



Assistive Devices: Inexpensive and Alternative Ways to Address Hearing Loss

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I. Introduction & Overview:

Assistive devices for individuals with hearing impairment fall into two main categories. Assistive Listening Devices (ALD) are products that address problems associated with listening in noise, at a distance, and in high reverberation. Alerting Devices (AD), are products that alert one to the presence of sound in the environment. Assistive devices may be used to improve communication in interpersonal and small and large group settings, on the telephone, while enjoying television programs, or to notify an individual of an important signal in their environment such as the telephone, doorbell, or a safety alarm.

When audiologists and other hearing professionals address the communication needs of people with hearing loss, assistive devices "fill in the gaps," they pick up where traditional ear-level amplification leaves off.

Traditional hearing aids have a relatively small "effective area" within which they work maximally, due to microphone size and microphone location. In other words, if two people are engaged in a conversation at a party, and if they move a few feet apart, the distance between the hearing aid microphone and the person speaking can increase dramatically, decreasing the signal-to-noise ratio while introducing significant ambient noise into the conversation. Typically, hearing aids provide acoustic signals only (FM and DAI systems used in tandem with hearing aids do indeed vary from the "traditional" limitations and are addressed below), which are subject to reverberation, signal-to-noise issues, background noise and other sources of degradation.

Assistive devices typically pick up signals closer to the sound source, that is, the microphone is placed in close proximity to the sound source. This is accomplished using a variety of methods including various and multiple microphones, induction pick-up systems, and direct connection. Assistive devices can transmit high quality auditory signals across significant distances, such as when an FM or infra-red system is used in a theater or lecture hall. Assistive devices can deliver the signal of interest to the end-user in several ways to assure a high quality sound. Options include various headphones and acoustic couplers, direct audio input or neckloop coupling to a personal hearing aid, vibrotactile signal, or the signal can be visually coded as in captioning.

There are times when assistive devices offer a more appropriate and more efficient solution to communication problems than do hearing aids. Depending on an individual's communication demands and financial constraints, ear-level amplification may not be the best solution. For example, a telephone amplifier and/or knowledge about how to access closed captioning on a home television set may yield a greater return on investment in a particular situation than would ear level amplification.

Recent studies examined how often audiologists provide information to patients about assistive devices. Prendergast and Kelly (2002) surveyed audiologists to determine the type and amount of audiologic rehabilitation techniques they employed. Results showed that 100% of the 120 respondents reported recognizing the benefit of providing more information about ALDs to their patients, while 78% of the respondents reported they provided information about ALDs to their patients most of the time.

A different perception of how often audiologists provide information about assistive technologies was provided by a survey of consumers. Stika, Ross, and Cuevas (2002) analyzed surveys from 651 members of Self-Help for Hard of Hearing People, Inc (SHHH). The respondents indicated they were hearing aid users who received services from

audiologists. Whereas 48% of respondents reported their audiologist made certain they understood their t-switch, only 34% of respondents stated their audiologist informed them about other assistive technologies.

The discrepancy between the survey of audiologists and consumers regarding how often assistive device information is provided could be a matter of perception, recall, or miscommunication. However, it may also serve to alert audiologists and other hearing health care professionals that consumers of our services are not recalling or retaining information about ALDs and ADs, and perhaps we need to transmit the message more consistently, and with greater emphasis.

Despite the benefit of assistive listening devices (ALD) and alerting devices (AD), some audiologists and hearing professionals are not able to provide adequate sample space for assistive technologies "in-house" due to cost, space, display, or inventory concerns. Others may not have the same expertise and comfort level with assistive devices as they have with hearing aids, and therefore they may elect to not offer these devices in the office.

II. Inexpensive Options:

A. The Benefits Of T-Coils

There are multiple benefits to flexible, adaptable (larger) hearing aids. T-coils can be built into behind-the-ear (BTE) and in-the-ear (ITE) hearing aids, but very few in-the-canal (ITC) and completely-in-the-canal (CIC) models contain t-coils, a pre-amplifier, and a mic/t-coil switch (Marshall, 2002). Despite the benefits of t-coils, less than 40% of hearing aids sold in the U.S.A. include t-coils (Ross, 2002). This is perhaps due in part to user preference for small, seemingly hard-to-see hearing aids.

My personal experience indicates that more often than not, when faced with the options and alternatives, most people choose t-coils. I generally provide patients with specific advantages and disadvantages of various styles of hearing aids, including a discussion regarding t-coils. Most patients conclude the functional benefits of a BTE or ITE style with a t-coil outweigh the cosmetic advantages of an ITC or CIC style hearing aid.

The key points relating to hearing aid selection, t-coils, and assistive devices, which I address with my patients and their families are noted below.

1. How t-coils and direct audio input (DAI) are used to couple ALDs to hearing aids via neck loops, small area and room loops.
2. How and why a t-coil can improve speech understanding with wired, mobile and cell telephones.
3. How t-coils (and DAI) are generally available in larger hearing aid styles.
4. The availability of ALDs in the community due to the Americans With Disabilities Act (ADA).
5. The benefits of ALDs in situations where hearing aids may not help. For example, in a movie theater or a worship service.
6. I also demonstrate (by wearing) a BTE aid with a clear ear mold in one ear and an ITC in the other ear to demonstrate their appearance when in use.

Providing the above information about t-coils and demonstrating the appearance of different types of hearing aids requires a few minutes of time during the initial discussion, but reduces frustrations and potential remake time later.

B. Order an appropriate t-coil.

An appropriate t-coil must be oriented in the hearing aid in a way that maximizes signal strength. It must be of sufficient strength to provide an audible signal, and lastly, it needs to be activated in a way suitable to the hearing aid user.

Proper orientation is dependent on how the t-coil will be used. The t-coil should be horizontal for telephone use and vertical when a neck or floor loop is used. A diagonal orientation compromises the usefulness of the t-coil in all uses situations. An alternative to diagonal orientation would be to orient the t-coil to the loop and have the user move the receiver to a position that generates the best signal while talking on the phone (Ross, 2002).

The audiologist can specify the orientation when ordering custom products by drawing a line on the earmold impression while it is in the ear to indicate horizontal to the manufacturer. For BTE products, the audiologist should contact the manufacturer to determine each models' t-coil orientation.

The strength of the t-coil pick-up is dependent on the size of the metal rod around which wire is coiled and on the presence of an amplifier for the t-coil. The larger the rod the more turns of wire, and the more powerful the t-coil (Ross, 2002). The size of the rod may be reduced when a pre-amplifier is available. Some manufacturers offer t-coils that include an integrated amplifier while other manufacturers will require that the audiologist order a pre-amplifier along with the t-coil. Regardless of the way in which the amplifier is added, the audiologist should ensure that an amplifier is included with the t-coil to maximize induction strength.

T-coils can be activated by the common Microphone/Telephone/Off (MTO) switch or a Microphone/Mic+T-coil (M/MT) switch, or, in some BTE models, a switch that offers both M/T/O and M/MT/O options. This type of switch can be difficult to operate for individuals with reduced dexterity. A newer t-coil control option is the "touchless" t-coil. This system automatically switches from the microphone to the t-coil when it "senses" the magnetic energy of the telephone and switches back to the mic when the magnetic field is no longer apparent (Marshall, 2002). This type of system makes t-coil activation much easier for the hearing aid user, and in particular, for those with limited or reduced dexterity.

C. Confirm the t-coil is working properly.

Real-ear probe-microphone measures (REM) are often used to fit, verify, and adjust hearing aids. The purpose of REM is to ensure the hearing aid output is appropriate. It makes sense to fit, verify and adjust the hearing aid output when the t-coil is active. Additionally, REM can indicate the placement of the telephone near the ear that results in the greatest signal strength and whether or not the volume control wheel (VCW) setting needs to be increased in order to maintain appropriate signal strength in the t-coil mode. See Mueller (1992), and Grimes and Mueller (1991a, 1991b) for specific directions on how to obtain REM with an active t-coil.

D. Teach patients how to use the t-coil.

Adults have reported they received inadequate training on how to use their t-coils when fit with hearing aids (Stika et al., 2002). Education at the time of fitting should include determining the telephone receiver position and VCW setting that produces the greatest signal strength (see above), verification that the patient can manipulate the control switch or remote control, and can recognize when the aid is on "M" versus "T".

Additionally, if the patient has access to a neck loop or small area or room loop in their home or community (see below), he or she should be reminded that the signal of interest can be accessed just by activating the t-coil and adjusting the VCW if necessary.

The patient should be notified of the availability of a directional array microphone (<http://www.etymotic.com/>) that can be used with hearing aids that have a t-coil. I also recommend that the patient be given information about the "Let's Loop America" initiative, a public awareness program designed to bring loop systems to more hearing aid users (Myers, 2002).

E. Provide Tips On How To Improve Telephone Communication

Hearing impaired people using wireless phones can often switch from the traditional audible ring option, to the vibrating option. When hearing impaired listeners are having difficulty due to ambient noise levels present while using their phone, they can cover the phone mouthpiece while listening. This simple act reduces the level of background noise picked up by the handset mouthpiece which is also directed to the listener's ear. Simple and inexpensive ways to increase the intensity of the acoustic signal include a strap-on portable amplifier (for wired, wireless and cellular phones) or an in-line tabletop amplifier (for wired phones) both of which are available from Ameriphone and NFSS. The HATIS cellular phone amplifier (CPA) is available from Life With Ease. Similarly, the telephone's electromagnetic signal can be amplified with an inductive coupler such as the Oticon TE-80 induction adapter available from Earlink or the Phonar PE 850 available from HARC. Table 1 (below) provides contact information for these and other companies.

F. Encourage Use Of Closed Captioning At Home

If your television has a screen larger than 13 inches and was manufactured after 1993, it will have closed captioning capability. Many people are unaware of closed captioning, its potential benefits, and how to access it. Consider instructing patients in how to access the captioning function via the menu button on their television's remote control. Some models allow the user to select the size of the captioning text and whether or not the text appears in a box.

G. Educate Patients About The Americans With Disabilities Act (ADA):

The ADA (Public Law 101-336) is landmark civil rights legislation. The ADA went into effect in January 1992 and it provides a comprehensive national mandate for the elimination and prevention of discrimination against individuals with disabilities. Because of the ADA, businesses and employers must take steps to ensure that disabled people, including those with communication disabilities, have access to all goods, services and facilities available to non-disabled people. Additionally, the ADA prohibits discrimination on the basis of disability by private entities and ensures that individuals with disabilities have access to public accommodations, employment opportunities, transportation and telecommunications (U.S. Equal Employment Opportunity Commission, 1992).

All individuals with hearing-impairment, regardless of their age, are affected by the ADA. It is the responsibility of public access facilities, employers, and telecommunication providers to comply with the ADA, but it is the responsibility of the consumer to demand compliance.

However, some consumers -- such as those with hearing loss -- may be unaware of the benefits of the ADA. Therefore, audiologists are the most logical professionals to educate consumers with hearing-impairment about the ADA and the rights of the hearing-impaired. Following are some ways in which audiologists can help their patients learn about and take advantage of the ADA.

1. Display access symbols.

Display the symbol that represents international access for the hearing impaired on your office door, in advertisements, on letterhead, and on mailings. Or, make a flier to instruct patients about this and other relevant symbols about the availability of assistive devices. These symbols are available on the websites www.accessibility.com.au/melbourne/product/signs.htm and http://www.monmouthharts council.org/ADA_icons/ADA_icons.html.

2. Provide a list of public access facilities in your community that have assistive devices and encourage ALD use.

Generate a list of theaters and other public venues in your community that are ADA compliant and have assistive devices for the hearing impaired. If time is a concern, you could consider contacting other individuals or organizations and ask them to help you with this task. For instance, you may ask an area SHHH or AG Bell group, or local middle or high school students, who are required to obtain volunteer hours, and suggest they take on this task as a community improvement effort. This list could be put in the form of a flier or brochure that is kept in your lobby, given to patients an initial during appointment, mailed to patients with a monthly bill or used as a column in your quarterly newsletter.

3. Educate Patients About Specific Assistive Listening And Alerting Device Options

There are a number of things that can be done to educate patients about specific devices. First, obtain catalogs from assistive device providers and put the catalogs in your waiting room alongside the magazines (see Table 1). Second, create a notebook of fliers that display photos, descriptions, and purchase information about various devices, and keep this notebook in your waiting room. Third, mail one of these fliers with monthly invoices or post them in your patient care areas. Fourth, develop a list of local providers and distributors in your area who offer reasonable policies for individual purchases, including inventory and price information, and return and repair policies. Fifth, show a looped videotape of assistive devices in your waiting room such as Cindy Compton's video, "Doorways to Independence." Sixth, for patients who have access to the Internet, compile a list of websites about the ADA and assistive technologies. See Table 2 for a short list of such websites. Make this flier available in the waiting room or put the information in your quarterly newsletter. Seventh, volunteer to give presentations to local SHHH or AG Bell support group meetings, worship groups, senior centers, local professional groups, or adult retirement communities. Presentation topics could include the ADA, local ADA compliance and self-advocacy regarding ADA compliance, t-coil use, the "Let's Loop America" initiative, and demonstrations of specific assistive device technologies.

Table 1. Assistive listening and alerting device sources available on the Internet.

Ameriphone, Inc. (800 874 3005) <http://www.ameriphoneinc.com/>

Audio Enhancement (800 383 9362) <http://www.audioenhancement.com/>

Beyond Hearing Aids <http://www.beyondhearingaids.com/>

Global Assistive Devices (888 778 4237) <http://www.globalassistive.com/>

HARC Mercantile/HAC Group (800 445 9968) <http://www.accessolutions.com/>

Hearing Aid Telephone Interconnect Systems (HATIS) <http://www.hatis.com/>

Hearing Resources On-Line Store <http://earlink.com/>

Life With Ease (800 966 5119) <http://lifewithease.com/>

NFSS (888 589 6671) <http://www.nfss.com/>

Phonic Ear, Inc (800 227 0735) <http://www.phonicear.com/>

Plantronics (408 426 5858) <http://www.plantronics.com/>

Siemens (800-766-4500) <http://www.siemens-hearing.com/>

Silent Call Corporation (800.572.5227) <http://www.silent-call.com/>

Sonic Alert, Inc (248 656 3110) <http://www.sonicalert.com/>

Ultratec, Inc (800 482 2424) <http://www.ultratec.com/>

Williams Sound Corp (800 843 3544) <http://www.williamssound.com/>

Weitbrecht Communications Inc (WCI) (800 233 9130) <http://www.weitbrecht.com/>

Table 2. Assistive device information available on the Internet.

Funding Assistive Technology For Persons With Disabilities: The Availability Of Assistive Technology Through

Medicaid, Public School Special Education Programs, And State Vocational Rehabilitation Agencies
<http://www.nls.org/vrbooklt.htm>

Gallaudet's Assistive Devices Center web page http://aslp.gallaudet.edu/aslpweb/business/ald/ald_desc.html

International Hearing Dog, Inc
<http://www.ihdi.org/>

Let's Loop America
<http://www.hearingloop.org//loopAmerica.htm>

National Institute on Deafness and Other Communication Disorders (NIDCD) captioning information
<http://www.nidcd.nih.gov/health/hearing/caption.asp>

Ross, M. (2002, January/February). Telecoil and telephones: The most commonly misunderstood "assistive listening device". *Hearing Loss*.
<http://www.hearingloss.org/html/rosstelecoilarticlej02.HTM>

References

Grimes, A. M., & Mueller, H.G. (1991a). Using probe microphone measures to assess telecoils and ALDs Part I: Assessment of telecoil performance. *The Hearing Journal*, 44, 16-18.

Grimes, A. M., & Mueller, H.G. (1991b). Using probe-microphone measures to assess telecoils and ALDs Part II: Assessment of ALDs, telephones, and telephone amplifiers. *The Hearing Journal*, 44, 16-18.

Marshall, B. (2002). Advances in technology offer promise of an expanding role for telecoils. *The Hearing Journal*, 55, 40-41.

Mueller, H. G. (1992). Assessment of telecoils and assistive listening devices. In H.G. Mueller, D. B. Hawkins, & J.L. Northern (Eds.) *Probe microphone measurements: Hearing aid selection and assessment* (pp. 227-249). San Diego: Singular.

Myers, D.G. (2002, Sept). The coming audiocoil revolution.

The Hearing Review, 28-31.

Prendergast, G.S., & Kelley, L.A. (2002). Aural rehab services: Survey reports who offers which ones and how often. *The Hearing Journal*, 55, 30-35.

Ross, M. (2002, Sept). Telecoils: The powerful assistive listening device. *The Hearing Review*, 22-26, 57.

Stika, C.J., Ross, M., & Cuevas, C. (2002, May/June). Hearing aid services and satisfaction: The consumer viewpoint. *Hearing Loss*, 25-31.

U.S. Department of Justice. (2002). *Enforcing the ADA: Looking back on a decade of progress*. Washington, DC: U.S. Government Printing Office.

U.S. Equal Employment Opportunity Commission. (1992). *The Americans With Disabilities Act questions and answers*. Washington, DC: U.S. Government Printing Office.