Complete Summary

GUIDELINE TITLE

Joint Committee on Infant Hearing. Year 2000 position statement. Principles and guidelines for early hearing detection and intervention programs.

BIBLIOGRAPHIC SOURCE(S)

American Academy of Pediatrics. Year 2000 position statement: principles and guidelines for early hearing detection. Pediatrics 2000 Oct;106(4):798-817. [164 references]

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
IMPLEMENTATION OF THE GUIDELINE
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY

SCOPE

DISEASE/CONDITION(S)

Hearing impairment

GUIDELINE CATEGORY

Evaluation
Screening
Treatment

CLINICAL SPECIALTY

Family Practice
Neurology
Otolaryngology
Pediatrics
Speech-Language Pathology

INTENDED USERS

Allied Health Personnel
Health Plans
Hospitals
Nurses
Physician Assistants
Physicians
Speech-Language Pathologists

GUIDELINE OBJECTIVE(S)

- To endorse early detection of, and intervention for infants with hearing loss through integrated, interdisciplinary state and national systems of universal newborn hearing screening, evaluation, and family-centered intervention
- To describe the principles underlying effective early hearing detection and intervention programs
- To provide guidelines on implementing and maintaining a successful early hearing detection and intervention program

TARGET POPULATION

All newborn infants and young children

INTERVENTIONS AND PRACTICES CONSIDERED

Assessment/Evaluation

1. Universal newborn infant hearing screening prior to hospital discharge after birth.
2. Initial screening with an acceptable methodology such as otoacoustic emissions (OAE), auditory brainstem response (ABR), either alone or in combination.
3. Follow-up audiologic and medical evaluation to confirm hearing loss and identify the type of hearing loss.
4. Otologic examination for infants with evidence of hearing loss on follow-up audiologic evaluation.
5. Language evaluation, including assessment of oral, manual, visual mechanisms and cognitive abilities.
6. Long-term surveillance of high risk infants.

Treatment

1. Amplification devices (e.g., hearing aids).
2. Medical intervention (e.g., removal of cerumen, treatment of otitis media).
3. Surgical intervention (cochlear implants).

MAJOR OUTCOMES CONSIDERED

- Screening test performance characteristics (sensitivity, specificity, positive and negative predictive values)
- Proportion of infants screened
- Referral and follow-up rates

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Not stated

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not applicable

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not stated

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Summarized by the National Guideline Clearinghouse (NGC)

Principles

The Joint Committee on Infant Hearing (JCIH) endorses the development of family-centered, community-based early hearing detection and intervention systems. Early hearing detection and intervention (EHDI) systems are comprehensive, coordinated, timely, and available to all infants. The following eight principles provide the foundation for effective early hearing detection and intervention systems.

1. All infants have access to hearing screening using a physiologic measure. Newborns who receive routine care have access to hearing screening during their hospital birth admission. Newborns in alternative birthing facilities, including home births, have access to and are referred for screening before 1 month of age. All newborns or infants who require neonatal intensive care receive hearing screening before discharge from the hospital. These components constitute universal newborn hearing screening (UNHS).
2. All infants who do not pass the birth admission screen and any subsequent rescreening begin appropriate audiologic and medical evaluations to confirm the presence of hearing loss before 3 months of age.
3. All infants with confirmed permanent hearing loss receive services before 6 months of age in interdisciplinary intervention programs that recognize and build on strengths, informed choice, traditions, and cultural beliefs of the family.
4. All infants who pass newborn hearing screening but who have risk indicators for other auditory disorders and/or speech and language delay receive ongoing audiologic and medical surveillance and monitoring for communication development. Infants with indicators associated with late-onset, progressive, or fluctuating hearing loss as well as auditory neural conduction disorders and/or brainstem auditory pathway dysfunction should be monitored.
5. Infant and family rights are guaranteed through informed choice, decision-making, and consent.
6. Infant hearing screening and evaluation results are afforded the same protection as all other health care and educational information. As new standards for privacy and confidentiality are proposed, they must balance the needs of society and the rights of the infant and family, without compromising the ability of health and education to provide care (American Academy of Pediatrics, Pediatric Practice Action Group and Task Force on Medical Informatics Privacy protection of health information: patient rights and pediatrician responsibilities. Pediatrics 1999;104:973-7).
7. Information systems are used to measure and report the effectiveness of early hearing detection and intervention services. Although state registries measure and track screening, evaluation, and intervention outcomes for

infants and their families, efforts should be made to honor a family's privacy by removing identifying information wherever possible. Aggregate state and national data may also be used to measure and track the impact of early hearing detection and intervention programs on public health and education while maintaining the confidentiality of individual infant and family information.

8. Early hearing detection and intervention programs provide data to monitor quality, demonstrate compliance with legislation and regulations, determine fiscal accountability and cost effectiveness, support reimbursement for services, and mobilize and maintain community support.

Guidelines for Early Hearing Detection and Intervention Programs

Hearing screening should identify infants at risk for specifically defined hearing loss that interferes with development. On the basis of investigations of long-term, developmental consequences of hearing loss in infants, current limitations of physiologic screening techniques, availability of effective intervention, and in concert with established principles of health screening, the Joint Committee on Infant Hearing defines the targeted hearing loss for universal newborn hearing screening programs as permanent bilateral or unilateral, sensory or conductive hearing loss, averaging 30 to 40 dB or more in the frequency region important for speech recognition (approximately 500 through 4000 Hz). The Joint Committee on Infant Hearing recommends that all infants with the targeted hearing loss be identified so that appropriate intervention and monitoring may be initiated.

Depending on the screening technology selected, infants with hearing loss less than 30 dB HL or with hearing loss related to auditory neuropathy or neural conduction disorders may not be detected in a universal newborn hearing screening program. Although the Joint Committee on Infant Hearing recognizes that these disorders may result in developmental delay, limitations of some currently recommended screening technologies preclude cost-effective detection of these disorders. All infants, regardless of newborn hearing screening outcome, should receive ongoing monitoring for development of age-appropriate auditory behaviors and communication skills. Any infant who demonstrates delayed auditory and/or communication skills development should receive audiologic evaluation to rule out hearing loss.

A. Hearing Screening (Principles 1 and 8)

1. Personnel

   Teams of professionals, including audiologists, physicians (neonatologists, pediatricians, other primary care physicians, and otolaryngologists), and nursing personnel, should be involved in establishing the universal newborn hearing screening component of early hearing detection and intervention programs. Hospitals and agencies should designate a physician to oversee the medical aspects of the early hearing detection and intervention program. Audiologists should be designated as the program manager with supervisory responsibilities for the hearing screening and audiologic aspects of the early hearing detection and intervention program and should be involved in the design, implementation, and evaluation of screening programs (including those of small and rural hospitals). In addition to

audiologists, personnel who carry out the screening procedure may include nurses, speech-language pathologists, and others who are trained by the audiologist.

2. Program Protocol Development

The development of a hospital-based screening program should consider technology, screening protocols including the timing of the screening relative to nursery discharge, availability of qualified screening personnel, acoustically appropriate environments, follow-up referral criteria, information management, and quality control. (See the NGC Complete Guideline Summary field labeled â Description of Implementation Strategyâ for more details.)

3. Screening Technologies

Objective physiologic measures must be employed to detect newborns and very young infants with the targeted hearing loss. Current physiologic measures used for detecting unilateral or bilateral hearing loss of various severities include otoacoustic emissions (OAEs), either transient-evoked (TEOAE) or distortion-product (DPOAE), and/or auditory brainstem response (ABR). Both otoacoustic emission and auditory brainstem response technologies have been successfully implemented for universal newborn hearing screening. Both technologies are noninvasive recordings of physiologic activity that underlie normal auditory function and that are easily recorded in neonates. Both otoacoustic emission and auditory brainstem response measures are highly correlated with the degree of peripheral hearing sensitivity.

Otoacoustic emissions are sensitive to outer hair cell dysfunction. The technology can be used to detect sensory (i.e., inner ear) hearing loss. Otoacoustic emissions can be reliably recorded in neonates in response to stimuli in the frequency range above 1500 Hz. The otoacoustic emission is known to be sensitive to outer ear canal obstruction and middle ear effusion, and, therefore, temporary conductive dysfunction can cause a positive test result (a "refer" outcome) in the presence of normal cochlear function. Because otoacoustic emission responses are generated within the cochlea by the outer hair cells, otoacoustic emission evaluation does not detect neural (i.e., eighth nerve or auditory brainstem pathway) dysfunction. Infants with auditory neuropathy or neural conduction disorders without concomitant sensory (i.e., outer hair cell) dysfunction will not be detected by otoacoustic emissions.

The auditory brainstem response reflects activity of the cochlea, auditory nerve, and auditory brainstem pathways. When used as a threshold measure, the click-evoked auditory brainstem response is highly correlated with hearing sensitivity in the frequency range from 1000 to 8000 Hz. The auditory brainstem response is sensitive to auditory nerve and brainstem dysfunction; therefore, auditory brainstem response screening may result in a positive test (a "refer"

outcome) in the absence of peripheral (e.g., middle ear or cochlear) hearing loss. Because the auditory brainstem response is generated by auditory neural pathways, the auditory brainstem response will detect auditory neuropathy or neural conduction disorders in newborns.

Development of a program includes the establishment of the interpretive criteria for pass and refer. Interpretive criteria should be founded on a clear scientific rationale. Such rationale may be based in statistics and signal detection theory or heuristic and empirically derived. Test performance efficiency, including sensitivity, specificity, and the positive and negative predictive values, should be evidenced-based. Screening technologies that incorporate automated response detection are preferred over those that require operator interpretation and decision-making. Automated algorithms eliminate the need for individual test interpretation, reduce the effects of screener bias and errors on test outcome, and ensure test consistency across all infants, test conditions, and screening personnel.

Programs that use trained and supervised nonprofessional staff must use technologies that provide automated pass-refer criteria. Before incorporating automated response detection algorithms, however, the screening program must ensure that the algorithms have been validated by rigorous scientific methods and that those results have been reported in peer-reviewed publications.

4. Screening Protocols

A variety of hospital-based universal newborn hearing screening protocols have been successfully implemented that permit all newborns access to hearing screening during their birth admission. Most infants pass their initial screening test. Many inpatient-screening protocols provide one or more repeat screens, using the same or a different technology, if the newborn does not pass the initial birth screen. For example, hospitals may screen with otoacoustic emissions technology or auditory brainstem response technology and retest infants who "refer" with the same or the other technology.

Some screening protocols incorporate an outpatient rescreening of infants who do not pass the birth admission screening within 1 month of hospital discharge. The mechanism of rescreening an infant minimizes the number of false-positive referrals for follow-up audiologic and medical evaluation. Outpatient screening by 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.

B. Recommended universal newborn hearing screening benchmarks include the following:
   1. Within 6 months of program initiation, hospitals or birthing centers screen a minimum of 95% of infants during their birth admission or before 1 month of age. Programs can achieve and maintain this outcome despite birth admissions of 24 or fewer hours.

2. The referral rate for audiologic and medical evaluation following the screening process (in-hospital during birth admission or during both birth admission and outpatient follow-up screening) should be 4% or less within 1 year of program initiation.
3. The agency within the early hearing detection and intervention program with defined responsibility for follow-up (often a state department of health) documents efforts to obtain follow-up on a minimum of 95% of infants who do not pass the hearing screening. Ideally, a program should achieve a return-for-follow-up of 70% of infants or more. Successful follow-up is influenced by such factors as lack of adequate tracking information, changes in the names or addresses of mother and/or infant, absence of a designated medical home for the infant, and lack of health insurance that covers follow-up services.

C. Confirmation of Hearing Loss in Infants Referred From Universal Newborn Hearing Screening (Principles 2 and 8)

Infants who meet the defined criteria for referral should receive follow-up audiologic and medical evaluations before 3 months of age. The infant should be referred for comprehensive audiologic assessment and specialty medical evaluations to confirm the presence of hearing loss and to determine type, nature, options for treatment, and (whenever possible) etiology of the hearing loss. After a hearing loss is confirmed, coordination of services should be expedited by the infant's medical home and Individuals with Disabilities Education Act (IDEA) Part C coordinating agencies. Part C agencies are responsible for child-find and interventions for children with disabilities and the related professionals with expertise in hearing loss evaluation and treatment. The infant's primary care physician, with guidance or coordination from state and local agencies, should address parental concerns and mobilize systems on behalf of the infant and family. Professionals in health care and education must interface to provide families with needed services for the infant with hearing loss.

1. Audiologic Evaluation

Audiologists providing the initial audiologic test battery to confirm the existence of a hearing loss in infants must include physiologic measures and developmentally appropriate behavioral techniques. Adequate confirmation of an infant's hearing status cannot be obtained from a single test measure. Rather, a test battery is required to cross-check results of both behavioral and physiologic measures. The purpose of the audiologic test battery is to assess the integrity of the auditory system, to estimate hearing sensitivity, and to identify all intervention options. Regardless of the infant's age, ear-specific estimates of type, degree, and configuration of hearing loss should be obtained.

For infants birth to 6 months of age, the test battery should begin with a child and family history and must include an electrophysiologic measure of threshold such as auditory brainstem response or other appropriate electrophysiologic tests using frequency-specific stimuli. The assessment of the young infant must include otoacoustic

emissions, a measure of middle ear function, acoustic reflex thresholds, observation of the infant's behavioral response to sound, and parental report of emerging communication and auditory behaviors. Appropriate measures of middle ear function for this age group include reflectance, tympanometry using appropriate frequency probe stimuli, bone conduction auditory brainstem response, and/or pneumatic otoscopy.

The confirmatory audiologic test battery for infants and toddlers age 6 through 36 months includes a child and family history, behavioral response audiometry (either visual reinforcement or conditioned play audiometry depending on the child's developmental age), otoacoustic emissions, acoustic emittance measures (including acoustic reflex thresholds), speech detection and recognition measures, parental report of auditory and visual behaviors, and a screening of the infant's communication milestones. Physiologic tests, such as auditory brainstem response, should be performed at least during the initial evaluation to confirm type, degree, and configuration of hearing loss.

In accordance with the U.S. Individuals with Disabilities Education Act, referral to a public agency must take place within 2 working days after the infant has been identified as needing evaluation. Once the public agency receives the referral, its role is to appoint a service coordinator, identify an audiologist to complete the audiologic evaluation, and identify other qualified personnel to determine the child's level of functioning. An individualized family service plan must be held within 45 days of receiving the referral.

2. Medical Evaluation

Every infant with confirmed hearing loss and/or middle ear dysfunction should be referred for otologic and other medical evaluation. The purpose of these evaluations is to determine the etiology of hearing loss, to identify related physical conditions, and to provide recommendations for medical treatment as well as referral for other services. Essential components of the medical evaluation include clinical history, family history, and physical examination as well as indicated laboratory and radiologic studies. When indicated and with family consent, the otolaryngologist may consult with a geneticist for chromosome analysis and for evaluation of specific syndromes related to hearing loss.

a. Pediatrician or primary care physician: The infant's pediatrician or other primary care physician is responsible for monitoring the general health and well-being of the infant. In addition, the primary care physician in partnership with the family and other health care professionals, assures that audiologic assessment is conducted on infants who do not pass screening and initiates referrals for medical specialty evaluations necessary to determine the etiology of the hearing loss. Middle-ear status should be monitored because the presence of middle-ear effusion can further compromise hearing. The pediatrician or

primary care physician should review the infant's history for presence of risk indicators that require monitoring for delayed onset and/or progressive hearing loss and should insure periodic audiologic evaluation for children at risk. Also, because 30% to 40% of children with confirmed hearing loss will demonstrate developmental delays or other disabilities, the primary care physician should monitor developmental milestones and initiate referrals related to suspected disabilities.

b. Otolaryngologist: The otolaryngologist's evaluation should consist of a comprehensive clinical history; family history; physical assessment, and laboratory tests involving the ears, head, face, neck, and such other systems as skin (pigmentation), eye, heart, kidney, and thyroid that could be affected by childhood hearing loss. The physical examination of the ear involves identification of external ear malformations including preauricular tags and sinuses, abnormalities or obstruction of ear canals such as the presence of excessive cerumen, and abnormalities of the tympanic membrane and/or middle ear, including otitis media with effusion. Supplementary evaluations may include imaging studies of the temporal bones and electrocardiograms. Laboratory assessments useful for identifying etiology may include urinalysis, blood tests for congenital or early-onset infection (e.g., cytomegalovirus, syphilis, toxoplasmosis), and specimen analyses for genetic conditions associated with hearing loss.

c. Other medical specialists: The etiology of neonatal hearing loss may remain uncertain in as many as 30% to 40% of children. However, most congenital hearing loss is hereditary, and nearly 200 syndromic and nonsyndromic forms have already been identified. For 20% to 30% of children, there are associated clinical findings that can be of importance in patient management. Where thorough physical and laboratory investigations fail to define the etiology of hearing loss, families should be offered the option of genetic evaluation and counseling by a medical geneticist. The medical geneticist is responsible for the collection and interpretation of family history data, the clinical evaluation and diagnosis of inherited diseases, the performance and assessment of genetic tests, and the provision of genetic counseling. Geneticists are qualified to interpret the significance and limitations of new tests and to convey the current status of knowledge during genetic counseling.

Other medical specialty areas, including developmental pediatrics, neurology, ophthalmology, cardiology and nephrology, may be consulted to determine the presence of related body-system disorders as part of syndromes associated with hearing loss. In addition, every infant with hearing loss should receive an ophthalmologic evaluation at regular intervals to rule out concomitant late-onset vision disorders. Many infants with hearing loss will have received care in a neonatal intensive care unit. Because neonatal intensive care unit-enrolled infants will demonstrate other developmental disorders, the assistance

of a developmental pediatrician may be valuable for management of these infants.

Recommended benchmarks for the confirmation of hearing loss:

There are few published data available to provide targets for programs involved in confirmation of hearing loss. Until benchmark data that provide a goal are published, programs should strive to provide care to 100% of infants needing services.

3. Comprehensive services for infants and families referred following screening are coordinated between the infant's medical home, family, and related professionals with expertise in hearing loss and the state and local agencies responsible for provision of services to children with hearing loss.
4. Infants referred from universal newborn hearing screening begin audiologic and medical evaluations before 3 months of age or 3 months after discharge for neonatal intensive care unit infants.
5. Infants with evidence of hearing loss on audiologic assessment receive an otologic evaluation.
6. Families and professionals perceive the medical and audiologic evaluation process as positive and supportive.
7. Families receive referral to Part C coordinating agencies, appropriate intervention programs, parent/consumer and professional organizations, and child-find coordinators if necessary.

D. Early Intervention (Principles 3 and 8)

The mounting evidence for the crucial nature of early experience in brain development provides the impetus to ensure learning opportunities for all infants. Research demonstrates that intensive early intervention can alter positively the cognitive and developmental outcomes of young infants with disabilities or infants who are socially and economically disadvantaged. Other researchers have corroborated these findings in infants with hearing loss.

1. Early Intervention Program Development

   Early intervention services should be designed to meet the individualized needs of the infant and family, including addressing acquisition of communicative competence, social skills, emotional well-being, and positive self-esteem. Six frequently cited principles of effective early intervention are:

   a. Developmental timing
   b. Program intensity
   c. Direct learning
   d. Program breadth and flexibility
   e. Recognition of individual differences
   f. Environmental support and family involvement

   Developmental timing refers to the age at which services begin and the duration of enrollment. Programs that enroll infants at younger ages and continue longer are found to produce the greatest benefits.

Program intensity refers to the amount of intervention and is measured by multiple factors, such as the number of home visits/contacts per week for the infant and the family's participation in intervention. Greater developmental progress occurs when the infant and family are actively and regularly involved in the intervention. The principle of direct learning encompasses the idea that center-based and home-based learning experiences are more effective when there is direct (provided by trained professionals) as well as indirect intervention. The principle of program breadth and flexibility notes that successful intervention programs offer a broad spectrum of services and are flexible and multifaceted to meet the unique needs of the infant and family. Rates of progress and benefits from programs are functions of infant and family individual differences; not everyone progresses at the same rate nor benefits from programs to the same extent. Finally, the benefits of early intervention continue over time depending on the effectiveness of existing supports: family involvement and other environmental supports (e.g., home, school, health, and peer). Individualization in intervention tailors the services to be developmentally appropriate and recognizes meaningful individual and family differences.

Optimal intervention strategies for the infant with any hearing loss require that intervention begin as soon as there is confirmation of a permanent hearing loss to enhance the child's acquisition of developmentally appropriate language skills. All infants with the targeted hearing loss are at risk for delayed communication development and should receive early intervention services. Early intervention provides appropriate services for the child with hearing loss and assures that families receive consumer-oriented information. Documented discussion must occur about the full range of resources in early intervention and education programs for children with hearing loss.

In supplying information to families, professionals must recognize and respect the family's natural transitions through the grieving process at the time of initial diagnosis of hearing loss and at different intervention decision-making stages. The range of intervention options should be reviewed at least every 6 months. Families should be apprised of individuals who and organizations that can enhance informed decision-making such as peer models, persons who are hard of hearing and deaf, and consumer and professional associations.

Early intervention must be preceded by a comprehensive assessment of the infant's and family's needs and the family's informed decision-making related to those needs. Federal law provides funds for states to participate in early intervention services for infants with hearing loss. Part C of the U.S. Individuals with Disabilities Education Act (IDEA) requires that an interdisciplinary developmental evaluation be completed to determine the child's level of functioning in each of the following developmental areas: cognitive, physical, and communicative development; social or emotional development; and adaptive development. The individualized family service plan is to be developed

by the family and service coordinator. The individualized family service plan specifies needs, outcomes, intervention components, and anticipated developmental progress. The full evaluation process must be completed within 45 days of primary referral. However, intervention services may commence before completion of the full evaluation of all developmental areas and during the confirmation of the hearing loss if parent/guardian consent is obtained and an interim individualized family service plan is developed. Once services are begun, ongoing assessment of progress is crucial to determine appropriateness of the intervention strategies. In addition, the family and service coordinator must review the individualized family service plan at least every 6 months to determine whether progress toward achieving the outcomes is being made and whether the outcomes should be modified or revised. The individualized family service plan must be evaluated at least annually and–taking into consideration the results of any current evaluations, progress made, and other new information, revised as appropriate.

Thirty to 40% of children with hearing loss demonstrate additional disabilities that may have concomitant effects on communication and related development. Thus, interdisciplinary assessment and intervention are essential to address the developmental needs of all children who are hard of hearing or deaf, especially those with additional developmental disabilities.

The diverse demographics of infants with hearing loss and their families highlight the importance of shaping the early intervention curriculum to the infant and family profile. Families who live in underserved areas may have less accessibility, fewer professional resources, deaf or hard of hearing role models, or sign language interpreters available to assist them. A growing number of children with hearing loss in the United States are from families that are non-native English speaking. These factors underscore the necessity of providing comprehensive, culturally sensitive information to families–information that is responsive to their needs and that results in informed choices.

2. Audiologic Habilitation

The vast majority of infants and children with bilateral hearing loss benefit from some form of personal amplification or sensory device. If the family chooses individualized personal amplification for their infant, hearing aid selection and fitting should be provided by the audiologist in a timely fashion. Delay between confirmation of the hearing loss and amplification should be minimized.

Hearing aid fitting proceeds optimally when the results of the medical evaluation and physiologic (otoacoustic emissions and auditory brainstem response) and behavioral audiologic assessments are in accord. However, the provision of amplification should proceed based on physiologic measures alone if behavioral measures of threshold are precluded because of the infant's age or developmental level. In such

cases, behavioral measures should be obtained as soon as possible to corroborate the physiologic findings. The goal of amplification fitting is to provide the infant with maximum access to the acoustic features of speech within a listening range that is safe and comfortable. That is, amplified speech should be comfortably above the infant's sensory threshold, but below the level of discomfort across the speech frequency range for both ears.

The amplification fitting protocol should combine prescriptive procedures that incorporate individual real-ear measurements. These techniques allow amplification to be individually fitted to meet the unique characteristics of each infant's hearing loss. Validation of the benefits of amplification, particularly for speech perception, should be examined in the infant's typical listening environments. Complementary or alternative sensory technology (FM systems, vibrotactile aids, or cochlear implants) may be recommended as the primary and/or secondary listening device, depending on the degree of the infant's hearing loss, goals of auditory habilitation, acoustic environments, and family's informed choices. Long-term monitoring of personal amplification requires audiologic assessment; electroacoustic, real-ear, and functional checks of the amplification/listening device, as well as refinement of the prescriptive targets. Long-term monitoring also includes continual validation of communication, social-emotional, cognitive, and later academic development to assure that progress is commensurate with the infant's abilities. The latter data are obtained through interdisciplinary evaluation and collaboration by the individualized family service plan team that includes the family.

The impact of otitis media with effusion (OME) is greater for infants with sensorineural hearing loss than those with normal cochlear function. Sensory or permanent conductive hearing loss is compounded by additional conductive hearing loss associated with otitis media with effusion. Otitis media with effusion further reduces access to auditory/oral language stimulation and spoken language development for infants whose families choose an auditory-oral approach to communication development. Prompt referral to otolaryngologists for treatment of persistent or recurrent otitis media with effusion is indicated in infants with sensorineural hearing loss. Ongoing medical/surgical management of otitis media with effusion may be needed to resolve the condition. Management of otitis media with effusion, however, should not delay the prompt fitting of amplification unless there are medical contraindications.

3. Medical and Surgical Intervention

Medical intervention is the process by which a physician provides medical diagnosis and direction for medical and/or surgical treatment options for hearing loss and/or related medical disorder(s) associated with hearing loss. Treatment varies from the removal of cerumen and the treatment of otitis media with effusion to long-term plans for reconstructive surgery and assessment of candidacy for cochlear implants. If necessary, surgical treatment of malformation of the outer

and middle ears should be considered in the intervention plan for infants with conductive or sensorineural plus conductive hearing loss. Cochlear implants may be an option for certain children age 12 months and older with profound hearing loss who show limited benefit from conventional amplifications. As noted above, in infants with identified sensorineural hearing loss, the presence of otitis media needs to be recognized promptly and treated, with the infant monitored on a periodic basis.

4. Communication Assessment and Intervention

Language is acquired with greater ease during certain sensitive periods of infants' and toddlers' development. The process of language acquisition includes learning the precursors of language, such as the rules pertaining to selective attention and turn taking. Cognitive, social, and emotional developments depend on the acquisition of language. Development in these areas is synergistic. A complete language evaluation should be performed for infants and toddlers with hearing loss. The evaluation should include an assessment of oral, manual, and/or visual mechanisms as well as cognitive abilities.

A primary focus of early intervention programs is to support families in developing the communication abilities of their infants and toddlers who are hard of hearing or deaf. Elements of oral and sign language development include vocal/manual babbling, vocal/visual turn-taking, and early word/sign acquisition. Oral and/or sign language development should be commensurate with the child's age and cognitive abilities and should include acquisition of phonologic (for spoken language), visual/spatial/motor (for signed language), morphologic, semantic, syntactic, and pragmatic skills.

Early interventionists should follow family-centered principles to assist in developing communicative competence of infants and toddlers who are hard of hearing or deaf. Families should be provided with information specific to language development and with family-involved activities that facilitate language development. Early interventionists should ensure access to peer and language models. Peer models might include families with normal hearing children as well as children or adults who are hard of hearing and deaf as appropriate to the needs of the infant with hearing loss. Depending on informed family choices, peer models could include users of visual language (e.g., American Sign Language) and other signed systems as well as users of auditory/oral communication methods for spoken language development. Information on visual communication methods such as American Sign Language, other signed systems, and cued speech should be provided. Information on oral/auditory language, personal hearing aids, and assistive devices such as FM systems, tactile aids, and cochlear implants should also be made available.

The specific goals of early intervention are to facilitate developmentally appropriate language skills, enhance the family's understanding of its infant's strengths and needs, and promote the family's ability to

advocate for its infant. Early intervention should also build family support and confidence in parenting the infant who is deaf or hard of hearing and increase the family's satisfaction with the early hearing detection and intervention process. Provision of early intervention services includes monitoring participation and progress of the infant and family as well as adapting and modifying interventions as needed. Systematic documentation of the intervention approach facilitates decision-making on program changes.

Recommended benchmarks for early intervention programs:

It should be the goal of the intervention component of an early hearing detection and intervention program that all infants be served as described below. Because specific benchmarks for early intervention have yet to be reported, target percentages are not noted here. The Joint Committee on Infant Hearing strongly recommends that these data be obtained so that benchmarks may be made available.

5. Infants with hearing loss are enrolled in a family-centered early intervention program before 6 months of age.
6. Infants with hearing loss are enrolled in a family-centered early intervention program with professional personnel who are knowledgeable about the communication needs of infants with hearing loss.
7. Infants with hearing loss and no medical contraindication begin use of amplification when appropriate and agreed on by the family within 1 month of confirmation of the hearing loss.
8. Infants with amplification receive ongoing audiologic monitoring at intervals not to exceed 3 months.
9. Infants enrolled in early intervention achieve language development in the family's chosen communication mode that is commensurate with the infant's developmental level as documented in the individualized family service plan and that is similar to that for hearing peers of a comparable developmental age.
10. Families participate in and express satisfaction with self-advocacy.

E. Continued Surveillance of Infants and Toddlers (Principle 4)

Since 1972, the Joint Committee on Infant Hearing has identified specific risk indicators that often are associated with infant and childhood hearing loss. These risk indicators have been applied both in the United States and in other countries and serve two purposes. First, risk indicators help identify infants who should receive audiologic evaluation and who live in geographic locations (e.g., developing nations, remote areas) where universal hearing screening is not yet available. The Joint Committee on Infant Hearing no longer recommends programs calling for screening at-risk infants because such programs will identify approximately 50% of infants with hearing loss; however, these programs may be useful where resources limit the development of universal newborn hearing screening. Second, because normal hearing at birth does not preclude delayed onset or acquired hearing loss, risk indicators help identify infants who should receive on-going audiologic and medical monitoring and surveillance.

Risk indicators can be divided into two categories: those present during the neonatal period and those that may develop as a result of certain medical conditions or essential medical interventions in the treatment of an ill child. Risk indicators published in the 1994 Position Statement are revised in 2000 to take account of current information.

1. Based on current data, the Joint Committee on Infant Hearing risk indicators have been modified for use in neonates (birth through age 28 days) where universal hearing screening is not yet available. These indicators are as follows:
    a. An illness or condition requiring admission of 48 hours or greater to a neonatal intensive care unit.
    b. Stigmata or other findings associated with a syndrome known to include a sensorineural and or conductive hearing loss.
    c. Family history of permanent childhood sensorineural hearing loss.
    d. Craniofacial anomalies, including those with morphological abnormalities of the pinna and ear canal.
    e. In utero infection such as cytomegalovirus, herpes, toxoplasmosis, or rubella.
2. The Joint Committee on Infant Hearing recommends the following indicators for use with neonates or infants (29 days through 2 years). These indicators place an infant at risk for progressive or delayed-onset sensorineural hearing loss and/or conductive hearing loss. Any infant with these risk indicators for progressive or delayed-onset hearing loss who has passed the birth screen should, nonetheless, receive audiologic monitoring every 6 months until age 3 years. These indicators are as follows:
    a. Parental or caregiver concern regarding hearing, speech, language, and or developmental delay.
    b. Family history of permanent childhood hearing loss.
    c. Stigmata or other findings associated with a syndrome known to include a sensorineural or conductive hearing loss or eustachian tube dysfunction.
    d. Postnatal infections associated with sensorineural hearing loss including bacterial meningitis.
    e. In utero infections such as cytomegalovirus, herpes, rubella, syphilis, and toxoplasmosis.
    f. Neonatal indicators–specifically hyperbilirubinemia at a serum level requiring exchange transfusion, persistent pulmonary hypertension of the newborn associated with mechanical ventilation, and conditions requiring the use of extracorporeal membrane oxygenation (ECMO).
    g. Syndromes associated with progressive hearing loss such as neurofibromatosis, osteopetrosis, and Usher's syndrome.
    h. Neurodegenerative disorders, such as Hunter syndrome, or sensory motor neuropathies, such as Friedreich's ataxia and Charcot-Marie-Tooth syndrome.
    i. Head trauma.
    j. Recurrent or persistent otitis media with effusion for at least 3 months.

Because some important indicators, such as family history of hearing loss, may not be determined during the course of universal newborn hearing screening programs, the presence of all late-onset risk indicators should be determined in the medical home during early well-baby visits. Those infants with significant late-onset risk factors should be carefully monitored for normal communication developmental milestones during routine medical care.

The Joint Committee on Infant Hearing recommends ongoing audiologic and medical monitoring of infants with unilateral, mild, or chronic conductive hearing loss. Infants and children with mild or unilateral hearing loss may also experience adverse speech, language, and communication skill development, as well as difficulties with social, emotional, and educational development. Infants with unilateral hearing loss are at risk for progressive and/or bilateral hearing loss. Infants with frequent episodes of otitis media with effusion also require additional vigilance to address the potential adverse effects of fluctuating conductive hearing loss associated with persistent or recurrent otitis media with effusion.

The population of infants cared for in the neonatal intensive care unit may also be at increased risk for neural conduction and/or auditory brainstem dysfunction, including auditory neuropathy. Auditory neuropathy is a recently identified disorder, characterized by a unique constellation of behavioral and physiologic auditory test results. Behaviorally, children with auditory neuropathy have been reported to exhibit mild-to-profound hearing loss and poor speech perception. Physiologic measures of auditory function (e.g., otoacoustic emissions and auditory brainstem response) demonstrate the finding of normal otoacoustic emissions (suggesting normal outer hair cell function) and atypical or absent auditory brainstem responses (suggesting neural conduction dysfunction). Reports suggest that those at increased risk for auditory neuropathy are (a) infants with a compromised neonatal course who receive intensive neonatal care, (b) children with a family history of childhood hearing loss, and (c) infants with hyperbilirubinemia. Currently, neither the prevalence of auditory neuropathy in newborns nor the natural history of the disorder is known, and treatment options are not well defined. Audiologic and medical monitoring of infants at risk for auditory neuropathy is recommended. Infants with these disorders can be detected only by the use of otoacoustic emission and auditory brainstem response technology used in combination.

F. Protection of Infants' and Families' Rights (Principles 5 and 6)

Each agency or institution involved in the early hearing detection and intervention process shares the responsibility for protecting infant and family rights. These rights include access to universal newborn hearing screening, information in the family's native language, choice, and confidentiality. Families should receive information about childhood hearing loss in consumer-oriented language. The information should cover the prevalence and effects of early hearing loss, the potential benefits and risks of screening and evaluation

procedures, and the prognosis with and without early identification and intervention. Alternative funding sources should be sought if the parent(s) or legal guardian desires to have the infant screened for hearing loss but does not have a reimbursement option.

Families have the same right to accept or decline hearing screening or any follow-up care for their newborn as they do any other screening or evaluation procedures or intervention. Implied or written consent consistent with the protocol of the hospital or the requirements of the state should be obtained for newborn hearing screening after determining the family or legal guardian have been provided appropriate educational materials and have had their questions answered by qualified health care personnel.

The results of screening are to be communicated verbally and in writing to families by health care professionals knowledgeable about hearing loss and the appropriate interpretation of the screening results. Early hearing detection and intervention data merit the same level of confidentiality and security afforded all other health care and education information in practice and law. The newborn and his or her family have the right to confidentiality of the screening and follow-up assessments and the acceptance or rejection of suggested intervention(s). Consent of the parent or guardian is the basic legal requisite for disclosure of medical information. In compliance with federal and state laws, mechanisms should be established that assure parental release and approval of all communications regarding the infant's test results, including those to the infant's medical home and early intervention coordinating agency and programs. Confidentiality requires that family and infant information not be transmitted or accessible in unsecured data formats. An effective information system is a tool to assure both proper communication and confidentiality of early hearing detection and intervention information.

G. Information Infrastructure (Principles 7 and 8)

In concert with its 1994 Position Statement, the Joint Committee on Infant Hearing recommends development of uniform state registries and national information databases incorporating standardized methodology, reporting, and system evaluation. Federal and state agencies need to standardize data definitions to ensure the value of state registries and federal data sets and to prevent misleading or unreliable information. Information management should be used to improve services to infants and their families; to assess the quality of screening, evaluation, and intervention; and to facilitate collection of data on demographics of neonatal and infant hearing loss. To achieve the first goal of improving services to infants and their families, multiple system components (e.g., hospitals, practitioners, public health, and public and private education agencies) that provide care for infants and families should be integrated. In addition to ensuring that each infant receives all needed services, effective information management is used to promote program measurement and accountability. The information obtained from the information management system should assist both the individual provider and the lead coordinating agency in measuring quality indicators associated with program services (e.g., screening, evaluation, and/or intervention). Those professionals closest to the process should be responsible for program

evaluation using the benchmarks and quality indicators suggested in this document. The information system should provide the measurement tools to determine the degree to which each process (e.g., screening, evaluation, and intervention) is stable, sustainable, and conforms to program benchmarks. Timely and accurate monitoring of relevant quality measures is essential. The Joint Committee on Infant Hearing endorses the concept of a national database to permit documentation of the demographics of neonatal hearing loss, including prevalence and etiology across the United States. Data transmitted from the states to the federal level need not include individually identifiable patient or family information.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is not specifically stated for each recommendation.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Maximize linguistic and communicative competence and literacy development for children who are hard of hearing or deaf.

Without appropriate opportunities to learn language, children who are hard of hearing or deaf will fall behind their hearing peers in language, cognition, and social-emotional development. Such delays may result in lower educational and employment levels in adulthood.

POTENTIAL HARMS

False Positives

- The otoacoustic emission is known to be sensitive to outer ear canal obstruction and middle ear effusion, and, therefore, temporary conductive dysfunction can cause a positive test result (a "refer" outcome) in the presence of normal cochlear function.

False Negatives

- Some infants with hearing loss will pass the newborn hearing screening. Both auditory brainstem response and otoacoustic emission technology can show false-negative findings.

Because otoacoustic emission responses are generated within the cochlea by the outer hair cells, otoacoustic emission evaluation does not detect neural (i.e., eighth nerve or auditory brainstem pathway) dysfunction. Infants with auditory neuropathy or neural conduction disorders without concomitant sensory (i.e., outer hair cell) dysfunction will not be detected by otoacoustic emissions.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

Roles and Responsibilities:

- Institutions and Agencies:

  A variety of public and private institutions and agencies may assume responsibility for specific components (e.g., screening, evaluation, intervention) of a comprehensive early hearing detection and intervention program and the training required for early hearing detection and intervention success. State and local agencies that are involved in components of an early hearing detection and intervention program should work collaboratively to define their roles, responsibilities, and accountability. These roles and responsibilities may differ from state to state; however, it is strongly recommended that each state identify a lead coordinating agency with oversight responsibility for early hearing detection and intervention. The lead coordinating agency should convene an advisory committee consisting of professionals, families with children who are hard of hearing or deaf, members of the hard of hearing and deaf communities, and other interested community leaders to provide guidance on the development, coordination, funding, and quality evaluation of community-based early hearing detection and intervention programs. The lead coordinating agency in each state should be responsible for identifying the public and private funding sources available to support development, implementation, and coordination of early hearing detection and intervention systems.

- Families and Professionals:

  The success of early hearing detection and intervention programs depends on professionals working in partnership with families as a well-coordinated team. The roles and responsibilities of each team member should be well defined and clearly understood. Essential team members are families, pediatricians or primary care physicians, audiologists, otolaryngologists, speech-language pathologists, educators of children who are hard of hearing or deaf, and other early intervention professionals involved in delivering early hearing detection and intervention services. Provisions for supportive family education, counseling, and guidance should be available.

Program Protocol Development:

Each team of professionals responsible for the hospital-based universal newborn hearing screening program needs to undertake a comprehensive review of the

current hospital infrastructure before implementation of screening. The development of a hospital-based screening program should consider technology, screening protocols including the timing of the screening relative to nursery discharge, availability of qualified screening personnel, acoustically appropriate environments, follow-up referral criteria, information management, and quality control. Reporting and communication management must all be defined. These 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. Methods for ensuring that communications to parents are confidential and sensitive should be well defined. Health communication specialists should work with early hearing detection and intervention stakeholders to develop and disseminate family information materials that are accessible and represent the range of alternatives. Materials should be produced in languages other than English for diverse cultures and for low-literacy consumers.

Quality Indicators

At each step in the process of care, performance measures should be undertaken to examine whether the system conforms to accepted standards of quality. The guideline developers outline quality indicators that serve to monitor compliance and outcomes at each step in the early hearing detection and intervention process. Quality indicators should be monitored using well-established practices of statistical process control to determine program consistency and stability. If the quality indicators demonstrate that a program is not meeting the recommended benchmark, sources of variability should be identified and corrected to improve the process. Solutions to problems are often found at the local level. Community resources should be accessed to achieve successful implementation of universal newborn hearing screening.

Quality indicators for birth admission hearing screening:

Associated quality indicators of the screening component of early hearing detection and intervention programs may include the following:

1. Percentage of infants screened during the birth admission.
2. Percentage of infants screened before 1 month of age.
3. Percentage of infants who do not pass the birth admission screen.
4. Percentage of infants who do not pass the birth admission screening who return for follow-up services (either outpatient screening and/or audiologic and medical evaluation).
5. Percentage of infants who do not pass the birth admission/outpatient screen(s) who are referred for audiologic and medical evaluation.
6. Percentage of families who refuse hearing screening on birth admission.

Quality indicators for hospital-based programs should be monitored monthly to ascertain whether a program is achieving expected benchmarks and outcomes (targets and goals).

Quality indicators for the confirmation of hearing loss:

Associated quality indicators of the confirmation of hearing loss component of the early hearing detection and intervention programs may include the following:

1. Percentage of infants and families whose care is coordinated between the medical home and related professionals.
2. Percentage of infants whose audiologic and medical evaluations are obtained before an infant is 3 months of age.
3. Percentage of infants with confirmed hearing loss referred for otologic evaluation.
4. Percentage of families who accept audiologic and medical evaluation services.
5. Percentage of families of infants with confirmed hearing loss that have a signed individualized family service plan (IFSP) by the time the infant reaches 6 months of age.

Quality indicators for early intervention programs:

Quality indicators for the intervention services may include the following:

1. Percentage of infants with hearing loss who are enrolled in a family-centered early intervention program before 6 months of age.
2. Percentage of infants with hearing loss who are enrolled in an early intervention program with professional personnel who are knowledgeable about overall child development as well as the communication needs and intervention options for infants with hearing loss.
3. Percentage of infants in early intervention who receive language evaluations at 6-month intervals.
4. Percentage of infants and toddlers whose language levels, whether spoken or signed, are commensurate with those of their hearing peers.
5. Percentage of infants and families who achieve the outcomes identified on their individualized family service plan.
6. Percentage of infants with hearing loss and no medical contraindication who begin use of amplification when agreed on by the family within 1 month of confirmation of the hearing loss.
7. Percentage of infants with amplification who receive ongoing audiologic monitoring at intervals not to exceed 3 months.
8. Number of follow-up visits for amplification monitoring and adjustment within the first year following amplification fitting.
9. Percentage of families who refuse early intervention services.
10. Percentage of families who participate in and express satisfaction with self-advocacy.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Staying Healthy

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

American Academy of Pediatrics. Year 2000 position statement: principles and guidelines for early hearing detection. Pediatrics 2000 Oct;106(4):798-817. [164 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2000 Jun

GUIDELINE DEVELOPER(S)

Joint Committee on Infant Hearing - Independent Expert Panel

GUIDELINE DEVELOPER COMMENT

The Joint Committee on Infant Hearing member organizations include (in alphabetical order):

- American Academy of Audiology
- American Academy of Otolaryngology–Head and Neck Surgery
- American Academy of Pediatrics
- American Speech-Language-Hearing Association
- Council on Education of the Deaf (whose member organizations include: Alexander Graham Bell Association for the Deaf and Hard of Hearing, American Society for Deaf Children, Conference of Educational Administrators of Schools and Programs for the Deaf, Convention of American Instructors of the Deaf, National Association of the Deaf, and Association of College Educators of the Deaf and Hard of Hearing)
- Directors of Speech and Hearing Programs in State Health and Welfare Agencies

Joint Committee member organizations that adopt this statement include the American Academy of Audiology, the American Academy of Pediatrics, the American Speech-Language-Hearing Association, the Council on Education of the Deaf (see above individual organizations), and the Directors of Speech and Hearing Programs in State Health and Welfare Agencies.

SOURCE(S) OF FUNDING

Not stated

GUIDELINE COMMITTEE

Joint Committee on Infant Hearing

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Joint Committee on Infant Hearing (JCIH) member organizations and their respective representatives who prepared this statement include (in alphabetical order): American Academy of Audiology (Terese Finitzo, Ph.D., chair; and Yvonne Sininger, Ph.D.); American Academy of Otolaryngology–Head and Neck Surgery (Patrick Brookhouser, M.D., vice-chair; and Stephen Epstein, M.D.); American Academy of Pediatrics (Allen Erenberg, M.D.; and Nancy Roizen, M.D.); American Speech-Language-Hearing Association (Allan O. Diefendorf, Ph.D.; Judith S. Gravel, Ph.D.; and Richard C. Folsom, Ph.D.); Council on Education of the Deaf whose member organizations include: Alexander Graham Bell Association for the Deaf and Hard of Hearing, American Society for Deaf Children, Conference of Educational Administrators of Schools and Programs for the Deaf, Convention of American Instructors of the Deaf, National Association of the Deaf, and Association of College Educators of the Deaf and Hard of Hearing (Patrick Stone, Ed.D; Joseph J. Innes, Ph.D.; Donna M. Dickman, Ph.D.*); and the Directors of Speech and Hearing Programs in State Health and Welfare Agencies (Lorraine Michel, Ph.D.; Linda Rose, MCD; Thomas Mahoney, Ph.D.)

Ex officios to the Joint Committee on Infant Hearing include: Evelyn Cherow, MA (American Speech-Language Hearing Association); Deborah Hayes, Ph.D., (Marion Downs National Center for Infant Hearing); and Liz Osterhus, MA and Thomas Tonniges, M.D. (American Academy of Pediatrics)

*Donna Dickman is deceased

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

ENDORSER(S)

Alexander Graham Bell Association for the Deaf and Hard of Hearing - Disease Specific Society
American Academy of Audiology - Medical Specialty Society
American Academy of Otolaryngology-Head and Neck Surgery - Medical Specialty Society
American Society for Deaf Children - Private Nonprofit Organization
American Speech-Language-Hearing Association - Professional Association
Association of College Educators of the Deaf and Hard of Hearing - Professional Association
Conference of Educational Administrators of Schools and Programs for the Deaf - Professional Association
Convention of American Instructors of the Deaf - Professional Association
Council on Education for the Deaf
Directors of Speech and Hearing Programs in State Health and Welfare Agencies - Professional Association
National Association of the Deaf - Private Nonprofit Organization

GUIDELINE STATUS

This is the current release of the guideline. This guideline updates a previously released version (1994).

An update is not in progress at this time.

GUIDELINE AVAILABILITY

Electronic copies are available from:

- American Academy of Audiology Web site (HTML format).
- Subscribers of the American Journal of Audiology, from the American Speech-Language and Hearing Association (HTML format).
- American Academy of Pediatrics (AAP) Web site:
    - Introduction statement from the American Academy of Pediatrics.
    - Full-text statement from the Joint Committee on Infant Hearing (in Portable Document Format [PDF]).

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Newborn and infant hearing loss: detection and intervention. Pediatrics 1999 Feb;103(2):527-30.

Electronic copies: Available from the American Academy of Pediatrics (AAP) Web site.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on February 15, 2001. The information was verified by the American Academy of Pediatrics as of December 5, 2001.

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