speech

Listening & Spoken Language

Spoken Language

Visual Language
Spring is my favorite season.
The sun shines bright. The flowers begin to grow. I like spring.

Audio and picture courtesy of Susan Nittrouer, Ohio State University
What enabled us to move from ....

- Earlier Identification of Hearing Loss
- Availability of Better Hearing Technology
- High quality, comprehensive Early Intervention programs that focus on teaching LANGUAGE

There  to  Here?
1988-1993
Rhode Island Hearing Assessment Project
(first large-scale evaluation of universal newborn hearing screening)

UNIVERSAL NEWBORN HEARING SCREENING USING TRANSIENT EVOKED OTOACOUSTIC EMISSIONS: RESULTS OF THE RHODE ISLAND HEARING ASSESSMENT PROJECT

Karl R. White, Ph.D., Betty R. Vohr, M.D., and Thomas R. Behrens, Ph.D.

The earlier that hearing loss can be identified and intervention begun, the better the prognosis for the child in areas ranging from language development to academic success, social interactions, and successful participation in society. Indeed, early identification of significant hearing loss is so important that the U.S. Department of Health and Human Services (HHS) recently set a goal to reduce to 12 months the average age at which significant hearing loss is identified. In spite of the acknowledged importance of identifying hearing loss as soon after birth as possible, the average age of identification in the United States is 24 to 30 months of using auditory brainstem response (ABR) to identify hearing loss among infants and toddlers. Such research certainly contributed substantially to the American Speech-Hearing Language Association's (ASHA) recommendation of ABR as the preferred method for screening the hearing of newborns. However, the expense of doing ABR testing of newborns was very likely what led to ASHA's recommendation that it be done only with infants who exhibit one of the ten risk factors identified by the Joint Committee on Infant Hearing.
The average age of diagnosis of hearing loss remains constant at about 2 ½ years of age.

All infants should be screened for hearing loss…this will be accomplished most efficiently by screening prior to discharge from the well-baby nursery.

Identification of hearing loss must be seen as imperative for all infants.
Percentage of Newborns Screened for Hearing in the United States
Age in Months at Which Permanent Hearing Loss Was Diagnosed

- Coplan (1987): 35 months
- Elssman et al. (1987): 19 months
- Gustason (1987): 30 months
- Meadow-Orlans (1987): 30 months
- Stein et al. (1990): 25 months
- Mace et al. (1991): 31 months
- Johnson et al. (1997): 3 months
- Vohr et al. (1998): 3 months
- Harrison and Roush (2003): 4 months
- Massachusetts (2004): 2 months

Effective EHDI (Early Hearing Detection and Intervention) Programs

Start

Diagnosis
- Early Intervention
- Medical Home
- Data Management
- Program Evaluation
- Family Support

Universal Newborn Hearing Screening

Success!

Good work, but I think we might need a little more detail right here
The Hearing Head Start Project

- Feasibility study from 2001-2004
- 69 programs in 3 states with 3,000+ children screened
- Identified 2 per 1,000 with permanent hearing loss and 20 per 1,000 with unidentified transient losses
- Currently in 46 of 50 states

National Sample of 2,000+ Physicians Who Care for Children

Do you ever do hearing screening for infants and young children in your office?

Yes – 30.2%

No – 69.8%
How often do you use each of the following to screen hearing in your office?

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Occasionally</th>
<th>Frequently</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. AABR</td>
<td>71.1%</td>
<td>16.2%</td>
<td>9.0%</td>
<td>3.7%</td>
</tr>
<tr>
<td>b. Response to sounds/noisemakers</td>
<td>16.7%</td>
<td>24.2%</td>
<td>36.6%</td>
<td>22.5%</td>
</tr>
<tr>
<td>c. Caregiver interview or questionnaire</td>
<td>8.7%</td>
<td>11.7%</td>
<td>35.2%</td>
<td>44.2%</td>
</tr>
<tr>
<td>d. OAE</td>
<td>34.1%</td>
<td>14.7%</td>
<td>27.9%</td>
<td>23.3%</td>
</tr>
<tr>
<td>e. Tuning Fork</td>
<td>55.1%</td>
<td>32.5%</td>
<td>8.4%</td>
<td>4.1%</td>
</tr>
<tr>
<td>f. Tympanometry</td>
<td>21.5%</td>
<td>28.0%</td>
<td>30.7%</td>
<td>19.8%</td>
</tr>
<tr>
<td>g. Other (describe)</td>
<td>25.0%</td>
<td>14.8%</td>
<td>36.4%</td>
<td>22.7%</td>
</tr>
</tbody>
</table>
Medical Evaluations
To determine etiology and identify related conditions

☐ Ophthalmologic (annually)
☐ Genetic

☐ Developmental pediatrics, neurology, cardiology, and nephrology (as needed)

Pediatric Audiologic Services
☐ Behavioral response audiometry
☐ Ongoing monitoring

American Academy of Pediatrics

Universal Newborn Hearing Screening, Diagnosis, and Intervention Guidelines for Pediatric Medical Home Providers
Assume a newborn for whom you are caring is diagnosed with a moderate to profound bilateral hearing loss. If no other indications are present, to which specialists would you refer the baby?:

<table>
<thead>
<tr>
<th>Specialist Evaluation</th>
<th>Always or Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ophthalmological evaluation</td>
<td>0.6%</td>
</tr>
<tr>
<td>Genetic evaluation</td>
<td>8.9%</td>
</tr>
<tr>
<td>Otolaryngological evaluation</td>
<td>75.6%</td>
</tr>
</tbody>
</table>

2005
Responses of 1,975 physicians in 21 states

What is your best estimate of the earliest age at which:

<table>
<thead>
<tr>
<th>Age Group</th>
<th>&lt;1 mo</th>
<th>1-3 mos</th>
<th>4-6 mos</th>
<th>7-9 mos</th>
<th>10-12 mos</th>
<th>&gt;12 mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-2012</td>
<td>51.9%</td>
<td>10.8%</td>
<td>12.4%</td>
<td>15.3%</td>
<td>0.3%</td>
<td>9.3%</td>
</tr>
<tr>
<td>2005-2012</td>
<td>20.5%</td>
<td>36.8%</td>
<td>26.1%</td>
<td>2.1%</td>
<td>9.9%</td>
<td>4.8%</td>
</tr>
<tr>
<td>2005-2012</td>
<td>38.3%</td>
<td>9.0%</td>
<td>11.3%</td>
<td>6.2%</td>
<td>18.1%</td>
<td></td>
</tr>
<tr>
<td>2005-2012</td>
<td>12.6%</td>
<td>27.7%</td>
<td>31.4%</td>
<td>7.8%</td>
<td>3.4%</td>
<td></td>
</tr>
<tr>
<td>2005-2012</td>
<td>61.6%</td>
<td>8.0%</td>
<td>13.1%</td>
<td>0.4%</td>
<td>7.0%</td>
<td></td>
</tr>
<tr>
<td>2005-2012</td>
<td>23.2%</td>
<td>34.8%</td>
<td>18.3%</td>
<td>7.8%</td>
<td>3.4%</td>
<td></td>
</tr>
</tbody>
</table>

b. A child can be definitively diagnosed as having a permanent hearing loss

c. A child can begin wearing hearing aids

d. A child with permanent hearing loss should be referred to early intervention services
The National Center for Hearing Assessment and Management (NCHAM) serves as the National Resource Center for the implementation and improvement of comprehensive and effective Early Hearing Detection and Intervention (EHDI) systems. As a multidisciplinary Center, our goal is to ensure that all infants and toddlers with hearing loss are identified as early as possible and provided with timely and appropriate audiological, educational, and medical intervention.

**EHDI News and RSS**

- Pediatric Hearing Health: Today and Tomorrow September 12, 2013
- CMV can Lead to Hearing Loss September 11, 2013
- Vanderbilt’s Telemedicine Initiative Conducts Followup Hearing Tests on Newborns in Rural Areas September 9, 2013
- Public Health Planning for Hearing Impairment—Short Course Scheduled in South Africa September 4, 2013
- How do families and healthcare providers find your state EHDI website? August 29, 2013
- Study Identifies Molecular Process Behind Form of Non Syndromic Deafness August 28, 2013
- More News...

**Disclaimer**

**EHDI Components**

- Newborn Hearing Screening
- Early Childhood Hearing Screening
- Diagnostic Audiology
- Early Intervention
- Family Support
- Medical Home
- Data Management
- Financing & Reimbursements
- Program Evaluation

**Diagnostic Audiology**

Diagnostic Audiology for Audiologists: This workshop was filmed during the Diagnostics and Amplification for Infants and Toddlers workshop on June 6th & 7th, 2012 in Meridian, Idaho, and is now available online for AAA CEUs.

**EHDI/UNHS Resources**

- Newborn Hearing Screening Training Curriculum
- Addressing Privacy Regulations
- Position Statements
- EHDI/UNHS FAQ
- Slideshow Presentations
- Educational and Training Videos
- NCHAM Materials
- EHDI Implementation in Latin America
- EHDI E-Book
- Telehealth
- Tele-Intervention Resource Guide
- EHDI Web Resource Guide

**State EHDI Information**

**EHDI Legislation**

- **Networking**
  - Facebook
  - RSS
  - Meetings
  - Events
  - Links
  - Workshops

- **EHDI-Related Videos**
  - Navigating Deafness In a Hearing World
  - Jeanne Hollabaugh: Parent Communication
  - Communicate With Your Child Using ASL
  - Rachel Coleman: One Deaf Child
  - Archive of EHDI-Related Videos

- **Diagnostic Audiology**

- **State EHDI Information**

- **EHDI Legislation**

- **Search ncham.org**