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Guidelines for Audiology Service Provision in and for Schools

Working Group on Audiology Services in Schools

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About This Document

These guidelines are an official statement of the American Speech-Language-Hearing Association (ASHA). They provide guidance on audiology service delivery in and for schools, but are not official standards of the Association. They were developed by the Working Group on Audiology in Schools: Merrill Alterman; vice president for professional practices in audiology Susan J. Brannen, monitoring vice president; Gail Rosenberg; Paula Schauer, working group facilitator; and Evelyn J. Williams, ex officio. These guidelines were approved by the Audiology/Hearing Science Assembly of ASHA's Legislative Council in 2002 and supersede ASHA's 1993 "Guidelines for Audiology in Schools."

Introduction

These guidelines are an official statement of the American Speech-Language-Hearing Association (ASHA). The ASHA Scope of Practice (ASHA, 1996a) states that the practice of audiology includes providing services for children with hearing loss and/or auditory processing disorders. The Preferred Practice Patterns (ASHA, 1997a) are statements that define universally applicable characteristics of practice; the guidelines within this document fulfill the need for more specific procedures and protocols for serving individuals with hearing loss and/or auditory processing disorders in and for schools. Individuals who practice independently in this area are required to hold the Certificate of Clinical Competence in Audiology and abide by the ASHA Code of Ethics (ASHA, 2001a), including Principle of Ethics II Rule B, which states: Individuals shall engage in only those aspects of the profession that are within the scope of their competence, considering their level of education, training, and experience.

Background

It has long been recognized that hearing loss and auditory processing disorders (APD) affect a child's ability to learn language and achieve academically (ASHA, 1993; Bellis, 1996, 2002; Bess, Dodd-Murphy, & Parker, 1998; Diefendorf, 1996). The effects of hearing loss and/or APD vary depending on several factors, including the nature and degree of the hearing loss and/or APD, as well as any concomitant disorders. It is essential that children with hearing loss and/or APD receive comprehensive audiologic services to reduce the possible negative effects of the loss and/or disorder and to maximize the children's auditory learning and communication skills. Further, all children can benefit from audiologic services in terms of development of listening skills, instruction in prevention of hearing loss, and provision of accessible acoustic environments.

Federal legislation continues to refine the responsibilities of public education for children with disabilities (PL 93-112, Rehabilitation Act of 1973, Section 504, 1973; PL 100-407, Technology Related Assistance for Individuals with Disabilities Act, 1988; PL 101-336, Americans with Disabilities Act of 1990; and PL 101-497, Individuals with Disabilities Education Act [IDEA 97]). Together these legislative mandates require access to a free, appropriate public education (FAPE) for all children with disabilities. Other mandates and provisions, such as universal newborn hearing screening; Medicaid's Early and Periodic Screening, Diagnosis and Treatment programs; and state and local audiologic screening programs, help to ensure that children with hearing loss are identified and that appropriate referrals and services are provided.

The role of the audiologist in the schools is clearly delineated in IDEA regulations. IDEA, Part B, which is applicable to children ages 3 to 21, defines audiology as follows:

1. "Audiology includes-
 - i. Identification of children with hearing loss;
 - ii. Determination of the range, nature, and degree of hearing loss, including referral for medical or other professional attention for the habilitation of hearing;
 - iii. Provision of habilitative activities, such as language habilitation, auditory training, speech reading (lip-reading), hearing evaluation, and speech conservation;
 - iv. Creation and administration of programs for prevention of hearing loss;
 - v. Counseling and guidance of children, parents, and teachers regarding hearing loss; and
 - vi. Determination of children's needs for group and individual amplification, selecting and fitting an appropriate aid, and evaluating the effectiveness of amplification." (34 CFR §300.24(b)(1))

IDEA Part C, which is applicable to children birth through age 2, states that

- (2) "Audiology includes-
 - i. Identification of children with auditory impairment, using at risk criteria and appropriate audiologic screening techniques;
 - ii. Determination of the range, nature, and degree of hearing loss and communication functions, by use of audiologic evaluation procedures;
 - iii. Referral for medical and other services necessary for the habilitation or rehabilitation of children with auditory impairment;
 - iv. Provision of auditory training, aural rehabilitation, speech reading and listening device orientation and training, and other services;
 - v. Provision of services for prevention of hearing loss; and
 - vi. Determination of the child's need for individual amplification, including selecting, fitting, and dispensing appropriate listening and vibrotactile devices, and evaluating the effectiveness of those devices." (34 CFR §303.12 (d)(2))

The regulations (34 CFR §300.303) also require that "Each public agency shall ensure that the hearing aids worn in school by children with hearing impairments, including deafness, are functioning properly." IDEA also indicates that when developing an IEP, the team must "consider whether the child requires assistive technology devices and services." (34 CFR §300.46(a)(2)(v))

Research continues to document the high incidence of hearing loss in children of all ages and the potentially negative consequences hearing loss can have on communication and academic and psychosocial development and/or performance (Bess, Dodd-Murphy, & Parker, 1998; Niskar, Kieszak, Holmes, Esteban, Rubin, & Brody, 1998; Yoshinaga-Itano, Sedey, Coulter, & Mehl, 1998). The importance of the listening environment for children with hearing loss is better understood and the use of hearing assistive technology systems (HATS) and devices has increased. Further, strategies for selecting, fitting, and evaluating amplification have become

more sophisticated (ASHA 1995, 2000a, 2000b; Levitt, 1985; Lewis, 1999; Mueller, Hawkins, & Northern, 1992; Musket, 1988; Seewald, 2000a, 2000b; Seewald & Moodie, 1992; Seewald, Moodie, Sinclair, & Scollie, 1999).

Critical components of audiologic service delivery in the schools can be summarized as follows:

- Audition is essential to auditory learning for all children.
- Language, academic achievement, and psychosocial development are particularly affected when children have unidentified or unmanaged hearing losses and/or APD.
- The potential negative impact of minimal, fluctuating, and/or unilateral hearing loss must be minimized.
- To ensure optimal use of residual hearing and the development of appropriate auditory and verbal communication, audiologic services must be provided as early in life as possible and must be available in the environment in which the child develops and learns. Therefore, certain audiologic management services must be delivered in the child's natural environment (e.g., home, day care), early intervention center, and/or school, and be designed to meet the specific needs of the child and family/guardian involved.
- Audiologic services should be provided by persons who have knowledge of and experience in pediatric or educational audiology.
- To meet the individualized, multifaceted, and ongoing audiologic assessment and management and education needs of school-age children with hearing loss and/or APD, services should be delivered in the child's school environment whenever possible. Audiologic services delivered outside the school environment should be delivered in collaboration and consultation with the local/intermediate/residential education cooperative/agency (LEA) and/ or a LEA-based audiologist.
- Audiologic services should be comprehensive in scope, designed to address the child's individualized communication, academic, and psychosocial development needs.
- Related and support services are necessary to address the needs of most children with hearing loss and/or APD. Such services should be sought through appropriate referral and follow-up from other qualified professionals when warranted.
- Audiologic assessment and audiologic (re)habilitation (AR) services must comply with the audiology scope of practice, the preferred practice patterns, and the letter and intent of local, state, and federal mandates.
- Audiologic services should be provided by persons who hold the Certificate of Clinical Competence in Audiology (CCC-A) from the American Speech-Language-Hearing Association (ASHA) and appropriate state licensure and/ or certification if required.

ASHA addressed the role of the audiologist in the schools in its 1993 "Guidelines for Audiology Services in the Schools." Despite federal regulations and ASHA's guidelines, there continues to be significant variability in interpretation of these documents and provision of services. A survey of state departments of education (Johnson, 1991) substantiated discrepancies in the level and type of audiology services provided by state education agencies (SEAs) and by LEAs within the same state.

Purpose

The purpose of this document is to provide guidance for audiologists, SEAs, and LEAs in providing appropriate cost-effective audiology services in the schools and in infant and toddler programs managed by a SEA or LEA. Information and/or guidance on the following will be provided:

- characteristics and needs of children with hearing loss and/or APD;
- service and program needs for children with hearing loss and /or APD;
- the role and function of audiologists in meeting the unique and specialized needs of children with hearing loss and/or APD;
- the most common audiology service delivery models used in the schools;
- caseload/workload recommendations and mitigating factors.

Characteristics and Needs of Children With Hearing Loss and/or APD

A child with hearing loss experiences both auditory and sensory deprivation and its effects on communication, learning, and psychosocial development. Therefore, the effective management of hearing loss must address medical, communication, education, and psychosocial considerations. Children with APD often exhibit similar behaviors and experience many of the same communication, learning, and psychosocial problems that children with hearing loss experience.

Prevalence and Types

Although demographic data are difficult to interpret, recent figures suggest that the prevalence of hearing loss in school-age children is between 11.3% and 14.9% (Adams, Hendershot, & Marano, 1999; Bess, Dodd-Murphy, & Parker, 1998; Niskar, Kieszak, Holmes, Esteban, Rubin, & Brody, 1998). Using these statistics, an average of 131 of every 1,000 school-age children have some degree of hearing loss that can potentially affect communication, learning, psychosocial development, and academic achievement.

Hearing loss may occur alone or in combination with other disabilities. Infants born with at-risk indicators and/or other disabilities have an increased probability that a hearing loss also will occur (ASHA, 1994; Joint Committee on Infant Hearing [JCIH], 1994, 2000). Children with language and learning disabilities have an increased incidence of hearing loss, and the incidence of hearing loss in special education students is higher than in the general school population. Data for children with APD are limited because these children are often classified as learning disabled or language impaired for special education purposes or are identified and served under Section 504 or other types of intervention programs. However, Chermak and Musiek (1997) reported that 2% to 3% percent of all children have an APD.

The most common cause of hearing loss in young children is otitis media, which may result in a conductive hearing loss. Conductive hearing loss usually is amenable to medical treatment. Although otitis media is most frequent during the first 3 years of life (Crandell & Flannagan, 1998; Klein, 1986; Roberts, Wallace, & Henderson, 1997), conductive hearing loss associated with otitis media often continues until the age of 8 to 10 years (Crandell & Flannagan, 1998; Crandell, Smaldino, & Flexer, 1995; Davis, Shepard, Stelmachowicz, & Gorga, 1981). Conductive hearing loss associated with otitis media has may be associated with delayed speech, language, and academic skills because it most often occurs during

the early critical language learning period between birth and age 3. Therefore, the speech, language, and academic progress of children with chronic otitis media should be monitored closely (Roberts et al., 1997).

Sensorineural hearing loss is caused by a variety of illnesses and conditions. It is usually permanent, may be progressive, and has a total incidence of at least 10 per 1,000 students. It has been estimated that seven times as many students have mild or moderate sensorineural hearing losses as have severe to profound sensorineural hearing losses. Sensorineural hearing loss may occur in one or both ears; only recently have the problems caused by unilateral hearing loss been recognized (Bess et al., 1998). Sensorineural hearing loss can occur at any time, and the prevalence of sensorineural hearing loss in the high frequencies increases dramatically with age and is becoming more common in secondary students because of their exposure to excessive noise (Niskar et al., 1998). When both conductive loss and sensorineural hearing loss are present simultaneously, the resulting loss is called "mixed."

In addition to the types of peripheral losses mentioned above, many children exhibit APD. In general terms APD has been defined as a deficit in the processing of auditory input that may include difficulties in listening, speech understanding, language development, and learning (Jerger & Musiek, 2000). Children with APD may not have normal peripheral hearing sensitivity and typically exhibit deficiency in one or more of the following areas:

- sound localization and lateralization
- auditory discrimination
- auditory pattern recognition
- temporal aspects of audition, including
 - temporal resolution
 - temporal masking
 - temporal integration
 - temporal ordering
- auditory performance decrements with competing acoustic signals
- auditory performance decrements with degraded acoustic signals (ASHA, 1996b)

Effects of Hearing Loss and/or APD

A child's ability to hear influences communication development and behavioral skills. If a hearing loss is undetected or is detected late (after 6 months of age), language and speech development can be delayed. This delay can affect a child's psychosocial development and academic performance. Recent research indicates that when hearing loss is identified and intervention is initiated by age 6 months, children exhibit higher language levels than children identified after that age. If a child has normal cognitive status, normal language development will typically occur if hearing loss is identified by age 6 months. Research has also found that auditory skill performance and psychosocial development are significantly related to age of intervention. Additionally, early detection of and intervention for children with hearing loss have been linked to lower rates of stress, depression, and conflict among parents and faster resolution of grief related to the identification of hearing loss (Calderon & Naidu, 2000; Yoshinaga-Itano et al., 1998).

Universal newborn hearing screening (UNHS) programs will potentially identify children at risk for hearing loss within the first few days of life. Auditory brainstem response (ABR) and otoacoustic emissions (OAE), and behavioral audiometry are being used to screen and confirm hearing loss during early infancy. As more states begin to institute this mandate, the numbers of children identified with hearing loss during infancy will increase. Because hearing loss is often not present at birth and occurs after the neonatal period, parents/guardians, audiologists, speechlanguage pathologists, and other health care and education professionals should monitor a child's response to sound and speech and language development. This is especially true for children with high-risk indicators for hearing loss.

Children with minimal to moderate and/or unilateral hearing losses are often identified late because they seem to hear and develop socially adequate speech and language. Speech is audible to them but, depending on the type and configuration of the hearing loss, parts of words or sentences may not be heard clearly. Therefore, it is often difficult for these children to understand what they hear. Additionally, background noise and distance from the person speaking may interfere with the child's ability to understand speech. Finally, identification of hearing loss and/or APD may also be compounded and delayed if there are differences in the home and school languages.

APD and hearing loss, whether conductive, sensorineural, mixed, unilateral, bilateral, fluctuating, permanent, or temporary, have the potential to affect children in three major areas: communication skills, academic achievement, and psychosocial development. Children with hearing loss or APD may exhibit one or more of the following communication, academic, and psychosocial characteristics, deficits, and behaviors. These behaviors may vary at each age level.

Communication Skills

Hearing loss and/or APD may delay acquisition and development of receptive and expressive communication skills. These difficulties may diminish communication and discourse skills necessary for participation in the classroom. Some of the communication implications for children with hearing loss and/or APD are listed below.

Children may have:

- difficulty forming linguistic categories (plurals, tenses)
- difficulty differentiating words and sounds
- receptive and expressive language delay
- difficulty performing tasks that involve language concepts
- problems with auditory attention and memory and with comprehension
- problems with syntax, semantics, and vocabulary development
- difficulty with speech perception and production
- problems with conversation and social language (ASHA, 1996b; Bellis, 1996, 2002; Diefendorf, 1996; Fisher, 1985; Johnson, Benson, & Seaton, 1997)

For children from racially, ethnically, and culturally diverse backgrounds, the differences between the home and school languages present significant factors that can influence the acquisition of speech and language skills. The 1999–2000 Annual Survey of Deaf and Hard of Hearing Children and Youth reported that 42.3% of school-age children who are deaf or have hearing loss are from racially, ethnically,

and culturally diverse backgrounds. Of this group, 22.5% reported a spoken and or written language other than English in the home (Gallaudet Research Institute, 2001). It is often erroneously assumed that because of the hearing loss, the child has learned little of the home language and is not affected by the language difference. The child's speech-language skills may reflect limited English proficiency that should not be confused with any speech-language difficulties associated with the hearing loss (Nuru-Holm & Battle, 1998). This child may know, understand, and use a concept or word that is known in one language but is not known in the other language due to a language difference and/or the hearing loss (Christensen, 2000; Gerner de Garcia, 1995).

Academic Achievement

Hearing loss and/or APD can frequently cause language delays that affect all areas of academics, including reading, spelling, and mathematical concepts, that may result in fewer choices for vocation and education. Some of the academic implications for children with hearing loss and/or APD are listed below.

Children may have:

- lower scores on achievement and verbal IQ tests
- high rates of grade repetition and academic failure
- increased need for special education and/or classroom support
- lags and deficits in academic achievement, including language arts, vocabulary development, reading, spelling, arithmetic, and problem solving
- verbally based learning difficulties
- progressive academic delays (ASHA, 1996b; Bellis, 1996, 2002; Diefendorf, 1996; Fisher, 1985; Johnson et al., 1997)

Psychosocial Development

Children with hearing loss and/or APD may experience social isolation, as they may lack insight into the rules of pragmatic language and social interaction. For example, they may misunderstand the speaker's voice, inflection, and the nuances of spoken language. Other psychosocial implications for children with hearing loss and/or APD include

- self-described feelings of isolation, exclusion, embarrassment, annoyance, confusion, and helplessness
- less independence in the classroom
- lags in psychosocial development
- lower performance on measures of social maturity
- reluctance or refusal to participate in classroom and social activities
- poor self-concepts (ASHA, 1996b, Bellis, 1996; Diefendorf, 1996; Fisher, 1985; Johnson et al., 1997)

APD - Additional Implications

The communication, academic, and psychosocial characteristics of children with APD are very similar to those of children with other education problems, such as attention deficit disorder, language/learning disabilities, or hearing loss. Therefore, a thorough differential diagnosis is needed. Some additional implications of APD are listed below.

Service and Program Needs for Children With Hearing Loss and/or APD

Children may

- exhibit communication, academic, and psychosocial behaviors similar to children with hearing loss
- score lower on measures of verbal IQ than on measures of performance
- score lower on receptive language measures
- have difficulty with reading and spelling
- require more help with organization in the classroom
- exhibit difficulty following multiple-step directions
- be reluctant to participate in class discussions or respond inappropriately
- act withdrawn or sullen
- have a history of chronic ear infections or other otologic and/or neurologic problems
- have poor singing and music skills
- have deficiencies in fine and/or gross motor skills (ASHA, 1996b; Bellis, 1996, 2002; Fisher, 1985; Johnson et al., 1997)

Early identification and intensive broad-based management can maximize a child's potential. To contribute effectively to this management process, audiologic services within the LEA-supported programs should include at least the following components:

Hearing Loss Prevention/Hearing Conservation

Audiologists provide information concerning methods of prevention, also known as hearing conservation, as well as causes and effects of hearing loss. Hearing conservation programs should be offered to students, education staff, medical providers, and community members on an ongoing basis. This information may be integrated into programs for children and their families/guardians, LEA-sponsored programs, and school curricula. It can take the form of classroom presentations, parent/student counseling, professional in-service training, and public information campaigns. Prevention can also be taught as a part of the student health/science curriculum. The prevention program should be closely tied to efforts aimed at early identification and intervention. At a minimum, a prevention program should include age-appropriate

- explanation of the ear, how we hear, and what happens when the ear is exposed to excessive noise levels
- information on common sound levels and which levels are considered too loud
- information on the physiologic warning signs of excessive noise exposure (e.g., threshold shift, tinnitus, pain)
- prevention strategies (e.g., hearing protectors, limiting exposure, buying items with low noise output ratings)

Hearing Loss Identification/Audiologic Screening

In addition to universal newborn hearing screening programs, ongoing identification programs that allow for periodic audiologic screening of all children between birth and 21 years old must be provided. LEA-sponsored identification programs should follow ASHA's recommended screening protocol that currently consists of a three-pronged process to include screening for ear disorder, hearing impairment, and related disability (ASHA, 1997b).¹ Audiologic screening is recommended for all children as needed, referred, requested, and/or required by

federal, state, and local mandates as well as for all children on initial entry into school and annually in kindergarten through 3rd grade, and in the 7th and 11th grades.

Additional populations to be screened include

- preschoolers as needed, referred, requested, or mandated, or if they have “at risk” indicators
- all children who were absent during previously scheduled screenings
- all children who failed a previous screening
- all children referred for or placed in special education programs
- all children who repeat a grade
- all children entering the school system without evidence of having passed a previous hearing screening
- all children considered “at risk” for hearing loss, including students with a history of exposure to noise (ASHA, 1997b; Johnson et al., 1997)

The identification program may include OAE, ABR, and pure tone screening for hearing impairment, visual inspection of the ears, otoscopy, and acoustic immittance when screening for ear disorder, and the use of standardized communication screening instruments when screening for disability. To be effective, the identification program must develop efficient and expedient lines of communication and referral among educators, families and guardians, and the medical community. Acoustic immittance screening should be provided for all children who are at risk for middle ear problems, particularly those under the age of 7 years. Identification programs should be developed and supervised by an ASHA-certified audiologist with state licensure and/or certification, if required, and carried out by appropriately trained and supervised personnel. Such programs must be systematic and include complete record keeping and follow-up procedures, including referral to audiologists, speech-language pathologists, psychologists, early intervention specialists, and appropriate education, medical, and other professionals.

Assessment

Audiologic assessment should provide qualitative and quantitative information concerning the nature and extent of the hearing loss or APD and its effect on communication function, academic performance, and psychosocial development. Comprehensive assessment to identify and determine functional disability, audiologic rehabilitation needs (e.g., amplification, receptive communication skill development, use of other hearing assistive technology), and other appropriate communication services must be completed for all children with hearing loss and/or APD. Determination of an APD is complex and should not be based on one assessment, but rather on a multidisciplinary assessment that examines all facets of the child's processing abilities, including functional processing skills in the education environment (ASHA, 1996b; Bellis, 1996, 2002; Chermak, 2001; Chermak & Musiek, 1997; Florida Department of Education, 2001; Jerger & Musiek, 2000; Johnson et al., 1997; Schow, Seikel, Chermak, & Berent, 2000). In

¹ The World Health Organization (2001) has recently approved the document *International Classification of Functioning, Disability and Health (ICF)*, which redefines disorder, impairment, and disability in terms of body functions, body structures, activities and participation, and environmental factors.

addition, appropriate educational and psychosocial supports and services must also be determined and implemented. An appropriate audiologic assessment consists of procedures and test materials that are developmentally and culturally appropriate and free from cultural bias. The assessment should be at least consistent with ASHA's preferred practice patterns (ASHA, 1997a) and include, but not be limited to

- determining the need for further pre-assessment information, including otologic consultation
- administering, scoring, and interpreting comprehensive audiologic assessment, which shall include the following, as appropriate:
 - review referral and other available information
 - case history
 - otoscopic examination
 - acoustic immittance audiometry
 - pure tone audiometry (air and bone conduction) with appropriate masking
 - speech recognition or awareness threshold with appropriate masking
 - word-recognition measures in quiet and/or in noise with appropriate masking
 - speech and word recognition in quiet and in noise with both auditory and visual inputs
 - most comfortable loudness level
 - uncomfortable loudness level
 - electrophysiologic tests (e.g., ABR, OAE)
 - auditory processing test battery
 - behavioral observation, reinforcement and conditioned play audiometry, as needed
 - functional listening skills
 - audiologic rehabilitation assessment
- selection, administering, scoring, and interpreting tests to determine the benefits of hearing aids, cochlear implants, and HATS (e.g., cochlear implants, FM systems), which shall include the following, as appropriate:
 - speech audiometry (in quiet and noise; auditory and auditory-visual)
 - functional measurements
 - real ear measurement
 - desired sensation level measurement
 - electroacoustic analysis
 - listening and speech sound checks
 - auditory skill development measurements
- documenting the influence of the hearing loss on communication, learning, psychosocial development, and adaptive behavior
- identifying coexisting factors that may require further evaluation or referral
- referring for assessment and/or treatment, using both school and other professional and/or community resources as appropriate. These may include assessments related to cognitive, academic, visual, and motor skills; emotional

status; selection of amplification; medical conditions; vocational interest and aptitude; and determination of the need for financial assistance in the purchase of amplification and other hearing assistive technology devices and systems.

Intervention and Instructional Services

Intervention and instructional services must be provided for all children identified by a multidisciplinary team as needing such services. These services are provided under one of the following educational support plans: an Individual and Family Service Plan (IFSP) for ages birth to 3 years, an Individualized Education Program (IEP) for ages 3 to 21 years, or a 504 plan for school-age students who have a hearing loss or APD but do not require special education services. Efforts must be made to compile and interpret information relative to communication skills, cognitive abilities, motor functioning, psychosocial development, adaptive behavior, health history, and academic status. Intervention and education services may be provided through a number of service-delivery options, including but not limited to

- direct/indirect intervention
- consultation/collaboration
- itinerant instruction
- team teaching
- general curriculum class with support
- self-contained special education classes
- residential placement

When determining placements and intervention services, opportunities for educational and social interaction with other children both with and without hearing loss should be considered. In addition, educational programming should consider placement of the child with hearing loss in the general curriculum class to the maximum extent possible or in the least restrictive environment (LRE).

The intervention needs of children with hearing loss and/or APD encompass many broad and sometimes overlapping areas. Some of the needed services may be provided directly by audiologists (ASHA, 2001b); others will be provided by other professionals, such as speech-language pathologists, teachers of the deaf and hard of hearing, psychologists, counselors, social workers, physical therapists, occupational therapists, nurses, or physicians. Some of the most important aspects of intervention are

- medical treatment, when indicated
- selection, fitting, and dispensing of appropriate amplification and HATS at the earliest possible age
- ensuring hearing aid and HATS compatibility with other technology devices and systems in use (e.g., computers, augmentative/alternative communication [AAC] devices and systems, infrared systems)
- auditory skill development training
- training in the use of hearing aids, cochlear implants, and HATS with other types of technology and in various environments (e.g., computers, AAC devices and systems, noisy classrooms, social situations)

- structuring a successful learning environment that includes teacher preparation, optimal room acoustics, accessibility to auditory and visual information, and peer and teacher orientation and training
- development and remediation of communication in collaboration with speech-language pathologists
- development of compensatory strategies such as the use of visual information to supplement auditory input
- academic tutoring or specialized instruction
- counseling and self-advocacy training
- facilitation of, access to, participation in, and transition between programs, grade levels, agencies, vocational settings, and extracurricular activities

Children with hearing loss require a clear auditory signal if they are to understand oral instructions, class discussions, and other spoken communications. Even when properly functioning amplification devices are worn, the child still may have difficulty understanding spoken language. In addition, the high levels of noise and reverberation that exist in most classrooms often reduce the effective use of hearing aids, cochlear implants, and HATS (Anderson, 1989; Crandell, 1991; Crandell & Smaldino, 2000; Crum & Matkin, 1976; Finitzo-Hieber & Tillman, 1978; Leavitt, 1991). For this reason, noise sources must be eliminated or reduced. To ensure that the child receives the best audible signal, HATS are often used to enhance signal-to-noise ratios in addition to, or instead of, personal hearing aids. The complex interactions among noise, distance from the speaker, acoustic characteristics of the room, and type of amplification make simple recommendations for preferential seating inadequate to ensure good use of hearing in the classroom (ASHA, 1995; Flexer, 1992; Flexer, Wray, & Ireland, 1989; Seep, Glosemeyer, Hulce, Linn, & Aytar, 2000). Although the use of hearing aids, cochlear implants, and HATS is often beneficial, sometimes room acoustics are so poor that acoustic modifications must be made or the child relocated to a room with more favorable acoustics. The audiologist should play a key role in determining the appropriateness of room acoustics and providing recommendations for various types of acoustic and/or instructional modifications.

Follow-Up and Monitoring

Follow-up services need to be provided by audiologists as an ongoing and underlying aspect of each component of the hearing identification, intervention, prevention, and educational services program. These services include, but are not limited to,

- consultation/collaboration with parents/ guardians, speech-language pathologists, teachers, other professionals and administrators
- parent/guardian, student, family counseling
- monitoring of communication function
- monitoring of academic performance
- monitoring of psychosocial needs
- monitoring the performance and effectiveness of hearing aids, cochlear implants, and HATS
- periodic reassessment in accordance to best practices as mandated, requested, and/or recommended

- monitoring of classroom acoustics and other listening/learning environments

Equipment and Materials

Provision of adequate identification, evaluation, and audiologic management services to children with hearing loss requires access to the equipment and materials listed below. Equipment should be calibrated according to manufacturers' and current American National Standards Institute's (ANSI) standards (ANSI, 2002), and test and intervention materials should be developmentally, linguistically, and culturally appropriate. Such equipment and materials include at least the following:

- sound-treated test booth
- clinical audiometer with sound field capabilities
- visual reinforcement audiometry equipment and other instruments necessary for assessing young children or difficult-to-test children
- high fidelity tape/CD player for use with recorded assessment materials
- visual reinforcement audiometry equipment and other instruments necessary for assessing young children or difficult-to-test children
- electrophysiological equipment (e.g., screening and/or clinical OAE/ABR equipment)
- portable audiometer
- clinical and portable acoustic immittance equipment
- otoscope
- electroacoustic testing equipment (e.g., hearing aid analyzer, real ear measurement system)
- hearing aids and HATS to be used on a permanent or temporary basis for evaluation of and intervention for hearing loss and/or APD
- earmold impression materials and modification equipment
- sound-level meter with calibrator
- test materials for screening speech and language and evaluating speechreading, functional listening, and auditory skills
- materials necessary for providing direct and indirect intervention services
- computer for administrative purposes (e.g., generating reports and tracking student data and outcomes)
- sterilization/sanitation supplies necessary for practicing universal precautions

EHDI Programs

Early hearing detection and intervention (EHDI) programs being implemented throughout the nation require states to identify agencies that will be responsible for EHDI program development, implementation, and follow-up. No matter which state agency is given ultimate responsibility for administration of EHDI programs, audiologists providing services in or for the schools and to pediatric populations in other facilities play an important role and should be an integral part of the identification and management process. In 1994, the Joint Committee of ASHA and the Council on Education of the Deaf (1994) identified essential EHDI program team members. They include families/guardians, audiologists, speech-language pathologists, physicians, educators, and other early intervention professionals. With expertise in identification, evaluation, and audiologic habilitation, audiologists should be and are typically involved in every component of the EHDI process. With respect to hearing screening, audiologists provide program development, management, quality assurance, service coordination, and transition to evaluation, habilitation, and intervention services. As a part of the

Roles and Responsibilities of Audiologists Providing Services in and for Schools

follow-up component, audiologists are uniquely qualified to provide comprehensive audiologic assessment, evaluation to determine candidacy for amplification and other hearing assistive technology devices and systems, and referral for intervention services. The audiologist's role in early intervention includes fitting and/or monitoring of hearing aids, cochlear implants, and HATS; participating in the development of IFSPs and later IEPs; and providing education and counseling for families and other appropriate parties. Audiologists are also an integral part of direct audiologic habilitation service delivery (JCIH, 2000; Pediatric Working Group of the Conference on Amplification for Children With Auditory Deficits, 1996).

Individualized intervention plans for all children with hearing loss and/or APD must be developed and implemented by a multidisciplinary team. The efforts of that team need to be guided by a complete understanding of the identified child's hearing loss and/or APD and overall needs. This knowledge must, in turn, be coordinated with and integrated into ongoing classroom instruction and extracurricular activities. The audiologist is the education team member with comprehensive knowledge about hearing loss and/or APD and their consequences. Therefore, audiologists provide an excellent resource for comprehensive assessment, direct/indirect services, in-service activities, and public information efforts that can significantly enhance the intervention efforts of the education team.

The roles and responsibilities of audiologists employed by a SEA (state education agency) or LEA (local/intermediate education cooperative/agency) are to serve as case manager, team member, consultant, and/or service provider for individuals birth through age 21 years and their families/guardians. Specifically, the LEA-based audiologist is uniquely qualified to assume responsibility for and/or to perform the following functions:

Audiologic Assessments

- select, maintain, and calibrate audiometric equipment
- provide comprehensive audiologic assessments, including pure tone air and bone conduction measures; speech reception and word recognition measures; immittance measures, otoscopy, and other tests (e.g., electrophysiological measures, differential determination of auditory disorders and/or APD) to determine the range, nature, and degree of hearing loss and communication function
- perform comprehensive educationally and developmentally relevant audiologic assessments of individuals birth through 21 years old, using procedures that are free of ethnic and cultural bias and are appropriate to the subject's receptive and expressive native-language skills, cognitive abilities, and behavioral functioning
- identify the need for and use the services of interpreters/translators
- provide for cerumen management
- determine the need for and appropriateness of hearing aids, cochlear implants, and HATS
- evaluate, select, dispense, and/or recommend hearing aids and/or HATS and make earmold impressions and modifications

- ensure the proper fit and functioning of hearing aids and/or HATS
- provide written and/or verbal interpretation of audiologic assessment results, functional implications, and management recommendations to school personnel and other appropriate parties—such as parents/guardians, physicians, and other professionals—individually and as part of a multidisciplinary team process

Referrals

- make appropriate medical, educational, and community referrals to other services necessary for the identification and management of children with hearing loss and/or APD and their families/guardians

Audiologic (Re)habilitation

The provision of AR services in and for schools has often been the sole responsibility of speech-language pathologists, classroom and/or resource room teachers, and/or teachers of the hearing impaired. Audiologists are uniquely qualified to provide AR services to students and should be considered in this capacity when intervention decisions are being made (ASHA, 2001b). The provision of AR services requires frequent contact and time to prepare for and provide services. Therefore an audiologist's caseload size and workload must be adjusted accordingly to allow for the necessary time allocations associated with this type of service delivery. In reference to AR services, audiologists:

- ensure appropriate functioning of the student's hearing aids, cochlear implants, and HATS by directly providing or training and supervising school staff to conduct daily visual and listening checks and troubleshooting of common causes of malfunction and provide for daily visual and listening checks of students' hearing aids, cochlear implants, and HATS, and troubleshooting of common causes of malfunction
- plan and implement orientation and education programs to ensure realistic expectations; to improve acceptance of, adjustment to, and benefit from hearing aids, cochlear implants and HATS
- identify and evaluate students' situational functional communication needs and performance and provide intervention for and/or recommendations to address them
- provide training in effective communication strategies to students with hearing loss and/ or APD and their families/guardians, teachers, other professionals and other relevant individuals
- develop and implement treatment plans to facilitate communication competence, which may include
 - speechreading
 - auditory/aural development
 - communication strategies
 - visual communication systems and strategies
- provide and/or make recommendations for hearing aids and HATS (e.g., radio/television, telephone, alerting, convenience)
- conduct routine assessments of, adjustment to, and effective use of hearing aids, cochlear implants, and HATS to ensure optimal communication function

- provide AR services, including programming in the child's natural environment if appropriate, in the areas of speechreading, listening, communication strategies, use and care of hearing aids, cochlear implants, and HATS, self-management of hearing needs, and other areas as appropriate
- interpret audiologic assessment results and their implications for psychosocial, communication, cognitive, physical, academic, and vocational development
- have knowledge of education options for children with hearing loss and/or APD, including appropriate intervention methods, intensity of services and vocational and work-study programming as part of a multidisciplinary team process. These procedures should integrate the following:
 - orientation to, and the use and maintenance of hearing aids, cochlear implants, and HATS (e.g., personal FM systems)
 - auditory skills development
 - speech skills development including phonology, voice, and rhythm
 - visual communication systems and strategies including speechreading, manual communication, and cued speech
 - language development (expressive and receptive oral, signed, cued, and/or written language)
 - selection and use of appropriate instructional materials and media
 - structuring of learning environments including acoustic modifications
 - case management/care coordination with family/guardian, school, and medical and community services
 - facilitation of transitions between levels, schools, programs, agencies, etc.
 - provision of auditory training, AR, and listening-device orientation and training
 - provision of services that provide habilitative and compensatory skill training to support academic deficits (e.g., reading and writing)
- maintain written records and appropriate/ required documentation
- collect efficacy and outcomes data

Education Management

- demonstrate an understanding of general child development and management and auditory skill development
- assist in program placement as a member of the education team to make specific recommendations for auditory and communication needs
- consult and collaborate with teachers and other professionals regarding the relationship of hearing and hearing loss to communication, physical, psychosocial, cognitive, academic, and vocational development
- ensure support for enhancing the development of auditory functioning and communication skills
- recommend appropriate instructional modifications and classroom accommodations of curricula and academic methods, materials, and facilities
- collaborate with speech-language pathologists, administrators, parents/guardians, teachers, special support personnel, and relevant community agencies and professionals to ensure delivery of appropriate services

Education Law

- demonstrate an understanding of and participate in the IFSP/IEP/504 and other SEA/LEA education program planning processes and procedures

- demonstrate an understanding of legal issues and procedures, especially the legal rights of (and due process for) students, parents/guardians, teachers, administrators, and the SEA/LEA, including the implications of the ADA, IDEA, Section 504 of the Vocational Rehabilitation Act, the Family Education Rights and Privacy Act, and any additional initiatives and mandates (federal, state, and local) related to confidentiality and access to education
- demonstrate an understanding of state mandates and laws that concern the health, development, and education of children

Education and Training

- Provide information and training to teachers, administrators, children, parents/guardians, and other appropriate professionals and individuals regarding:
 - hearing and auditory development
 - hearing loss and/or APD and the implications for communication, learning, and psychosocial development
 - EHDI programs and resources
 - AR services
 - hearing aids, cochlear implants, and HATS
- Train and supervise audiology support personnel (ASHA, 1998)
- Share knowledge of school systems; multidisciplinary teams; and community, national, and professional resources

Counseling

- counsel families/guardians and students with hearing loss and/or APD by giving emotional support, information about hearing loss and its implications, and interaction strategies to maximize communication and academic success and psychosocial development
- possess sensitivity to individual and family/ guardian systems, diversity, and cultures, including Deaf culture
- possess effective interpersonal communication skills
- identify the need for and use the services of interpreters/translators

Classroom Acoustics

- analyze classroom noise and acoustics
- make recommendations for improving the listening environment, and provide information regarding implications for learning
- advocate for and facilitate acoustic accessibility of listening/learning environments

Identification Programs

- establish, administer, and coordinate hearing and/or APD identification programs
- train and supervise audiology support personnel or other personnel, as appropriate, to screen for hearing loss and/or APD

Hearing Loss Prevention/Hearing Conservation

- establish, manage, and implement prevention/ hearing conservation programs

- provide for education of and access to hearing protection devices

EHDI Programs

As EHDI program managers and participants, audiologists who provide services to infants and toddlers should ensure that EHDI programs and/or their components are family/guardian-centered, community-based, fiscally sound, free of ethnic and cultural bias, and appropriately administered. Programs and/ or their components should also embrace the eight principles endorsed by the JCIH that are basic to the development and implementation of any EHDI program (JCIH, 2000). These principles ensure that:

- all infants have access to hearing screening using a physiologic measure
- all infants who do not pass the hearing screening/rescreening are evaluated before age 3 months to confirm hearing loss
- all infants with confirmed permanent hearing loss begin intervention services before age 6 months
- all infants who pass the hearing screen but have high-risk indicators receive ongoing monitoring
- infants' and families' rights are guaranteed through informed choice, decision-making processes, and consent
- privacy and confidentiality are protected
- appropriate systems are used to measure and report the effectiveness of EHDI services

Advocate and Community Resource Liaison

- serve as advocate to ensure that all newborns, infants, toddlers, and children with hearing loss and/or APD are promptly identified, evaluated, and provided with appropriate intervention services
- have knowledge of, work with, and/or work to improve SEA and LEA systems; federal, state, and local initiatives and mandates; multidisciplinary teams; and community, national, and professional resources
- advocate for acoustically favorable listening/ learning environments

Continuing Education

- maintain knowledge base of current trends and research
- comply with continuing education requirements for ASHA certification (ASHA, 2001c) and SEA and state licensure and certification if required.

Audiology Services Delivery

Audiologic needs of children with hearing loss and/or APD can be addressed through a variety of service delivery models. Although implementation of a specific audiology service delivery model may vary, all programs must ensure that LEAs provide the essential service components necessary to meet state and federal education and civil rights statutes, mandates, and regulations. In addition, service delivery models must correlate with the communication, academic, and psychosocial development needs of children with hearing loss and/or APD.

Direct provision of audiology services by audiologists employed by the local or intermediate education agencies (LEA-based) is considered to be the preferred practice. Other models include service contracts with private or public entities or a combination of LEA-based and contracted services. Factors to consider in the selection of an audiology service delivery model include effective or best practices,

the size and needs of the population to be served, equipment and facility resources, accessibility, proximity and timeliness of available services, cost effectiveness, and liability factors.

Service Delivery Models

LEA-Based Audiology Services

Audiology services that are LEA-based are directed and/or performed by audiologists employed by local or intermediate education agencies, cooperatives, or residential programs. LEA-based audiologists should possess the Certificate of Clinical Competence in Audiology (CCC-A) from ASHA and be credentialed according to state certification and/or licensure requirements.

Contracted Audiology Services

Audiology services may be provided by LEAs through contractual agreements with a variety of sources, including for-profit and nonprofit private practitioners, clinics, medical facilities, university training programs, and/or public agencies. Contracts should specify the exact nature of the services to be provided, the names and credentials of the service providers, and timelines and the nature of and requirements for data collection, reporting, consultation, referral, and follow up. Contracts should also include provisions for collaborating with and providing recommendations for/to LEA-based audiologists and other appropriate LEA/SEA personnel and teams. The LEA is responsible for service coordination and seamless delivery of comprehensive audiology services to the school population. This includes not only assessment and technology recommendations, but also services that must be delivered on site (e.g., teacher consultation, direct and indirect intervention services, instruction, measurement of classroom acoustics). The LEA may contract for all audiology services or only those it does not or cannot provide directly. Equipment, supplies, and materials are typically obtained and maintained by the service provider identified in the contract. Contractual audiologists should be ASHA-certified and credentialed according to state certification and/or licensing requirements.

Model Selection Considerations

Determination of the most effective service delivery model should be based on considerations related to the quality and comprehensiveness of the services to be provided; the number, geographic distribution, and population to be served; compliance with local, state, and federal regulations; and cost effectiveness. Whatever delivery model is employed, efforts should be made to avoid unnecessary duplication of readily available services; collaboration between education and community resources is encouraged.

LEA-based audiology services are often more comprehensive and efficient than contracted services, because services are provided directly by audiologists who have constant and easy access to students and well-established daily communication with other education personnel (Allard & Golden, 1991). By virtue of their employment setting, audiologists who are employed by LEAs may show a greater connection or familiarity with the students and LEA they serve.

Contracted audiology services have the potential to be as effective as LEA-based services, but care must be taken to ensure that the contracts are not limited in the provision of comprehensive services. Additionally, timelines, services, reports,

and records must comply with federal, SEA, and LEA requirements. It is critical that contractors understand education policies and procedures, collaboration, and the multidisciplinary approach to service delivery to students with hearing loss and/or APD. In addition, contractors must be aware of the communication, education, and psychosocial development implications of a hearing loss and/or APD in pediatric populations. Reports, collaboration, staff development activities, and recommendations specific to a child and pertaining to associated education issues should be included in all contracts. At a minimum, contracts should outline the timelines and services to be provided and include a requirement for a written interpretation of test results, including a functional description of the child's hearing loss and/or APD, and a written rationale for any recommendations that are provided. This will enable families/guardians and LEA personnel to make informed decisions regarding appropriate intervention services and education planning. Additionally, when contracted services are used, it is critical that the school's responsibility for assessment, hearing aids and HATS, and direct intervention services be differentiated from the parent's/guardian's responsibility. This is necessary to avoid conflict of interest and disputes that arise when the same audiologist fulfills the school contract and provides private audiology services in a community.

Cost effectiveness is another factor in the consideration of a service delivery model. The cost of LEA-based audiology services includes the salaries and fringe benefits of audiology personnel and the purchase of or contracting for use of necessary audiologic equipment and materials. The size and nature of the school population will determine the number of staff members and the equipment needed. Contracted services are typically provided on a fee-for-services basis, which may be calculated in terms of time involved or number of children for whom services are provided. With contracted services, the school is usually not responsible for providing assessment materials or equipment.

Caseload/Workload Recommendations for LEA-Based Audiologists

To ensure that identification; auditory management; and the education, communication, and psychosocial needs of children with hearing loss and/or APD are not neglected, adequate numbers of audiologists must be available to provide services to children. Therefore, fiscal and administrative support must be sufficient to carry out the standards of practice recommended in these guidelines.

A ratio of at least one full-time equivalent (FTE) audiologist for every 10,000 children age birth through 21 years old served by an LEA is recommended to provide screening and basic diagnostic audiologic services (Colorado Department of Education, 1998). When audiologists provide time-intensive services (e.g., direct management/intervention, service to infants and toddlers) and one or more of the factors listed below is present, a caseload ratio of 1:10,000 will be unreasonable and must be reduced. The following is a list of factors that will affect and influence caseload size:

- itinerancy/excessive travel time
- number of schools and LEAs served
- student placements within an LEA
- the number of children with hearing loss and/ or APD
- the number and age of children with other disabilities requiring audiologic assessment and intervention services

- the number of hearing aids, cochlear implants, and HATS in use
- the quantity of tests provided, including auditory processing test batteries
- the number and age of students receiving direct, ongoing audiologic intervention services
- the number of infants and preschoolers receiving assessment and intervention services
- EHDI program responsibilities
- hearing loss identification/prevention/conservation program responsibilities
- the scope of audiologic services provided (e.g., assessment, intervention, hearing aid dispensing)
- the extent of supervisory and administrative responsibilities
- the number of multidisciplinary team meetings and reporting requirements
- in-service training and counseling responsibilities
- other duties assigned that are outside the audiologist's scope of service delivery

Summary

The education needs of children with hearing loss and/or APD are the responsibility of SEAs and LEAs based on IDEA, Section 504, and the ADA. Comprehensive audiology services from birth to age 21 years include prevention, identification, assessment, (re)habilitation and instructional services, supportive in-service and counseling, follow-up and monitoring services, and provision of accessible acoustic education environments. Audiology programs in schools must be supported by adequate qualified personnel, equipment and materials, technical assistance, administrative support, evaluation, and research.

The needs of children with hearing loss and/or APD are diverse. Therefore, a comprehensive team approach that includes LEA-based or contracted audiologists is the only way to ensure that these children receive the most appropriate services. Services for children with hearing loss and/or APD are greatly enhanced when audiologists are integral participants of the education team. Inclusion of audiologists makes possible the proper interpretation and integration of audiologic data into planning for academic programming. Audiologists bring critical and unique skills and knowledge to the education setting, thus ensuring the optimal use of residual hearing and/or listening abilities for auditory learning and communication. Audiology services can be obtained by directly employing audiologists within schools and/or contracting for their services. Regardless of the service delivery system used, adequate numbers of certified, licensed audiologists must be available to provide appropriate and comprehensive audiology services to all infants and children.

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