

SELECTED HOSPITAL SECTIONS

Year 2007 Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs

Joint Committee on Infant Hearing



AMERICAN
SPEECH-LANGUAGE-
HEARING
ASSOCIATION

Reference this material as: Joint Committee on Infant Hearing. (2007). *Year 2007 position statement: Principles and guidelines for early hearing detection and intervention*. Available from www.asha.org/policy.

Index terms: infants and toddlers, screening, newborns, early intervention

DOI: 10.1044/policy.PS2007-00281

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HOSPITALS

A. Roles and Responsibilities

The success of EHDI programs depends on families working in partnership with professionals as a well-coordinated team. The roles and responsibilities of each team member should be well defined and clearly understood. Essential team members are the birth hospital, families, pediatricians or primary health care professionals (i.e., the medical home), audiologists, otolaryngologists, speech-language pathologists, educators of children who are deaf or hard of hearing, and other early intervention professionals involved in delivering EHDI services (American Speech-Language-Hearing Association, 1991, 1994). Additional services including genetics, ophthalmology, developmental pediatrics, service coordination, supportive family education, and counseling should be available (Calderon, Bargones, & Sidman, 1998).

The birth hospital is a key member of the team. The birth hospital, in collaboration with the state EHDI coordinator, should ensure that parents and primary health care professionals receive and understand the hearing screening results, that parents are provided with appropriate follow-up and resource information, and that each infant is linked to a medical home (AAP Medical Home Initiatives, 2002). The hospital ensures that hearing screening information is promptly transmitted to the medical home and appropriate data are submitted to the state EHDI coordinator.

The most important role for the family of an infant who is deaf or hard of hearing is to love, nurture, and communicate with the baby. From this foundation, families usually develop an urgent desire to understand and meet the special needs of their infant. Families gain knowledge, insight, and experience by accessing resources and through participation in scheduled early intervention appointments including audiologic, medical, habilitative, and educational sessions. This experience can be enhanced when families choose to become involved with parental support groups, individuals who are deaf or hard of hearing, and/or their children's deaf or hard-of-hearing peers. Informed family choices and desired outcomes guide all decisions for these children. A vital function of the family's role is ensuring direct access to communication in the home and the daily provision of language learning opportunities. Over time, the child benefits from the family's modeling of partnerships with professionals and advocating for their rights in all settings. The transfer of responsibilities from families to their child develops gradually and increases as their child matures, growing in independence and self-advocacy.

HOSPITALS

Inpatient Screening

B. Hearing Screening

Multidisciplinary teams of professionals, including audiologists, physicians, and nursing personnel, are needed to establish the UNHS component of EHDI programs. All team members work together to ensure that screening programs are of high quality and are successful. An audiologist should be involved in each component of the hearing screening program, particularly at the level of statewide implementation and, whenever possible, at the individual hospital level. Hospitals and agencies should also designate a physician to oversee the medical aspects of the EHDI program.

Each team of professionals responsible for the hospital-based UNHS program should review the hospital infrastructure in relationship to the screening program. Hospital-based programs should consider screening technology (i.e., OAE or automated ABR testing); validity of the specific screening device; screening protocols, including the timing of screening relative to nursery discharge; availability of qualified screening personnel; suitability of the acoustical and electrical environments; follow-up referral criteria; referral pathways for follow-up; information management; and quality control and improvement. Reporting and communication protocols must be well defined and include the content of reports to physicians and parents, documentation of results in medical records, and methods for reporting to state registries and national data sets.

Physiologic measures must be used to screen newborns and infants for hearing loss. Such measures include OAE and automated ABR testing. Both OAE and automated ABR technologies provide noninvasive recordings of physiologic activity underlying normal auditory function, both are easily performed in neonates and infants, and both have been successfully used for UNHS (Finitzo, Albright, & O'Neal, 1998; Mason & Hermann, 1998; Norton et al., 2000; Prieve et al., 2000; Vohr, Carty, Moore, & Letourneau, 1998). There are, however, important differences between the two measures. OAE measurements are obtained from the ear canal using a sensitive microphone within a probe assembly that records cochlear responses to acoustic stimuli. Thus, OAEs reflect the status of the peripheral auditory system extending to the cochlear outer hair cells. In contrast, ABR measurements are obtained from surface electrodes that record neural activity generated in the cochlea, auditory nerve, and brainstem in response to acoustic stimuli delivered via an earphone. Automated ABR measurements reflect the status of the peripheral auditory system, the eighth nerve, and the brainstem auditory pathway.

Both OAE and ABR screening technologies can be used to detect sensory (cochlear) hearing loss (Norton et al., 2000); however, both technologies may be affected by outer or middle ear dysfunction. Consequently, transient conditions of the outer and middle ear may result in a "fail" screening test result in the presence of normal cochlear and/or neural function (Doyle, Burggraaff, Fujikawa, Kim, & MacArthur, 1997). Moreover, because OAEs are generated within the cochlea, OAE technology cannot be used to detect neural (eighth nerve or auditory brainstem pathway) dysfunction. Thus, infants with neural conduction disorders or auditory neuropathy/dyssynchrony without concomitant sensory dysfunction will not be detected by OAE testing.

Some infants who pass newborn hearing screening will later demonstrate permanent hearing loss (J. L. Johnson et al., 2005). Although this loss may reflect delayed-onset hearing loss, both ABR and OAE screening technologies will miss some hearing loss (e.g., mild or isolated frequency region losses).

Interpretive criteria for pass/fail outcomes should reflect clear scientific rationale and should be evidence-based (M. D. Hyde, Sininger, & Don, 1998; M. L. Hyde, Davidson, & Alberti, 1991). Screening technologies that incorporate automated response detection are necessary to eliminate the need for individual test interpretation, to reduce the effects of screener bias or operator error on test outcome, and to ensure test consistency across infants, test conditions, and screening personnel (Eilers, Miskiel, Ozdamar, Urbano, & Widen, 1991; Herrmann, Thornton, & Joseph, 1995; McFarland, Simmons, & Jones, 1980; Ozdamar, Delgado, Eilers, & Urbano, 1994; Pool & Finitzo, 1989). When statistical probability is used to make pass/fail decisions, as is the case for OAE and automated ABR screening devices, the likelihood of obtaining a pass outcome by chance alone is increased when screening is performed repeatedly (Benjamini & Yekutieli, 2005; Hochberg & Benjamini, 1990; Zhang, Chung, & Oldenburg, 1999). This principle must be incorporated into the policies of rescreening.

There are no national standards for the calibration of OAE or ABR instrumentation. Compounding this, there is a lack of uniform performance standards. Manufacturers of hearing-screening devices do not always provide sufficient supporting evidence to validate the specific pass/fail criteria and/or automated algorithms utilized in their instruments (Gravel et al., 2005). In the absence of national standards, audiologists must obtain normative data for the instruments and protocols they use.

The JCIH recognizes that there are important issues differentiating screening performed in the well-baby nursery from that performed in the NICU. Although the goals in each nursery are the same, numerous methodologic and technological issues must be considered in program design and pass/fail criteria.

HOSPITALS

Screening Protocols in the Well-Baby Nursery

Many inpatient well-baby screening protocols provide one hearing screening and, when necessary, a repeat screening no later than the time of discharge from the hospital, using the same technology both times. Use of either technology in the well-baby nursery will detect peripheral (conductive and sensory) hearing loss of 40 dB or greater (Norton et al., 2000). When automated ABR is used as the single screening technology, neural auditory disorders can also be detected (Sininger, Abdala, & Cone-Wesson, 1997). Some programs use a combination of screening technologies (OAE testing for the initial screening, followed by automated ABR for rescreening; i.e., 2-step protocol; NIH, 1993), to decrease the fail rate at discharge and the subsequent need for outpatient follow-up (Arehart, Yoshinaga-Itano, Thomson, Gabbard, & Brown, 1998; Finitzo et al., 1998; Gravel et al., 2000; Mason & Hermann, 1998; Mehl & Thomson, 1998; Vohr et al., 1998). Using this approach, infants who do not pass an OAE screening but subsequently pass an automated ABR are considered a screening “pass.” Infants in the well-baby nursery who fail automated ABR should not be rescreened by OAE and “passed,” because such infants are presumed to be at risk of having a subsequent diagnosis of auditory neuropathy/dyssynchrony.

Hospitals - NICU

Screening Protocols in the NICU

A NICU is defined as a facility in which a neonatologist provides primary care for the infant. Newborn units are divided into categories as follows:

- Level I: basic care, well-baby nurseries
- Level II: specialty care by a neonatologist for infants at moderate risk of serious complications
- Level III: a unit that provides both specialty and subspecialty care including the provision of life support (mechanical ventilation)

A total of 120 level-II NICUs and 760 level-III NICUs have been identified in the United States by survey, and infants who have spent time in the NICU represent 10% to 15% of the newborn population (Stark & AAP, 2004).

The JCIH 2007 position statement includes neonates at risk of having neural hearing loss (auditory neuropathy/auditory dyssynchrony) in the target population to be identified in the NICU (Berg, Spitzer, Towers, Bartosiewicz, & Diamond, 2005; Shapiro, 2003; Starr, Picton, Sininger, Hood, & Berlin, 1996), because there is evidence that neural hearing loss results in adverse communication outcomes (Sininger, Abdala, & Cone-Wesson, 1997; Sininger et al., 1995). Consequently, the JCIH recommends ABR technology as the only appropriate screening technique for use in the NICU. For infants who do not pass automated ABR testing in the NICU, referral should be made directly to an audiologist for rescreening and, when indicated, comprehensive evaluation, including diagnostic ABR, rather than for general outpatient rescreening.

HOSPITALS

Conveying Test Results

Screening results should be conveyed immediately to families so they understand the outcome and the importance of follow-up when indicated. To facilitate this process for families, primary health care professionals should work with EHDI team members to ensure the following:

- Communications with parents are confidential and presented in a caring and sensitive manner, preferably face-to-face.
- Educational materials are developed and disseminated to families that provide accurate information at an appropriate reading level and in a language they are able to comprehend.
- Parents are informed in a culturally sensitive and understandable manner that their infant did not pass screening and informed about the importance of prompt follow-up. Before discharge, parents should be offered an appointment for follow-up testing.

To facilitate this process for primary care physicians, EHDI systems should ensure the following:

- Medical professionals receive the results of the screening test (pass, did not pass, or missed) as documented in the hospital medical record.

- Medical professionals receive communication directly from the hospital screening program regarding each infant in their care who did not pass or is missed and recommendations for follow-up.

HOSPITALS

Outpatient Screening

Outpatient Rescreening for Infants Who Do Not Pass the Birth Admission Screening

Many well-baby screening protocols will choose to incorporate an outpatient rescreening within 1 month of hospital discharge to minimize the number of infants referred for follow-up audiologic and medical evaluation. The outpatient rescreening should include the testing of both ears, even if only one ear failed the inpatient screening.

Outpatient screening no later than 1 month of age should also be available to infants who were discharged before receiving the birth admission screening or who were born outside a hospital or birthing center. State EHDI coordinators should be aware of some of the following situations under which infants may be lost to the UNHS system:

- Home births and other out-of-hospital births: States should develop a mechanism to systematically offer newborn hearing screening for all out-of-hospital births.
- Across state border births: States should develop written collaborative agreements among neighboring states for sharing hearing screening results and follow-up information.
- Hospital missed screenings: When infants are discharged before the hearing screening is performed, a mechanism should be in place for the hospital to contact the family and arrange for an outpatient hearing screening.
- Transfers to in-state or out-of-state hospitals: Discharge and transfer forms should contain the information of whether a hearing screening was performed and the results of any screening. The recipient hospital should complete a hearing screening if not previously performed or if there is a change in medical status or a prolonged hospitalization.
- Readmits: For readmissions in the first month of life when there are conditions associated with potential hearing loss (e.g., hyperbilirubinemia requiring exchange transfusion or culture-positive sepsis), a screening ABR should be performed before discharge.

Additional mechanisms for states to share hearing screening results and other medical information include (a) incorporating the hearing screening results in a statewide child health information system and (b) providing combined metabolic screening and hearing screening results to the primary care physician.

HOSPITALS

H. Benchmarks and Quality Indicators

The JCIH supports the concept of regular measurements of performance and recommends routine monitoring of these measures for interprogram comparison and continuous quality improvement. Performance benchmarks represent a consensus of expert opinion in the field of newborn hearing screening and intervention. The benchmarks are the minimal requirements that should be attained by high-quality EHDI programs. Frequent measures of quality permit prompt recognition and correction of any unstable component of the EHDI process (Agency for Health Care Policy and Research, 1995).

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Quality Indicators for Screening

- Percentage of all newborn infants who complete screening by 1 month of age. Recommended benchmark is >95% (age correction for preterm infants is acceptable).
- Percentage of all newborn infants who fail initial screening and fail any subsequent rescreening before comprehensive audiologic evaluation. Recommended benchmark is <4%.