Hearing Health Perceptions and Literacy Among Primary Healthcare Providers in the United States: A National Cross-Sectional Survey

*Sarah A. Sydlowski, †John P. Marinelli, ‡Christine M. Lohse, †Matthew L. Carlson, and Hearing Health Collaborative

*Cleveland Clinic Head and Neck Institute, Cleveland, Ohio; †Department of Otolaryngology–Head and Neck Surgery, Mayo Clinic, Rochester, Minnesota; and ‡Division of Clinical Trials and Biostatistics, Department of Quantitative Health Sciences, Mayo Clinic, Rochester, Minnesota

Objective: To characterize current awareness, perceptions, and literacy surrounding hearing loss among United States primary healthcare professionals.

Study design: National cross-sectional survey study.

Setting: United States.

Participants: Four hundred six healthcare professionals.

Results: Survey respondents included 205 primary care physicians and 201 nurse practitioners or physician assistants. When compared with 10 other common health conditions, only 1% of respondents ranked hearing loss as a “most important” health condition to manage. Less than half of providers reported recommending hearing testing for their patients at least once per year, whereas evaluation of blood pressure, total cholesterol, body mass index, and blood glucose levels are recommended at least annually by more than 80% of providers. Although 95% of respondents indicated that it is somewhat important or very important for patients to know the standard definition for normal hearing, only 57% of surveyed providers know of a standard definition themselves, and only 28% reported familiarity with the concept of “20/20 hearing.” Conversely, more than 80% of respondents know the “normal” metric for blood pressure, total cholesterol, body mass index, blood glucose, and vision. Most respondents realize that hearing is important to overall health and hearing loss can impact personal safety, lead to social isolation, and negatively impact quality of life. Fifty-four percent also acknowledged a link between hearing loss and depression, but a majority were not very aware of the relationship of hearing loss to risk of falling and dementia, reduced income and job opportunities, and type 2 diabetes. Importantly, only 40% of providers believe hearing loss is treatable, and only 17% believe it is preventable.

Conclusion: Despite widespread literacy of what constitutes normal blood pressure, total cholesterol, body mass index, blood glucose, and vision metrics, healthcare providers exhibit a poor understanding of normal hearing levels. Few providers prioritize hearing health or regularly recommend for annual hearing evaluation. Most providers believe that options for people with hearing loss are limited, which may have important implications for prioritizing discussion of hearing loss with patients.

Key Words: Cochlear implantation—Deafness—Hearing loss—Sensorineural hearing loss.

Otol Neurotol 43:894–899, 2022.

INTRODUCTION

Hearing loss affects nearly a quarter of all Americans 12 years and older (1). It has been cited as the third most common chronic health condition in older adults (2), and the prevalence is expected to continue to increase because of the increasingly aging population (3). Although frequently disregarded as an expected consequence of aging, untreated hearing loss has been linked to depression, social isolation, poor quality of life, reduced educational achievement and employability, heightened fall risk, and premature mortality (4–7). Furthermore, in the updated 2020 Lancet Commission on Dementia, midlife hearing loss remains the single largest modifiable risk factor for later-life cognitive impairment and dementia (8). Importantly, hearing loss is more common in individuals with other comorbidities such as heart disease (9) and diabetes (10).

Despite compelling evidence suggesting that hearing loss is a significant health condition requiring early
identification and intervention, it remains underdiagnosed and undertreated. Estimates suggest that 21% of individuals who are candidates for hearing aids use them (11); 2.1 to 12.7% of candidates for cochlear implants have one, with a range depending on whether conservative or more inclusive candidacy criteria (e.g., single-sided deafness) are applied (12). Furthermore, it is impossible to estimate how many of those who are using these devices are potentially inadequately treated. Multiple factors have been cited as possible underlying reasons for inadequate treatment of hearing loss, including lack of routine screening protocols for at-risk adults, misconceptions regarding the importance of early and adequate management, lack of recognition of hearing loss as a healthcare priority, stigma, and cost, among others (13).

Healthcare providers are often the first line of intervention for health conditions, including hearing loss. However, approximately 50% of primary care providers believe that nothing can be done to manage hearing loss and often do not inquire about it (14). Unfortunately, even when asked, approximately 30% of adults misclassify their hearing ability (15), suggesting that routine formal screening for hearing loss is required. Patients’ poor ability to self-identify as requiring intervention for hearing decline underscores the importance for literacy and proficiency surrounding hearing loss among frontline healthcare providers. For this reason, the current study was undertaken to assess attitudes and behaviors regarding hearing loss among healthcare providers in the United States.

METHODS

An online quantitative survey (Supplementary Appendix, http://links.lww.com/MAO/B454) was sent to a convenience sample of 4,300 US healthcare providers from May 5 to May 13, 2019; 951 respondents started the survey, and 406 qualified and completed. The overall survey response rate was 9.4%, and the overall conversion rate was 43%. Continuous features were summarized with medians and interquartile ranges, and categorical features were summarized with frequencies and percentages. Participants were asked to consider patients 50 years and older in their responses. Statistical analyses were conducted using SAS software (SAS Institute, Cary, NC).

RESULTS

Respondent Demographics

Survey respondents included 406 US healthcare professionals; 205 were primary care physicians, and 201 were nurse practitioners (NPs) or physician assistants (PAs). Half of healthcare professionals surveyed were female, and 44% were in private practice. Demographic respondent data are presented in Table 1.

Defining Hearing Loss

Healthcare professionals felt it was “very important” (42%) or “somewhat important” (53%) for patients 50 years or older to know the standard definition for normal hearing and hearing loss. However, only 57% of healthcare professionals surveyed were aware that an established definition existed. By comparison, healthcare professionals were more frequently aware of established “normal” or “average” ranges for blood glucose (98%), blood pressure (98%), body mass index (95%), cholesterol (93%), and vision (76%) (Table 2). Not surprisingly, hearing came in last among these conditions in terms of healthcare provider familiarity of these normal ranges. In this case, only 28% of providers were familiar with the concept of “20/20 hearing,” whereas 82% or more were familiar with other standard health metrics (Table 2).

Prioritization of Hearing Health

When asked to rank the importance of addressing hearing loss within the context of 10 other common health conditions, including Alzheimer’s disease, arthritis, asthma, cancer, chronic obstructive pulmonary disease, diabetes, heart disease, high blood pressure, obesity, and vision loss, hearing loss was tied for last by healthcare professionals (Table 3). When considering annual health maintenance,

| TABLE 1. | Demographics for healthcare professional respondents |
|----------|------------------------------------------------------|
| Demographics<sup>a</sup> | All (n = 406) | Physicians (n = 205) | NPs/PAs (n = 201) |
| Sex | | | |
| Male | 50 | 78 | 23 |
| Female | 50 | 22 | 77 |
| Geographic region | | | |
| Northeast | 21 | 19 | 23 |
| Midwest | 22 | 19 | 25 |
| South | 38 | 38 | 39 |
| West | 18 | 24 | 12 |
| Job title | | | |
| Physician | 50 | 100 | — |
| NP | 25 | — | 50 |
| PA | 25 | — | 50 |
| Practice type<sup>b</sup> | | | |
| Private practice | 44 | 51 | 36 |
| Physician network practice | 7 | 8 | 5 |
| Outpatient clinic practice | 23 | 21 | 25 |
| Community hospital-based practice | 12 | 9 | 14 |
| Academic/teaching hospital-based practice | 16 | 11 | 21 |
| Private hospital-based practice | 6 | 4 | 8 |
| Military/other government practice | 1 | 1 | 1 |
| Other | 2 | 1 | 2 |
| Years in practice post-residency for physicians | — | 20 (12–27) | — |
| Years in practice for NPs/PAs | — | — | 11 (6–19) |
| Percent of time spent treating patients | 99 (90–100) | 99 (90–100) | 99 (90–100) |
| Percent of patients in the following age brackets<sup>c</sup> | | | |
| 0–17 yr | 5 (0–10) | 5 (0–10) | 5 (0–10) |
| 18–34 yr | 15 (10–20) | 15 (10–20) | 15 (10–20) |
| 35–49 yr | 20 (15–25) | 20 (15–25) | 20 (15–25) |
| 50–64 yr | 20 (20–25) | 20 (20–25) | 20 (20–25) |
| 65–74 yr | 20 (15–25) | 20 (15–25) | 20 (10–25) |
| 75+ yr | 10 (9–20) | 10 (10–20) | 10 (5–20) |

<sup>a</sup>Demographics summarized with median or percentages.
<sup>b</sup>Respondents were asked to check all that apply.
<sup>c</sup>Respondents were asked to focus on patients 50 years or older for the questions summarized in the remaining tables.

NP indicates nurse practitioner; PA, physician assistant.

Otology & Neurotology, Vol. 43, No. 8, 2022
TABLE 2.  Literacy and utilization of “normal” or “average” health metrics among healthcare professionals

| Responsesa | All (n = 406) | Physicians (n = 205) | NPs/PAs (n = 201) |
|------------|---------------|----------------------|-------------------|
| Knowledge of a standard definition for normal or average health metricsb | | | |
| Blood pressure | 98 | 97 | 98 |
| Total cholesterol | 93 | 92 | 95 |
| Body mass index | 95 | 95 | 95 |
| Blood glucose | 98 | 98 | 98 |
| Vision | 76 | 77 | 75 |
| Hearing | 57 | 62 | 52 |

Familiarity with normal or average health metricsc | | | |
| Blood pressure 120/80 mm Hg | 94 | 96 | 92 |
| Total cholesterol <200 mg/dl | 93 | 95 | 92 |
| Body mass index 18.5–24.9 kg/m² | 90 | 92 | 89 |
| Blood glucose 70–130 mg/dl | 89 | 89 | 88 |
| Vision 20/20 | 82 | 85 | 78 |
| Hearing 20/20 | 28 | 32 | 23 |

Frequency of evaluating/testing and discussing results of health conditions with patientsd | | | |
| Blood pressure | 93 | 98 | 87 |
| Total cholesterol | 82 | 91 | 72 |
| Body mass index | 90 | 96 | 83 |
| Blood glucose | 87 | 93 | 82 |
| Vision | 60 | 68 | 51 |
| Hearing | 46 | 55 | 36 |

aResponses of “yes” summarized with percentages.
bResponses of “very familiar” summarized with percentages.
cResponses of “twice a year or more” combined with “once a year” summarized with percentages.

TABLE 3. Most important health condition to manage (hierarchy of health conditions) among healthcare professionals

| Responsesa | All (n = 406) | Physicians (n = 205) | NPs/PAs (n = 201) |
|------------|---------------|----------------------|-------------------|
| Heart disease | 29 | 33 | 25 |
| Cancer | 20 | 17 | 24 |
| Diabetes | 15 | 15 | 15 |
| High blood pressure | 15 | 17 | 13 |
| Obesity | 12 | 11 | 12 |
| Arthritis | 2 | 1 | 3 |
| COPD | 2 | 1 | 2 |
| Vision loss | 2 | 4 | 1 |
| Alzheimer's disease/dementia | 1 | 0 | 1 |
| Asthma | 1 | 0 | 1 |
| Hearing | 1 | 1 | 1 |

aResponses summarized with percentages.

Otology & Neurotology, Vol. 43, No. 8, 2022

hearing loss is the least commonly discussed or recommend screening, with only 46% of providers reporting they do so (Table 2).

When hearing loss is discussed, 65% of healthcare professionals recommend that patients 50 years or older with hearing loss receive at least annual hearing testing, and 36% recommend at least annual testing among the same-age demographic without diagnosed hearing loss (Table 4). However, in a recent survey (16), when US adult respondents were asked when the last time their hearing was checked, the most frequent response was “in the past 6 months” (36%), and in total, 64% had their hearing checked within the past 12 months. The second most commonly cited reason for not pursuing a hearing test was “my healthcare provider has never mentioned getting my hearing tested” (30%). The most common reasons for a healthcare professional to initiate a conversation about hearing loss are presented in Table 5.

Awareness and Perceptions Surrounding Hearing Loss

Although 54% of healthcare professionals were “very aware” of the link between hearing loss and depression, awareness of other health risk associations ranged from 37% to as low as 10% (Supplementary Table 1, http://links.lww.com/MAO/B455). Although most healthcare professionals acknowledge the potential impacts of hearing loss on health, safety, and quality of life, less than half strongly agree that hearing loss is treatable and less than 20% strongly agree that hearing loss is preventable (Table 6).

Prevention and Treatment

When asked about hearing loss prevention related to noise exposure, 71% of healthcare professionals recommended use of hearing protection such as earplugs and earmuffs when around loud noise (Supplementary Table 2, http://links.lww.com/MAO/B455); however, 41% indicated they did not know at what sound level these measures should be used.

DISCUSSION

Although pervasive, hearing loss has been traditionally reduced to an unavoidable aspect of senescence, garnering limited attention in medical education and practice. However, growing evidence over the past two decades links hearing loss with myriad important health consequences beyond obvious quality-of-life decrements to include elevated risk of dementia and even mortality (4–8). Despite
ultimately not treating most causes of adult hearing loss, primary care and other frontline providers harbor a significant educational burden as most patients rely heavily on those interactions for information regarding their medical conditions (17,18).

The current work illustrates the disproportionately limited understanding of the consequences of hearing loss compared with other common medical conditions among healthcare providers in the United States. For instance, although more than half of providers recognize the relationship between hearing loss and depression, less than 40% appreciate the association of hearing loss with increased fall risk, reduced income and job opportunities, dementia, and type 2 diabetes mellitus. Thus, despite over 80% of providers discussing blood pressure, total cholesterol, body mass index, and blood glucose with patients at least once per year, only 46% acknowledge doing the same for hearing.

These observations may be influenced by providers feeling limited in their capacity to offer solutions when inquiring about hearing loss. Substantial barriers surrounding hearing healthcare among primary care practices have been described, including limited referral options to an audiologist as well as general attitudes surrounding the effectiveness and usability of hearing aids (19–22).

Notable differences were observed regarding awareness of a standard definition for normal or average hearing compared with similar metrics for other health conditions. Whereas more than 80% of providers readily recognized normative values for blood pressure, total cholesterol, body mass index, blood glucose, and vision, only 28% of providers understood the metric “20/20” as it relates to hearing. Even without a specific metric, only 57% of providers know there is a normative level. It is therefore interesting to note that 95% of providers believed that it is somewhat important or very important for patients to know the standard definition for normal hearing, even though providers do not feel comfortable that they know that information themselves.

Studies suggest that healthcare providers, and particularly primary care providers, are influential for changing patient behaviors. Often the first point of contact for a patient experiencing changes in their hearing (23), primary care providers play an essential role in educating patients and inspiring action. In a recent study considering the role of primary care providers for encouraging older adults to change their lifestyle behaviors pertaining to diet and physical activity, participants reported that their providers influence their health behaviors by developing strong relationships, addressing concerns and encouraging change, and providing concrete instruction. When providers did not discuss the relevant topics, or mentioned them only briefly, participants frequently perceived that they should continue their current behaviors (24). Similarly, if healthcare providers neglect hearing loss or cannot provide substantive direction about management, patients will unknowingly be at risk for deleterious long-term sequelae.

Bennett et al. (19) recently reviewed data surrounding the implementation of hearing screening programs targeting older adults, showing that small changes—such as routinely asking hearing screening questions and establishing a relationship with local audiology and otolaryngology practices—significantly increase detection rates of hearing loss and subsequent intervention. However, in the absence of a standard screening program for at-risk adults, it is uncommon for patients to routinely receive recommendation for comprehensive hearing evaluation. In the 2014 National Health Interview Survey, of 40.3 million adults with self-reported hearing loss, 12.9 million (32%) had never seen a healthcare professional regarding their hearing loss and

### TABLE 5. Reasons to initiate conversation about hearing loss among healthcare professionals

| Responsesa | All (n = 406) | Physicians (n = 205) | NPs/PAs (n = 201) |
|------------|--------------|----------------------|------------------|
| Reason for initiating conversation | | | |
| Noticed difficulty hearing during a discussion with patient | 87 | 83 | 91 |
| Caregiver/loved one recommended to talk about hearing loss | 86 | 85 | 88 |
| Patient noted hearing loss on intake form | 77 | 77 | 78 |
| Patient demonstrated symptoms possibly associated with hearing loss | 65 | 63 | 68 |
| Routine part of a physical examination | 58 | 58 | 58 |
| Association with other health conditions | 47 | 39 | 55 |
| Other | 1 | 2 | 1 |
| None of the above | 1 | 1 | 1 |

aResponses summarized with percentages.
NP indicates nurse practitioner; PA, physician assistant.

### TABLE 6. Impact of hearing loss on health, safety, and quality of life among healthcare professionals

| Responsesa | All (n = 406) | Physicians (n = 205) | NPs/PAs (n = 201) |
|------------|--------------|----------------------|------------------|
| Impacts of hearing loss | | | |
| Hearing loss impacts the quality of one's life | 84 | 81 | 87 |
| Hearing loss can lead to social isolation | 78 | 77 | 78 |
| Hearing loss can impact one's personal safety | 76 | 72 | 81 |
| Hearing is important to my overall health | 67 | 60 | 74 |
| Hearing loss is treatable | 40 | 36 | 44 |
| Hearing loss is a normal part of aging | 20 | 20 | 21 |
| Hearing loss is preventable | 17 | 19 | 14 |

aResponses of “strongly agree” summarized with percentages.
NP indicates nurse practitioner; PA, physician assistant.
over 11 million (27%) had never previously undergone formal audiometric testing (25).

Beyond implementation of screening programs into primary care practices, several other key action areas exist to improve hearing healthcare nationally. For instance, the combination of often inadequate reimbursement for hearing health services and the significant associated out-of-pocket cost of many hearing rehabilitation devices, such as hearing aids, introduces an important socioeconomic barrier. Interestingly, delays in patient referral are prevalent even within many general audiology and otolaryngology practices (26). Evidence suggests that many patients with significant hearing disability are inadequately treated, with modern cochlear implant recipients experiencing several years of qualifying hearing loss before undergoing cochlear implantation (27,28). Similarly, many sociodemographic factors seem to influence who receives cochlear implants among those with qualifying hearing loss (29,30). Taken together, multiple actionable areas exist to improve widespread hearing health across the United States.

There are several important limitations of the current work. First, survey data are inherently influenced by respondents’ susceptibility to recall bias. For instance, the act itself of taking a survey about hearing loss likely influences responses to questions such as the likelihood of recommending hearing evaluation. The extent to which recall bias influences the primary conclusions of the current work—that is, the uniformly poor understanding of normal hearing compared with other common medical conditions and the limited understanding of long-term sequelae of untreated hearing loss—is presumably less affected as these questions chiefly deal with what respondents currently know rather than past or future behavior. In addition, the findings of a nonrandomized convenience sample cannot be extrapolated beyond the population sampled. Future studies may benefit from eliciting more information regarding the typical populations seen (e.g., geriatric versus family medicine practices) and any screening measures already routinely incorporated.

CONCLUSION

Despite widespread literacy of what constitutes normal blood pressure, total cholesterol, body mass index, blood glucose, and vision metrics, respondents demonstrate limited understanding of normal hearing levels. Few providers report hearing loss as a top 10 health condition to evaluate and manage, and recommendation for annual hearing evaluation is predictably low. Most providers believe that options for people with hearing loss are limited, and this may harbor important implications for prioritizing discussion of hearing loss with patients. Primary care providers are key frontline contacts for patients who may have hearing loss that has not yet been identified or managed. Ensuring frontline provider literacy surrounding normative metrics and reliable standards for referral is essential for improving hearing healthcare nationally.

REFERENCES

1. Goman AM, Lin FR. Prevalence of hearing loss by severity in the United States. Am J Public Health 2016;106:1820–2.

2. Cruickshanks KJ, Wiley TL, Tweed TS, et al. Prevalence of hearing loss in older adults in Beaver Dam, Wisconsin. The Epidemiology of Hearing Loss Study. Am J Epidemiol 1998;148:879–86.

3. World Health Organization. Available at: https://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss. Accessed April 1, 2021.

4. Maharani A, Pendleton N, Leroi I. Hearing impairment, loneliness, social isolation, and cognitive function: Longitudinal analysis using English Longitudinal Study on Ageing. Am J Geriatr Psychiatry 2019;27:1348–56.

5. Marriute-Huarte R, Calavia D, Huarte Irujo A, et al. Treatment for hearing loss among the elderly: Auditory outcomes and impact on quality of life. Audiol Neurootol 2016;21(1):29–35.

6. Clinkard D, Barbaric S, Amoody H, et al. The economic and societal benefits of adult cochlear implant implantation: A pilot exploratory study. Cochlear Implants Int 2015;16:181–5.

7. Harris MS, Boyce L, Pisoni DB, et al. The relationship between environmental sound awareness and speech recognition skills in experienced cochlear implant users. Otol Neurotol 2017;38:e308–14.

8. Livingston G, Huntley J, Sommerlad A, et al. Dementia prevention, intervention, and care. 2020 report of the Lancet commission. Lancet 2020;396:413–46.

9. Reed NS, Huddle MG, Betz J, et al. Association of midlife hypertension with late-life hearing loss. Otolaryngol Head Neck Surg 2019;161:996–1003.

10. Kim MB, Zhang Y, Chang Y, et al. Diabetes mellitus and the incidence of hearing loss: A cohort study. Int J Epidemiol 2017;46:717–26.

11. Nassiri AM, Rickets T, Carlson M. Current estimate of hearing aid utilization in the United States. Otol Neurotol Open 2021;1:e001.

12. Nassiri AM, Sorkin DL, Carlson M. Current estimates of cochlear implant utilization in the United States. Otol Neurotol 2022;43:e558–62.

13. Ritter CR, Barker BA, Scharp KM. Using attribution theory to explore the reasons adults with hearing loss do not use their hearing aids. PLoS One 2020;15:e0238468.

14. Zazove P, Puggle MA, Kileny PR, et al. Initial results of the Early Auditory Referral—Primary Care (EAR-PC) study. Am J Prev Med 2017;53:e139–46.

15. Kamil RJ, Genther DJ, Lin FR. Factors associated with the accuracy of subjective assessments of hearing impairment. Ear Hear 2015;36:164–7.

16. Carlson ML, Nassiri AM, Marinelli JP, Lohse CM, Sydlowksi SA, 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:e323–30.

17. D’Haeze FSC, De Bodt M, Van Rompaey V, et al. Awareness of hearing loss in older adults: Results of a survey conducted in 500 subjects across 5 European countries as a basis for an online awareness campaign. Inquiry 2018;55:46958018759421.

18. Contrera KJ, Wallhagen MJ, Mamo SK, et al. Hearing loss health care for older adults. J Am Board Fam Med 2016;29:394–403.

19. Bennett RJ, Conway N, Fletcher S, Barr C. The role of the general practitioner in managing age-related hearing loss: a scoping review. Am J Audiol 2020;29:265–89.

20. Dunhauer JL, Celeni KE, Johnson CE. Use of a hearing and balance screening survey with local primary care physicians. Am J Audiol 2008;17:3–13.

21. Gilliver M, Hickson L. Medical practitioners’ attitudes to hearing rehabilitation for older adults. Int J Audiol 2011;50:850–6.

22. McShea L. Managing hearing loss in primary care. Learn Disabil Pract 2015;18:18–23.

23. Schneider JM, Gopinath B, McMahon CM, et al. Role of general practitioners in managing age-related hearing loss. Med J Aust 2010;192:20–3.

24. Bardach SH, Schoenwe BG. The role of primary care providers in encouraging older patients to change their lifestyle behaviors. Clin Geriatr Med 2018;34:326–34.
25. Mahboubi H, Lin HW, Bhattacharyya N. Prevalence, characteristics, and treatment patterns of hearing difficulty in the United States. JAMA Otolaryngol Head Neck Surg 2018;144:65–70.
26. Marinelli JP, Carlson ML. Barriers to access and health care disparities associated with cochlear implantation among adults in the United States. Mayo Clin Proc 2021;96:547–9.
27. Holder JT, Reynolds SM, Sunderhaus LW, et al. Current profile of adults presenting for preoperative cochlear implant evaluation. Trends Hear 2018;22:2331216518755288.
28. Barnes JH, Yin LX, Marinelli JP, Carlson ML. Audiometric profile of cochlear implant recipients demonstrates need for revising insurance coverage. Laryngoscope 2021;131:E2007–E.
29. Tolisano AM, Schauwecker N, Baumgart B, et al. Identifying disadvantaged groups for cochlear implantation: demographics from a large cochlear implant program. Ann Otol Rhinol Laryngol 2020;129:347–54.
30. Dornhoffer JR, Holcomb MA, Meyer TA, et al. Factors influencing time to cochlear implantation. Otol Neurotol 2020;41:173–7.