



# Newborn Hearing Screening Protocol

**Policy** All newborns and infants born in Iowa, except those born with a condition that is incompatible with life, shall be screened for hearing loss to aid in the identification of infants with permanent hearing loss.

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**Background** It has long been recognized that unidentified hearing loss at birth can adversely affect speech and language development as well as academic achievement and social-emotional development.<sup>1</sup>

National recommendations are to have an infant's hearing screened before ONE month of age, hearing loss identified by THREE months of age and early intervention services in place by SIX months of age.

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**Personnel** Every birth hospital or birth center shall designate an employee to be responsible for the newborn hearing screening program in that institution.

Newborn hearing screen shall be performed by an audiologist, audiology assistant, audiometrist, registered nurse, licensed physician, or other person for whom newborn hearing screening is within the person's scope of practice.

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**Equipment** All newborns and infants born in Iowa, except those born with a condition that is incompatible with life, shall be screened for hearing loss using at least one of the following procedures:

1. Automated auditory brainstem response (AABR), or
2. Evoked otoacoustic emissions (OAE)

Equipment shall be calibrated in accordance with manufacturer's recommendation and a log sheet will be kept documenting the dates of calibration, repair, or replacement of parts.

Disposable components of equipment shall not be reused.

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<sup>1</sup> Joint Committee on Infant Hearing. (2007). Year 2007 Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs. *American Academy of Pediatrics*. 120: 898-921. <http://pediatrics.aappublications.org/cgi/content/full/120/4/898>.



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*The state EHDI program will not recommend or endorse a particular brand of equipment; however, the following technologies are acceptable.*

## **Otoacoustic Emissions**

A miniature earphone and microphone are placed in the ear. Sounds are played and a response is measured. If the ear reacts, a response can be measured in the ear canal by the microphone. When a baby has a hearing loss, no response can be measured on the OAE test. The two types of OAE screenings are:

1. Transient Evoked Otoacoustic Emissions (TEOAE) - Sounds emitted in response to an acoustic stimulus of very short duration; usually clicks but can be tone-bursts.
  2. Distortion Product Otoacoustic Emissions (DPOAE) - Sounds emitted in response to two simultaneous tones of different frequencies.
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## **Automated auditory brainstem response (AABR)**

Sounds are played to the baby's ears after band-aid like electrodes are placed on the baby's head to detect responses. This screening measures how the hearing nerve responds to sounds and can identify babies who have a hearing loss.

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## **Screening Parameters and Pass Criteria for DPOAE**

### **DPOAE**

#### **Collection parameters**

- Stimulus type: two primary pure tones, response measured at  $2f_1-f_2$  for each
- stimulus tone pair
- Stimulus intensity: L1 65 dB SPL, L2 55 dB SPL
- Frequency ratio ( $f_2/f_1$ ): 1.22
- F2 Frequency region: 2-5 kHz

#### **Pass criteria**

- Response presence can be determined by examining response level or by examining the response level relative to the noise floor (SNR) (ASHA 2004).
  - SNR should be at least 6 dB, with a minimum response level of -5 to -8 dB SPL and an acceptably low noise floor (-4 dB SPL or less) at a minimum of three of four F2 frequencies.
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## Screening Parameters and Pass Criteria for TEOAE

### TEOAE

#### Collection parameters

- Stimulus type: click
- Click rate: 50-80 per second
- Stimulus intensity: 78-82 dB SPL
- Frequency region: 1-5 kHz

#### Pass criteria

Common clinical practice defines presence of a response as a SNR of at least 6 dB, or an overall minimum amplitude (wideband) response of 6 dB, with a reproducibility of 50% or greater.

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## Screening Parameters for AABR

### AABR

#### Stimulus Parameters

Stimulus type: 0.1 msec click

Intensity: 35 dB nHL

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## When to stop screening

Many factors influence the outcome of a hearing screen, such as:

- technology used
- skill of the screener
- state of the baby
- noise level in the room
- age at which the infant is screened
- hearing sensitivity of the baby

To reduce the refer rate at the time of discharge, babies who refer on the first screen are often screened again. While this is a viable means of reducing the false positive rate (referring babies with normal hearing), **excessive rescreening** can increase the false negative rate (passing babies with actual hearing loss).

No guidelines are currently available that address the number of times a hearing screen should be repeated on a baby before hospital discharge or at outpatient follow-up. Because birthing debris in the ear canal is the primary cause of false positive results, the preferable age of initial screening is 24 hours of age in the well-baby nursery, and at least five days of age in the NICU. Ear canal massage between screens is recommended.

The following guidelines can be used until published data are available.

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## Stop Criteria for Well Baby Nursery

Assuming that screening conditions are adequate (quiet baby, quiet room, acceptable probe fit):

### OAE screening in the well-baby

- Two screening sessions of no more than three screens per ear are recommended, for a total of six screens per ear.
- The screening sessions should be conducted several hours apart.

### AABR screening in the well-baby nursery

- No more than two screens per ear are recommended.

The screens should be conducted several hours apart.

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## Stop Criteria for NICU

Assuming that screen conditions are adequate (quiet baby with little or no muscle movement, quiet room, acceptable electrode impedance and headphone placement):

### OAE screening is not recommended in the NICU, the recommended screening equipment is AABR.

- Baby should be screened close to the time of discharge.
  - If the baby is less than five days old, follow the well-baby protocol for AABR.
  - If the baby is at least five days of age, recommended stopping criteria are one screen per ear.
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## Stopping Criteria for Outpatient Screening

Assuming that the babies are at least five days of age, and screening conditions are adequate:

### OAE's

- Three screenings per ear.
- If baby passes on the third attempt, the screen should be immediately repeated. If the pass result cannot be replicated, the result should be recorded as "refer".
- Proceed to AABR, if available.

***A baby who referred on an AABR in the NICU, should not be rescreened with OAE alone. AABR screening is required if AABR was used to screen the baby. If both screens are utilized, record both sets of results in the statewide EHDI data management system.***

- Scheduling a second outpatient OAE rescreen is not recommended.
- Proceed to a comprehensive evaluation following *Pediatric Audiologic Diagnostic Protocol* at [www.idph.state.ia.us/iaehdi/professionals.asp](http://www.idph.state.ia.us/iaehdi/professionals.asp).



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## **AABR**

- One screen per ear.
- Scheduling a second outpatient screening AABR is not recommended.

Proceed to a comprehensive evaluation following *Pediatric Audiologic Diagnostic Protocol* at [www.idph.state.ia.us/iaehdi/professionals.asp](http://www.idph.state.ia.us/iaehdi/professionals.asp)

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## **Parent Notification**

The person who completes the newborn hearing screening shall report newborn hearing screening results to the parent or guardian in written form. Although not required by law, it is also wise to discuss the results verbally in language the parents can understand.

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## **Parent Refusal**

Although parental consent is not necessary to perform newborn hearing screening, parental objection to the screening is valid. If a parent refuses the newborn hearing screen, obtain a written refusal from the parent or guardian (form available at [www.idph.state.ia.us/IAEHDI/professionals.asp](http://www.idph.state.ia.us/IAEHDI/professionals.asp), go to parent refusal form). Maintain the original copy in the infant's medical record. A copy of the refusal should be sent to the Iowa Department of Public Health within six days of the infant's birth.

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## **Required Reporting of Hearing Screen Results**

The following information shall be reported to the Iowa Department of Public Health within six days of the birth of the newborn, utilizing the department's designated reporting system.

1. The name and date of the birth of the newborn.
2. The name, address and telephone number, if available, of the mother of the newborn. If the mother is not the person designated as legally responsible for the child's care, the name address and telephone number of the guardian shall be reported.
3. The name of the primary care provider for the newborn at the birthing hospital or birth center.
4. The results of the newborn hearing screening, either 'pass', 'refer', or 'not screened', for each ear separately.
5. The results of any rescreening, either 'pass' or 'refer', and the diagnostic audiologic assessment procedures used for each ear separately.
6. The name, address and telephone number, if available, of the mother of the newborn. If the mother is not the person designated as legally responsible for the child's care, the name address and telephone number of the guardian shall be reported.
7. The name of the primary care provider for the newborn at the birthing hospital or birth center.



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8. The results of the newborn hearing screening, either 'pass', 'refer', or 'not screened', for each ear separately.
  9. The results of any rescreening, either 'pass' or 'refer', and the diagnostic audiologic assessment procedures used for each ear separately.
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### **Confidentiality**

Reports, records, and other information collected by or provided to the department relating to a child's newborn hearing screening, rescreen, and diagnostic audiologic assessment are confidential records.

Personnel of the Iowa Department of Public Health shall maintain the confidentiality of all the information and records used in its review.

No individual or organization providing information to the department in accordance with its rules shall be deemed to be or held liable for divulging confidential information.

Reference: Iowa Law – 135.131