abstract

Older adults are the fastest-growing age group in Canada. Hearing loss is highly prevalent among this population. Of those persons who would benefit from the use of hearing aids, only a small number actually own and use them. Digital hearing aids now constitute the majority of hearing aids on the market. Technological advances in hearing aids and hearing assistive technologies have expanded the range of options available to improve the success of device use. Matching the needs and optimizing performance of older adults with the broad range of devices available requires appropriate assessment, selection, verification, and follow-up by the audiologist.

Key words: *hearing aids, hearing assistive technologies (HATS), rehabilitation services, older adults*

Hearing Rehabilitation for Older Adults: An Update on Hearing Aids, Hearing Assistive Technologies, and Rehabilitation Services

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A Rehabilitative Approach to Hearing Loss in Aging

Persons over the age of 65 years are the fastest-growing age group in Canada. The number of adults in this age bracket is expected to grow from 3.5 million in 1996 to an estimated 6.9 million by the year 2021.[1] Older Canadians are working later in life than ever before, and good communication is essential to their continued involvement in the workplace and the wider social sphere.[2,3]

Hearing loss is one of the most common chronic disabilities for older adults, and the prevalence of hearing loss increases with age.[4] Based on self-report, 41.1% of adults over the age of 65 who are not institutionalized have hearing loss.[5] The typical hearing loss for older adults is permanent and involves a gradual decrease in hearing sensitivity for higher frequencies.[6] In suboptimal listening conditions of noise interference, even persons with only mild hearing losses will have difficulty understanding speech.[7] An acquired sensorineural hearing loss affects speech understanding, and has significant social and psychological implications.[4,8,9]

Only 27% of persons of all ages in Canada who report having a hearing loss also report using hearing aids.[10] In the past, stigma attached to hearing loss was a main reason for not purchasing a hearing instrument.[11,12] Current reasons for not using hearing instruments include the costs outweighing the perceived benefits, the amplification of noise, a lack of physical comfort, performance problems, and difficulty with adjusting or handling the instrument.[13,14] Benefits of using hearing aids include improved relationships within the family and greater independence and security, but even those who wear hearing aids on a consistent basis may still have socially disabling levels of communicative difficulty.[4,15,16] Comprehensive postfitting rehabilitation programs that are designed specifically for this population can support successful adaptation to the use of hearing assistive technologies.[17,18,19]

Older adults today are more technologically savvy than ever before. As such, they are more comfortable with the use of technology and may be less intimidated by the use of hearing aids or other hearing assistive technologies (HATS). Older adults are most receptive to the use of technology when there is a high level of concern for the problem that can be alleviated through the use of technology, when there is social support for using technology, and when technology is geared toward enhancing quality of life.[20] Today's older adults use computers to

access information on the internet, educate themselves before coming to see the audiologist, and arrive with an idea of the type of device they believe will fit their needs. The audiologist must be prepared to dispel some of the myths seen in advertising and be ready to work in partnership with the patient to choose an instrument that will best suit his/her communication and lifestyle needs.

Hearing Aids and Hearing Assistive Technologies (HATS)

Technological advances in hearing aids and HATS have expanded the range of options available to improve the success of a device use. Today's hearing aids differ significantly from their analog predecessors because the application of digital signal processing has permitted many adaptive and/or automatic features. In the past decade, hearing instrument technology has developed to the point that digital hearing aids now constitute nearly 90% of all hearing aid sales in the U.S.[21] This growth has permitted decreases in the cost of digital technology so that digital hearing aids now span the range from entry-level prices to high-end pricing, thus allowing all users the option of digital technology.

Included in the benefits of digital hearing aids are improved sound quality; multiple listening programs for different listening environments; advanced noise reduction strategies; acoustic feedback reduction; compatibility with remote control options; and flexibility in manipulation of the frequency, compression, and gain (Table 1). These developments allow the audiologist considerable flexibility in choosing appropriate technology for the varied needs of older adults. Such features as automatic function of the telecoil (a hearing aid component for use with the telephone or for coupling to HATS) and multiple programs ensure that even those with limited manual dexterity or cognitive impairments can wear a device that optimizes performance across a broad range of listening environments. It is no longer necessary to find the switch or remember to return to a listening program when the conversation has ended for effective telephone use.

Table 1: Benefits Attributed to Digital Hearing Aids

Improved sound quality
Multiple listening programs for different listening environments
Advanced noise reduction strategies
Acoustic feedback reduction
Compatibility with remote control options
Flexibility in manipulation of the frequency, compression, and gain

Difficulty understanding speech amid noise is a common complaint for hearing aid users. Directional microphone technology has advanced to optimize the directional responsiveness of the hearing aid microphone in order to reduce the level of noise when the noise source is from an angle that is behind or beside the hearing aid user. Automatic directional systems are intended to accurately switch between directional and omnidirectional modes, and this option is available even in the lower-priced entry-level digital devices.

Specific HATS Technologies

Development of HATS has resulted in increased demand for devices such as amplified telephones, frequency-modulated (FM) assistive listening systems, and visual or tactile alerting devices that allow older adults to remain active within the community and stay safe in their homes.

Amplified Telephones

Amplified telephones are available with a range of additional features including adjustable volume, visual ring alert, variable ring intensity, and enlarged number display, all of which address the needs of those with hearing, vision, and dexterity concerns (such as the ClearSounds® CSC50, depicted in Figure 1). Telephone in-line amplifiers also offer portability and lower cost options for successful telephone use. Ear level receivers for behind-the-ear hearing aids have given access to Bluetooth® technology permitting wireless mobile phone and Personal Digital Assistant (PDA) use for those adults demanding access to these technologies.

Figure 1: ClearSounds® CSC50 Amplified Telephone

Image courtesy of ClearSounds

FM Assistive Listening Systems

The FM assistive listening system reduces the difficulty of listening in background noise for hearing aid or headset users. The signal is carried by radio wave from the transmitter to the receiver. The miniaturization of FM receivers has resulted in ear-level receivers that can be placed either within the hearing aid by the manufacturer or attached to the bottom of a behind-the ear-style aid (Figure 2). FM assistive listening systems can also be coupled to hearing aids that have telecoils through neck loop receivers.

Component Miniaturization

Technological advances have resulted in miniaturization of many hearing aid and HAT components. These advances have lead to the production of some smaller devices such as mini behind-the-ear hearing aids, completely-in-the-canal hearing aids, and miniature FM receivers. Small devices may not meet the needs of all device users particularly because they may be difficult for an older person to manipulate or adjust. Discussion with the audiologist will ensure selection of appropriate devices to meet each individual's needs. Remote control capability for hearing aids is another available feature that must be carefully considered. Watch, keychain, and handheld options are all available.

Figure 2: Behind-the-Ear Hearing Aids

Individual with hearing loss using a behind-the-ear hearing aid with miniature FM receiver and communication partner using the FM transmitter.

Image courtesy of Brian Hillier, Photographer

Individualizing Technologies

The broad range of devices available, coupled with the flexibility of these devices, has led to increased success in matching technology to the individual needs of those experiencing hearing loss. However, this complexity requires appropriate assessment, selection, and verification, and follow-up to optimize the performance of each user with the chosen device. In modern hearing aid fitting, the audiologist will input data to the software program that provide individual ear acoustics to ensure appropriate output limiting characteristics to provide comfort and protect the residual hearing of the individual. When fitting FM assistive listening systems, it is important that the electroacoustic characteristics of the hearing aid are matched to those of the hearing aid in combination with the FM receiver.

Assessment and Support in the Use of Hearing Aids and Hearing Assistive Technologies

The audiological management of hearing impairment in older adults requires a comprehensive approach. Assessment and rehabilitation is focussed on activity, participation, and quality of life using the World Health Organization's International Classification of Functioning, Disability, and Health.[22,23] Within this framework issues related to barriers and facilitators to hearing aid use can be identified through a comprehensive assessment by the audiologist that includes the patient's communication abilities and needs, lifestyle, experience with the use of technologies, manual dexterity, vision, attitude towards amplification, motivation, and reasonable expectations from amplification.

Following a comprehensive assessment, clear and realistic individualized goals for rehabilitation are set cooperatively by the audiologist and the patient. Rehabilitation programs include the prescription of, orientation to, and the use of hearing aids and HATS, and participation in counselling programs that address communication strategies and nonauditory factors that may impact on successful outcomes through education and peer-support.[19,22] Group counselling programs are available at many audiology clinics, and at universities that train audiologists, which may have onsite clinics. In Ontario, for example, these include the H.A. Leeper Speech and Hearing Clinic at the University of Western Ontario, and at Canadian Hearing Society branches throughout the province. These counselling programs provide the opportunity for older adults to share knowledge and experiences and have been found to decrease the number of hearing aids returned and to increase the use of hearing aids and hearing assistive technologies.[17,18,24] Pamphlets that provide information about these programs are available at local audiology clinics. Family practitioners and patients with hearing loss can also contact their local audiology clinics to locate these services in their own communities.

Electroacoustic verification of all hearing aids and hearing assistive technologies is carried out on an ongoing basis to ensure that technologies are functioning optimally. Progress of attainment of individualized goals is monitored over time and provides an opportunity to add new goals based on changing individual needs.

Key Points

- Audiologists must complete a comprehensive assessment of the patient's communication abilities and needs, lifestyle, and experience with the use of technologies in order to prescribe hearing assistive technologies.
- The patient's manual dexterity and vision are key factors in his or her ability to use smaller-sized devices: if the individual cannot pick up the device, install and change the battery, insert the device in the ear, and manipulate the controls, the device will not be used.
- A comprehensive postfitting rehabilitation program implemented by an audiologist is critical to the successful uptake and use of hearing technologies by older adults.
- The patient's attitude towards amplification, motivation, and reasonable expectations are related to satisfaction with the use of hearing aids.
- The majority of hearing aids on the market now employ digital technology.
- Hearing aids do not work optimally in all listening environments, and other hearing assistive technologies such as FM systems and amplified telephones are important to ensure maximum accessibility for older adults.
- Older adults are more technologically savvy than ever before and have a greater awareness of hearing products that are on the market.

Conclusion

Hearing loss is highly prevalent in the older adult population. Of those persons who would benefit from the use of hearing aids, only a small number actually own and use them. Technological advances in hearing aids and HATS have expanded the range of options available to improve the success of device use. Older adults today are more technologically savvy than in previous generations, and may be more receptive to the use of technology when it is matched to their specific needs. It is also important that older adults set goals for rehabilitation in partnership with the audiologist. Appropriate and comprehensive assessment, selection, verification, and follow-up by the audiologist are critical. Primary care physicians can assist older adults with hearing loss by ensuring they have access to the services of an audiologist.

No competing financial interests declared.

Acknowledgements: Research by Mary Beth Jennings is carried out in the Robert B. Johnston Audiologic Rehabilitation Laboratory and the Bernafon Innovative Hearing Solutions Assistive Devices Laboratory within the National Centre for Audiology, and is supported by the Canadian Foundation for Innovation.

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