

Sound **Beginnings**

KANSAS GUIDELINES

AMPLIFICATION FOR INFANTS

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ACKNOWLEDGMENTS

Sound Beginnings expresses extreme gratitude to the members of the Assessment and Amplification Task Force for sharing their expertise, time and energy to develop the Kansas Guidelines - Amplification for Infants. Their commitment demonstrates their strong belief in the importance of providing the highest quality of assessment services for infants and their families. They recognize that the early months in the life of an infant “are not a rehearsal, but the real show.”

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Guidelines will be reviewed every two years and updated as needed.

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These guidelines were developed to help Kansas attain Health and Human Services' Healthy People 2010 goal for infants: **to confirm hearing loss by three months of age with appropriate intervention no later than six months of age**. It is understood that it is a family's choice as to whether or not their infant should use hearing aids. For most infants with hearing loss, a key component of intervention will be amplification and other assistive devices. With existing technology and expertise, this goal of providing intervention with amplification by no later than six months of age can be routinely met.

I. INTRODUCTION

In order for an infant with significant hearing loss to optimally develop speech and oral language and to maintain contact with environmental sounds, a clear, consistent, and undistorted auditory signal is essential. The primary goal of amplification is to make as much of the speech signal audible as possible and to maintain an auditory awareness of the environment. In light of substantial evidence of the importance of early stimulation in the development of the brain and auditory nervous system, the timely fitting of appropriate amplification is crucial.

The fitting of hearing aids, including referral of the family to local early intervention services, should be initiated as soon as the hearing loss has been identified, even with limited audiologic information.

Candidacy for Amplification

The infant with a significant bilateral hearing loss is a candidate for amplification. A significant hearing loss occurs when a minimal hearing response of 25 dB HL or greater is detected in the 500-4000 Hz range. "Hearing threshold of 25 dB HL or greater can be assumed to impede a child's ability to perceive the acoustic features of speech necessary for optimum aural/oral language development. Hence, thresholds equal to or poorer than 25 dB HL would indicate candidacy for amplification in some form. In cases where full audiometric information is not available, the clinician must make a 'best estimate' of the residual hearing across the frequency range important for speech". (The Pediatric Working Group, 1996).

Even though amplification may not be recommended, infants with a hearing loss at any frequency should be monitored carefully to assure that aural/oral communication and cognitive abilities are developing appropriately. If delays are noted, amplification should be considered.

In cases of unilateral hearing loss, amplification may be recommended depending on the degree of hearing loss and the status of the better ear.

Assumptions Underlying Fitting an Infant with Amplification

- Once hearing loss has been confirmed, medical clearance from a physician must be obtained prior to the hearing aid fitting.
- Information about all options should be provided to the family, including the possibility of cochlear implantation if appropriate.
- The needs of the infant as well as the concerns and goals of the family must be considered during the process of selection and fitting of the hearing aids.
- The cost of the hearing aids should not be a limiting factor in the selection of the hearing aids most appropriate for a particular infant.
- The audiologist should be familiar with local early intervention services. If the family is not already working with community-based early intervention services, then the audiologist should refer the family to the appropriate agency and this referral should take place concurrent with hearing aid fitting.

II. RECOMMENDATIONS FOR INFANT HEARING AID FITTING

Selection Considerations

- Binaural hearing aids should be fit unless contraindicated by medical condition or audiologic results.
- Behind-the-ear (BTE) hearing aids are the most appropriate style for infants. Many compact, child-sized units are available including digital, programmable, and power models, which should accommodate all types of hearing losses.
- For some infants with profound hearing losses and some infants with physical limitations/considerations, the addition or use of an FM system may be appropriate.

Features

- The hearing aids should provide the greatest amount of flexibility in terms of gain, output, and frequency response characteristics in order to provide the most appropriate fit. Flexibility is particularly essential so modifications can be made as additional audiologic information becomes available or as hearing may change over time.
- The hearing aids should be upgradable or periodically replaced to allow for technological advances.
- Safety features such as volume control covers and tamper resistant battery doors should be standard. Caregivers must be counseled regarding battery toxicity.
- Pediatric earhooks should be selected for all infants.
- Custom earmolds should be made of soft, flexible materials. Families should be advised

that the earmolds will need to be remade as often as every 90 days for the infant due to the rapid growth rate typical at this time.

- Hearing aids should include direct audio input (DAI) capabilities as a standard feature.
- Hearing aids should have a telecoil as a standard feature.

Fitting Strategies

As complete audiometric evaluation information is rarely available for infants, a prescriptive system of hearing aid fitting designed for children (*e.g.*, Desired Sensation Level (DSL), Seewald, 1992), which compares estimated audiometric thresholds with individual real-ear measurements, is recommended. Target values for frequency gain and frequency output limiting characteristics should be selected which maximize the audibility of speech while limiting the output to presumably comfortable levels. Care must be taken in determining hearing aid output (SSPL90) to protect an infant from overamplification and its potential damage to the hearing system. The hearing aid gain and maximum output characteristics should be preset in a hearing aid analyzer using real-ear-to-coupler differences (RECD) for which there are age-related correction factors (Appendix A). Real-ear (probe microphone) measurement should be performed.

Warranty, Loss, and Damage

All hearing aids should have an extended warranty coverage period of at least two years for repair, loss and damage. Information should be provided to the family regarding coverage and obtaining additional years of coverage. In addition, the family should be given information about hearing aid insurance.

Loaner Hearing Aids

Loaner hearing aids should be available when the infant's own hearing aids are in need of repair. Loaner hearing aids, provided at no cost to the family, should match the performance characteristics of the infant's own hearing aids as closely as possible.

Parent Education/Counseling

- At the time of the fitting, the family should be given information regarding expected frequency of appointments, hearing aid care, warranty, maintenance, troubleshooting, battery safety, earmold care, moisture cautions, and how to keep hearing aids on an infant. Instruction on how to perform a daily listening check on the hearing aids should also be provided.
- The tools necessary for the family to maintain their infant's hearing aids should be provided and demonstrated when the hearing aids are fit. These would include, but are not limited to, listening stethoset, battery tester, and dri-aid kit (optional: huggies, otoclips).

III. EVALUATION OF AIDED AUDITORY PERFORMANCE

Observation of aided auditory performance is important to verify the appropriateness of the hearing aid fit. Verification can be accomplished in two ways: By parents, caregivers, and early intervention service providers who have the opportunity to observe the infant in his/her natural listening environment, and by the audiologist who sees the infant in the clinical setting.

Parents, Caregivers, and Early Intervention Service Providers

- Reporting the benefits of hearing aid use via a “parent/caregiver journal” helps confirm that the speech signal is audible and comfortable (Appendix B).
- Completing the Infant/Toddler-Meaningful Auditory Integration Scale (IT-MAIS) or similar scale helps assess aided performance (Contact Sound Beginnings to obtain the IT-MAIS scale).
- Multi-program hearing aids provide opportunities to observe an infant’s auditory behavior using a variety of amplification programs.

Audiologist

When the infant is developmentally ready for behavioral audiometry (around six months developmental age), aided sound field responses to various stimuli including speech, warble tones and/or calibrated narrow band noise can be used to assist in verifying the frequency gain characteristics of the hearing aid.

IV. FOLLOW-UP EXAMINATIONS

Once an infant has been fit with appropriate amplification, he/she should be seen for follow-up in two to six weeks, then at least every three months for the first two years, and every six months thereafter. If parental concerns arise or any change in hearing is suspected, the infant should be seen immediately.

The follow-up audiologic evaluation of the hearing aids should include the following:

- Electroacoustic assessment and listening check of hearing aids.
- Reassessment of probe microphone measurements including Real-Ear to Coupler Differences (RECD) as appropriate, especially whenever earmolds are replaced.
- Check of earmold fit to monitor feedback, abrasions, or any other condition which might limit the use of the hearing aid.
- Unaided and aided hearing assessment, as possible (See Chapter III. Evaluation of Aided Auditory Performance).

V. OTHER CONSIDERATIONS:

Audiologist Role as Consultant

The dispensing audiologist should work closely with other early intervention service providers (e.g., educational audiologist, speech-language pathologist, teacher of the deaf/hard of hearing, early childhood special educator) to assure that the hearing aids are functioning optimally to meet the needs of the infant.

Cochlear Implants

Cochlear implant evaluation may be recommended for infants with severe to profound hearing losses if:

- The infant does not benefit from amplification.
- The infant's speech production and auditory language development has not progressed with amplification.
- The parents want to pursue this option.

When Amplification is Not Recommended

At the discretion of the audiologist and in consultation with the parents, amplification may not be recommended if:

- A physician determines medical conditions preclude use of amplification.
- Family chooses not to use amplification.
- When testing can not confirm a hearing loss.

Resource for Families

Sound**Beginnings** has developed the Kansas Resource Guide for Families with Infants and Toddlers Who are Deaf/Hard of Hearing. This resource guide can be obtained from Sound**Beginnings** Kansas Department of Health and Environment (KDHE), 1-800-332-6262. Audiologists should have copies available to give to families.

VI. PROVIDER REQUIREMENTS

It is understood that not all Kansas audiologists will be providers of amplification for infants under this system based on availability of appropriate test equipment, experience in the evaluation and treatment of infants, and interest in working with this population.

As a minimum, a provider must:

- be licensed as an audiologist in Kansas, and
- be licensed as a hearing aid dispenser in Kansas, and
- be willing and able to participate in continuing education specific to the evaluation and treatment of infants, and
- be willing and able to collect and transmit appropriate data on testing and treatment to the Kansas Department of Health and Environment (KDHE) as defined by KDHE, and
- have the appropriate equipment needed for infant hearing assessment (unaided and aided) including a hearing aid analyzer with real-ear probe assembly.

SELECTED REFERENCES

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Appendix A

REAL-EAR-TO-COUPLER DIFFERENCES for PEDIATRIC CORRECTIONS¹

The following chart indicates the amount of gain (dB) by which the gain of the aid should be decreased for the frequency regions shown, based on the child's age:

	HTL Changes			UTL Changes		
	LOW	MID	HIGH	LOW	MID	HIGH
0-12 months	10	14	16	5	7	8
13-24 months	10	12	10	5	6	5
25-48 months	8	10	8	4	5	4
49-60 months	6	8	6	3	4	3
>60 months	0	0	0	0	0	0

¹Hall, J.W. (1992) Handbook of Auditory Evoked Responses.

Appendix B

PARENT/CAREGIVER JOURNAL

Infant Name	Hearing Aid(s)							Week of			
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday				
List the sounds the infant responded to.											
How did he/she respond to the sound?											
How often did he/she respond to the sound?											
List any vocalizations the infant made.											
How often did he/she make vocalizations?											
Infant's reaction to his/her aid(s).											
Observations of the parent/caregiver.											
Other observations or concerns											
Other observations or concerns											

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