

Considerations in Establishing an Optimum Assistive Listening Device Center

Sharon A. Lesner and Mona S. Klingler
*School of Communicative Disorders
The University of Akron*

Assistive listening devices (ALDs) are an important component in the delivery of comprehensive hearing care services to individuals with hearing impairments. Several considerations are discussed concerning how to incorporate ALDs into an audiologic practice. These include room size, furnishings, and environment, as well as the organization of special equipment. The authors were fortunate to have sufficient funds to outfit a state-of-the-art demonstration center. Several suggestions regarding development of an ALD center are offered based upon the authors' experiences.

Assistive listening devices (ALDs) are a key component in the delivery of comprehensive hearing care services. These devices can solve problems that cannot be handled with hearing aids alone, especially when noise, distance, and reverberation are present. ALDs can serve to improve quality of life, guarantee communication access, and they can also serve as life-saving tools (Ross, 1994; Sandridge, 1995).

Due to the highly technological nature of the devices and the great variety of options available, patients typically need "hands-on" experience with ALDs in order to appreciate the benefits they can provide and to select the most appropriate options. As Naisbitt (1982) stated, "whenever new technology is introduced into society, there must be a counterbalancing human response – that is, high touch – or the technology is rejected. The more high tech, the more high touch"

Sharon A. Lesner, PhD, is Professor, School of Communicative Disorders, The University of Akron, OH, 44325-3001. Mona S. Klingler, MA, is Assistant Professor of Communicative Disorders, The University of Akron, OH, 44325-3001.

(p. 39). If patients are to be convinced of the need and worth of ALDs, and if they are to understand the manner in which ALDs function, they must actually use the devices. Preferably the devices should be demonstrated by a caring and knowledgeable professional.

Several options exist for audiologists to incorporate ALDs into their practices. Because all individuals with hearing impairments are potential candidates for ALDs, a referral to a center or individual who works with the devices is one option. Merely telling someone about a particular device is not acceptable because patients may be reluctant to purchase devices which they have not experienced first hand. Also, without guidance, they may purchase inappropriate or inferior equipment. ALDs are in many instances similar to hearing aids. Just as we would never encourage patients to select hearing aids on their own, we should offer guidance in the selection of ALDs. It is the role and responsibility of the audiologist to provide guidance as to which ALDs are appropriate, functional, and safe for the individual.

Preferably, all audiologists would have a basic selection of ALDs in their practice setting. ALD presentations might be accomplished by keeping some devices in cabinets, using dedicated displays, or having a dedicated room. Considering the necessary investment of time, space, and equipment, one's choice needs to be weighed carefully.

Although a selection of devices in cabinets is better than not having any devices, there are several potential problems with this approach. One of the most obvious problems is that when patients see that the audiologist is having difficulty setting up or adjusting an ALD as they remove the device from the cabinet, there is a tendency to think that "if the expert is having trouble, how can I be expected to work with the device!" Second, the additional wear and tear that occurs with repeated assembling and disassembling of devices tends to result in more frequent damage. Third, missing components occur often. Finally, the additional time and effort needed to get the device, set it up, and then put the device away often result in the effort not even being made.

The use of permanent display shelves solves some of the above problems. However, care must be taken so that the displays are not overwhelming. Too many devices, wires, and options can easily overwhelm or discourage patients. Additional problems with a dedicated display include reduced flexibility in the use of the equipment and the need for dedicated space. With careful planning, however, dedicated displays can be effective.

Although a dedicated ALD room requires the most space, if done appropriately, it offers the greatest number of options and benefits. We have had the luxury of designing and equipping a state-of-the-art ALD room at The University of Akron. After experiencing the benefits that ALDs provide, one of our patients donated funding to establish an Assistive Listening Device Center. We had the freedom to choose the room layout, furnishings, audiovisual equipment, and the

ALDs.

Although we have been able to experiment with a wide range of devices and equipment, not everyone is so fortunate. Based upon our experiences, though, there are several recommendations that we can offer for others as they consider incorporation of ALDs into their particular setting.

Room Size

The size of a room will impact on the potential uses of an ALD center. When sufficient space is present, an ALD center may be used for multiple purposes including working with groups as well as individuals. Our Center is 5.5 m by 7.6 m with a separate observation/equipment room which is 2.3 m by 2.4 m (see Figure 1). This is large enough so that in addition to storing, selecting, and assessing ALDs in the Center, we also do individual and group counselling, hearing aid work, and research. We also hold our Hearing-aid Orientation Program (HOP) in the Center. Thus, the space, audio-visual equipment, and ALDs can be used optimally by the audiology staff for a variety of purposes.

The observation/equipment room provides a place for additional storage, especially of the audio equipment. Because the room has a lock, additional security is provided for expensive equipment. Keeping the equipment here frees up storage space for ALDs in the Center and keeps the patient area less cluttered and less overwhelming. In addition, a telephone and the telephone-switching equipment (which is described below) are kept in the Observation Room. In this fashion, telephone conversations can be conducted with the patient in the Center and a clinician or significant other in the observation/equipment room.

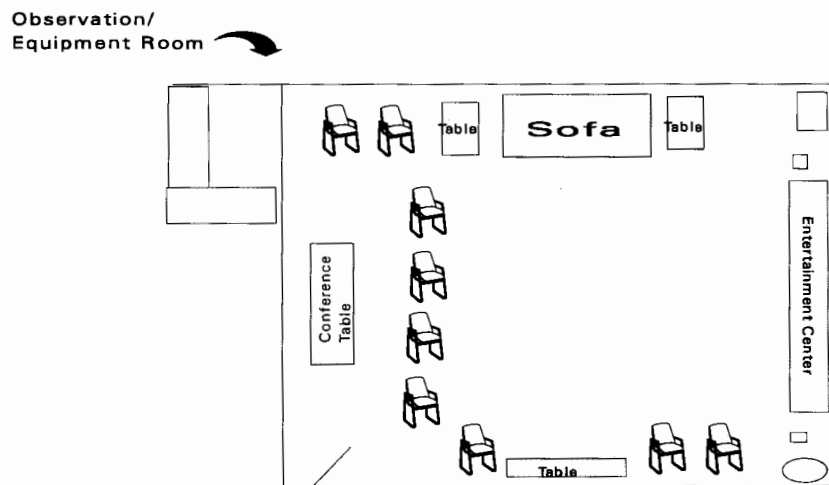


Figure 1. Floor plan of the assistive listening device center.

Furnishings

We attempted to select pieces that were inviting, comfortable, and understated, incorporating classic and traditional designs and colors. Avoidance of trendy decorating styles and colors assures that the center will not become dated.

Functionality of furniture was a key consideration. Pieces that provided comfortable support and which were easy to lower oneself onto and rise from were chosen. Fabrics and frames for chairs were selected which could withstand frequent use, but which were also light enough so that they could be easily re-arranged. Twelve guest chairs were purchased along with one 152 cm long sofa.

Only one sofa was included because strangers tend to be more comfortable in individual seating. In addition, when a person with a hearing impairment sits on a sofa, they are placing themselves at a disadvantage for lipreading anyone who sits with them on the same piece of furniture due to the extreme angles involved.

A 183 cm × 89 cm conference table was included for small group work and conferencing, and if needed, for displaying devices. A good quality home entertainment center provides excellent storage for the television monitor and ALDs. The unit also lends a more residential atmosphere to the room. Occasional tables provide additional discreet storage and further add to the home-like atmosphere. Incandescent lamps, telephones, and alerting devices can also be displayed on the tables as they would be in a patient's home.

If the task of designing decor seems daunting, many furniture stores have decorator services that can be of assistance. However, your guidance is still necessary considering the special needs of patients who will be using the room.

Environmental Considerations

To optimize therapeutic interventions, the environment must be tailored to accommodate typical age-related changes that occur in sensory function (Lesner, 1995). Consideration should especially be given to both the acoustic and visual environments. Ambient noise should be minimized by selecting a quiet, low traffic site. Wall-to-wall carpeting and sound-treated doors can also help to reduce reverberation and improve signal-to-noise ratio. The Center has a built-in sound-field amplification system that was installed by a sound contractor. With four wall-mounted speakers and anti-feedback detectors, significant amplification is possible. The Center is also looped. FM units are provided to patients as needed.

Because many older adults are affected by glare (Kricos, 1995), indirect, non-directional lighting and window curtains should be used. Older individuals also need greater illumination in order to optimize visual input (Atchley, 1988).

SPECIAL FEATURES OF THE CENTER

Telephone System

Telephone use is important for social, vocational, and safety reasons. Because demonstration of several telephone options may be necessary, and because there

are numerous signaling and TTY devices which we wanted to display, it was not feasible to have multiple dedicated telephone lines in the Center. Instead, we have developed a complete closed circuit telephone system using several A/B switches and a device known as the "Inter-Phone," which is available from HARC Mercantile, LTD., Kalamazoo, MI.

The Inter-Phone is a telephone-line simulator. It can be used with telephones, answering machines, TTYs, or alerting devices. The Inter-Phone accepts live-voice input from a telephone or recorded stimuli from a tape deck, compact disc, video cassette recorder, and so forth. Thus, a significant other can converse with a patient or recorded speech can be routed to the patient.

The output of the Inter-Phone can go directly to another telephone, TTY, and so forth or it can be routed to an A/B switch or *T-Switch*. The A/B switches provide a mechanism so that the *common* input signal can be routed to various other devices by merely dialing the desired connection.

Figure 2 is a diagram of a simple system in which a telephone is used as the input device and directed through the Inter-Phone. The Inter-Phone's output goes to the first A/B switch. By dialing *A* on the switch, Phone A would be rung by the Inter-Phone and the signal would be directed to this device. If *B* were dialed on the A/B switch, then Phone B would be activated. If A/B switch #1 were dialed to *D*, then the output from the Inter-Phone would be directed to A/B switch #2. Then the phones connected to A/B switch #2 could be activated by dialing in

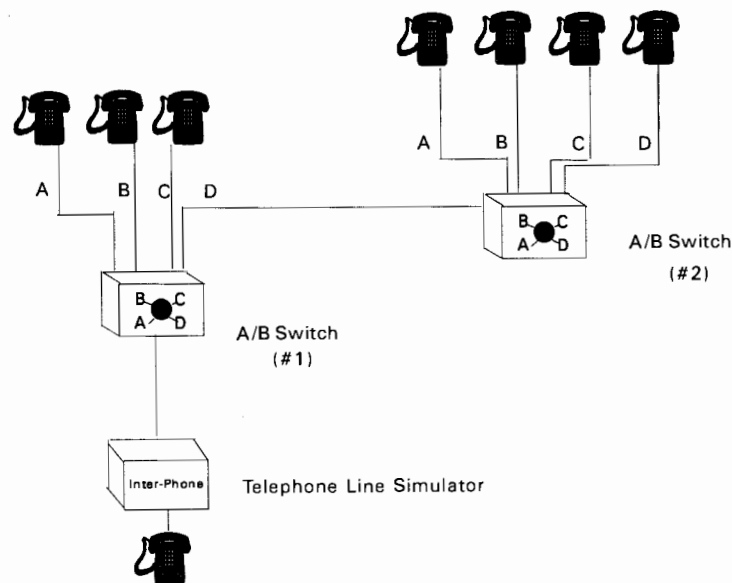


Figure 2. Diagram of the telephone line simulator used with two A/B switches.

the desired letter. By cascading several A/B switches, the number of phones, signalling devices, and so forth that can be activated is increased.

Currently five Inmac Model 1992 A/B switches, each with four output settings, are being used. These switches are used to activate telephones, signaling devices, and TTYs which are color coded. In addition to placing color tags on the devices, we have placed corresponding color tags on the A/B switches. A floor plan is kept next to the switches, with each device, the location of the device, and the corresponding color on the A/B switch indicated.

Having a closed-circuit telephone system is a significant savings and doing your own wiring can also decrease costs. Materials are readily available from retail establishments such as Radio Shack. Bulk 4-wire telephone cable (about \$0.13/foot), 4 pin modular plugs (\$0.29), a crimper (\$8.99), and RJ11 phone jacks (\$3.99) are needed to set up a similar closed-circuit phone line.

Audio-Visual Equipment

The audio-visual equipment includes a television, compact disc, audio-cassette, and laser disc players. A surround-sound amplifier couples these devices to six speakers within the room, including a sub-woofer. In addition, a sound mixer, sound-field amplification system, and hearing loss simulator are available.

The television screen is 69 cm with built-in closed captioning. The size of screen needed should be chosen based upon the viewing distance, with larger rooms needing larger monitors. Instead of relying upon broadcast programs to demonstrate captioning, which would involve the added expense of cable and the need to seek out programs that were captioned at particular viewing times, we used captioned laser disc recordings. *The Wizard of Oz* is effective because it is known by practically all individuals and it seems to be appealing to people of all ages. With the laser disc, any part of the movie can be accessed in a matter of seconds.

The surround-sound system is useful for a variety of purposes including the generation of sound effects, provision of music that can be used for selection of assistive devices and hearing aids, and creation of sound conditions for communication therapy. The Yamaha Model DSP-A970 surround-sound amplifier in the Center can electronically simulate various acoustical environments including those of concert halls, movie theaters, clubs, and churches. A choice of 24 pre-set environments can be selected. A menu system also can be used to change reverberation time, room size, room liveliness, and initial delay of sound.

Music

A variety of compact discs (CDs) were selected that represent various styles of music. Patients are asked what type of music they prefer. Familiar pieces provide an opportunity to assess the quality of ALDs. Better results are obtained when high quality CDs are selected, especially if a good sound system is utilized.

One way in which to judge potential CD sound quality is to check the code that is displayed on the jacket. Three letters are listed, for example, *AAA*, *ADA*, *ADD*, or *DDD*. The letters refer to the three stages involved in the recording process and each can be either an analog (A) or digital (D) format.

The first letter refers to the first recording of a work, which can be done on an analog or digital multi-track machine. The second letter refers to the product of the mixing process. The third refers to the format of the final product. CDs are designated *D* and audiotapes are designated *A*. In general, the more D ratings, the higher the quality of the output. Digital mixing was not available until the early 1980s so older music on CDs will typically be labeled *AAD*, or *ADD*.

Sound Effects

Another important set of sound stimuli that we have available are CDs with sound effects. Several commercially available CDs with a variety of sounds and backgrounds can be purchased through commercial and professional sources. These CDs can be used to recreate problematic listening situations for a patient and ALDs can be assessed for their effectiveness in these noise backgrounds.

Another excellent method for generating sounds that are particularly problematic for patients is to make audio-recordings in the patient's environment. The recordings can then be used in the selection/alteration of ALDs and hearing aids and for communication therapy.

Degradation of speech for assessment and intervention can be produced electronically. This is especially easy with surround-sound systems through the introduction of different "listening environments." Degradation can also be produced through the introduction of noise (speech noise, white noise, or music can be introduced), or by degradation of speech (e.g., by routing the audio signal through the HELOS).

The HELOS is a hearing loss simulator (Gagné & Erber, 1987) which provides attenuation of acoustic signals, simulated loudness recruitment, loudness discomfort thresholds, reduced dynamic range, and reduced frequency selectivity. The HELOS is especially useful for demonstrating the effects of sensory-neural hearing loss to significant others.

Need for Upkeep/Replacement/Additions

Because breakage is inevitable and new devices are constantly being developed, consideration should be given to where and how funds will be accessed in order to cover ongoing expenses. Replacements for batteries, forms, microphone covers, earbuds, and pocket talkers, for example, are frequently needed.

Possible funding sources include incorporating costs within the fees charged for services. Fees can be charged when devices are lent to patients. Grant support may also be available. The Lions Club, Hike Foundation, and Sertoma, for example, have funded various ALD projects. Although somewhat more difficult,

establishing an endowment fund provides an excellent method of assuring that your center and devices will remain state-of-the-art.

ALDs can make a significant difference in the lives of people with hearing impairments. They are a necessary component in the delivery of comprehensive hearing care and should be considered for all patients. Ideally, all audiologists should be familiar with ALDs and provide at least a basic selection of devices for their patients. If this is not possible, referral to audiologists who provide ALD services should be actively encouraged.

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