

☺☺☺ Hearing Loss among Individuals with Dementia: Barriers and Facilitators to Care

☺☺☺ La perte auditive chez les individus atteints de démence : les facteurs nuisibles et favorables aux soins

KEY WORDS

HEARING LOSS

ADULTS

DEMENTIA

LONG-TERM CARE

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Abstract

Hearing loss is highly prevalent among older adults with dementia, particularly those in long-term care settings. Unfortunately, barriers exist that may prevent many individuals with dementia from participating in necessary hearing health care. Barriers include the fact that older adults do not always seek help for their hearing loss and care partners may not recognize hearing loss because communication problems associated with hearing loss and dementia often overlap. Even when hearing loss is identified, individuals with dementia may not be referred for further evaluation of hearing because of a lack of awareness of available intervention strategies beyond hearing aids, and a tendency for care partners to minimize the negative effects of hearing loss. To facilitate hearing health, audiologists and speech-language pathologists need to assist care partners of individuals with dementia in understanding the signs, symptoms and impact of hearing loss on daily life. Further, clinicians need to adapt hearing assessments and design holistic interventions to meet the specific needs of people with dementia. The purpose of this paper is to review the recent literature on this topic, with a focus on key issues in hearing health care for individuals with dementia and hearing loss, as well as assessment and intervention strategies to promote hearing and communication.

Abrégé

La perte auditive est très répandue chez les adultes âgés atteints de démence, particulièrement chez ceux se trouvant en milieu de soins à long terme. Malheureusement il y a des obstacles qui peuvent empêcher beaucoup de personnes atteintes de démence de recevoir des soins nécessaires en santé auditive. Les obstacles incluent le fait que les adultes âgés ne cherchent pas toujours à avoir de l'aide pour leur perte auditive, et les partenaires de soins peuvent ne pas reconnaître la perte auditive parce que les problèmes de communication associés à la perte auditive peuvent être aussi reliés à la démence. Même quand une perte auditive est identifiée, des individus atteints de démence peuvent ne pas être référés pour une évaluation de l'audition à cause d'un manque de sensibilisation aux stratégies d'intervention disponibles, au-delà des appareils auditifs, et à cause d'une tendance qu'ont les partenaires de soins à minimiser les effets négatifs de la perte auditive. Pour faciliter la santé auditive, les audiologistes et les orthophonistes doivent aider les partenaires de soins des personnes atteintes de démence à reconnaître les signes et les symptômes de la perte auditive ainsi que les impacts de la surdit  sur la vie quotidienne. De plus, les cliniciens doivent adapter les  valuations de l'audition et concevoir des interventions holistiques pour r pondre aux besoins particuliers des personnes atteintes de d mence. Le but de cet article est de passer en revue la litt rature r cente sur ce sujet en mettant l'accent sur les principales questions de soins de sant  auditive pour les personnes atteintes de d mence et de perte auditive, ainsi que sur les strat gies d' valuation et d'intervention visant   promouvoir l'audition et la communication.

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Hearing loss may be defined as an impairment in auditory functions, such as sound detection and speech discrimination, which result from structural changes to peripheral and/or central auditory systems (Hickson & Scarinci, 2007). Age-related hearing loss (ARHL) is a complex condition that results from multiple causes. Current findings support the theory that metabolic presbycusis, or atrophy of the lateral cochlear wall and stria vascularis, is the predominant cause of ARHL in older humans (Schmiedt, 2010). Other factors also contribute to ARHL, particularly noise exposure, which is common in western society, and ototoxic drugs, both of which preferentially affect the outer hair cells in the basal coil of the cochlea (sensory presbycusis) (Schmiedt, 2010). Most ARHL in humans results from a combination of metabolic and sensory presbycusis and is characterized by mild, flat loss at low frequencies coupled with steeply sloping high-frequency loss above ~1 kHz (Schmiedt, 2010).

Hearing loss is one of the most prevalent health conditions in the world (World Health Organization, WHO, 2000) and ARHL is particularly widespread. Among community-dwelling adults, Gates et al. (1995) reported that 30% of those 65-74 years and 50% over 75 years had a hearing loss, Dalton et al. (2003) reported that 50% of individuals in their sample (aged 53-97) had hearing loss, and Cruickshanks et al. (1998) reported hearing impairment among 46% of 3743 adults in their sample (mean age = 65.8 years). For older adults living in long-term care (LTC) environments, hearing loss may be even more prevalent, ranging from 70-83% (Schow & Nerbonne, 1980; Voeks, Gallagher, Langer, & Drinka, 1990; Weinstein & Amsel, 1986). Given that the fastest growing segment of the world population is adults over age 65 (Kinsella & Velkoff, 2001), hearing loss will continue to be a major health concern in the coming years.

Like hearing loss, dementia is increasing in incidence and prevalence as the population ages. Dementia is a syndrome that can be caused by many diseases ('all-cause' dementia). According to McKhann et al (2011), all-cause dementia is diagnosed in an individual when there are cognitive or behavioral symptoms that interfere with the ability to function at work or at usual activities, that represent a decline from previous levels of functioning and performing, and are not explained by delirium or major psychiatric disorder. The cognitive or behavioral impairment involves a minimum of two of the following domains: (a) impaired ability to acquire and remember new information, (b) impaired reasoning and handling of complex tasks and poor judgment, (c) impaired visuospatial abilities, (d) impaired language functions (speaking, reading, writing), and (d) changes in personality, behaviour and comportsment.

Probable Alzheimer's disease is the most frequent cause of dementia ('AD dementia') and is diagnosed when an individual meets the criteria for a dementia diagnosis, plus insidious onset of symptoms, clear-cut worsening of cognition by report or observation, and initial and most prominent cognitive deficits in one of the following categories: amnesic presentation, (memory systems are primarily impaired), or nonamnesic presentation (language, visuospatial and executive functions are primarily affected) (McKhann et al., 2011). The amnesic presentation of AD dementia is the more common of the two types.

According to the Alzheimer's Society of Canada report, *Rising Tide: The Impact of Dementia on Canadian Society* (2010), approximately 100,000 new cases of dementia are diagnosed each year in Canada and this number is expected to more than double over the next 20 years. Approximately 500,000 people in Canada are living with dementia, and 55% of individuals over the age of 80 are estimated to be affected (Alzheimer Society of Canada, 2010). The situation is similar in other countries. In the United States, more than five million people currently have a diagnosis of dementia, including one in eight individuals over 65 years old, and almost half of all people over the age of 85 years (Hebert, Scherr, Bienias, Bennett, and Evans, 2003; Plassman et al., 2007).

The high prevalence of hearing loss and dementia among older adults means that the two health conditions will often co-exist (Chartrand, 2005; Kricos, 2009). Although much research has been devoted to hearing and aging, relatively little research exists on the topic of hearing and dementia specifically. The purpose of this paper is to summarize some of the recent literature in this area, with a review of key issues, a discussion of barriers to hearing health care for individuals with hearing loss and dementia, and assessment and intervention strategies to address these barriers. The general term 'dementia' is used throughout the paper to refer to Alzheimer's disease and related dementias, and the focus is on individuals in the middle to later stages of cognitive decline, many of whom live in LTC settings.

Barriers to Hearing Health Care for Individuals with Dementia

Many older adults who have hearing loss do not seek help for it. In fact, Oyler (2012) reports that only 20% of older adults with hearing loss who might benefit from treatment actually receive it, and many delay intervention until their activity limitations are quite severe. One reason for delay in seeking treatment is that hearing loss in aging is insidious and progresses slowly, such that affected individuals consider it a

normal part of aging (Oyler, 2012; Weinstein, 2000) and do not readily acknowledge the loss as a problem. Health care professionals may share this assumption. Gilliver and Hickson (2011) reported that 60% of medical practitioners who were in a position to refer older adults with hearing loss to an audiologist agreed with the statement that hearing loss is a normal part of aging that does not require treatment.

For individuals with dementia, the situation is compounded by the fact that hearing loss can be difficult to identify because symptoms of untreated hearing loss and dementia often overlap (Chartrand, 2005; Kricos, 2009; Palmer, Adams, Bourgeois, Durrant & Rossi, 1999) (see Table 1). In AD, for example, cognitive impairment causes anomia, repetitiousness, discourse processing problems (conversational topic initiation, maintenance and repair), and, eventually, severely restricted verbal output (see Bourgeois and Hickey, 2009 for a review). As Bayles and Tomoeda (2007) note, individuals with moderate to severe AD are frequently disoriented and confused, often forgetting what they have seen and heard as well as their own intentions. These limitations and restrictions lead to frequent communication breakdowns.

Age-related hearing loss can cause similar communication problems, primarily as a result of difficulties with speech comprehension. In fact, one of the earliest symptoms reported by older adults with hearing loss is difficulty understanding speech, particularly in settings with multiple speakers and/or background noise (Hickson & Scarinci, 2007; Pichora-Fuller, 2003). Older adults with hearing loss often

repeatedly request repetition of speech (Caissie, Dawe, Donovan, Brooks, & MacDonald, 1998), confuse spoken messages and experience difficulty maintaining conversations (Garstecki, 1981). Because group communication situations are particularly problematic, older adults with hearing loss may withdraw from such conversations or avoid them entirely (Dalton, et al., 2003; Morgan, Hickson & Worrall, 2002).

It is difficult to determine the relative contributions of ARHL and cognitive impairment to speech comprehension difficulties among older adults with dementia. In typical aging, researchers have noted that ARHL accounts for most of the speech-recognition problems of older adults in quiet settings; however, the elevated thresholds associated with presbycusis only partially account for the difficulty older adults experience in noise (Humes & Dubno, 2010; Pichora-Fuller, 2003). Whereas typically aging older adults can use semantic context to improve speech comprehension and compensate for hearing loss in adverse listening conditions (Pichora-Fuller, 2008), individuals with moderate to severe dementia and ARHL have significant cognitive impairments that potentially limit the benefits of top-down processing to compensate for reductions in speech audibility. This hypothesis remains to be addressed in future research.

In mild dementia, when the focus is on differential diagnosis of the cause of cognitive impairment, it is imperative that audiologists conduct a full evaluation of hearing status prior to evaluation of cognition (Chartrand, 2005; Weinstein, 2000). Neuropsychological tests used to help diagnose dementia are heavily biased

Table 1. Overlapping presentation of communication problems and psychosocial consequences of dementia and untreated hearing loss in older adults

| | Dementia | Untreated Hearing Loss |
|---|---|---|
| Problems understanding speech that is complex, fast or presented in noise | Orange (1995); Rochon, Waters and Caplan (1994); Small, Kemper and Lyons (1997) | Wingfield, McCoy, Peele, Tun and Cox (2006); Tun (1998) |
| Impaired conversational abilities | Ripich and Terrell (1988); Tomoeda and Bayles (1993) | Caissie et al. (1998); Garstecki (1981) |
| Withdrawal from social activities/social isolation | Potkins et al. (2003) | Weinstein and Ventry (1982); Hull (1992) |
| Presence of depression, anxiety | Bierman, Comijs, Jonker and Beekman (2007) | Cacciatore et al. (1999) |

(Adapted from Chartrand, 2005)

towards spoken language. Thus, hearing loss may disadvantage the individual with dementia, making cognitive function seem worse than it is (Kricos, 2009), a finding previously reported by researchers (Weinstein & Amsel, 1986).

In moderate to severe dementia, cognitive impairment may mask the negative effects of hearing loss. In Hopper, Bayles, Harris and Holland (2001), 55 LTC residents with dementia failed a pure-tone hearing screening, however only 15 were identified as having impaired hearing. These findings are similar to those reported by Voeks et al. (1990) who found that only 16% of the 198 patients in the study were identified as having a hearing loss by a physician or nurse, despite the fact that 54% had moderate to profound losses across frequencies. Garahan, Waller, Houghton, Tisdale and Runge (1992) also reported that most LTC residents with hearing loss have no institutional documentation of the problem. This lack of awareness of hearing loss among LTC residents with dementia obviously limits residents' access to hearing health care.

Even when the hearing loss is identified, referrals for further evaluation and/or intervention may not be made (Durrant, Gilmartin, Holland, Kamerer, & Newall, 1991; Kricos, 2009). Hopper et al. (2001) reported that among the 15 LTC residents with dementia and an identified hearing loss, none was referred to an audiologist or speech-language pathologist (S-LP) for follow-up. Although the reasons for lack of referrals are unclear, they are likely similar to those offered to explain the small minority of community-dwelling older adults who seek hearing health care. Another potential reason is a lack of awareness of available treatments for hearing loss. Care partners may assume that the only intervention available is a hearing aid, and that the audiologist's primary goal is to prescribe one. Amplification is, indeed, an effective, evidence-based treatment strategy for the sensory deficit of hearing loss (Weinstein, 1996). Also, hearing aid use has been shown to confer a benefit on older adults' health-related quality of life (Chisholm et al., 2007) and may be associated with a decrease in caregiver-identified problem behaviours among community-dwelling individuals with dementia (Palmer et al., 1999). Nevertheless, as noted by several authors (Boothroyd, 2007; Hickson & Scarinci, 2007; Oyler, 2012), the scope of practice of an audiologist is holistic and extends beyond hearing aids to include consideration of activity limitations/participation restrictions and environmental and personal factors (WHO, 2001) that contribute to hearing health.

A further barrier to hearing health care for individuals with dementia in LTC may be that care partners minimize the effects of hearing loss on

communication and psychosocial functioning of the residents in their care (Smith & Kricos, 2003). Care partners may relegate hearing loss to an issue of lesser importance, behind more pressing care needs related to hygiene, nutrition, safety, and pain management. However, hearing loss must be acknowledged as a priority health concern as well. The negative psychosocial consequences of untreated hearing loss (e.g., depression) can have a profound impact on quality of life (Kochkin & Rogin, 2000). Moreover, hearing loss may interfere with the ability of individuals with dementia to participate in cognitively stimulating activities that improve affect, engagement, behaviour and perhaps slow cognitive decline over time (Chapman, Weiner, Rackley, Hynan & Zientz, 2004). Finally, hearing loss may seem innocuous to care partners until they realize that its presence among individuals with dementia has been associated with an increased rate of cognitive decline over time as compared to individuals with dementia and relatively normal hearing (Peters, Potter & Scholer, 1988).

In summary, the previously mentioned issues act as barriers to the use of audiology services by older adults with hearing loss and dementia. To facilitate hearing health, audiologists and S-LPs need to help care partners of individuals with dementia and hearing loss to understand the signs, symptoms and impact of impaired hearing on daily life. In addition, care partners should be taught to use strategies to moderate the communicative impact of hearing loss. Demonstrating the benefits of communication programs for individuals with dementia on a case-by-case basis is often the most effective way to increase awareness and change negative assumptions about the ability of individuals with dementia to benefit from treatment (Bourgeois & Hickey, 2009). The first step in such a process is a comprehensive assessment of hearing.

Issues in Hearing Assessment for Individuals with Dementia

Impairment-based assessment. When cognitive decline is mild, individuals with dementia will generally be able to participate in standard audiological assessment protocols. However, when cognitive decline is moderate to severe, individuals with dementia can be difficult to test. They may not understand test directions, may lack the ability to be conditioned to the testing protocol, may experience anxiety, and be unable to tolerate headphones. Additionally, among residents in LTC settings, dementia rarely occurs in isolation, such that residents present with multiple co-morbid health conditions, including visual impairments and physical

mobility issues (Kaye, Harrington, & LaPlante, 2010) that can make the testing a challenge.

In a recent study of audiology assessments in nursing home residents, approximately half of whom had a diagnosis of dementia or “dementia-characterized behaviours” (p.532), only 16/307 residents (5%) were able to complete a full, traditional audiometric assessment protocol that included air and bone conduction testing from 500 to 4000 Hz, speech reception threshold and speech recognition testing, and establishment of uncomfortable and most comfortable listening level of speech (Burkhalter, Allen, Skaar, Crittenden and Burgio; 2009). Although Durrant et al. (1991) reported that individuals with moderate to severe AD participated successfully in hearing testing, their sample size was limited (n=10) and the authors added a caveat that the participants needed encouragement at times, which suggests some difficulties were encountered.

For these reasons, a traditional standard assessment of hearing will often need to be adapted. According to the American Speech-Language-Hearing Association (ASHA; 1997), *Guidelines for Audiology Service Delivery in Nursing Homes*, adaptations to hearing testing are recommended to ensure that the evaluation is tailored to the individual's cognitive status and functional abilities. Burkhalter et al. (2009) went further, stating that modifications of general procedures established by ASHA and the American Academy of Audiology for other difficult-to-test populations (such as pediatric populations) could be applied to audiology assessment procedures for LTC residents, including those with dementia.

The second author of the current paper (PH) has used several modifications when evaluating hearing in individuals with dementia who are unable to participate in the traditional test battery. For example, if Speech Recognition Threshold (SRT) testing is unsuccessful, audiologists may obtain Speech Awareness Thresholds (SAT) and extrapolate results to SRT. Wilson and Margolis (1983) stated that SRT is generally 6 to 10 dB higher than SAT among individuals with normal hearing. However, they note that the relationship between speech recognition and awareness varies as a function of testing context and participant characteristics, and thus, it is not possible to state the difference between SAT and SRT with a single number that is applicable to all situations.

Modifications to the stimuli used in speech audiometry may also increase the likelihood of successful testing with individuals who have dementia. Familiar names and other vocabulary items that are personally meaningful to the individual may be used as an alternative to spondee words. The use of such

stimuli may decrease cognitive processing effort, reduce demands on impaired attention and memory systems, and facilitate appropriate responding.

Response mode may also need to be adapted during testing. For pure-tone audiometry, if the individual with dementia has difficulty following spoken instructions, audiologists may try doing ‘team testing’ in which another person who is familiar to the resident with dementia (staff, family member) provides physical cuing to hand raise during pre-test conditioning trials. In all behavioural testing situations, clinicians need to be aware of the time of day when the individual appears most alert and responsive, plan to conduct testing over multiple sessions or days to control for fatigue, and avoid testing after medications are given that may have sedative side-effects.

With appropriate modifications, many individuals with moderate to moderately-severe dementia can be tested behaviourally. However, in the absence of reliable results from behavioural measures, the presence of acoustic reflexes, auditory brainstem responses and otoacoustic emissions may be used to infer ‘functional’ hearing.

Activity/Participation-based assessments. A plethora of measures exist to assess activity limitations/participation restrictions related to hearing loss. Questionnaires and rating scales are commonly used (see Worrall & Hickson, 2003 for a review). However, in moderate to severe dementia, individuals may not be aware of their hearing loss or be able to communicate about the impact of hearing loss on their everyday lives. Therefore, it is essential that care partners provide their perspectives on the issue. One example of a scale that can be completed by care partners of individuals with dementia in LTC settings is the *Nursing Home Hearing Handicap Index: Staff Version* (Schow & Nerbonne, 1977). It is a 10-item questionnaire with a 5-point Likert scale response format to which care partners rate level of agreement with statements related to residents' hearing in different contexts. Less structured approaches to soliciting care partner input are also suitable, such as interviews, which can yield rich information on problems associated with hearing in everyday activities. Weinstein (2000) provides an abbreviated list of questions that can be asked of caregivers to help identify hearing impairment, limitations and restrictions, including the following: Does the individual have the volume of the television set high? Does the individual ask for frequent repetitions or say “what” often? Does the individual hear the doorbell or telephone ring? Does the individual give incorrect answers to questions? Does the individual smile a lot during conversation, but not participate in discussions?

Additionally, systematic observation of residents in LTC may provide important information on patterns of communication interactions and potential problems during ADLs (Bourgeois & Hickey, 2009) that are related to hearing and may be amenable to treatment.

Intervention

Earlier intervention is generally agreed to yield better outcomes for older adults with hearing loss. For older adults with typical cognitive functioning and those with mild dementia, it is beneficial to initiate hearing health care before further cognitive or other age-related health declines occur (Donahue, Dubno & Beck, 2010). Although little has been written regarding interventions specifically for individuals with dementia, some aspects of aural rehabilitation can be modified to address the unique needs of individuals with hearing loss and dementia. For example, Boothroyd (2007) outlined four components of aural rehabilitation as follows: management of sensory deficits, instruction in the use of technology and control of the listening environment, perceptual training, and counseling to address quality of life issues related to residual hearing impairments. All components can be used in aural rehabilitation for individuals with dementia. The focus, however, is necessarily shifted to rely heavily on care partners, particularly in the management of sensory deficits via amplification, and control of the listening environment. Examples of these approaches will be discussed in the section that follows.

Amplification: An Impairment-based Approach

Hearing Aids. Based on a comprehensive assessment, the audiologist will determine if an individual with ARHL is a candidate for a hearing aid. As mentioned previously, hearing aids are an effective treatment for many adults with hearing impairment yet many individuals delay in seeking treatment of this sort. For individuals with dementia, hearing aid use may be even more limited (Cohen-Mansfield & Infeld, 2006; Durrant et al., 1991). To encourage successful use of hearing aids by individuals with dementia, certain practical considerations are necessary.

There is a large literature on the hearing aid fitting process, from pre-selection and pre-fitting to post-fitting education and counseling (see Weinstein, 2000 for a review). Although the focus in fitting a hearing aid is foremost on audiometric considerations (data collected during the assessment process), non-acoustic factors are particularly important for individuals with dementia and interact with acoustic factors to influence successful hearing aid use (Pichora-Fuller & Singh, 2006; Weinstein, 2000). These include hearing aid related

characteristics such as style and complexity of controls, as well as cognitive ability of the older adult and degree of dependence for care.

In general, style is a personal preference and many older adults desire smaller, less visible aids such as in-the-ear and in-the-canal models. However, the second author has found that behind-the-ear (BTE) aids may be a better style choice for adults with dementia. BTE aids are bigger and therefore easier to handle, which is important for older adults who may have deficits in vision (Erber, 2003) as well as hand function and manual dexterity (see Singh, 2009 for a review).

Regardless of style, Palmer et al. (1999) recommend using hearing aids with automatic volume controls and a minimal number of programs for adults who have cognitive impairments. Additionally, because individuals with dementia in LTC are generally dependent upon others for hearing aid insertion and operation, relatively simple controls and directions will make it easier for care partners to use and care for hearing aids.

A significant challenge to hearing aid use among individuals with dementia and hearing loss in LTC settings is the potential for hearing aids to be damaged and lost. In studies involving several LTC facilities, researchers found that 30 – 70% of hearing aids were not working and/or were in need of repair (Bradley & Molloy, 1991; Thibodeau & Schmitt, 1988). Healthcare professionals who work in LTC settings anecdotally report many instances of misuse and misplacement of hearing aids. For example, individuals with dementia may worry about losing their hearing aids and thus “put them in a safe place” which they later cannot recall. Staff members also worry about losing expensive hearing aids, and therefore may not use the aids or only use them selectively. In a recent conversation with a son of a woman with dementia and hearing loss, the son told the S-LP that he took his mother’s hearing aids home, on recommendation of the staff, because her worry over losing the aids was becoming disruptive and staff members did not want to be responsible for having to replace the aids if they were lost. In other facilities, health professionals have noticed several pairs of hearing aids in plastic bags in drawers and on towel carts, the hearing aids unlabeled and their owners unknown.

Certain protocols are necessary to minimize loss and damage to aids. These strategies represent environmental modifications that facilitate hearing aid use. First, hearing aids should be labeled, with the help of an audiologist, to ensure that any warranty is not voided by improper labeling. Second, an otoclip should always be used to attach the aid to the wearer’s clothes. Third, a routine needs to be established when removing

aids and storing them until the next use. To address this, the second author has been involved in the 'Blue Box Project' initiated at St. Joseph's Hospital - Parkwood site, to reduce the loss and damage to at-risk items such as hearing aids, eyeglasses and dentures. Once consent is obtained from the patient's substitute decision maker, an inexpensive plastic storage tray is placed out of reach at the patient's bedside. The individual items are checked off on the tray's label and care partners place these items in the box when not in use (see Figure 1). Outcomes of the Blue Box Project have been positive in that fewer items are misplaced and patients wear the items more consistently.



Figure 1. Blue Box Project

Another useful strategy to promote hearing aid care has been provision of regular maintenance of patients' hearing aids on a rotating basis throughout the facility. The second author and a representative from a community dispensing clinic perform this service, which is particularly important for individuals with dementia who are often unable to report any malfunctioning of equipment to care partners. The frequency and number of aids requiring external servicing by manufacturers has dropped considerably since the routine maintenance strategy was implemented, resulting in devices functioning more consistently and less time for patients to spend without hearing aids.

Post-fitting education is an important part of aural rehabilitation programs. Whether the adult with dementia has a hearing aid upon admission to LTC, or acquires one while a resident, the audiologist and S-LPs should ensure that staff members receive the necessary instruction in hearing aid care and that there is a strategy for follow-up and referral should problems arise. It is important to remember that individuals who

are longtime hearing aid users may be able to maintain independent use and care of their aids well into the progression of their dementia. Routine aspects of hearing aid use may depend primarily on procedural or non-declarative memory, which has been shown to be relatively preserved in AD as compared to declarative memory (Bäckman 1996; DeWeer et al., 1994). The earlier such routines are created and the more they are practiced, the more resistant to forgetting they become, underscoring the importance of early intervention.

Assistive Listening Devices. Assistive listening devices (ALD) may be used as a supplement or an alternative to hearing aids. These types of devices generally comprise a remote microphone that is placed close to the sound source, and a signal transmission system that occurs through hard-wired and wireless systems, the latter including FM radio waves, infrared light waves and electromagnetic energy (Sandridge, 1995). The benefit of ALDs is that the sound reaches the individual with hearing loss without attenuation or interference from noise (Kaplan, 1996). Thus, ALDs are helpful for listening in group situations, in the presence of background noise and when listening to the radio and television, all of which are reported as activity limitations by older adults with hearing loss. Pichora-Fuller (1997) provides a review of the use of ALDs in LTC settings. Although not specific to individuals with dementia, many of the recommendations apply to residents with and without cognitive impairment.

It is advantageous to have more than one type of ALD available and to try different types in various listening situations to determine suitability for each individual. Two options for ALDs that have been used by the authors of this paper are the Sennheiser AudioPort (Sennheiser.com) and the Williams Sound PocketTalker™ (williamssound.com); several other good models are also available. As with hearing aids, the education and involvement of care partners are integral to the proper use of ALDs. Trial use over several weeks during daily routine can help care partners to determine improvements in auditory awareness (e.g., awareness of sounds in the environment), communication, and behaviour.

Education of Communication Partners: An Environment-focused Approach

Environmental factors include physical, social, and attitudinal variables that are part of a person's everyday life (WHO, 2001). For people with dementia, who become dependent on others for their care, the attitudes, knowledge and behaviours of care partners can be significant barriers or facilitators of communication functioning (Byrne & Orange, 2005). Because individuals

with dementia are unable to intentionally modify their own communication behaviours, education is necessarily focused more on the communication partner than on the person with dementia.

The literature contains many examples of aural rehabilitation programs for older adults with hearing loss (See Pronk et al., 2011, for a recent review), yet few, if any, have been focused exclusively on individuals with dementia. Erber and Heine (1996) review important components of an education program for care partners of older adults with hearing loss in LTC. They highlight the importance of cerumen removal, and the use of hearing aids and ALDs in addition to education about hearing loss and its impact on communication and psychosocial functioning, education also includes, information on how and when to refer to an audiologist or, initially the S-LP, for screening, and details on modification of the physical environment to promote hearing-friendly communication settings. An integral part of training for care partners is the use of facilitative strategies to prevent and repair communication breakdowns when they occur. One of these facilitative strategies involves the use of clear speech.

Clear speech is a method of speaking that is used to enhance comprehension of spoken language by individuals with hearing loss. Clear speech is defined relative to conversational speech (Uchanski, 2005), which tends to be rapidly produced, often imprecise and 'surprisingly under-articulated' (Wingfield & Tun, 2001). From this speech stream, listeners must identify words, activate their meanings and determine syntactic and semantic structure at the phrase, sentence and discourse levels (Wingfield & Tun, 2001). Clear speech is characterized by accurate, precise production of sounds in each word, natural voice stress, and phrasing (Schum, 1996), which helps mark word boundaries. Clear speech rate tends to be moderate/normal, rather than fast or artificially slow.

Researchers have studied the acoustic characteristics of clear speech and its effect on speech perception by individuals with hearing loss and found facilitative effects (see Caissie & Tranquilla, 2010, for a review). However, published data on the use of clear speech with individuals who have hearing loss and dementia is lacking. Clear speech may be particularly beneficial for individuals with dementia because some of the components of clear speech, such as the use of pauses to moderate speech rate and stress on key words, may also be beneficial to reduce demands on working memory and increase auditory comprehension in individuals with dementia (Small, Kemper & Lyons, 1997). Further research is necessary to address questions related to treatment efficacy and effectiveness for older adults with different profiles of cognitive and sensory functioning.

In the meantime, Caissie and Tranquilla (2010) describe a clear speech training program that they have used in previous research (Caissie et al., 2005) with typically aging older adults with hearing loss and their spouses. The training is based on a model proposed by Tye-Murray and Witt (1997) and includes formal instruction, guided learning and real-world practice. They note that clear speech should be paired with other listener-focused approaches including conversation breakdown repair strategies and physical environmental modifications. Again, there is overlap between these strategies (see Table 2), recommended for individuals with hearing loss, and the strategies recommended for repairing conversation with individuals who have dementia, a point emphasized by Chartrand (2005).

In summary, the interventions reviewed in this paper were limited to impairment-based approaches to manage the sensory deficit of hearing, as well as environmental modifications (i.e., changing the physical environment to minimize the chances of hearing aids

Table 2. Conversational repair strategies and environmental modifications recommended for facilitating communication with individuals with dementia and those with hearing loss

| |
|--|
| Repeat and/or rephrase |
| Simplify message content; highlight key words |
| Supplement spoken language with nonverbal and written communication |
| Use a moderate, rather than slow or fast rate of speech |
| Speak face-to-face |
| Signpost/highlight when changing a conversational topic |
| Avoid noisy, reverberant environments |
| Limit group conversations and focus on one-on-one/dyadic conversations |
| Reduce distractions |

being lost or damaged; caregiver education in clear speech) to facilitate speech comprehension and general communicative functioning of individuals with hearing loss and dementia. Other types of interventions may be appropriate, such as those directed at activity/participation levels of function, and need to be considered in the context of client need/wishes, current best research evidence and clinician expertise (Sackett, Rosenberg, Gray, Haynes, and Richardson, 1996). Indeed, audiological intervention for older adults with dementia should help to increase performance of activities of daily living as well as improve overall quality of life (Schneider, Pichora-Fuller, & Daneman, 2010).

Case Studies

In the following section we illustrate the use of specific interventions through case study descriptions. Each of the case studies is based on an actual client with dementia living in LTC. In the first case, we demonstrate how audiologists and S-LPs can act as consultants to care and in the second, we show the importance of trial use of amplification to promote positive hearing outcomes.

Mr. B

Mr. B was a 92 year old retired carpenter who lived in a LTC facility. At the time of referral to the S-LP, he had lived in the LTC for one year. Prior to admission, Mr. B lived at home alone but received frequent help from his daughter who was concerned for his safety. In addition to long-standing hearing loss, Mr. B had multiple medical conditions, including atherosclerosis, renal insufficiency, osteoarthritis, and moderate cognitive decline associated with dementia.

In the six months after admission, his formal caregivers and his daughter noted changes in his daily behaviour and demeanor. Generally, Mr. B was considered to be gregarious, a man who was friendly and liked to socialize. However, he had begun to display aggressive, agitated behaviours during interactions in the dining room, in the activities room and in the hallway. He had also become resistant to care and often became angry during daily tasks such as dressing. At the time of referral to the S-LP, he had stopped eating meals in the dining room and spent much of his day in his room, by himself, either sleeping or staring out the window.

The registered nurse and physician reviewed Mr. B's medical chart to rule out potential medical causes (e.g., new medications, worsening of general cognition) that might account for changes in his behaviour. Subsequently, at a care plan meeting, the registered nurse requested a screening by the S-LP with the goal of identifying if/how staff members could

improve their communication strategies to decrease Mr. B's apparent frustration, and increase successful social interactions and compliance with care tasks. Mr. B's daughter was in attendance and told the S-LP that her father had hearing aids but did not like to wear them. He had owned bilateral, in-the-ear aids for almost two years but had never worn them consistently. Once he was admitted to the LTC facility, he refused to wear them at all.

An audiology evaluation was requested with the purpose of assessing any change in his hearing status, the condition of his hearing aids and additional options for intervention. In this case, Mr. B was ambulatory and had a supportive family member to take him to an audiology clinic in the community, thus, access to diagnostic hearing health care was not an issue.

The audiologist who had previously evaluated his hearing and prescribed his hearing aids re-evaluated his hearing and checked the aids. The aids were in working condition. At that time, an appointment for follow-up was made to ensure that Mr. B was adjusting to the use of his hearing aids and the audiologist provided additional information to Mr. B's daughter regarding care of hearing aids within the LTC setting, which she shared with the LTC nursing staff. The audiologist also provided printed information on hearing aid care for Mr. B's medical chart and the S-LP worked with the nursing home staff on effective communication strategies (listener-directed and environmental modifications) to increase successful interactions.

Positive outcomes were achieved, with Mr. B becoming more engaged in daily life activities, and less resistant to care. Mr. B needed encouragement to wear his hearing aids, and still sometimes refused, but did wear them more frequently than he had in the past. Nursing staff reported being more comfortable with handling the hearing aids, which had previously been an issue and a barrier to their use. The S-LP, with knowledge of hearing and communication, was a referral source for the audiologist, who acted in a consultative capacity. Together with the resident, his family and formal caregivers, the goal for improved communication was met.

Jack

Jack was an 86 year old veteran of World War II who was admitted to LTC with a diagnosis of multi-infarct dementia. Jack demonstrated high levels of anxiety, refusing to leave his bedside for any reason. In addition to his anxiety, he was verbally very disruptive, speaking loudly and demonstrating constant verbal self-stimulation behaviors. The audiologist began initiating use of a PocketTalker™ amplifier during brief visits at

bedside. Over several appointments, the audiologist was able to gain sufficient trust to get Jack to participate in a more formal assessment and obtained a minimal amount of behavioural test data. These results were sufficient to determine the presence of a previously undiagnosed moderate to severe sensorineural hearing loss and prescribe behind-the-ear hearing aids. His use of loud speech decreased, and the verbal self-stimulation ceased. Although some anxiety remained, eventually, Jack developed a trusting relationship with a paid companion who was instructed by the audiologist regarding use of appropriate anticipatory and repair communication strategies. They successfully attended recreational activities within the facility, including ceramics and outings including attendance at the local fall fair.

Conclusions and Directions for Future Research

Hearing loss is under-recognized and under-treated in individuals with dementia, particularly those who live in LTC settings. Although barriers to accessible hearing health care currently exist, audiologists and S-LPs can collaborate to ensure appropriate services are available. Through such collaborations, individuals with dementia and hearing loss may have more successful communication interactions with care partners, and become more actively engaged in daily life. More research is needed on the effectiveness of amplification and other aural rehabilitation strategies as used specifically with individuals who have dementia at different stages of cognitive decline and in different living settings. Future research should also include a focus on developing and testing modified audiology evaluation protocols for use with older adults with cognitive impairment.

Undoubtedly, increased access to audiologists is a necessary area for advocacy. If access to services does improve, and more adults with hearing loss seek the services of audiologists, there will be a shortage of qualified professionals to meet their needs (Donahue et al., 2010). Given the aging population and the projected increased need for audiological services for older adults, Donahue et al. discussed the move by professional organizations in the U.S. to train and certify audiology assistants and technicians in an “effort to maximize productivity of the most highly trained individuals” (p. 4). This model is one that would be especially helpful in ensuring that older adults in institutional care environments receive needed services, where limited access to audiologists is a current and growing problem. Audiologists are not typically employed on-site in LTC settings and in the vast majority of cases, work as consultants who visit the LTC setting only rarely

(Lubinski, Stecker, Weinstein & Volin, 1993; Worrall & Hickson, 2003). In a Canadian context, audiologists may need to rely more on S-LPs and other staff in LTC to carry out programs, under a consultative model in which audiologists provide services and appropriate staff training on a rotating basis across care facilities within health regions.

The relationship between hearing loss and dementia is receiving increased attention. As communication professionals, S-LPs and audiologists must work together to conduct research and educate the general public and healthcare policy makers on the central importance of the ability to hear and to communicate to encourage active aging (WHO, 2002) by older adults with chronic health conditions, such as dementia.

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Received date: March 13, 2012

Accepted date: July 5, 2012

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