Audiological Management of Hearing-Impaired Babies and Toddlers: A Teacher's Perspective

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As audiologists know only too well, it is often extremely difficult to obtain reliable hearing thresholds from infants and toddlers. Frequently hearing aids must be fitted on the basis of very sketchy audiological information. Even so, it is crucial to a hearing-impaired child's speech and language development to achieve optimal amplification as early as possible. Otherwise precious verbal language learning potential may be underused. This paper provides suggestions for obtaining more accurate and relevant audiological results earlier, placing particular emphasis on the teacher's potentially valuable role in this regard.

For a hearing-impaired child to benefit maximally from amplification, the audiologist and the teacher must have a working knowledge of the important aspects of each other's job. Audiologists can help teachers of the hearing-impaired become more effective and can use teachers more effectively in the following ways:

1. Provide in-servicing to teachers on aspects of the audiologist's job about which teachers are likely to be poorly informed. Advantages and limitations of Brain Stem Evoked Response testing, the process of hearing aid selection, fitting and fine-tuning of hearing aids, interpretation of hearing aid specifications, and electroacoustic analysis of hearing aids are areas in which teachers' knowledge often is very limited. Many teachers do not know what auditory performance to expect from a child with a presumed degree of hearing loss and a given hearing aid set at a specific given tone, gain, and output. Uninformed teachers will lose important opportunities to provide audiologists with information needed for the fine-tuning of amplification.

2. Invite the teacher to the initial hearing aid fitting. During or shortly after the fitting, particularly if the teacher has not been able to be present, provide her with pertinent information about the hearing aids: brand and model, serial numbers, tone, gain and maximum output settings, recommended volume, and earmold fit. If the child has had a problem with middle ear infections, this fact should be pointed out. The teacher is likely to have more contact with the child and family than the audiologist and will be able to answer the family's questions better if she knows how the hearing aids have been adjusted and why. Her presence at the fitting will ensure consistency of information provided to the family.

3. Involve the teacher directly in subsequent audiological testing by requesting her presence in the sound suite with the child. Her greater knowledge of the child's usual performance will assist the audiologist in interpretation of the child's responses. If the child has been trained at this point for play audiometry, a skilled teacher will help keep the child motivated and on task during this testing.

4. Use the teacher to train the child to perform the play audiometry task from a very early age. With consistent practice a child can usually perform this task reliably in the test suite by 18 to 24 months of age. Long before the skill has been firmly established, however, the child can provide the teacher with useful information during therapy sessions. This will be discussed further in a later section.

5. Welcome feedback from the teacher on the child's middle ear functioning. If the teacher suspects a problem, try to make time to perform a quick tympanogram and otoscopic inspection. Better still, train the teacher to perform these tasks. A quick return to normal middle ear function is important, because abnormal function may cause hearing levels to drop temporarily, and a child's listening ability will be compromised. In children with severe and profound hearing losses, residual hearing may drop beyond a usable range while middle ear pathology is present.

6. Request information from the teacher on the child's performance on various listening tasks, for example, phoneme discrimination, imitation, and selection on demand. The child's speech errors also may be very telling. These points will be discussed in more detail below.

The teacher of the hearing-impaired can make an important contribution to a child's audiological management in the following ways:

1. Become thoroughly informed about the child's audiologic status and hearing aids with the help of the audiologist. Request in-servicing on these subjects.

2. Invite the audiologist to observe the occasional therapy session. If the teacher has any specific concerns, she can try to arrange for the audiologist to watch for them during a particular session. Increased exposure to a hearing-impaired child will help an audiologist in the interpretation of that child's responses during testing.

3. Train the auditory conditioning task daily, right from babyhood before 1 year of age. Long before the child can be trained to respond reliably using play audiometry, variations of this task can yield useful information that should be passed on to the

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audiologist. Using the vowels of Ling and Ling's (1978) *Five Sound Test* ([u], [a], and [i]) and later, the consonants [ʃ] and [s], parent and teacher can perform a listening game: teacher saying a sound and parent responding, for example, by putting a stacking ring on a stick. The child is placed facing away from the speaker. An interested 9-month-old child, even profoundly hearing-impaired, usually will indicate he has heard a particular sound by turning towards the speaker and later, after continued exposure, by turning first to the speaker and then towards the parent in anticipation of the ring being put on the stick. Once a child has responded at least to vowel sounds, his responses to more frequency-specific auditory stimuli can be assessed by playing the same listening game using a hand held or small infant audiometer that emits tones and does not require headphones. By 15 to 18 months, most children will be able to participate themselves in the listening game. At first they will need a restraining adult hand as they hold the stacking ring to their ear in eager anticipation of the stimulus sound. Although responses will still be unreliable, the teacher will nonetheless be able to gain an impression, over time, for whether a child usually responds to a particular stimulus; she then can convey her impressions to the audiologist. By 18 to 24 months, a child will respond reliably enough to start performing play audiometry in the test suite.

4. Train the child to perform a simple auditory-only selection task as soon as the child shows comprehension of four or five easy-to-hear very different speech sounds, each paired with a meaning, for example, [uuu...] for a train; [bababa...] for a boat; and [aaa...] for an airplane. Most children who can hear these sounds are able to select the corresponding objects on demand by age 12 to 15 months, after daily practice over a few weeks. Often young children can be trained to perform reliably on this selection task before they can perform as well on an imitation task or play audiometry. Therefore, a simple auditory selection task can yield useful information about the child's ability to detect and discriminate sounds at this very early stage. This information can be particularly useful in the case of a profoundly hearing-impaired child who has not responded to Brain Stem Evoked Response testing at all and whose responses to Visual Reinforcement Audiometry have been questionable.

5. Every hearing-impaired child should be encouraged, as soon as he can use a few words expressively, to imitate those words on demand using audition alone. This skill, if trained, usually emerges between ages 15 and 18 months. When the repertoire of phonemes contains two or three vowels and as many consonants, imitation of these mastered phonemes in babbled nonsense syllables should be elicited, again, by audition alone. Performance on imitation tasks gradually will become more and more reliable as the child improves his auditory attention through daily practice. Errors on imitation tasks may signal problems with the child's amplification. If, for example, a child consistently imitates [u] when the teacher has said [i] in babble or words, her knowledge of acoustic phonetics should suggest to her that perhaps insufficient high-frequency information is being perceived. If a child repeatedly confuses [b] and [m], this might indicate a problem with perception of low-frequency information. The audiologist needs to be alerted to the teacher's impressions in order to be able to act promptly in determining whether alterations to the amplification are appropriate and possible. Substitutions and omissions in the child's spontaneous speech, usually replicable in an imitation task as described above, also may point to a need for further fine-tuning of amplification.

6. Use an auditory approach to the greatest degree possible for the development of speech and language. A young child, who has learned new phonemes, linguistic structures, and vocabulary through audition alone and who is expected to use audition alone in ideal listening conditions, will gain not only skill but also confidence in listening. Audiological testing on a skilled, confident listener will be easier and more accurate.

7. Learn to troubleshoot hearing aids and earmolds, and teach parents to do so daily. Alert the audiologist immediately if a hearing aid is not working properly or if an earmold does not fit well enough for the hearing aid to be worn at the recommended volume without feedback.

8. Alert the audiologist if a baby or toddler constantly tries to remove the hearing aids, even after a month or so of determined effort by the parents to keep them on during all the child's waking hours. If middle ear pathology and irritation to the ear canal by the earmold can be ruled out, then non-compliance could mean that a child is not hearing enough with his hearing aids to be interested in the sounds they produce, and therefore simply finds them bothersome. Conversely, a child could be suffering from recruitment and find the level of amplification painful. In either case, adjustment of the hearing aids needs to be considered by the audiologist.

9. Be appreciative of the audiologists' efforts and understand their frustrations while you ensure that they receive the wealth of information that you, the teacher, can offer them.

A closer liaison between audiologists and teachers of the hearing-impaired would enable audiologists to obtain more precise information about hearing status at an earlier age thereby permitting better amplification for babies and toddlers. Better hearing aid fittings would enhance auditory, speech, and language development and would increase the effectiveness of the auditory-verbal approach.

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