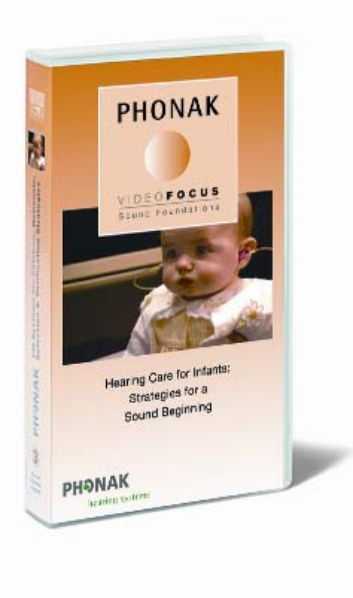
Hearing Care for Infants: Strategies for a Sound Beginning



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This booklet is intended to serve as a supplement to the Phonak Video Focus *Hearing Care for Infants: Strategies for a Sound Beginning*. The video was designed to provide a model for the components of care needed in the first year of life following referral from newborn hearing screening for infants with sensory (cochlear) hearing loss (hearing healthcare services). This booklet is divided into eight sections corresponding to the individual chapters in the DVD.

1. Introduction
2. Screening
3. Comprehensive Audiologic Assessment and referral for otologic evaluation
4. Hearing Instrument Fitting and Verification
5. Hearing Instrument Orientation
6. Behavioral Audiologic Assessment and Follow-up
7. Functional Assessment and Advanced Technologies
8. Other Considerations

Introduction

To be effective and responsive to the needs of the family, a program of services must be: multidisciplinary, technologically appropriate, and sufficiently flexible to meet the changing needs of each family. Optimal infant hearing healthcare services include:

- Hearing screening within one month after birth
- Comprehensive audiologic and otologic evaluation by three months of age
- Hearing instrument fitting and orientation no later than six months of age
- Enrollment in early intervention services no later than six months
- Parent counseling and support
- Developmentally appropriate behavioral assessment
- On-going audiologic follow-up that includes monitoring of middle ear function

Readings

Joint Committee on Infant Hearing. Year 2000 Position Statement: Principles and guidelines for early hearing detection and intervention programs. *American Journal of Audiology.* 2000; 9: 9-29.

Yoshinaga-Itano, C. The social-emotional ramifications of universal newborn hearing screening, early identification and intervention of children who are deaf or hard of hearing. In R. Seewald and J. Gravel (eds.), *A Sound Foundation Through Early Amplification 2001: Proceedings of a Second International Conference*. (pp. 233-250). Stäfa, Switzerland: Phonak AG, 2001.

Screening

Two technologies are used for newborn hearing screening: evoked otoacoustic emissions and the auditory brainstem response. Some hospitals use a combination of the two screening technologies. If an infant does not pass the hearing screening in the hospital nursery, many programs recommend re-screening within one month after hospital discharge. If an infant does not pass the re-screening, referral is made for a comprehensive audiologic evaluation. Multiple re-screenings can delay the confirmation of hearing loss and should be avoided.

Readings

American Speech-Language-Hearing Association. Guidelines for audiologic screening of newborn infants who are at risk for hearing impairment Rockville, MD: ASHA, 2001.

Centers for Disease Control and Prevention. National Center for Birth Defects and Developmental Disabilities, Early Hearing Detection and Intervention Program. *Early Hearing Detection and Intervention Program Guidance Manual.* March, 2003.

Gorga MP and Neely ST. Cost-effectiveness and test-performance factors in relation to universal newborn hearing screening. *Mental Retardation and Developmental Disabilities Research Reviews*. 2003; 9(2):103-8.

Hall, JW, Smith, SD and Popelka, GR. Newborn hearing screening with combined otoacoustic emissions and auditory brainstem response. *Journal of the American Academy of Audiology* 2004; 15: 414-425.

White KR. The current status of EHDI programs in the United States. *Mental Retardation and Developmental Disabilities Research Reviews.* 2003; 9(2):79-88.

Web Resources

National Center for Hearing Assessment and Management, Utah State University. www.ncham.org.

Marion Downs National Center for Infant Hearing, University of Colorado. www.colorado.edu/slhs/mdnc

United Kingdom: Newborn Hearing Screening Programme www.nhsp.info

Comprehensive Audiologic Assessment

Comprehensive assessment of infants referred from newborn screening primarily involves physiologic and electrophysiologic measures including application of the auditory brainstem response, evoked otoacoustic emissions testing, and acoustic immittance measures. Successful completion of the initial comprehensive assessment by three months of age is facilitated by the increased the likelihood of the infant sleeping quietly through:

1) Informing parents of the need to have the infant ready to sleep soon after arrival in the clinic

2) Timed feeding so the infant is ready to eat shortly before testing begins.

Use of Sedation. If the infant is active and unable to sleep during the evaluation, testing should be rescheduled. For infants older than three months of age, it may be necessary to use sedation during the auditory brainstem response test. This is the case when appointment times are not flexible in time or duration and thus, cannot accommodate the infant's normal sleep/wake schedule. Established guidelines should be carefully followed whenever sedation is used.

Readings

American Academy of Pediatrics, Committee on Drugs. Guidelines for monitoring and management of pediatric patients during and after sedation for diagnostic and therapeutic procedures. *Pediatrics.* 1992; 89: 1110 –1115.

American Academy of Pediatrics, Committee on Drugs. Guidelines for monitoring and management of pediatric patients during and after sedation for diagnostic and therapeutic procedures: Addendum. *Pediatrics.* 2002; 110: 836-838.

ABR Assessment Protocol. Diagnostic auditory brainstem response (ABR) assessment should be completed with click stimuli and with frequency-specific (tone burst) stimuli. Air conduction thresholds should be obtained for low, mid, and high frequency tone burst stimuli. Once frequency-specific thresholds have been obtained, high intensity clicks are used to assess neural integrity. When air conduction testing reveals a hearing loss, testing should be completed with bone conducted stimuli to determine if the hearing loss is conductive, –cochlear (sensory) or mixed (conductive and sensory). Results of the high intensity click ABR are used in the diagnosis of neural hearing loss. A comprehensive ABR assessment allows the audiologist to develop estimates of the infant's hearing thresholds for the purpose of hearing instrument fitting and medical referral.

Readings

Cone-Wesson, B and Ramirez, GM. Hearing sensitivity in newborns estimated from ABRs to bone-conducted sounds. *Journal of the American Academy of Audiology.* 1997; 8: 299-307.

Foxe, JJ and Stapells, DR. Normal infant and adult auditory brainstem responses to bone-conducted tones. *Audiology.* 1993; 32(2): 95-109.

Gravel, JS and Hood, L J. Pediatric audiologic assessment. In F. Musiek & W. Rintelmann (eds.), *Contemporary perspectives in hearing assessment* (pp. 305-326). Boston: Allyn & Bacon, 1999.

Sininger, YS, Abdala, C and Cone-Wesson, B. Auditory threshold sensitivity of the human neonate as measured by the auditory brainstem response. *Hearing Research.* 1997; 104: 27-38.

ASHA. Guidelines for the Audiologic Assessment of Children from Birth to 5 Years of Age. Available at http://www.asha.org/members/deskref-journals/deskref/default. 2004.

Stapells, DR. Frequency-specific evoked potential audiometry in infants. In R. Seewald (ed.), *A Sound Foundation Through Early Amplification: Proceedings of an International Conference*. (pp. 13-31). Stäfa, Switzerland: Phonak AG, 2001.

Auditory Steady State Response. ASSR technology is now available for clinical use. As with the auditory brainstem response, the auditory steady state response is an electrophysiologic measure that provides frequency-specific threshold information. It may also help to distinguish between infants with severe and profound hearing loss. Research continues on this promising new test. In the meantime, frequency specific ABR remains an essential component of the comprehensive audiologic test battery

Readings

Gorga, MP, Neely, ST, Hoover, BM, Dierking, DM, Beauchaine, KL and Manning, C. Determining the upper limits of stimulation for auditory steady-state response measurements. *Ear and Hearing.* 2004; 25(3):302-307.

Luts, H, Desloovere, C, Kumar, A, Vandermeersch, E, and Wouters, J. Objective assessment of frequency-specific hearing thresholds in babies. *International Journal of Pediatric Otorhinolaryngology.* 2004; 68(7): 915-26

Picton, TW and John, MS. Avoiding electromagnetic artifacts when recording auditory steady-state responses. *Journal of the American Academy of Audiology.* 2004; 15(8): 541-54.

Stapells, DR. Current status of the auditory steady-state response and tone-evoked auditory brainstem response for estimating an infant's audiogram. Presentation at the Sound Foundation Through Early Amplification Conference. Chicago, November 2004.

Acoustic Immittance Measures. Tympanometry, an objective measure of middle ear function, is an important component of the pediatric test battery; however, obtaining valid tympanograms in the young infant requires special consideration. Tympanometric measures obtained before the age of four months should employ a 1000-Hertz probe tone instead of the standard 226-Hertz probe tone.

Readings

Margolis, RH, Bass-Ringdahl, S, Hanks, WD, Holte, L and Zapala, DA. Tympanometry in newborn infants:1 kHz norms. *Journal of the American Academy of Audiology*. 2003; 14(7):383-92.

Otoacoustic Emissions. OAE testing should be included in the comprehensive audiologic evaluation. A test battery that includes OAEs along with ABR and tympanometry will allow the audiologist to determine whether the infant has normal hearing, cochlear, conductive, mixed or neural hearing loss, as well as the degree and configuration of the impairment.

Readings

Gorga, MP, Neely, ST, Ohlrich, B, Hoover, B, Redner, J and Peters, J. From laboratory to clinic: A large scale study of distortion product otoacoustic emissions in ears with normal hearing and ears with hearing loss. *Ear and Hearing.* 1997: 18: 440-455**.**

Harrison, WA and Norton, SJ. Characteristics of transient evoked otoacoustic emissions in normal-hearing and hearing-impaired children. *Ear and Hearing.* 1999; 20(1): 75-86.

Stover, L, Gorga, MP, Neely, ST and Montoya, D. Toward optimizing the clinical utility of distortion product otoacoustic emission measurements. *The Journal of the Acoustical Society of America.* 1996; 100(2, Pt 1): 956-67.

Otologic Examination.The otologic examination performed by an otolaryngologist familiar with the special needs of infants and young children with hearing loss is a critical component of the hearing healthcare program. The otolaryngologist conducts a physical examination and may recommend additional procedures including: radiologic evaluation, genetic testing and counseling, referral to ophthalmology for eye examination, electrocardiogram, and laboratory

studies. It is often possible to schedule the otologic evaluation on the same day as diagnostic audiologic testing. If this is not possible, an appointment for this purpose should be scheduled as soon as possible, so as not to delay the hearing aid fitting.

Readings

Joint Committee on Infant Hearing. Year 2000 Position Statement: Principles and guidelines for early hearing detection and intervention programs. *American Journal of Audiology.* 2000; 9: 9-29.

ASHA. Guidelines for the Audiologic Assessment of Children from Birth to 5 Years of Age. Available at http://www.asha.org/members/deskref-journals/deskref/default. 2004.

Informing Parents. Upon completion of the comprehensive audiologic evaluation, results should be discussed with the family. For most families the diagnosis of permanent hearing loss evokes a complex range of emotions and for nearly all families the experience is unfamiliar and stressful. Although a full discussion of this topic is beyond the scope of this video, it is essential that communication with families be handled with skill and sensitivity. Indeed, the long-term success of audiologic management is often the result of a positive interaction with the family during this initial visit. Each family's reaction to the diagnosis of hearing loss is unique. Some families arrive at the diagnostic evaluation knowing their infant has hearing loss and ready to proceed. Others may be shocked by the diagnosis and have difficulty accepting the news. The audiologist needs to determine how the family wishes to proceed and how best to support that process. Above all, it is important that families leave the clinic with hope – and with the knowledge there is much they can do to help their child be happy and successful.

Readings for Professionals

Luterman, D. and Kurtzer-White, E. Identifying hearing loss: Parents' needs. *American Journal of Audiology.* 1999; 8: 13-18.

Harrison, M. and Roush, J. Information for families with young deaf and hard of hearing children: Reports from parents and pediatric audiologists. In R. Seewald and J. Gravel (eds.), *A Sound Foundation Through Early Amplification 2001: Proceedings of a Second International Conference*. (pp. 233-250). Stäfa, Switzerland: Phonak AG, 2001.

Readings for Parents

Luterman, D. and Ross, M. When *Your Child is Deaf: A Guide for Parents*. Baltimore: York Press, 1991.

Schwartz, S. Choices *in Deafness: A Parents Guide to Communication Options*. Bethesda, MD: Woodbine House, 1996.

Waldman, D. and Roush, J. *Your Child's Hearing Loss*. New York: Perigee, 2005.

Web Resources for Parents

Boy's Town National Research Hospital: www.babyhearing.org

Alexander Graham Bell Association for the Deaf and Hard of Hearing: www.agbell.org

Hearing Instrument Fitting and Verification

Once the necessary medical clearance for hearing instrument fitting has been obtained and the family has indicated a desire to proceed, ear impressions are taken. It is often necessary to obtain ear impressions several times during the first year due to the rapidly changing size of the infant's external ear.

Hearing instrument selection for infants requires many considerations including choice of signal processing, electroacoustic flexibility, size, and durability. In nearly all cases, behind the ear (BTE) instruments are preferable for infants and young children. The hearing instruments selected should allow for:

- acoustically tuned pediatric tone hooks,
- tamper resistant battery doors,
- volume control covers,
- FM system compatibility

Most hearing instruments used with infants and young children are programmed using software supplied by the manufacturers. Frequency-specific thresholds are entered into the computer and the software calculates a set of desired amplification characteristics based on a prescriptive formula developed specifically for pediatric applications. Although the manufacturer's fitting software provides an estimate of the required amplification characteristics, it is essential that the actual hearing instrument performance be verified at the time of the fitting. An approach to verification developed specifically for pediatric applications uses a measurement called the real-ear-to-coupler difference (RECD). This procedure allows the audiologist to accurately account for the unique acoustic characteristics of the ear canal and earmold for each infant.

At the time of fitting, the following information is entered into the real-ear measurement system:

- The prescriptive formula to be used in the fitting process
- The age of the infant
- The type of transducer used in the diagnostic assessment, and
- Estimates of the infant's hearing thresholds across a range of frequencies

Once this information is entered, test signals are measured in a standard hearing instrument (2cc) coupler. Levels of the same test signal are then measured in the occluded ear canal of the infant using a probe microphone. This procedure includes:

- Placing the probe tube in the ear canal (allowing the audiologist to measure the level of sound within the infant's ear canal);
- Inserting the infant's custom earmold;
- Attaching the test signal transducer to the tubing of the infants' earmold;
- Delivering the test signal into the ear canal.

The test system displays the RECD which is subsequently used to predict how the hearing instrument will perform when fitted to the infant. If the child is too active for the RECD measurement, average values stored in the verification system can be used.

Once the RECD measurement has been completed, the test system stores the results and calculates the infant's desired real-ear hearing instrument performance. The results of the hearing instrument verification process are displayed on the computer screen. The video demonstration provides an orientation to the RECD procedure used in conjunction with the Desired Sensation Level (DSL) method for pediatric hearing instrument fitting. The test system displays unaided thresholds, amplification target levels for everyday listening, and targets for maximum hearing instrument output.

Verification that the desired amplification target levels have been achieved is critical in the fitting of hearing instruments to infants. To verify that the hearing instrument is performing appropriately for the infant, the instrument is placed in a hearing instrument test chamber and attached to the standard 2cc coupler. Speech or speech-like signals are available for evaluation of hearing instrument performance. In the video demonstration, a recording of average conversational speech is delivered into the test chamber and the amplified speech signal is displayed on the screen. This allows comparison of the hearing instrument's actual performance to target levels. A high level signal is then delivered into the test chamber and the maximum hearing instrument output is compared to prescribed target values. Modifications can then be made using the manufacturer's fitting software.

This approach to verification can be used to confirm the performance of the hearing instrument for average conversational speech as well as for soft and loud speech inputs to the hearing instrument. Once the audiologist has verified that the hearing instrument is performing appropriately, the settings are saved to memory.

Readings

American Academy of Audiology, Pediatric amplification protocol, October, 2003; http://www.audiology.org/professional/positions/pedamp.pdf

Bagatto, M.P. Scollie, S.D. Seewald, R.C. Moodie, K.S., and Hoover, B. Real-ear-to-coupler difference (RECD) predictions as a function of age for two coupling procedures, *Journal of the American Academy of Audiology.* 2002; 13(8): 416-27

Bagatto, M.P. (2000). Optimizing your RECD measurements. *Hearing Journal.* 2000; 54(9): 32, 34-46.

Scollie, S.D. and Seewald, R.C. Hearing aid fitting and verification procedures for children. In: J. Katz, (ed.) *Handbook of Clinical Audiology, Fifth Edition.* (pp. 687-706). Baltimore, MD: Williams & Wilkins, 2002.

Scollie, S.D. and Seewald, R.C. Electroacoustic verification measures with modern hearing instrument technology. In R. C. Seewald & J. S. Gravel, (Eds.), *A Sound Foundation Through Early Amplification: Proceedings of the Second International Conference.* (pp. 121-137). Stäfa, Switzerland: Phonak, 2002.

Cornelisse, LE, Seewald, RC and Jamieson, DG. The input/output (i/o) formula: A theoretical approach to the fitting of personal amplification devices. *Journal of the Acoustical Society of America.* 1995; 97(3): 1854-1864.

Seewald, RC and Scollie, SD. An approach for ensuring accuracy in pediatric hearing instrument fitting. *Trends in Amplification.* 2003; 7(1): 29-40.

Web Resources

National Audiology Centre, University of Western Ontario, Tutorial: The Desired Sensation Level Method, www.dslio.com

Hearing Instrument Orientation

After the hearing instruments have been adjusted, parents are instructed on care, use, and basic trouble-shooting. It is recommended that parents be provided with a battery tester, an air blower, dehumidifier, lubricant to aid in earmold insertion, and a "listening stethoset" (a way for the parent to check the functioning of the hearing aid on a daily basis). Hearing instrument insertion and removal is demonstrated by the audiologist and family members are given the opportunity to practice inserting the instrument in the baby's ear before going home. With young infants it is important to provide a variety of options for retaining the instrument on the ear (see parent resources). A return appointment for follow up is scheduled 3-4 weeks after the initial hearing aid visit.

Resources for Parents

Phonak Hearing Systems. Hearing Solutions for Children: Information for Professionals about Hearing Loss in Children. http://www.phonak.com/consumer/parents/brochures.htm

Waldman, D. and Roush, J. *Your Child's Hearing Loss*. New York: Perigee, 2005.

Behavioral Audiologic Assessment and Follow-Up

Visual Reinforcement Audiometry. Behavioral assessment is an essential component of the audiologic test battery. Unconditioned behavioral observation testing is not reliable for infant hearing threshold determination; however, when the infant reaches a developmental age of 5-6 months, behavioral audiologic assessment using visual reinforcement audiometry (VRA) can be initiated. The infant is seated on the parent's lap or in a highchair with the visual reinforcement unit to one side. Visual reinforcers with a variety of novel, illuminated mechanical toys housed in dark smoked Plexiglas boxes increase the number of responses. Video reinforcement shows promise for the use in VRA assessment.

Frequency-specific test stimuli such as warbled (FM) pure tones or narrow band noises should be used when performing behavioral audiometry with infants. It is important to obtain ear-specific audiologic information. The use of insert earphones is recommended for this purpose. Another means of obtaining ear-specific information for use in monitoring the hearing loss, as well as for hearing aid fitting is to couple the insert earphone directly to the infant's own earmold. Most babies who are accustomed to wearing hearing aids will easily adjust to the use of insert earphones attached to their own earmolds. Consideration of the RECD allows the audiologist to more accurately predict threshold sensitivity.

Once air conduction thresholds have been obtained, testing should be completed with bone-conducted test signals to corroborate physiologic results and to confirm the nature of the hearing loss as, cochlear, conductive, or mixed. As shown in the video, use of an adjustable, pediatric-size headband modified to provide extra padding will increase the likelihood of the

infant retaining the bone oscillator and headband. For typically developing infants, a reasonable goal is to have a complete air conduction audiogram, for each ear as well as bone conduction thresholds by 8-9 months of age. Several sessions may be necessary for this to be accomplished. Assessment of infants is an ongoing process.

Readings

Bernstein, RS, and Gravel, JS. A method for determining hearing sensitivity in infants: the interweaving staircase procedure (ISP). *Journal of the American Academy of Audiology.* 1990; 1(3): 138-45.

Widen JE, Folsom RC, Cone-Wesson B, Carty L, Dunnell JJ, Koebsell K, Levi A, Mancl L, Ohlrich B, Trouba S, Gorga MP, Sininger YS, Vohr BR, and Norton SJ. Identification of neonatal hearing impairment: hearing status at 8 to 12 months corrected age using a visual reinforcement audiometry protocol. *Ear and Hearing.* 2000; 21(5): 471-487.

Scollie, SD, Seewald, RC, Cornelisse, LE and Jenstad, LM (1998) Validity and repeatability of level-independent HL to SPL transforms. *Ear and Hearing.* 1998; 19(5): 407-413.

Middle Ear Monitoring. Otitis media with effusion is highly prevalent in young children from 6-18 months of age. It is especially problematic for children with sensorineural hearing loss because, in addition to the medical implications, a conductive component is likely to reduce the benefits of hearing instrument use. Tympanometry should be performed during each follow up visit. When tympanometric results suggest middle ear effusion, the infant should return to the otolaryngologist or pediatrician for evaluation and management. Placement of pressure equalization tubes should be considered if middle ear problems are persistent

Readings

Rosenfeld, RM et al. Clinical Practice Guideline: Otitis media with Effusion. *Otolaryngology, Head and Neck Surgery.* 2004; 130(5 Suppl): S95-118.

Sound Field Procedures. Once unaided thresholds have been obtained for each ear, aided detection thresholds can be measured in sound field. This information may be useful to the audiologist in obtaining an estimate of the lowest level of sound the infant can detect in the aided condition.

It may also be helpful for families to see their baby's improved detection of sound in a controlled environment. However, *aided threshold testing is not an acceptable alternative to the more precise and comprehensive hearing instrument verification procedures described in this video.* Aided threshold testing does not provide measurement of maximum hearing instrument output levels, a major consideration when working with infants. Furthermore, aided threshold testing cannot be used to develop a valid estimate of speech audibility in hearing instruments that employ digital signal processing.

Functional Assessment and Advanced Technologies

Functional Assessment Tools. While the use of current technologies and appropriate fitting methods are important, many families will want functional assessment tools to assist them in monitoring their child's auditory development. These measures not only provide a survey of the child's progress but they create opportunities for parent-professional collaboration and encourage parents' active participation in the child's communication development.

Functional Assessment Tools

The ELF and CHILD, can be downloaded from the Phonak website: www.phonak.com/professional/pediatrics/diagnostic.htm

IT-MAIS: Infants and Toddlers Meaningful Auditory Integration Scale. Available from Advanced Bionics, Customer Service, 800 678-2575.

Advanced Technologies. Once full time use of the hearing instruments has been established, advanced hearing instrument technology options may be considered. These include remote controls, directional microphones, and FM systems. Directional microphones can be used to improve the signal to noise ratio when listening in the presence of background noise. With the advent of newer programmable and digital hearing instruments, it is now possible to choose a hearing instrument that allows selection of directional or omni-directional modes by changing a switch on the hearing aid or by use of a remote control. As the child grows and becomes more

active, the distance between the parent's voice and the child's ear increases. FM systems can be used by parents to overcome the effects of distance and background noise on the audibility of speech. In the past, the receiver portions of FM systems were large and bulky and used only in schools. Recent advances in technology have made it possible to incorporate the FM receiver into a small "boot" that attaches to the bottom of the hearing instrument. This reduction in size of the FM receiver has made it more feasible for parents to use FM systems in the home environment with infants and young children.

Readings

Stelmachowicz, P. The importance of high-frequency amplification for young children. In R. C. Seewald & J. S. Gravel, (Eds.), *A Sound Foundation Through Early Amplification: Proceedings of the Second International Conference.* (pp. 167-176). Stäfa Switzerland: Phonak, 2001.

Scollie, S.D. and Seewald, R.C. Hearing Aid Fitting and Verification Procedures for Children. In: J. Katz, (ed.) *Handbook of Clinical Audiology, Fifth Edition.* (pp. 687-706). Baltimore, MD: Williams and Wilkins, 2002.

Other Considerations

Loaner Instruments. Inevitability, hearing instruments will suffer the effects of wear and tear and require repair by the manufacturer. Ongoing monitoring of the hearing instruments by parents, teachers, and audiologists is needed to ensure that the child is getting consistent auditory input. For this to occur, it is essential that loaner hearing instruments be provided whenever a hearing instrument is sent for repair. Following repair, the audiologist should verify that the settings previously selected have been restored.

Cochlear Implants. It is important for parents, audiologists, and other professionals to monitor the child's progress in speech, language, and auditory development. If the child has a severe or profound hearing loss and is not making adequate progress in these areas, the family should be offered the option of referral for cochlear implant evaluation. As criteria for cochlear implant

candidacy have changed, there are now many children who use a cochlear implant in one ear and a hearing aid in the other.

Readings

Gates, G. and Miyamoto, R. Cochlear implants. *New England Journal of Medicine*. 2003; 349: 421-423.

Chute, PM and Nevins ME. *The Parents' Guide to Cochlear Implants*. Washington, DC: Gallaudet University Press, 2002.

Web Resources

Cochlear Implants. National Institute on Deafness and Other Communication Disorders. National Institutes of Health. http://www.nidcd.nih.gov/health/hearing/coch.asp

National Cochlear Implant Users Association (NCIUA), United Kingdom
http://www.nciua.demon.co.uk/nciua.htm

Other Disabilities. Today, at least one-third of all children diagnosed with hearing loss will have one or more disabilities in addition to hearing loss and some newborns will experience serious illness related to a disease or syndrome. When making recommendations for management, professionals who serve these families must consider the complexities of their daily lives. It is not uncommon for families whose children face multiple challenges to make several visits each week to physicians and other specialists. There will be times when medical treatment and other services must take priority over the management of hearing loss. In these cases appointments must be carefully coordinated, whenever possible, for the benefit of the child and to assist families with the logistics of transportation and follow-up.

Readings

Roush J, Holcomb M, Roush P, and Escolar M A. When hearing loss occurs with multiple disabilities. *Seminars in Hearing*. 2004; 25: 333-345

Peer Support and Information. When hearing loss is diagnosed, families are faced with many decisions. In order to make these decisions they will need accurate unbiased information. In addition, many parents appreciate guidance on how they can connect with other parents of children with hearing loss. A growing number of families have access to web-based resources.

Web Resources

Beginnings: For Parents of Children who are Deaf or Hard of Hearing
http://www.beginningssvcs.com

Habilitative Services. Comprehensive audiologic assessment and appropriate hearing instrument fitting are essential, but these services must be provided in the context of a complete habilitative program. A description of communication options and early intervention programs is beyond the scope of this video. However, to assist families in accessing needed services, the pediatric audiologist must be well informed regarding community services and resources as well as legal and regulatory requirements for referral and follow-up.

Readings

Carney, AE, & Moeller, MP. Treatment Efficacy: Hearing Loss in Children. *Journal of Speech, Language, and Hearing Research.* 1998; 41(1): 61-84.

Joint Committee on Infant Hearing. Year 2000 Position Statement: Principles and guidelines for early hearing detection and intervention programs. *American Journal of Audiology.* 2000; 9: 9-29.

Web Resources

www.infanthearing.org

Optimal management of hearing loss in the first year requires an early, accurate, well-coordinated continuum of care, provided in a spirit of parent-professional collaboration. When achieved, the young infant with hearing loss is given an unprecedented opportunity to experience the natural process of early communication development.