Early Intervention for Children With Unilateral and Mild Bilateral Degrees of Hearing Loss

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Some children with unilateral hearing loss or mild bilateral hearing loss are at risk for developmental delays, educational difficulties, and other adverse effects. However, these children face several challenges in receiving services that can prevent such problems. Many do not meet existing eligibility requirements for early intervention services in their state. Information disseminated to professionals and parents often does not convey the significance of unilateral and mild bilateral hearing loss. Some professionals indicate that there are insufficient guidelines defining appropriate intervention services for these children. Factors that

influence developmental outcomes in this population are not well understood, making it difficult to determine which children can benefit from intervention services. Additional data are needed about how to minimize or prevent adverse outcomes in these children. This article presents suggestions for intervention and future research that were developed by participants of the 2005 National Workshop on Mild and Unilateral Hearing Loss.

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Developmental delays and educational problems in children with unilateral hearing loss (UHL) or mild bilateral hearing loss (MBHL) have been reported since the 1930s.¹ In the 1980s, Bess

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and Tharpe^{2,3} began a series of studies on the consequences of minimal hearing loss in children. Since then, several studies have documented the problems that children with UHL and MBHL can encounter in speech, language, academic achievement, and psychosocial development. These studies are summarized in a separate article in this issue by Tharpe titled "Minimal and Mild Hearing Loss in Children: Past and Current Perspectives."

This article provides an overview of federal and state funded early intervention (EI) providers for infants and children with hearing loss and EI techniques that should be considered for children with UHL or MBHL. It also reports on recommendations for additional research that resulted from the 2005 National Workshop on Mild and Unilateral Hearing Loss. The goal of that workshop was 2-fold: (1) to develop guidance for policy makers, early hearing detection and intervention (EHDI) program staff, Part C and B service coordinators and providers, physicians, audiologists, parents, and other interested parties

about the identification of and appropriate intervention for children with UHL or MBHL and (2) to increase awareness of the significance of UHL and MBHL among professionals and families.

Early Intervention Providers

Part C and Section 619 of Part B

The primary providers of federal and state funded EI services are Part C and Part B of the Individual with Disabilities Education Improvement Act of 2004 (IDEA). This act is a federally funded program that provides 3 types of special education grants to states: school age, preschool, and infants or toddler. These 3 grant programs provide supplemental funds that are combined with state resources to provide special education services. School-age grants and preschool grants are under Part B of IDEA and have similar goals and eligibility criteria. There is an overlap between the school-age grants and preschool grants, where school-age grants serve children from 3 to 21 years of age, and preschool grants (Section 619 of Part B) serve children from 3 to 5 years of age. Services for infants and toddlers (0 to 3 years of age) are provided under Part C. A major difference between Part B and Part C programs is that Part C programs also provide support services for families of infants and toddlers who have a developmental delay or who are at risk of development delays.⁴

Part B and Part C grants also differ in eligibility criteria. The general eligibility criteria for Part B is a child with a disability (3 through 21), or with developmental delay (3 to 9 only) who, as a result, needs special education and related services. Disability categories include mental retardation, hearing, vision, or speech impairment, emotional disturbance, orthopedic impairment, autism, traumatic brain injury, other health impairments, specific learning disability, or multiple disabilities.⁵ States may choose whether or not to use the terms “developmental delay” as part of their eligibility criteria. The states that use these terms must choose the age range to serve and to define the criteria of developmental delay. In all, 37 states use the term “developmental delay.” Definitions for each state and age range served can be found on the National Early Childhood Technical Assistance Center (NECTAC) Web site at www.nectac.org.

Eligibility criteria for Part C include children who are experiencing developmental delays and children who have a diagnosed mental or physical condition

which has a high probability of resulting in developmental delay. In addition, states may choose to serve children who are “at risk of experiencing a substantial developmental delay if EI services are not provided.”⁶ Each state and territory creates its own definition of developmental delay and identifies procedures to determine eligibility. Part C of IDEA specifies the following areas of development that are to be included: cognitive, physical, communication, social or emotional, and adaptive development. Some states use quantitative criteria, such as the difference between chronological age and performance, number of months functioning below chronological age, or standard deviations below the norm. Other states choose to use qualitative measures, such as atypical development or behavior. Definitions for each state can be found in the notes by Shackelford in 2006.⁶ Some state definitions include specific language for eligibility of children with hearing loss. Information about the different Part C eligibility definitions related to hearing loss in each state can be found on the NECTAC Web site. Each state has a coordinator for Part C and Section 619 of Part B.⁷ Referrals to these programs can be made and information can be obtained by direct contact with state coordinators.

Rehabilitation Act: Section 504

A child who does not qualify for special services under Part C or Part B of IDEA but has a mental or physical impairment that significantly limits his or her life activities, such as hearing, speaking, or learning, may qualify for special accommodations in a general education classroom under Section 504 of the Rehabilitation Act of 1973.⁸ Section 504 ensures that children with a disability can take part in, and can receive benefits from, public education programs without discrimination because of their disability. It also entitles them to reasonable accommodations, such as extended time on tests and homework, use of a computer or calculator, and special seating.

Unlike IDEA, which provides specialized instruction to remediate disabilities, Section 504 is solely focused on discrimination regarding equal access to learning. Individuals with Disabilities Education Improvement Act defines specific disabilities and entitles eligible students to special education and related services. Students considered as disabled under Section 504 can be determined eligible under broader disability criteria. Under Section 504, the term “individual with a disability” includes a child who has a physical or mental impairment, which substantially limits 1

or more of a person's major life activities; has a record of such an impairment; or is regarded as having such an impairment. An Individualized Education Program (IEP) is designed for each special education student under Part B of IDEA, whereas a 504 plan outlines the reasonable modifications and/or accommodations under the provisions of the Rehabilitation Act of 1973 to assist students with special needs who are in a regular education setting.⁸ For example, to assure a "free appropriate public education" the IEP team could determine that a child with a mild hearing loss requires an Frequency-modulated (FM) system as an assistive technology device under either a special education or a related service. A 504 plan could be developed for a child with a mild hearing loss, who has been determined ineligible for special education; such plans could include appropriate teaching accommodations, preferential seating, and classroom-listening equipment.

Other EI-Providers

Some states have private and other state-funded programs for children with mild or unilateral hearing loss who do not meet the eligibility requirements of Part C, Part B, or 504 plan. For example, many states have schools for the deaf, which provide monitoring services, home visits, and information and support for families. Some State Departments of Health also provide monitoring and support services through programs such as the Children With Special Health Care Needs. Information on programs available for children with hearing loss can be obtained by contacting the state's EHDI program coordinator. A list of these coordinators is available online at www.cdc.gov/ncbddd/ehdi/documents/EHDI_Contact.pdf

Challenges to Providing Services for Children With UHL and MBHL

Eligibility Requirements and Availability of Services

Although UHL and MBHL can adversely affect a child's development, obtaining intervention services through Part C and Part B programs for these children can be a challenge. Eligibility requirements differ by state, resulting in some children with UHL and MBHL not qualifying for the EI services. At present, only slightly more than half of the states

have language in their legislation or regulations that extends coverage for intervention services to children with mild, unilateral, or any hearing losses.⁷ When states and territories do not include UHL and MBHL in their Part C and Part B eligibility criteria, it is difficult for children with these losses to receive intervention unless their families pay for private services. Some states do provide services for children with UHL and MBHL under the "at-risk" category of Part C or through other state programs. This is a proactive approach to children with UHL or MBHL based on the determination that there is sufficient risk for future delay or deficits to warrant preventative EI. This proactive approach differs significantly from a failure-based model, wherein children are not given intervention until significant delays are evidenced. Changing each state's eligibility criteria to infants and children with any degree of hearing loss would be needed to ensure equal access to EI regardless of demographics. However, it is unlikely that all states can expand their eligibility criteria to include all the children with hearing loss until more empirical evidence linking UHL and MBHL to developmental delays in early life is widely disseminated. Additionally, research regarding the efficacy of EI with infants and young children with MBHL and UHL in the prevention of later-onset developmental or academic deficits is also needed.

Limited Knowledge About Appropriate Services

Best practices for developmental and audiologic intervention for children with UHL and MBHL are often unknown or unclear to professionals, primarily because of a lack of supportive efficacy studies. Some interventionists, teachers, and therapists working with children with UHL and MBHL also lack the necessary knowledge, skills, and expertise in hearing loss (eg, assessing functional auditory skills, monitoring amplification, providing speech-language stimulation) that are needed to provide effective EI for these infants and children. Additionally, ambiguities regarding what constitute appropriate services for children with UHL and MBHL can interfere with quality service provision.

For example, it can be beneficial for some children with UHL or MBHL to be aided or to receive speech and language services or both, whereas other children may not receive such benefits. It is clear that the audiogram alone is not sufficient for determining which children are at risk for developing

speech-language delays and/or later academic problems. Other intrinsic and extrinsic factors such as cognitive abilities, existence of co-occurring developmental disabilities, socioeconomic status, abundance of language stimulation in the home, quality of the child care environment, and recurrent otitis media with effusion may significantly affect the outcomes for children with MBHL and UHL.⁹⁻¹³

Misunderstood Terminology

Parents and professionals often interpret the terms "mild" or "minimal" hearing loss to mean that the hearing loss is insignificant; therefore, they may believe the child is not at risk for developmental delays and does not require EI.¹⁴ Information and materials disseminated to professionals, preprofessionals, and parents often do not accurately describe the significance and possible implications of UHL and MBHL. It is important that the potential effect of UHL and MBHL be clearly understood if mild and unilateral losses are to be recognized as significant and therefore taken seriously by professionals and parents alike.

Services Lost During Transition

Transition from Part C to Part B services is another challenge often faced by children with UHL or MBHL and their families. Young children with hearing loss face a significant transition as they approach their third birthday. Children are eligible for Part C services only until 36 months of age. Eligibility requirements for the intervention services under Section 619 of Part B, which serves preschool children 3 years of age to 5 years of age, are frequently more restrictive than the requirements of Part C, which serves infants and toddlers. As a result, many preschool children with UHL and MBHL lose access to state intervention services at 3 years of age. For example, a child with a mild or unilateral hearing loss who has been enrolled in Part C may be functioning within normal limits or may have only a slight delay. However, the eligibility criteria for some Part B programs require that the child have a disability or developmental delay of 1.5 or even 2 standard deviations below the norm. Therefore, a child who is functioning within normal limits or who is determined to have only a slight delay in the infant-toddler period would not be eligible for Part B services as a preschooler. This is disturbing because the

preponderance of the evidence currently available on children with UHL and MBHL suggests that performance deficits are apparent in children with UHL and MBHL when they are confronted by the listening environment and demands of the academic environment.¹⁵ It may be because similar to children with early transient hearing loss due to otitis media with effusion, there are periods in which the effects of the mild hearing loss are more or less apparent depending on the listening and language demands placed on them.¹⁶

Although Part C requires that a transition plan should be part of the Individualized Family Service Plan, the transition can often leave the children with UHL and MBHL and their families with limited or no services from the state. A few states have initiated policies to close this gap in services. For example, children enrolled in Part C in Florida can be temporarily assigned to preschool education for a 6-month period. Colorado encourages Part C and B dual eligibility at 2 years of age, so loss of services at 3 years of age can be avoided.⁵

Lack of Knowledge About Which Children Need Intervention

The provision of intervention services is further complicated by a lack of understanding about the factors associated with both typical and atypical developmental outcomes for infants and children with UHL and MBHL. This makes it difficult to determine which infants and children with UHL and MBHL might benefit from EI. Because it is not yet possible to determine which children with UHL or MBHL will experience negative educational or psychosocial outcomes, monitoring through a developmental diagnostic process should be considered. This process should include diagnostic tests that are standardized for children without hearing loss, are norm referenced, and have an acceptable sensitivity and specificity. They should also measure skills in multiple developmental domains related to hearing, including speech, language, and functional listening skills at home, in school as well as in the clinical environment. At present, there are no federally endorsed standards or recommended diagnostic tests to use in the assessment of children with UHL and MBHL. Each individual state is responsible for deciding the test(s) they will use to assess these children.

During the provision of EI services, a multidisciplinary team should continue to monitor and assess

the skills, abilities, and needs of the child. Speech, language, and auditory development, along with other developmental domains such as vision, cognition, and motor skills, should also be monitored because children with hearing loss are at increased risk for secondary disabilities.¹⁷

What Can Be Done

A review of the literature and opinions expressed by professionals who attended the July 2005 National Workshop on Mild and Unilateral Hearing Loss—sponsored by the Centers for Disease Control and Prevention and the Marion Downs Hearing Center and the Joint Committee on Infant Hearing 2007 Position Statement¹⁸—advocate that it is important for children with UHL and MBHL to receive EI services. Similar to finding by Bess et al,¹⁵ a recent study by Most¹⁹ indicates the need for EI for mild and unilateral hearing loss by making the statement “children with unilateral and minimal hearing losses have lower functioning than those with more severe hearing loss.” The author suggests the reason for this was that children with more severe hearing losses were identified at an earlier age and received more services.¹⁹ At a minimum, families of children with UHL and MBHL should receive information and support services. This should include teaching skills that can help parents observe and assess their child’s progress and can provide EI activities that facilitate development. Their children should also receive monitoring related to the child’s degree of hearing loss and developmental progress. Monitoring auditory status is important due to the possibility that children with mild hearing losses are at risk for progression to greater degrees of loss. Clinical evidence also suggests children with UHL are at risk for developing bilateral hearing loss.²⁰

However, the possible compounding of the hearing loss due to transient or persistent otitis media with effusion (OME) is of greater concern. Because children within the first 3 years of life are at increased risk for as much as 10 to 40 dB additional hearing loss associated with OME, MBHL and UHL can become moderate or greater impairments.²¹ A history of OME also puts a child at increased risk for future episodes, for some well into the school years.²²

The child’s developmental status (speech, language, vision, cognition, social development, and motor skills) should be monitored to adjust EI activities as needed. Audiologists have a role to play in evaluating

children’s functional auditory abilities, a routine component of each audiologic evaluation. The information about hearing status and functional auditory abilities should be imparted to EI providers.

Children with UHL or MBHL may need special help in using amplification and in developing communication skills in less-than-optimum acoustic environments to facilitate the acquisition of cognitive, behavioral, preacademic, and social skills. Early intervention services for children with hearing loss should include, but not be limited to, amplification services (including personal and FM for trial periods) and developmental intervention. Detailed information about amplification options for children with UHL and MBHL is provided in another article in this issue by McKay, Gravel, and Tharpe titled, “Amplification Consideration for Children with Minimal or Mild Bilateral Hearing Loss and Unilateral Hearing Loss”.

Developmental Intervention

Although there is a lack of published guidelines for working with infants and children with mild or unilateral hearing loss, enough information is currently available to initiate EI services as soon as the hearing loss is identified. Numerous general principles of intervention that apply to most children with a disability, such as providing information to families and creating an environment conducive to a child’s development, can be tailored to children who have UHL or MBHL. These practices when applied to children with UHL and MBHL include the following: (1) providing information to families, so that they understand the implications of the hearing loss and can become knowledgeable and skilled at observing and communicating with their child; (2) creating an environment that is acoustically friendly and that encourages learning by reducing background noise, distance, reverberation, adding carpeting and drapes, etc; (3) using the infant’s cues to facilitate reciprocal communicative interactions between provider and child; and (4) adjusting intervention activities to accommodate a child’s interests.

The following specific strategies for infants and children with UHL or MBHL are based on the literature review and the EI recommendations made at the 2005 National Workshop.

- Parent-to-parent support: Providing parents with contact information for organizations of parents with children who have UHL or MBHL.
- Support to child care providers: Provide information about the effect of UHL and MBHL to any

child care providers with which the child with hearing loss may come in contact.

- Getting the child's attention before talking to him or her: Get the child's visual attention (ie, make eye contact), then make sure that the child is able to listen before speaking; make your voice a little louder.
- Focusing on adapting the environment for optimal opportunities to hear: Examples include, minimizing background noise that may interfere with listening; for children with UHL, making sure the better hearing ear is facing you when you speak to the child; provide carpeting in the classrooms or cover the bottom of chair legs with felt or other soft but durable materials, and providing appropriate amplification; be sure there is good lighting.
- Providing visual clues such as gestures, pictures, or written instructions for children who can read; let the child see your lips or the noisemaker.
- Engaging in face-to-face contact with the family (in contrast to monitoring by phone and mail, which makes the condition seem less important).
- Presenting an unbiased list of intervention approaches that includes information about speech and language development, functional auditory skill development, amplification, and visual forms of communication.

Future Research

Although the potential adverse effects of UHL or MBHL in children are documented, the efficacy of intervention needs further examination. For example, although the ability of a child with UHL or MBHL to perceive speech in ambient noise can be improved with the use of FM system technology,²³⁻²⁵ extensive research is needed to examine the relationship between improved speech perception and improved psychoeducational or psychosocial outcomes. Furthermore, there is a need for more empirical study to show how interventions such as hearing aid usage or early speech and language stimulation might prevent the potentially negative effects of UHL and MBHL. Attendees at the 2005 National Workshop on Mild and Unilateral Hearing Loss encouraged new research in the following areas:

- Developmental intervention
- Determine the short-term and long-term efficacy of providing EI programming to infants and toddlers with UHL or MBHL.
- Conduct prospective research to identify which children with UHL or MBHL have a high likelihood of experiencing developmental delays.

- Survey parents of children with UHL or MBHL to identify desired service delivery models.
- Survey state Part C and Part B agencies to determine eligibility of infants and children with UHL or MBHL for services.
- Survey state Part C and Part B agencies to describe the range and intensity of services offered to infants and children with UHL and MBHL.
- Hearing technology for infants and children with UHL or MBHL
- Compare developmental outcomes for infants and young children who use amplification (FM systems and hearing aids) and those who do not.
- Determine the efficacy of nontraditional amplification systems (eg, bone-anchored hearing aids, FM systems, and transcranial aids) in the pediatric population.
- Examine the use of directional microphones in young children with UHL or MBHL.
- Determine the limits of aidable hearing for infants and children who have varying degrees of unilateral pure-tone hearing loss and speech-perception ability.
- Develop more sensitive, age-appropriate, valid, and norm-referenced outcome measures and functional auditory assessments for children with UHL or MBHL, especially for the population younger than 3 years of age.

Conclusions

Unilateral hearing loss of any degree and MBHL are relatively common conditions of childhood that may adversely affect the child's development or school performance. It is the position of participants in the 2005 National Workshop on Mild and Unilateral Hearing Loss that, despite the dearth of efficacy data on intervention practices, infants and children with these hearing losses should be identified and should be offered appropriate EI services as soon as possible based on the high percentage of children with MBHL and UHL at school age that demonstrate psychoeducational and social problems.¹⁵

For children and families to receive appropriate intervention, current services for children with mild or unilateral hearing loss need to be expanded and new services need to be developed. New curriculum materials that provide information on how to intervene with infants and children with MBHL or UHL need to be developed. In addition to the development of materials, professionals need to be informed about the effect of mild and unilateral hearing loss and should receive appropriate training.

Communication between programs and agencies can facilitate the exchange of information and can help ensure that infants and children with these hearing losses are identified early and receive appropriate intervention, communication, and audiologic monitoring services. It is as a result of such cooperative and proactive efforts that profiles of these children will inform the development of evidence-based best practices.

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