MedCrave
Step into the World of Research

Journal of Otolaryngology-ENT Research

Review Article

Open Access

CrossMark

Vision, audition, cognition and sensory-based clinics

Volume 15 Issue 2 - 2023

Douglas L Beck,[1] Jed Grisel,[2] Solomon Gould[3]

[1]Vice President of Clinical Sciences Cognivue Inc., USA
[2]Chief Medical Officer, Amplify Hearing, USA
[3]Senior Clinic Operations Director Eye Care, USA

Correspondence: Douglas L Beck, Vice President of Clinical Sciences Cognivue Inc., New York, USA, Email douglaslbeck@gmail.com

Received: April 13, 2023 | **Published:** May 01, 2023

Introduction to Dementia

As clinicians, the more we understand the needs of our patients, the better we can address their specific sensory and general healthcare concerns. As clinicians who address primary sensory pathways (such as vision and hearing) we endeavor to understand the immediate and long-term impact of sensory deficits. Further, we must address broader and potentially life-altering issues secondary to sensory deficits including functional outcomes, quality of life (QOL) and the cognitive impact of sensory degradation.

In a 2021 survey of more than 1000 people, the top five health conditions feared the most were cancer (Ca, 84%), Alzheimer's Disease (AD, 79%), heart attack/disease (76%), stroke (72%) and COVID-19 (67%). The authors (MedicareAdvantage.com)[1] report the two most-feared outcomes were cognitive decline (86%) and the loss of mobility (84%).

The United States Alzheimer's Association[2] reports 6.2 million Americans 65 years and older had AD in 2021. When we consider the probable undiagnosed AD and all-cause dementia population, there may be 10 million people in the USA with all-cause dementia. Nichols, Vas, Murray et al.,[3] estimate that by 2050 the quantity of people globally with all-cause dementia will triple. Similarly, the number of all-cause dementia cases in the United States by 2050 would be 30 million.

The World Health Organization[4] reports more than 55 million people worldwide have dementia. They report AD is the most common dementia, representing 2/3rds of all dementia cases. Early-stage dementia is often characterized by forgetfulness, losing track of time, or becoming lost in familiar places. Middle-stage dementia may include forgetting recent events and the names of people, confusion at home, increased difficulty with communication, needing assistance with personal care, wandering and repeated questioning. Late-stage dementia is characterized as being unaware of time and place, difficulty recognizing relatives and friends, requiring assistance for self-care and possibly aggressive behaviors.

Minor and major neurocognitive disorders

There are two general categories of neurocognitive disorders (NCDs). The first is mild cognitive impairment (MCI) which is also referred to as Mild Neurocognitive Disorder (MiNCD). MCI is defined by decreases in cognitive ability without major interruptions in activities of daily living (ADL). MCI occurs in approximately 22% of people over 65 years of age[5] and approximately 1 in 5 people with MCI convert to dementia annually. When ADLs such as toileting, feeding, cooking, dressing, driving and essentially tending to one's personal needs, can no longer be managed independently by the patient, consideration is given to Major NCDs (MajNCDs) such as Alzheimer's Disease (AD), Fronto-temporal dementia, vascular dementia, Lewy Body dementia, Parkinson's with dementia and more.

Currently, there is not a generally accepted or universal "cure" for dementia. While some treatments may alleviate or slow the development of symptoms, there are no FDA-approved medications available which definitively cure or reverse dementia. As such, public health campaigns to combat dementia are centered around risk factor management and prevention. Peracino[6] reported a modest one-year delay in conversion from MCI to dementia would decrease the global disease burden in 2050 by 10%. As such, identifying risk factors for dementia and mitigating that risk is an urgent public health matter.

Potentially modifiable dementia risk factors

Livingston, Huntley, Sommerlad et al.,[7] reported that some 60% of dementia risk is due to age and deoxyribonucleic acids (DNA). However, some 40% of dementia risk may be attributed to 12 potentially modifiable risk factors; less education, untreated hearing loss, traumatic brain injury, untreated hypertension, excessive alcohol consumption, untreated diabetes, smoking, obesity, depression, social isolation, physical inactivity and air pollution. In brief, addressing and managing these potentially modifiable risk factors prior to the onset of dementia, and arguably before MCI, or as soon as possible after mild cognitive impairment is suspected or diagnosed, intervention (via the 12 modifiable risk factors) may change the trajectory for the individual at-risk, and their family.

More recently, and regarding the relationship between audition, amplification and cognition, Jiang, Mishra, Shrestha et al reported in the Lancet[8] "our findings highlight the urgent need to take measures to address hearing loss to improve cognitive decline."

Vision, hearing & cognition

Although not present in the Livingston, Huntley, Sommerlad et al.,[7] article, numerous studies have highlighted vision loss as a risk factor for dementia. In one cross-sectional study it was noted that cognitive function improved following both vision correction and cataract surgery (Spierer)[9] A longitudinal study of 2,520 US adults showed visual impairment is associated with declining cognitive function over time, with worsening vision having a stronger association with declining cognition than vice versa Zheng.[10] A systematic review and meta-analysis encompassed 40 studies and 47 million participants found that vision impairment increases the risk of cognitive impairment at least two-fold.[11]

Regarding the impact of hearing loss on dementia, it has been well-documented that the most significant potentially modifiable risk factor for dementia is hearing loss (see Lin, Metter & O'Brien et al.,[12] see Livingston et al.,[7] see Beck, Bant & Clarke,[13], see Beck,[14] and see Beck & Grisel[15]) When hearing loss is diagnosed and managed early (through amplification, FM transmitters, digital remote microphones, telecoils and loop systems, assistive listening devices and more) long-term outcomes appear significantly improved, as compared to untreated hearing loss see Amieva et al.,[16] Glick & Sharma,[17] and Jiang, Mishra, Shrestha et al.[8]

Older adults with dual sensory impairment (DSI; hearing and vision impairment) perceive even greater difficulty and worse outcomes than those with only vision or hearing loss. Across the USA, some 12% of the population has vision-only loss, approximately 13% have hearing-only loss, and about 8% have DSI Shakarchi, Assi, Ehrlich et al.,[18] Nonetheless, a recent Scoping Review[19] reports despite a clear need, only limited outcomes-based information, regarding how and when optometrists work with dementia patients, is available.

Interventions to correct vision problems and hearing loss in a combined effort have indicated and demonstrated promising results to alter the trajectory of dementia development. For example, data from the SENSE-COG Field Trial suggest that managing vision and hearing impairment among patients with cognitive decline improves quality of life, increases social engagement, decreases feelings of isolation, and decreases dependence on caregivers (Leroi et al.,).[20]

Paradigm shift: sensory-based clinics

Currently, the US healthcare system does not have a functional, well-recognized pathway or protocol whereby most patients with potential MCI can be screened, referred, educated, and managed.

Primary care physicians are over-burdened with time and resource limitations and are charged with managing the vast multitude of general health conditions which impact their patients. Specialists (neurologists, geriatricians, psychiatrists, etc.) generally assume care for patients in later stages of dementia. However, the evidence (see above) indicates early detection and management during MCI, is more promising, effective, and efficient, than detection and management at a later stage.

Clearly, multiple sensory deficits are well-known risk factors for MCI. As such, the introduction of sensory-based audiology and optometry clinics could serve as primary screening, referral and management pathways for potential MCI patients and their families. A probable significant percentage of patients in sensory-based clinics have already, or may soon develop, MCI.

Further, a large percentage of Americans already have regular contact with a sensory provider. Approximately 2/3 of US adults 50-80 years old plan to visit their optometrist within the next 12 months (Carlson)[21,22] Optometrists and audiologists are licensed experts and their ability to employ evidence-based treatments (which may potentially modify dementia risk) is part of their everyday practice.

Synergies associated with sensory based-clinics

The prevalence of dual sensory loss dramatically increases with age. For this reason, vision clinics tend to have a relatively high concentration of patients with hearing loss, and vice versa. These neurodegenerative processes are also linked to cognitive decline. As we age, pro-active cognitive screening, education, and modifiable risk-factor management, as well as referral to speech-language pathologists, psychologists, memory clinics and online resources and more may significantly alter the trajectory of dementia development.

Integrating audiology services into optometry practices serves as an innovative way to bring professional services to more patients. In the United Kingdom, combined audiology and optometry clinics are rapidly expanding. Within the past decade the quantity of audiology clinics interwoven into optometry clinics is just over 1400 (www.hearingaid.org).[23] With over 7200 optometry/optical locations across the United Kingdom (www.statista.com)[24] audiology services are available in approximately 1 in 5 optometry practices. The success of these sensory-based clinics suggests patients are willing to, and might prefer to, access multiple sensory healthcare disciplines within one location.

Partnerships between independent audiologists and optometrists offer significant advantages for the professionals including enhanced patient access, greater patient flow, shared marketing initiatives, shared facility and administrative personnel, shared rent, lease and utilities, and various other economies of scale which help create mutually beneficial professional opportunities and relationships.

Sensory clinic advantages

For independent optometrists and audiologists, there remains constant pressure to be socially and commercially relevant, and financially solvent. Amidst an ever-growing number of competitive delivery channels such as mass marketing via TV channels, internet-based and social media marketing, big box stores, giant national and global pharmacy chains and more.

As such, synergistic professional service delivery represents a welcomed opportunity for patients and professionals. Mutually beneficial partnerships result in profitable activity for optometrists and audiologists thereby supporting the independence and financial stability of both while offering advantages and convenience for the patients. Offering in-tandem vision and hearing services transforms typical vision and hearing clinics into "sensory" clinics with potentially greater appeal to more patients. Additionally, the combined services give more opportunities to make the clinic "sticky" regarding the retention of patients and encouraging repeat business.

Discussion

Embarking on an audiology-optometry partnership requires caution. Audiology and optometry are unique specialties, each with their own clinical, professional, and financial considerations. Oversimplification can create problems for patients and professionals. The "sensory clinic" strategy must be more encompassing than simply selling hearing aids to vision patients and vice versa.

Rather, successful integration requires a partnership of highly skilled professionals who implement best practices as well as screenings, referrals, diagnosis, management, and functional short- and long-term follow-up as well as a true multi-disciplinary offerings and options to the patients they serve.

In the USA, UK and the EU, demographic shifts indicate an increasing percentage of significantly older adults and a rapidly aging population. The demographic overlap of older people with hearing, listening, vision, and cognitive issues in isolation or in-tandem is significant. As such, sensory-based clinics offer a pragmatic value and alternative for professionals and patients regarding sensory and cognitive health. By combining services in one location, these sensory-based clinics can maximize synergies which are rarely available independently for professionals and patients.

Acknowledgements

None.

Conflicts of interest

No conflicts of interest.

Funding

None.

References

1. MedicareAdvantage.com: What medical condition are you most afraid of? 2022.
2. Alzheimer's association: Alzheimer's disease facts and figures. *The Journal of the Alzheimer's Association*. 2021.
3. Nichols, Vos, Murray, et al. Estimation of the global prevalence of dementia in 2019 and forecasted prevalence in 2050: an analysis for the Global Burden of Disease Study 2019. *GBD 2019 Dementia Forecasting Collaborators.* 2022;7(2):105–125.
4. World Health Organization. 2022.
5. Manly JJ, Jones RN, Langa KM, et al. Estimating the prevalence of dementia and mild cognitive impairment in the US: The 2016 health and retirement study harmonized cognitive assessment protocol project. *JAMA Neurol.* 2022;79(12):1242–1249.
6. Peracino A. Hearing loss and dementia in the aging population. *Audiol Neurotol.* 2014;19(suppl 1):6–9.
7. Livingston G, Huntley J, Sommerlad A, et al. Dementia prevention, intervention, and care: 2020 report of the Lancet Commission. *Lancet*. 2020;396(10248):413–446.
8. Jiang, F, Mishra SR, Shrestha N, et al. Association between hearing aid use and all-cause and cause-specific dementia: an analysis of the UK Biobank cohort. *Lancet Public Health.* 2023;8(5):329–338.
9. Spierer O, Fischer N, Barak A, et al. correlation between vision and cognitive function in the elderly: a cross-sectional study. *Medicine*. 2016;95(3):e2423.
10. Zheng DD, Swenor BK, Christ SL, et al. Longitudinal associations between visual impairment and cognitive functioning: The salisbury eye evaluation study. *JAMA Ophthalmoly*. 2018;136(9):989–995.
11. Vu T, Fenwick E, Gan A. The bidirectional relationship between vision and cognition: a systematic review and meta-analysis. *Ophthalmology*. 2021;128(7):981–992.
12. Lin FR, Metter EJ, O'Brien RJ, et al. Hearing loss and incident dementia. *Arch Neurol*. 2011;68(2):214–220.
13. Beck DL, Bant S, Clarke NA. Hearing loss and cognition: a discussion for audiologists and hearing healthcare professionals. *J Otolaryngol ENT Res.* 2020;12(3):72–78.
14. Beck DL. A Deeper Dive into Cognition & Audiology: 2022. *Hearing Review.* 2022;29(9):22–26.
15. Beck DL, Grisel JJ. Cognitive screenings in otolaryngology? The time has come. *Journal of Otolaryngology ENT Research.* 2022;14(2):56–60.
16. Amieva H, Ouvrard C, Giulioli C, et al. Self-reported hearing loss, hearing aids, and cognitive decline in elderly adults: a 25-year study. *J Am Geriatr Soc*. 2015;63(10):2099–2104.
17. Glick HA, Sharma A. Cortical neuroplasticity and cognitive function in early-stage, mild-moderate hearing loss: evidence of neurocognitive benefit from hearing aid use. *Front Neurosci*. 2020;14:1–22.
18. Shakarchi AF, Assi L, Ehrlich JR, et al. dual sensory impairment and perceived everyday discrimination in the United States. *JAMA Ophthalmol*. 2020;138(12):1227–1233.
19. Piano, MEF, Nguyen BN, Gocuk SA, et al. Primary eyecare provision for people with dementia: what do we need to know? *Clinical & Experimental Optometry.* 2022;14:1–15.
20. Leroi I, Simkin Z, Hooper E, et al. Impact of an intervention to support hearing and vision in dementia: The SENSE-COG field trial. *Int j Geriatr Psychiatry*. 2020;35(4):348–357.
21. Carlson ML, Nassiri AM, Marinelli JP, et al. Hearing health collaborative. awareness, perceptions, and literacy surrounding hearing loss and hearing rehabilitation among the adult population in the United States. *Otol Neurotol*. 2022;43(3):e323–e330.
22. Petersen, RC. Mild cognitive impairment. *Continuum*. 2016;22(2 Dementia):404–448.
23. www.hearingaid.org
24. https://www.statista.com/statistics/431369/number-of-optician-outlets-in-selected-european-countries/