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# Hearing and Nutrition: Why Integrated Care Could be Beneficial

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In the previous issue of the Canadian Audiologist, I reviewed topics covered in this column in 2023, and I invited Canadian audiologists to join me in a resolution to make 2024 the year to move hearing care into a new era of integrated person-centered inter-professional primary care (Pichora-Fuller, 2024). One of the topics raised in 2023 was the importance of the World Health Organization (WHO) guidance on integrated person-centered care for older adults (ICOPE; WHO, 2019). Recall that the ICOPE guidance identifies six key capacities to be considered in integrated care: hearing, vision, mobility, mental health, cognition, and vitality. Vitality includes nutrition, metabolic disorders, cardiovascular disease, and frailty. Most audiologists would not find it surprising that there are connections between hearing and four other key capacities: vision, mobility, mental health, and cognition. However, it may be less obvious that there are connections between hearing and nutrition. Given that many people make New Year's resolutions to adopt healthier diets, exploring the connections between hearing and nutrition that might be important in integrated inter-professional primary care for older adults seems timely.

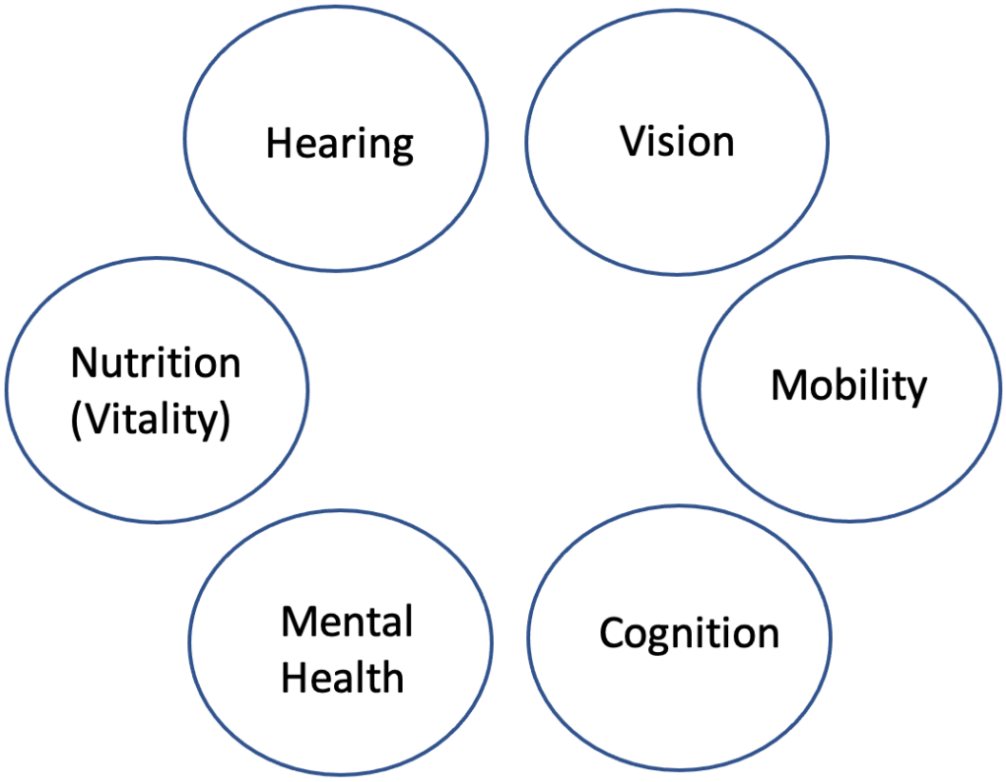


**Figure 1. Six key capacities identified in ICOPE.**

## Malnutrition

In a French nutrition study conducted in older community-dwelling people seeking healthcare, an analysis of ICOPE screening data from almost 15,000 people over 60 years of age (mean age = 76.7 years; 62% female; 70 kg average weight) found significant connections between appetite loss and weight loss (hallmarks of malnutrition) and all of the other key capacities, including hearing (Gaussens et al., 2023). In the sample, 63% screened with alerts for hearing based on self-reported hearing problems or the whisper test, and 20% screened with alerts for nutrition based on self-reported appetite and weight loss. Possible explanations for the findings were discussed. Associations between nutrition and mobility could be due to effects on muscle function. Eating is related to mood disorders (e.g., depression), and eating disorders can be a sign of neurocognitive disorders (e.g., dementia). Associations between nutrition and hearing or vision could be due to micronutrient deficiencies that affect the energy metabolism needed for sensory processing.

## Obesity

Obesity is a possibly modifiable risk factor for dementia (Livingston et al., 2020) and it may also be a risk factor for hearing loss in older adults (Kim et al., 2014, 2016). The Body Mass Index (BMI) or Fat Mass Index (FMI) are indicators of obesity. Higher BMI and, to an even greater extent, FMI have been associated with hearing loss in cross-sectional and longitudinal research (Croll et al., 2019; see also Cruickshanks et al., 2015; Curhan et al., 2013; Fransen et al., 2008; Helzner et al., 2011). Overall, it seems that body composition likely influences hearing thresholds through vascular mechanisms that may affect the stria vascularis in the cochlea. Interestingly, both malnutrition and obesity may increase the risk of hearing loss.

## Dietary Intake

Studies of diet quality and the contributions of specific nutrients suggest that fish, whole grains, and moderate intake of alcohol may be related to lower risk for hearing loss (Gopinath et al., 2010, 2013; Péneau et al., 2013; Rosenhall et al., 2015; Spankovich et al., 2013). Research examining the association between hearing loss and three common healthy dietary patterns has found that middle-aged and older women who followed a healthy diet had about a 30% lower risk of hearing loss than women who did not follow a healthy diet (Curhan et al., 2018, 2020). Those who were the best at following healthy diets were slightly older, leaner, more likely to be physically active, and less likely to be current smokers; however, these potential confounding characteristics were controlled for statistically. Similar results were found for three common healthy dietary patterns: the alternate Mediterranean diet (AMED), Dietary Approaches to Stop Hypertension (DASH), and the 2010 Alternative Healthy Eating Index (AHEI-2010). AMED is based on fruits, vegetables, nuts, whole grains, legumes, olive oil, and fish, with only moderate alcohol. DASH encourages fruits, vegetables, nuts, lean meats, fish, and low-fat dairy with limited sodium, sugar, and fat. The AHEI-2010 diet also encourages vegetables, fruits, and whole grains but limits sugar, salt, and animal fat. Notably, according to the National Institute on Aging in the USA, the “MIND” diet, a hybrid of the AMED and DASH diets, is recommended to reduce risk of dementia (https://www.nia.nih.gov/health/alzheimers-and-dementia/what-do-we-know-about-diet-and-prevention-alzheimers-disease). Importantly, the same healthy dietary patterns seem to minimize the risk for both dementia and hearing loss.

## Diabetes

Various health conditions related to vitality (e.g., diabetes, obesity, smoking, hypertension, cardiovascular disease) are risk factors for hearing loss (Agrawal, Platz, & Niparko, 2009; Mick et al., 2023). In one population study, hearing impairment was about twice as prevalent in people with diabetes compared with those without diabetes after adjusting for age and other risk factors for hearing impairment (Bainbridge et al., 2004). In a study of people with Type 1 diabetes, the AIC measure of blood glucose (used to monitor diabetes) was associated with an increased risk of hearing impairment when tested after long-term (> 20 years) follow-up (Schade et al., 2018). Hyperglycemia and oxidative stress in Type 2 diabetes may contribute to cochlear microangiopathy and auditory neuropathy (Helzner & Contrera, 2016). Furthermore, in addition to being a possible cause of hearing loss, diabetes can cause dementia and other sensory losses, including loss of vision (diabetic retinopathy) and loss of smell (American Diabetes Association, 2021). Recall that hearing loss and diabetes are both risk factors for dementia (Livingston et al., 2020). In addition, there are other potentially modifiable risk factors for dementia (obesity, smoking) that may also increase the risk of both hearing loss and diabetes. Importantly, there could be multiple common causes of hearing loss, diabetes and dementia. Strategies for managing diabetes include lifestyle changes, including following a healthy diet (American Diabetes Association, 2022). The healthy diets (e.g., the Mediterranean diet) recommended for diabetes (Martín-Peláez et al., 2020) are similar to those that reduce the risk of hearing loss.

## Conclusions

Connections between hearing and nutrition that might be important in integrated inter-professional primary care for older adults may involve malnutrition, obesity, dietary patterns, and diabetes. The connection between hearing and malnutrition is also relevant to mobility and mental health as key capacities. The connection between hearing and diabetes is also relevant to vision as a key capacity. Hearing and obesity and diabetes are relevant to cognition as a key capacity. Overall, hearing and nutrition are connected. Both are connected to each of the other key capacities (mobility, mental health, vision, cognition). These connections allow hearing care to play a role in integrated care to promote healthy aging.

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