



SHORT REPORT

The Impact of Hearing Loss on Health: Interprofessional Guidance for Health and Primary Care Providers (PCPs)

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ABSTRACT

In the United States, approximately one in eight (13 percent, or 30 million) individuals aged 12 years or older has bilateral hearing loss. When unaddressed and untreated, hearing loss is associated with and contributes to other significant health issues; specifically, social isolation, depression, stress, and anxiety, incidental falls, dementia and impaired cognition, and reduced quality of life. This is a public health concern. Health and primary care providers are in a unique position to have a positive impact by probing the hearing of the patients they see, providing information, and making appropriate referrals to reduce deleterious effects when this impairment occurs.

Abbreviations: Hertz (Hz); High frequency hearing loss (HFHL); Personal listening devices (PLDs); Sensorineural hearing loss (SNHL)

Format: Small group discussion, classroom and clinical practicum settings.

Target audience: The student and practicing health professions (e.g. occupational and physical therapy, psychologists, physician assistants, nursing, and medical) involved and the relevant point in their training and practice.

1. Introduction

Hearing loss affects individuals of all ages. World-wide, it is estimated that approximately 466 million individuals have some type of disabling hearing loss; this number is predicted to rise to 900 million by 2050 (World Health Organization [WHO], 2020).^[22] Further, a disproportionate burden of hearing loss occurs in lower income countries due to lack of availability of hearing aids and/or hearing assistive technologies. In the United States, approximately one in eight (13 percent, or 30 million) individuals aged 12 or older has bilateral hearing loss (Lin, Niparko, & Ferrucci, 2011).^[15] Fung and colleagues (2013)^[8] found

that 24 percent of adults between 18 and 45 years of age experience bilateral high-frequency (3,000-8,000 Hertz [Hz]) hearing loss (HFHL) and/or tinnitus (ringing in the ear) attributed to excessive use of personal listening devices (PLDs; e.g. iPods, MP3 players). Berg and Serpanos (2011)^[3] found that HFHL doubled over a 24-year period from 10.1% in 1985 to 19.2% in 2008 in a group of 8,710 adolescent females in a residential foster care facility. Compared to the general adolescent population, this group of female adolescents presented with a higher percentage of bilateral mild or greater degrees of HFHL at two or more frequencies including 3,000, 4,000, and 6,000 Hz. Use of PLDs increased four-fold, from 18.3% in 2001 to 76.4% in 2008. Of the total

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number reporting tinnitus, 99.7% also reported regular PLD use. A significant relationship was found between PLD use and reported tinnitus and HFHL irrespective of time of use of PLD.

Further, age-related hearing loss, often referred to as presbycusis, has been reported to occur in approximately one in three individuals between the ages of 65 and 74 years living in the United States, increasing to nearly half of those older than 75 years (National Institute on Deafness and Other Communication Disorders [NIDCD], n.d.).^[18] Presbycusis is different from the hearing loss that occurs in younger individuals. Age-related hearing loss is complex and involves alterations in the peripheral and central auditory systems as well as challenges regarding cognition and working memory. Onset is gradual. Presbycusis affects the sensory and/or neural components of the inner ear, auditory nerve, and central auditory system and is characterized by sensorineural hearing loss (SNHL). A typical audiometric configuration is sloping with better hearing sensitivity in the lower frequencies than high frequencies, of mild to moderate degree, and symmetrical in both ears (Howarth & Shone, 2006).^[10] Initially, the hearing loss is observed around 4,000 Hz with gradual involvement of the mid to lower frequencies. Chien and Lin (2012)^[4] estimated that 23 million adults 50 years and older in the United States have untreated hearing loss and that only one in seven uses a hearing instrument. Reasons why so few older adults use hearing aids include that they are not recommended, they are costly, and/or that there is the perception they are not needed (Gopinath, Schneider, Hartley, Teber, McMahon, et al., 2011).^[9] Unaddressed and uncorrected hearing loss in older adults not only has consequences regarding communication, but also contributes to reduced quality of life (QoL), poor psychosocial well-being, depression, and cognitive dysfunction (Arlinger, 2003).^[2]

Hearing loss not only affects the lives of individuals with this impairment but their families as well. It has an impact on communication, language learning, academic achievement, and reduced participation in the workforce (WHO, 2017).^[21] When unaddressed and untreated, hearing loss is associated with and contributes to other health issues; specifically, social isolation, depression, stress, and anxiety, incidental falls, dementia and impaired cognition, and reduced QoL. Deal and colleagues (2019)^[6] found a significant relationship in adults 50 years of age or greater diagnosed with untreated hearing loss and increased incidence of other health conditions; specifically, a 10-year increased risk of dementia (3.2 per 100 persons), depression (3.6 per 100 persons), falls (6.9 per 100 persons), and myocardial

infarction (1.1 per 100 persons). In addition, some chronic diseases (e.g. diabetes, hypertension) put individuals at even greater risk for impaired hearing. Frisina and colleagues (2006)^[7] found significant differences in inner ear auditory function in older individuals with type 2 diabetes when matched with older adult controls; specifically, reduced cochlear reserve as measured by otoacoustic emissions, decreased low-frequency hearing thresholds, and poorer speech recognition scores. This is a public health concern.

Hearing conservation and protection, education to promote hearing health, screening, identification, and appropriate and effective treatment (e.g. medical, hearing aids, cochlear implants, and communication strategies through audiology rehabilitation) mitigate some of the health and risk factors associated with hearing loss. Addressing hearing loss has been shown to be cost effective, reducing burdensome health care issues and costs, and improving QoL (WHO, 2017).^[21] Often, health and primary care providers (PCPs) are in a position to probe hearing health as part of their care and service delivery.

2. Depression, Anxiety, and Stress and Hearing Loss

Kalayam and colleagues (1991)^[12] found an association between age of onset of depression and hearing loss within the speech frequencies (500, 1,000, 2,000, and 4,000 Hz); 85% of participants experienced depression when sensorineural hearing loss of 40 decibel hearing level (dB HL) or greater occurred at 1,000 and 2,000 Hz. The self-imposed social isolation that often ensues due to hearing loss contributes to depression, stress, anxiety, and loneliness. Lawrence and colleagues (2019)^[13] conducted a systematic review and meta-analysis to examine hearing loss and depression in older adults. Thirty-five cross-sectional and/or cohort studies examining 147,148 participants met inclusion criteria. They found that hearing loss increased the odds of depression in older adults. Further, increased levels of anxiety and stress can lead to cardiac and inflammatory diseases and potentially, unhealthy lifestyle decisions (e.g. adoption of excessive alcohol use) and visceral obesity (Jayakody et al., 2018).^[11] Jayakody and colleagues (2018)^[11] found that the severity of hearing loss increased the severity of depression, stress, and anxiety. Participants in their study with moderate-to-severe and profound sensorineural (inner ear) hearing loss experienced greater levels of depression, stress, and anxiety as well as other health issues than individuals with hearing within normal limits. Further, the

evidence that exists showing anatomic and physiologic changes in cortical and subcortical structures as a result of depression, stress, and anxiety are also implicated in presbycusis; specifically, reduced grey matter in the temporal and frontal gyri, primary auditory cortex, and hypothalamus (Jayakody et al., 2018).^[11]

3. Cognitive Impairment and Dementia

Individuals with untreated hearing loss are at greater risk for developing cognitive decline, impairment, and dementia. Liu and Lee (2019)^[16] examined three groups of adults with hearing loss; between 45 and 64 years, between 65 and 74 years, and 75 years and greater. They found that not only the incidence of dementia increased in individuals with hearing loss, but the risk of incurring dementia was greatest for adults in the age range of 45 to 64 years. Loughrey and colleagues (2018)^[17] conducted a systematic review and meta-analysis to examine if an association between presbycusis and cognitive impairment existed. Thirty-six studies met their inclusion criteria. They found that presbycusis could be a potential biomarker for the increased threat of cognitive decline, impairment, and dementia, but not Alzheimer's disease (Loughrey, Kelly, Kelley, et al., 2018).^[17]

Dawes and colleagues (2015)^[5] found that hearing aid use was associated with better cognition, independent of social isolation and depression in a subsample (n = 164,770) from the United Kingdom (UK) Biobank data set in adults aged 40 to 69 years who completed a hearing test. Improved cognition could partially be attributed to increased social engagement due to improved audibility of the speech signal. Finally, dual sensory impairment has been found to be associated with increased cognitive and functional decline (Lin, Guitierrez, Stone, et al, 2004)^[14] and older adults often have both vision and hearing issues.

4. Falls and Hearing Loss

Agmon and colleagues (2017)^[11] conducted a systematic review of the association of falls, postural stability, and mobility in older adults with hearing loss. Degree and severity of the hearing loss was found to be related to greater difficulties in agility and increased falls. These authors postulated that the association between falls and hearing impairment may be due to the physical, cognitive and behavioral processes involved in the auditory system (Agmon, Lavie, & Dumas, 2017).^[11] Deal and colleagues (2019)^[6] also found an increased incidence of falls, 6.9 per 100 persons, in individuals with hearing loss.

5. Suggestions for the Health and Primary Care Provider and Conclusions

For adults, two tools, the Hearing Handicap Inventory for Adults-Screening (HHIA-S; Newman, Weinstein, Jacobson, & Hug, 1991)^[19] and the Hearing Handicap Inventory for the Elderly-Screening (HHIE-S; Ventry & Weinstein, 1983),^[20] are easy and time-efficient questionnaires (10 items) to incorporate into the PCP practice. They can be accessed at no charge from <https://105b31079a1ba381f52eac2ec5114feb632a1114f20df0e72453.ssl.cf2.rackcdn.com/Sidebar/59f9dc02-a7e0-4762-8266-315b0ad284e6/HHIE.pdf> and https://www.lifescandiabetesinstitute.com/sites/default/files/blog_attachment/Hearing%20Handicap%20Inventory%20for%20the%20Elderly.pdf.

When speaking to the individual with hearing loss, face them, speak at a typical volume, use a slightly slower rate of speech to increase audibility and intelligibility of the high frequency consonants that are lower in intensity compared to vowels, reduce competing background noise when possible, and ensure the topic discussed is known and clarified to the patient. Context-based communication facilitates comprehension and has been shown to be beneficial. Rephrasing has also been shown to be effective for improving communication. Hearing loss is frustrating for both the person with the hearing loss and their communication partners. Audiologic rehabilitation strategies must address the frustrations of both the person with the hearing loss and their family members/caregivers. Communication repair strategies require implementation by both parties. These strategies improve communication even in challenging listening environments. Health and primary care providers can have a positive impact by probing the hearing of the patients they see, providing information, and making appropriate referrals to reduce deleterious effects when this impairment occurs.

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