Dementia and Hearing Loss: Interrelationships and Treatment Considerations

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ABSTRACT

Hearing loss is common among typically aging older adults and those with dementia. In recent years, there has been a renewed interest in the relationship between hearing and cognition among older adults, and in hearing loss as a modifiable risk factor for dementia. However, relatively less attention has been focused on the management of hearing loss among individuals with dementia and the key roles of speech–language pathologists and audiologists in providing such care. In this article, the authors review the literature on hearing loss and dementia, and analyze the research evidence for treatment of hearing loss in the context of major neurocognitive disorders, such as Alzheimer's disease. This article provides an up-to-date review of research evidence for hearing interventions, as well as recommendations for speech–language pathologists and audiologists to work together to ensure access to hearing health care and increased opportunities for meaningful life engagement for people with dementia and hearing loss.

KEYWORDS: dementia, hearing, communication, audiology, speech–language pathology

Learning Outcomes: As a result of this activity, the reader will be able to (1) describe age-related hearing loss and dementia as comorbidities; (2) explain recent research evidence related to the management of hearing loss for individuals with dementia; and (3) provide recommendations to increase collaborative hearing health care for individuals with dementia.

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People today are living longer than ever before in history. Worldwide, most people can expect to live into their seventh decade. However, a longer life does not always coincide with an extended period of good health. In fact, more people are living longer with chronic conditions that negatively affect their independence and life participation. Age is a leading risk factor for many chronic conditions, such as cancer, cardiovascular disease, and neurodegenerative disease.[1] Among the most common neurodegenerative diseases is Alzheimer's disease, which is a leading cause of dementia/major neurocognitive disorder (Diagnostic and Statistical Manual of the American Psychiatric Association, DSM-5).[2] There are 46 million individuals living with dementia worldwide with a projected doubling of cases every 20 years according to the World Alzheimer Report.[3]

Reflecting this trend, the American Speech-Language-Hearing Association (ASHA) estimates that people with dementia-related cognitive communication disorders are the fastest growing segment of speech–language pathologists' (SLPs') caseload.[4] SLPs in healthcare settings reported that clients with dementia represented 15% of their caseloads, and in skilled nursing facilities specifically, SLPs reported spending 27% of their time providing services to individuals living with dementia.[5]

Dementia often coexists with other disorders, particularly hearing loss. Hearing loss is among the most frequently reported chronic health problems in older age, along with arthritis and hypertension.[6,7] Age-related hearing loss is estimated to affect approximately 25% of people aged 60 to 69 years, 55% of people aged 70 to 79, and nearly 80% of individuals older than 80 years.[8]

The prevalence of each of these conditions among older adults suggests a high likelihood of overlap. In fact, the comorbid prevalence of hearing loss and dementia is high, although estimates vary depending on the sample tested and how hearing loss is defined in the sample.[9–11] At a minimum, the prevalence of hearing loss among older adults with cognitive impairment seems to reflect population estimates of hearing loss. For example, approximately 60% of adults older than 50 years followed at a memory disorders clinic had at least a mild hearing loss in the better hearing ear.[10] Because hearing loss and dementia are independently linked with negative impacts on several aspects of functioning, including communication and participation in activities of daily living, interventions that address both hearing loss and cognitive-communication disorders of dementia are necessary. In this article, we will review the latest research on age-related hearing loss, dementia, and hearing interventions for older adults with hearing loss and those with hearing loss and dementia. We will conclude with recommendations for SLPs and audiologists to facilitate improved hearing healthcare for older adults with hearing loss and dementia across the continuum of care.

AGE-RELATED HEARING LOSS

Age-related hearing loss, also known as presbycusis, is highly prevalent and there is a doubling of prevalence with each decade of life.[12] Among adults over 70 years of age, nearly two-thirds have at least a mild hearing loss in their better hearing ear.[8] Age-related hearing loss has multiple underlying causes that manifest in different audiometric patterns.[13] A primary source of age-related hearing loss results from metabolic changes in the endocochlear potential (EP) of the fluid in the cochlea, which serves as the "battery supply" for the outer hair cells (OHCs).[14] The OHCs are responsible for the active mechanism of the cochlea that essentially amplifies the signal. Without the appropriate biochemical balance in the inner ear, the OHCs lose their electromotility and consequently, there is an elevation in auditory thresholds.[15] In addition, noise exposure can result in loss of spiral ganglion cells and afferent cochlear nerve synapses in typically aging mice even if it does not result in temporary threshold shifts.[16,17] Furthermore, these neural changes can be measured in the absence of elevated auditory thresholds as well as in the presence of intact OHCs.[18] These findings suggest that beyond the threshold elevation seen in older adults, many older adults also experience suprathreshold changes in peripheral encoding of the auditory signal. The most typical configuration of sensorineural hearing loss among older adults is relatively normal or

mild hearing loss in the low frequencies, sloping to moderate or severe hearing loss in the high frequencies. In summary, age-related changes contribute to reduced audibility and poor auditory processing of complex speech signals.

The impact of age-related hearing loss is likely caused by an interaction between peripheral and central auditory changes. Hearing and understanding speech is a complex interactive process dependent on bottom-up encoding of the acoustic signal and top-down cognitive processes required to decode and interpret the spoken message.[19] Variables that influence peripheral auditory performance include pure-tone sensitivity, frequency selectivity, temporal processing acuity, and loudness perception. At the same time, top-down processing that affects central auditory performance includes cognitive abilities, such as processing speed, attention, executive function, and memory.[20] Along with a decrease in the audibility of everyday speech, sensorineural hearing loss results in a distortion of the speech signal that often makes speech unclear even after appropriate amplification. This finding is supported by reports from older adults who, despite having clinically normal auditory thresholds, perform poorly on tasks of understanding speech in noisy backgrounds.[21–23] Such reduced performance on speech in noise tasks could be due to a decline in auditory temporal processing acuity as well as reduced working memory capacity. The functional impact of this hearing loss tends to be that in quiet, one-on-one conversations, many older adults hear reasonably well. However, speech often lacks clarity and becomes very difficult to understand in noisy backgrounds, which are common in everyday life situations. In short, the common complaint of "I hear you, I just don't understand you" is the result of typical age-related hearing loss.

The impact of hearing loss, especially untreated hearing loss, extends beyond communication and is associated with poorer psychosocial health and quality of life. Kramer and colleagues[24] explored psychosocial ratings for over 3,000 older adults living with various chronic conditions. They found that older people with hearing loss were more likely to report reduced psychosocial engagement and quality of life relative to older people with normal hearing. Older adults with hearing loss were more likely to report smaller social networks, more feelings of loneliness, and more depressive symptoms. In related studies, researchers have found hearing loss to be associated with mental fatigue as a result of increased perceptual and cognitive effort,[25,26] social withdrawal,[27] loneliness,[28] and higher prevalence of depression/anxiety.[29]

In addition, the presence of hearing loss has been linked to an increased risk of developing dementia[12,30] and more rapid cognitive decline.[31,32] The reasons for these associations are unclear, but researchers have proposed several hypotheses. The "common cause" hypothesis, originally highlighted by Lindenberger and Baltes[33] and later supported by Lin et al[34] and Schneider and Pichora-Fuller,[35] posits that the association between cognition and hearing reflects common degenerative neurological mechanisms, such as vascular changes, that affect both cognitive and sensory systems. A potential second explanation is found in the "cascade" hypothesis in which long-term deprivation of auditory input is proposed to affect cognition via a mediating factor such as impoverished input or social isolation.[34] Lastly, the "cognitive load" hypothesis posits that a possible link between hearing loss and cognitive decline arises from poor hearing, which taxes limited cognitive resources, resulting in less cognitive effort being applied to encoding, understanding, and responding to an incoming auditory message.[23,26,36,37] It is possible that one or more of these interactions is taking place, as researchers do not believe these potential contributing factors to be mutually exclusive.[19,31,38,39]

DEMENTIA

Dementia is heterogeneous in its causes and manifestations. However, the syndrome of dementia, also known as major neurocognitive disorder by the DSM-5,[2] has a core set of defining characteristics. The DSM-5 criteria for diagnosis of dementia include evidence of significant decline in one or more cognitive domains (attention, executive function, learning and memory, language, perceptual motor and social cognition). The evidence for this decline is based on concern of the individual or

knowledgeable informant, as well as cognitive performance on standardized neuropsychological tests. For a diagnosis of dementia, these deficits must be of sufficient severity to interfere with independent completion of activities of daily living and cannot be attributable to any other cause such as delirium or another mental disorder.[40]

Once criteria for a diagnosis of dementia have been met, underlying causes should be explored. Common etiologies include, but are not limited to, vascular disease, Lewy body disease, and most often Alzheimer's disease,[41] occurring alone or in combination. Patterns of cognitive and communication deficits will vary according to the underlying cause of the dementia. In Alzheimer's dementia,[40] memory and learning are prominently impaired early in the disease course, and all aspects of cognition are impaired to some extent as the disease progresses.[42,43] Expression and comprehension of written and spoken language are eventually impaired, and communication is adversely affected.[44] In addition, changes in behavior are a common feature of most types of dementia.

Behavior changes in dementia are generally referred to as neuropsychiatric symptoms,[45,46] which can be classified in a variety of ways. Aalten et al[47] described behaviors as being of four types: psychosis (delirium, hallucinations, delusions), affective (depression, anxiety), apathy (apathy, appetite disorder), and hyperactivity which is akin to agitation (pacing, wandering, repetitive speech, disinhibition). Neuropsychiatric symptoms, especially aggressive behaviors, are a significant contributor to caregiver burden and a predictor of institutionalization for people living with dementia;[48] thus, they are important targets for intervention. It is important to note that agitation may represent a distinct construct from other behavioral symptoms in that it has underlying causes that are multifactorial and not solely disease related,[49] such as social/environmental factors.[45] Because agitation may be exhibited in response to social/environmental factors, researchers have coined the term "responsive behaviors" to describe symptoms such as pacing, wandering, and repetitive verbalizations, helping to shift the view of such behaviors from being problematic to having meaning that can be addressed with appropriate interventions.[50]

In terms of social/environmental contributors to agitation in individuals with dementia, researchers have found that a lack of social interaction may be a key contributor.[51–53] Accordingly, multicomponent interventions that include social interaction as a key component have been shown to be effective for reducing the frequency and severity of agitation among individuals with moderate dementia.[45,54] However, if an individual with dementia has a hearing loss significant enough to interfere with communication, the therapeutic effects of social interaction interventions may be diminished. Resnick et al[55] found that visual deficits and moderate-to-severe hearing impairments in long-term care residents with dementia were associated with decreased levels of social engagement and time spent in activities.

Although there are currently no therapies to prevent or slow down the progression of Alzheimer's and other dementias, the current consensus among experts in the field supports active management of symptoms with a focus on meaningful life engagement.[56] Active management includes effective treatment of coexisting conditions and appropriate use of available treatment options, coordination of care, and encouragement of increased participation in activities that are meaningful and bring purpose to one's life.[56] A useful framework for SLPs and audiologists to use in providing services to individuals with dementia and hearing loss is the World Health Organization's International Classification of Functioning, Disability, and Health (WHO-ICF).[57]

A FRAMEWORK FOR COMMUNICATION INTERVENTIONS

The WHO-ICF (Fig. 1)[57] is a useful framework for helping clinicians to conceptualize, implement, and measure outcomes of treatment for hearing loss in dementia. Indeed, audiologists and SLPs have used the ICF to describe the disability experienced by older individuals with hearing loss[58,59] and individuals with dementia.[60,61] Furthermore, the ICF is

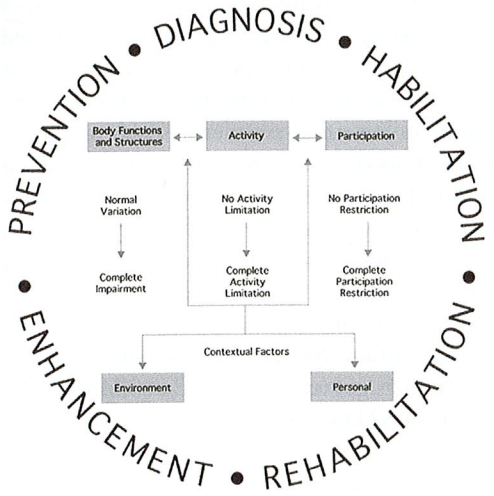

Figure 1 Framework depicting the ICF. (Reprinted with permission from ASHA, 2016: https://www.asha.org/policy/SP2016-00343/).

identified as a foundational document in both the speech–language pathology and the audiology scope of practice statements.[62,63] Across the continuum of care, interventions that include hearing care may help slow down progression of cognitive decline and maximize meaningful participation and quality of life for individuals with dementia.[37]

Within the nomenclature of the ICF, interventions can be conceptualized as targeting impairments, activity/participation levels of functioning, or environmental factors. Approaches are not mutually exclusive, nor is one intervention superior to the other; rather they complement each other. Such a holistic approach is necessary for accommodating hearing loss among those living with dementia. For example, hearing aids (HAs) support hearing at the impairment level to improve auditory thresholds, communication strategies used by partners help to increase comprehension of speech during activities, and environmental modifications (creation of private places for conversation in communal living settings) allow meaningful interactions with loved ones.

Intervention programs should ideally include components that target several aspects of a person's functioning, and outcomes should be broadly evaluated. Based on research linking hearing loss to cognitive decline, performance on cognitive tests is often measured as an outcome of audiologic intervention. The evidence-based research to support hearing interventions as an avenue to improve cognition is growing. Many intervention studies aimed at measuring the effects of amplification through HAs, cochlear implants, or assistive listening devices (ALDs) have yielded positive cognitive outcomes for older adults with hearing loss.[30,64–66]

HEARING INTERVENTIONS FOR TYPICALLY AGING OLDER ADULTS

Taljaard et al[67] conducted a meta-analysis of 33 studies to determine the effects of hearing interventions on cognition in over 5,000 adults. The average age of the participants was 57.7 (±27.0) years. The hearing interventions included use of HAs or cochlear implantation. Outcome measures of cognition were generally standardized measures including tests of attention processing and speed, semantic processing, short-term working memory, long-term memory, and/or executive function. The researchers conducted a meta-analysis of the results of these studies and found, first, that poorer hearing ability was significantly associated with poorer cognitive ability, regardless of whether or not the hearing loss was treated. Second, their meta-analysis revealed that individuals who received hearing intervention exhibited better cognitive performance than individuals who did not receive treatment for hearing loss. The authors concluded that treatment of hearing loss improves cognitive outcomes in typically aging older adults. However, the authors stated that their findings should be interpreted with caution because of a lack of randomization in many studies and generally small effect sizes.

Cochlear implants may be recommended over conventional HAs for those with severe or profound hearing loss, especially if the amplification provided by conventional HAs does not improve speech discrimination or communicative ability. In fact, those over the age of 65 years constitute the fastest growing segment receiving cochlear implants.[68] Miller and colleagues[68] completed a systematic review for the effects of cochlear implantation on cognition in older adults with sensorineural hearing loss.

The inclusion criteria of the review were as follows: participants were aged 65 years or older, cochlear implants were used as treatment, and cognition was a primary outcome measure. The review included over 3,000 articles, but only three articles fit the criteria set for the critical review. Although their review yielded many findings to support the benefits of cochlear implants relative to speech perception, social functioning, and overall quality of life, it did not include prospective studies of older adults in which cognition was included as a primary outcome measure. Based on the results of the systematic review, future research is warranted to substantiate the positive impact of cochlear implants on cognitive function in older adults.

In 2017, Deal and colleagues[30] reported the preliminary results of a randomized controlled trial for exploring the effects of hearing treatment for reducing cognitive decline in older adults without dementia. Forty individuals with hearing loss and intact cognition were randomly assigned to one of two intervention groups: best practice hearing intervention or successful aging intervention. Those assigned to the best practice hearing intervention were fitted with receiver-in-the-canal HAs fit to prescriptive targets. Over the course of 10 to 12 weeks, these participants completed four, 1-hour sessions with an audiologist where aids were adjusted to the participants' needs and objectively verified via real-ear measures and monitored to record daily usage via HA datalogging. Participants in the hearing intervention arm of the study also were offered an ALD that paired with their HA. They were instructed to use the ALDs during difficult listening situations (e.g., in the presence of background noise). Alternatively, the individuals assigned to the successful aging intervention followed an evidence-based, interactive health education program completing four, 1-hour sessions over a 10- to 12-week period with an intervention-certified nurse. Overall, on measurements of perceived handicap, psychosocial ratings, and cognitive tests, the hearing intervention group performed consistently or better from baseline to follow-up; the successful aging group performed consistently or worse from baseline to follow-up. Preliminary findings reported in this study indicate that participants in the hearing intervention group demonstrated significantly improved perceived hearing handicap scores and memory performance at a 6-month follow-up assessment. The group that received successful aging intervention showed significant improvement only on the delayed word recall measure. These findings served as the pilot study for a randomized control trial that will measure cognitive decline over a 3-year period as the primary outcome (ClinicalTrials.gov Identifier: NCT03243422; https://www.clinicaltrials.gov/ct2/show/NCT03243422?id=NCT03243422&rank=1).

HEARING INTERVENTIONS FOR INDIVIDUALS WITH DEMENTIA: THE EVIDENCE

Results from the aforementioned studies demonstrate positive hearing treatment outcomes for older adults with intact cognition. Far fewer treatment studies have been conducted evaluating the cognitive effects of amplification among participants with dementia. Some research studies that evaluated treatment of hearing loss in older adults with cognitive impairment measured changes in dementia-related behavioral symptoms. A review of the literature revealed several recent studies in which individuals with dementia participated in hearing interventions, with variable outcomes. The primary categories of intervention include amplification through HAs or ALDs. Overall, most of these studies have shown a positive impact of hearing loss treatment on symptoms such as verbal aggression, agitation, and depression. The level of evidence for these studies, however, is low with pre/post quasi-experimental designs with no control group,[69,70] single-subject design,[71,72] and case studies.[73,74]

In a recent study, Hopper and colleagues[75] compared test performance in 31 residents of long-term care facilities in a quasi-experimental crossover design with and without amplification using an ALD manufactured by Sennheiser. The ALD had two integrated microphones and a stereo sound amplifier with headphones. To set the appropriate amplification for each participant, the audiologist set the volume using

Verifit (Audioscan), a software that generates best fit of auditory targets. Study inclusion criteria included that participants in the study had received a previous diagnosis of dementia, including Alzheimer's dementia, vascular or mixed dementia, and presented with mild to moderate hearing loss by audiological assessment. Participants were tested twice between 4 to 14 days apart under two conditions: with and without amplification. The testing conditions were carefully controlled to ensure that they remained consistent across all sessions, and the test battery consisted of several cognitive and cognitive-linguistic tests (including naming, storytelling, word recognition, and clock drawing). During the amplified testing conditions, participants were provided with over-the-counter ALDs. Although the researchers found no improvement in test performance with the use of the ALD compared with the condition without amplification, they caution that conducting the assessment in ideal one-on-one conditions may not reflect functional differences that may be experienced by the person with dementia and hearing loss.

Mamo and colleagues[69] tested the effects of a simple hearing care intervention that comprised hearing screening, education regarding hearing loss, communication strategies, and instructions for use and maintenance of ALDs with an emphasis on caregiver education and strategies. The intervention was delivered in a geriatric memory disorders clinic. Twenty dyads of caregivers and participants with dementia completed baseline measures, training, and 1-month follow-up assessment. Participants with dementia had mild to severe hearing loss and degree of cognitive impairment. The primary outcome measures addressed depressive symptoms, behavioral symptoms, and caregiver burden. Researchers encouraged individuals with dementia to use the ALD daily and provided instruction to the caregivers on various supportive communication strategies. Per caregiver report, 65% of participants with dementia wore the amplification device at least 1 hour per day. Although pre/post comparisons on the primary outcomes were not significantly different, the authors note that those with higher symptom burden at baseline showed greater reduction in depressive and behavioral symptoms as measured by Cornell Scale for Depression in Dementia[76] and Neuropsychiatric Profile Inventory[77] at follow-up testing 1 month later.

In the few studies that have been conducted that assessed the cognitive abilities of adults with dementia following HA fitting, results have not shown substantial improvements in cognitive function. Nguyen and colleagues[78] and Adrait and colleagues[79] described a multicenter randomized control trial to determine if the use of HAs improves cognition and behavior in 51 individuals with probable Alzheimer's disease and hearing loss. In their companion papers, participants were randomly assigned to either active HA group or a placebo HA group for 6 months. The HA prescriptions for the active treatment group were programmed according to proprietary "first fit" prescriptions based on their audiogram. The placebo group received HAs set to provide mild gain (30 dB SPL) to make up for occlusion of the ear canal by the HA. Following the intervention period of 6 months, the control group's HAs were activated, and the two groups were followed up until the 12-month time point.[80] Their primary outcome measures included tests of general cognition, Alzheimer's disease–related quality-of-life behavioral and functional measures, as well as caregiver's quality of life. They did not find a group difference between the immediate treatment and delayed control group after 6 months.[78] However, these findings should be interpreted cautiously as detailed in a response by Mamo and Palmer.[81] Most notably, the HA fitting protocol did not include verification with real-ear measures, which often results in the hearing output providing insufficient amplification for improved speech understanding.[82] The control group was provided with low-gain amplification during their delayed treatment period, and as such, it is unclear whether the treatment group and the placebo group were, in fact, receiving sufficiently different treatments. Moreover, neither group demonstrated the expected amount of decline in ADAS-Cog[80] scores during the yearlong follow-up period, which makes it difficult to interpret the nonsignificant difference between groups.

The use of HAs has been found to support cognition for typically aging older adults with

hearing loss and to reduce dementia-related responsive behaviors in older adults with cognitive impairment and hearing loss. These findings suggest that hearing loss treatment is beneficial in older adults facing various stages of cognitive decline. However, more high-quality research is necessary to understand the impact of hearing loss treatment on cognition for adults with dementia, especially due to the variable and progressive nature of the most common underlying diseases.

COLLABORATION BETWEEN AUDIOLOGISTS AND SLPS: RECOMMENDATIONS TO IMPROVE HEARING HEALTH CARE FOR PEOPLE WITH DEMENTIA

In the recent iteration of the ASHA Scope of Practice statement for Speech-Language Pathology,[62] collaboration with other professionals as well as individuals with communication disorders and their families is highlighted as an explicit practice domain. Furthermore, auditory habilitation/rehabilitation, including speech, language, communication, and listening skills impacted by hearing loss and deafness, is stated as a speech–language pathology practice area. To provide such services, SLPs must collaborate with audiologists. The nature of collaboration will vary based on social and physical environmental factors (e.g., a client's place of residence, family support/interaction) as well as impairment-based variables (e.g., severity of hearing loss, stage of cognitive decline, and the presence of other health conditions). Yet, there are barriers to collaboration. Audiologists are not as commonly employed in rehabilitation and long-term care settings as compared with SLPs. According to data collected by ASHA, approximately 7% of SLPs work in skilled nursing facilities, compared with only 1.1% of audiologists.[83] Furthermore, intervention services provided by audiologists are not currently eligible for reimbursement by Medicare. Finally, the research evidence to support audiologic rehabilitation (AR) for individuals with dementia is still in its early stages. The question thus arises: How do SLPs and audiologists address these barriers to ensure appropriate interprofessional collaboration and, ultimately, functional communication outcomes for people with dementia and hearing loss?

INCREASE AWARENESS: ADVOCACY AND EDUCATION

Professional organizations at the state and national levels engage in advocacy for the disciplines of audiology and speech–language pathology as part of their mandates and roles. However, SLPs and audiologists also have an individual responsibility to advocate for communication and hearing care for their clients and patients. In particular, as there are more SLPs than audiologists working with adults with dementia, SLPs have an important role in raising awareness of hearing loss and its management. A variety of mechanisms exist, including community awareness campaigns, prevention activities, education, and training programs.[62] These efforts can be tailored and coordinated across the continuum of care. For example, in the early stages of dementia, SLPs may provide communication and swallowing services in the person's home, or in outpatient clinics, as well as day and respite programs. Thus, education and advocacy initiatives need to be targeted to these settings and audiences to ensure appropriate action and referral to audiologists. SLPs can help educate healthcare professionals, family, caregivers, and people with dementia about the importance of hearing health and its assessment and treatment and the broad scope of AR, including, but not limited to, HAs.

In later stages of dementia, when individuals are residing in supported living environments (e.g., long-term care), SLPs can provide in-house workshops on hearing health and the importance of identification and management of residents' hearing loss and its impact through communication strategies, use and care of existing hearing technology, and environmental modifications (both physical and social). Hearing loss is highly prevalent in these settings,[84,85] yet commensurate levels of care are lacking.[86,87] Reasons for this lack of care include, but are not limited to, staff members' limited knowledge of hearing loss.[87,88] Thus, education becomes a foundational and integral part of improving hearing health care.[85] Models for such initiatives can be found in the research and policy literature

related to public schools. The Centers for Disease Control and Prevention[89] has published a document on recommendations for promoting hearing health in schools, which includes an emphasis on education, as well as policies to promote hearing health, and routine hearing screenings for all students. In addition, programs such as *Sound Sense*[90] and *Cheers for Ears*[91] are promoted nationally in Canada and Australia, respectively, to ensure appropriate education and prevention of hearing loss among children. An innovative approach to collaboration could include adaptation of these programs with a focus on the specific needs of long-term care facilities and their residents. Importantly, direct care staff providers (e.g., certified nursing assistants, personal support workers) may benefit from learning about how hearing loss affects their ability to provide everyday care and how specific techniques can improve their ability to connect with residents and promote their well-being. Many strategies that are recommended to improve comprehension by adults with hearing loss are also appropriate for use with individuals who have cognitive impairments and communication limitations in the context of dementia (see Table 1).[73]

EXPLORE ALTERNATIVE MODELS OF HEARING HEALTH CARE TO INCREASE ACCESSIBILITY

There is a need to develop accessible approaches to AR for individuals with dementia.[92] AR involves maximizing hearing function to promote meaningful life participation through sensory management, instruction, perceptual training, and counseling.[93,94] AR can be provided through individual and group sessions that are delivered in person; however, older adults who have mobility and transportation issues, or individuals with dementia living in long-term care, may not be able to visit an audiologist or SLP at a clinic for such services. Mamo et al[92] acknowledged the burden of accessing care outside the home and recommended embedding AR services wherever the individuals with dementia are living or participating in care (e.g., long-term care facility, primary health care clinic, day program site).

When a face-to-face visit is not feasible, telehealth modalities may be leveraged to increase access to hearing healthcare services for older adults.[95] Increased speed and distribution of internet connectivity provides increasing opportunity for implementation of telehealth to provide audiology services.[96] In a systematic review of the use of telehealth in speech, language, and hearing sciences, results showed that telehealth services improved access to care and underscored a need (particularly in the area of audiology) for services aimed at increasing such access.[97] The researchers reported that patient and clinician attitudes toward telehealth service provision were also generally positive, a finding consistent with results reported from a survey of 202 hearing healthcare practitioners (including audiologists and hearing instrument specialists) in Canada regarding their attitudes toward

Table 1 Strategies to support communication for adults with dementia and hearing impairment

Communication strategies	Environmental strategies
Speak clearly (use clear speech)	Reduce noise—turn down televisions, avoid loud talking/yelling during staff-to-staff communication
Face the resident when speaking	Retrofit the physical environment when possible: use high-performance, sound-absorbing acoustical tile; include soft fabrics and surfaces
Say the resident's name before starting a conversation	Provide private spaces for conversation
Use written and graphic cues to supplement spoken language	
Stay on topic, provide clear transition statements between topics	
Reduce distractions	
Use nonverbal communication (gestures, actions, facial expression) to help comprehension of speech	

Source: Adapted from Dupuis et al,[50] Hopper and Hinton,[73] and Mamo et al[69,92] 2017.

tele-audiology.[95] In this study, the majority of respondents reported that telepractice would likely have a positive effect on access to hearing healthcare services for their clients. Furthermore, respondents indicated support of tele-audiology for almost all AR services, including answering questions, counseling, communication training, HA programming and adjustments, and screening activities. Because SLPs can provide and bill for AR services in the United States, they can work with audiologists on a consultative basis to ensure proper diagnosis of hearing loss, as well as implementation of individualized AR programs for people with hearing loss and dementia. Although research on the use of tele-audiology for older adults with dementia is nascent, these preliminary findings support further exploration of this service modality to improve collaboration and hearing healthcare for this vulnerable group of older adults. At the time of this article's publication, speech–language and audiology services provided by telepractice are not reimbursable by Medicare in the United States.

CONCLUSION

Although the relation between hearing loss and cognitive decline has not been fully detailed, evidence from multiple accounts supports a link between hearing loss and more rapid cognitive decline and onset of dementia. Additionally, both hearing loss and dementia have been found to increase restrictions to activities and participation in everyday life. Preliminary research with typically aging adults who have hearing loss suggests amplification may improve cognition. Additionally, emerging research evidence supports the benefits of amplification for reducing problem behaviors among individuals with dementia. SLPs who work with individuals living with dementia should recommend audiological evaluations, follow audiologists' recommendations regarding amplification, continue to monitor/facilitate use of HAs or ALDs, and train communication partners and nursing staff on supported communication techniques to maximize social engagement and life participation for their clients. SLPs are a key partner in addressing hearing loss for individuals with dementia holistically, and ensuring access to necessary hearing health care for all clients.

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