



Texas School for the Blind and Visually Impaired Outreach Programs

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Hearing Issues for Students with Deafblindness

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3:00-4:00 PM

Presented by

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Developed for

Texas School for the Blind & Visually Impaired

Outreach Programs

Audiological Testing of Students with Deafblindness

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Educational Audiologist

"Educational audiologists are uniquely qualified to understand the impact of hearing loss on classroom learning and have the knowledge and skills to recommend specific strategies and technology to meet the individual communication, academic and psychosocial needs of students with hearing loss."

Educational Audiologist

What we typically do:

- Perform a battery of tests to determine type and extent of hearing loss
- Recommend and program Assistive Listening Devices (ALDs) such as hearing aids, FM systems etc.
- Consult with educational staff regarding effective use of ALDs in classroom settings
- Make recommendations regarding classroom acoustics to reduce ambient or background noise.
- Align ALDs for use with other devices such as iPhones, tablets, computers.

Preparing for the Testing

- Gather Information for the Audiologist
 - Etiology
 - Observations of student's ability to detect/recognize environmental sounds, voices and speech.
 - What a listening response may look like for the individual student.

Audiological Testing

Perform a comprehensive battery of tests that systematically evaluates the outer, middle and inner ear.

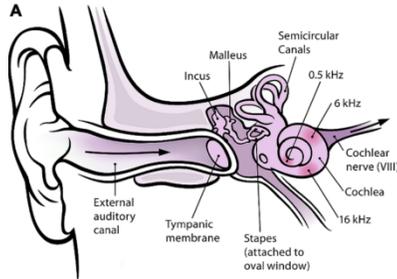


Figure 1 Diagram of the ear (outer, middle, and inner segments). Citation: Chittka L, Brockmann A (2005) Perception Space—The Final Frontier. PLoS Biol 3(4): e137. doi:10.1371/journal.pbio.0030137

Audiological Testing

- Outer Ear
- Auditory Canal Otoscope



Figure 2 Photo of an otoscope. Used with permission from School Health www.schoolhealth.com.

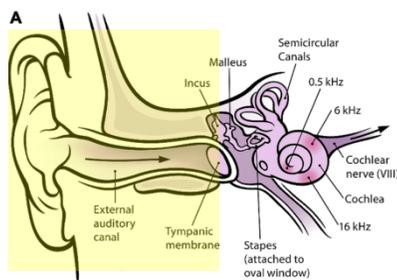


Figure 3 Diagram of the ear with the outer ear segment highlighted in yellow. Citation: Chittka L, Brockmann A (2005) Perception Space—The Final Frontier. PLoS Biol 3(4): e137. doi:10.1371/journal.pbio.0030137

Audiological Testing

- Middle Ear
- Tympanometer



Figure 4 Photo of a tympanometer. Used with permission from School Health www.schoolhealth.com

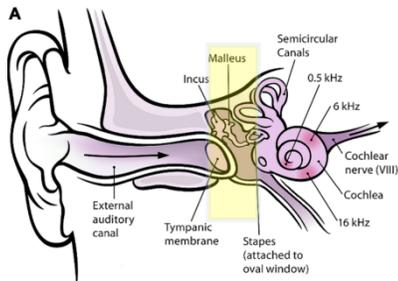


Figure 5 Diagram of the ear with the middle ear segment highlighted in yellow. Citation: Chittka L, Brockmann A (2005) Perception Space—The Final Frontier. PLoS Biol 3(4): e137. doi:10.1371/journal.pbio.0030137

Audiological Testing

- Inner Ear
- Otoacoustic Emissions (OAE)



Figure 6 Photo of a Maico ERO-SCAN OAE Test System and Accessories. Used with permission from School Health www.schoolhealth.com

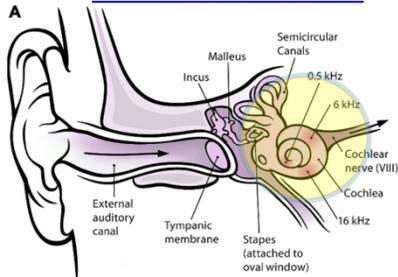


Figure 7 Diagram of the ear segments with the inner ear highlighted in yellow. Citation: Chittka L, Brockmann A (2005) Perception Space—The Final Frontier. PLoS Biol 3(4): e137. doi:10.1371/journal.pbio.0030137

Ear Probes

The previous test requires something being inserted into the student's ear.



Figure 8 Photo of various ear probes used in audiological testing. <https://www.schoolhealth.com/school-health-brand-ear-tips-for-welch-allyn-and-audx-oea-screeners> Used with permission from School Health www.schoolhealth.com

Audiological Testing

- Inner Ear and Brain Pathways
- Auditory Brainstem Response (ABR)

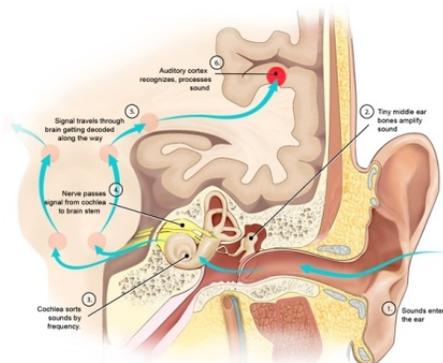


Figure 9 Steps involved in hearing speech: Sound signals travel from the ear to the brain where they are recognized and decoded, as detailed in the illustration.

http://www.nsf.gov/news/special_reports/linguistics/speech.jsp

Audiological Testing

- Pure Tone
- Speech Thresholds



Figure 10 Photo of AMBCO 650A Audiometer. Used with permission from School Health www.schoolhealth.com

Audiological Testing

Sound-proof Booth



Figure 11 Photo of an audiologist testing a man in a sound booth. Flávia Costa
<http://www.agenciaminas.mg.gov.br/admin/fotos/25112008061145imagem%2001%20009.jpg>

Preparing the Deaf-Blind Student

- Sound Booth
- Head Phones
- Probes in Ear Canal
- Experience Book



Figure 12 Photo of a teacher working with a student prior to having his hearing tested.

“I hear that!”

Preparing Students with Dual Sensory Impairments for Audiological Testing

By Adam Graves
Deafblind Education Consultant
Texas Deafblind Project

For students with a dual sensory impairment a simple visit to the audiologist is not always such a simple activity. There are a whole host of new and unfamiliar sounds, sights, smells, textures and people to explore and understand. Practicing and preparing for the unusual environment and activity that accompanies an audiological exam can help reduce anxiety for the child, the parents, the teachers and the audiologist and help produce more accurate results on hearing exams.

“Where am I?”

Preparing for the testing room

For someone new to the process of a hearing screening the testing booth can be a pretty frightening place. Most young children do not have the experience of being enclosed in a very small room in which ambient noise has been so thoroughly muted.

Though we try to create a classroom environment in which we avoid too much auditory clutter, a completely sound free room is impossible to achieve. There is the constant hum of air ducts, appliances, voices from both inside and outside the room, the reverberation of voices and environmental sounds off of hard, flat walls and other surfaces as well as a myriad of other noises that most of us have learned to tune out.

A child with a hearing and visual impairment may become attuned to specific environmental sounds and use them to determine whether or not he is in a place that feels safe and secure. The testing booth, with its lack of an auditory stimulus and small size can be very confusing and upsetting for a child who has become used to listening for these environmental cues.

If the child has a tendency to show a high level of anxiety when entering new places, a pre-screening appointment with the audiologist before the actual testing date can help. At this pre-appointment the child is allowed to explore the testing area. He or she might practice some familiar games and routines in the testing booth. If an educational audiologist will be conducting the audiological exam at the school, frequent visits to the exam room help. These visits can be combined with a familiar, quiet, calming routine which can help the child acclimate to the testing environment and become more relaxed during the actual exam. Learning to stay calm and respond during an audiological exam might be one of the skills targeted in direct services for students. These skills could even be practiced during one-on-one work with a speech and language pathologist or teacher of the deaf and hard of hearing.

“What am I doing here?”

Preparing for the testing procedures

Conducting a traditional pure tone test is another simple activity which becomes much more complex with a student who is deafblind. Most of the environmental sounds that we experience on a day to day basis are made up of many tones vibrating at various frequencies which blend together to create sounds we recognize as a car motor, the dripping of a faucet or even a person speaking. A visually impaired student with a concomitant hearing loss may learn to turn their head to one side and use their body to try to localize and seek out the source of their favorite Led Zepplin song, a blender, a familiar voice or even a vibrating guitar or piano string. But, a single tone often holds no meaning and may not generate much interest for a child with limited language skills.

Creating an inventory of environmental sounds to which the child will alert can help guide the audiologist in how to recognize a behavioral response from that child. This inventory could be developed by the parent or the school staff in collaboration. Play games in which the child learns to expect and seek out a specific toy or interaction following the playing of a specific pitch. For example, provide brushing or deep pressure compressions on a specific body part from a trusted adult, after making a low-pitched sound. Information gathered from these inventories and games can help the audiologist make a more accurate determination of the authenticity of the child's response to pure tones.

In general, having a person at the exam who is familiar with the child and with whom the child has a trusting relationship can help. A trusted adult can help reduce feelings of anxiety and stress, and provide familiar auditory stimulus such as the sound of a familiar voice. A person who knows the child well can also interpret the child's behavior and help ensure that sufficient processing time for the child is provided after a tone is played. This insight helps the audiologist recognize authentic responses to stimuli, which will lead to a more accurate assessment.

“What is this stuff they're putting in my ear?!”

Preparing for the testing instruments

Of course, there is the matter of helping the child to acclimate to the tools and instruments used in performing the exam. This is often the most difficult aspect of preparing for any exam that requires a series of physical probes or inspections. Some of these may already be familiar to the child, since many children go through regular testing and/examinations due to the medical complications accompanying etiologies which lead to deafblindness. Many of these tests are quite invasive and occur without warning or explanation.

It can be quite frightening and painful to suddenly have an unfamiliar object thrust into your ear without ever knowing what purpose it serves. Providing children ample opportunity for structured exploration and play with unfamiliar objects associated with audiological testing in a familiar setting with a trusted adult helps to instill a sense of security and safety that may enable the child to become less defensive when encountering the same objects in a less familiar environment. Allowing the child to have some time to be in control of the objects, take some turns, and observe a trusted adult being examined using the same instruments can also serve to reduce the level of fear associated with a typical audiological exam.

Many educational audiologists will have some experience working with children with multiple disabilities and will understand some of the unique challenges in trying to prepare a student for an exam. If you are unfamiliar with the procedures of an audiological exam or earmold casting, a brief call or visit to the clinic to explain the unique needs of your child and your desire to help familiarize him/her with the objects associated with the exam ahead of time can often yield some useful ideas as well as common items such as the speculum (the plastic tips used on the end of an otoscope), the rubber tips used on the end of the tympanometer, and the foam rubber, probe and foaming gel that are used to make a cast for an earmold.

Try to develop calming routines, such as breathing deeply, brushing, or deep pressure routines, that make the child feel safe and secure and can be duplicated in an unfamiliar setting. Gradually you can begin to introduce audiological tools and instruments and incorporating their uses into these routines to make them a little less threatening and a lot more familiar.

“Remember all that stuff they put In my ear?”

Talking about the test

Experience books or conversation boxes are another excellent way to help a child with a dual sensory impairment and language delays to emotionally process and/or prepare for a visit to the audiologist. Role playing and pretending are important ways that all children help themselves process frightening and unfamiliar experiences emotionally, physically and intellectually and to practice performing their parts within these experiences.

Deafblind children need more opportunities to practice and talk about these types of unfamiliar or emotionally loaded experiences. They cannot gain the cursory understanding of what an audiology exam is like by watching a video or hearing about the experiences of friends and family in the way that a typical sighted and hearing child would. This is especially true if the child's language is delayed as well. Allow an audiologist to perform an exam on you first or have a partner help you act out the process of an audiological exam as the child explores the items and how they are applied to your body. This can help eliminate some of the mystery of the process for the child and reduce the amount of stress associated with an exam.

Experience books and conversation boxes are also a wonderful way to keep discussions about the audiologist fresh in the child's mind and to validate their emotions. If, for example, the child reaches into the box and picks up the speculum that caused them to recoil in dread when it was placed in his ear, try placing the speculum in your own ear. Then, provide the child some time to visually and/or tactilely observe the speculum in your ear. You may even want to act out the child's reaction to the speculum followed by modeling a return to a relaxed state. These are just a few ways let the child know that is ok to be scared by medical/audiological tools but that you, a trusted adult, use these tools and know they are safe.

These strategies may not be effective for all deafblind children and they certainly will not completely eliminate the anxieties of a visit to or from the audiologist. However, implementing some of these ideas will hopefully make the exam a little less stressful and a little more enjoyable for everyone.

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Figure 13 TSBVI logo.



This project is supported by the U.S. Department of Education, Special Education Program (OSEP). Opinions expressed here are the authors and do not necessarily represent the position of the Department of Education.

Figure 14 IDEAs that Work logo and OSEP disclaimer.