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Clinical Practice Guideline: Age-Related Hearing Loss Executive Summary

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Abstract

Objective. Age-related hearing loss (ARHL) is a prevalent but often underdiagnosed and undertreated condition among individuals aged 50 and above. It is associated with various sociodemographic factors and health risks including dementia, depression, cardiovascular disease, and falls. While the causes of ARHL and its downstream effects are well defined, there is a lack of priority placed by clinicians as well as guidance regarding the identification, education, and management of this condition.

Purpose. The purpose of this clinical practice guideline is to identify quality improvement opportunities and provide clinicians trustworthy, evidence-based recommendations regarding the identification and management of ARHL. These opportunities are communicated through clear actionable statements with an explanation of the support in the literature, the evaluation of the quality of the evidence, and recommendations on implementation. The target patients for the guideline are any individuals aged 50 years and older. The target audience is all clinicians in all care settings. This guideline is intended to focus on evidence-based quality improvement opportunities judged most important by the Guideline Development Group (GDG). It is not intended to be a comprehensive, general guide regarding the management of ARHL. The statements in this guideline are not intended to limit or restrict care provided by clinicians based on their experience and assessment of individual patients.

Action Statements. The GDG made *strong recommendations* for the following key action statements (KASs): (KAS 4) If screening suggests hearing loss, clinicians should obtain or refer to a clinician who can obtain an audiogram. (KAS 8) Clinicians should offer, or refer to a clinician who can offer, appropriately fit amplification to patients with ARHL. (KAS 9)

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Clinicians should refer patients for an evaluation of cochlear implantation candidacy when patients have appropriately fit amplification and persistent hearing difficulty with poor speech understanding. The GDG made *recommendations* for the following KASs: (KAS 1) Clinicians should screen patients aged 50 years and older for hearing loss at the time of a health care encounter. (KAS 2) If screening suggests hearing loss, clinicians should examine the ear canal and tympanic membrane with otoscopy or refer to a clinician who can examine the ears for cerumen impaction, infection, or other abnormalities. (KAS 3) If screening suggests hearing loss, clinicians should identify sociodemographic factors and patient preferences that influence access to and utilization of hearing health care. (KAS 5) Clinicians should evaluate and treat or refer to a clinician who can evaluate and treat patients with significant asymmetric hearing loss, conductive or mixed hearing loss, or poor word recognition on diagnostic testing. (KAS 6) Clinicians should educate and counsel patients with hearing loss and their family/care partner(s) about the impact of hearing loss on their communication, safety, function, cognition, and quality of life. (KAS 7) Clinicians should counsel patients with hearing loss on communication strategies and assistive listening devices. (KAS 10) For patients with hearing loss, clinicians should assess if communication goals have been met and if there has been improvement in hearing-related quality of life at a subsequent health care encounter or within 1 year. The GDG offered the following KAS as an *option*: (KAS 11) Clinicians should assess hearing at least every 3 years in patients with known hearing loss or with reported concern for changes in hearing.

Keywords

age-related hearing loss, amplification, cochlear implantation, presbycusis, sensorineural hearing loss

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Age-related hearing loss (ARHL), despite being the most common sensory deficit seen in the older population, remains an underdiagnosed and undertreated condition.[1] Between ages 65 to 74, 1 in 3 adults experience hearing loss and almost 50% of those 75 years of age or older will report hearing loss according to the National Institute on Deafness and Other Communication Disorders.[2] The impact of untreated hearing loss goes beyond limiting the ability to communicate. The risk of dementia, depression, cardiovascular disease, and falls has been associated with untreated hearing loss.[3-5] There is also an association between hearing loss and lower household income, unemployment, and increased social and emotional isolation compared to those without hearing loss.[6-10] Although the risks of untreated hearing loss have been well described, 1 barrier to treatment is the lack of priority placed by health care clinicians in addressing hearing loss either by insufficient screening or referral.[11] The association of untreated hearing loss with an individual's physical, mental, psychological, and social status supports the need to identify and address ARHL in a timely manner to limit the potential downstream effects.

While there are many causes of hearing loss, this guideline focuses on ARHL, which refers to progressive bilateral sensorineural hearing loss associated with the process of aging in persons ≥50 years old (**Table 1**). Epidemiologic studies show an increase in high-frequency hearing loss with aging, rising more rapidly in men than women.[12] Multifactorial in nature and influenced by intrinsic and extrinsic factors, ARHL is typically a symmetric and gradual process as opposed to other sudden-onset or rapidly progressive forms of hearing loss. Although the definition of symmetric hearing loss can vary, a previously published position statement of the American Academy of Otolaryngology–Head and Neck Surgery Foundation (AAO-HNSF) defines symmetric hearing loss as audiometric results within 15 dB for the pure tone average between ears with a difference in word recognition scores of 15% or less between ears.[13] From studying temporal bones, Dr Schuknecht proposed 4 different categories of ARHL: sensory, neural, strial or metabolic, and conductive.[14] Sensory hearing loss is thought to be due to the degeneration of hair cells, starting at the basal turn whereas neural hearing loss, which affects speech discrimination, is caused by neuronal loss. Atrophy of the stria vascularis, which changes the endolymphatic potential, is believed to cause strial or metabolic presbycusis and was initially thought to be the primary factor driving ARHL. However, more recent studies suggest that the loss of hair cells is the primary cause of ARHL.[15] Conductive presbycusis is hypothesized to be due to alterations in the cochlear aqueduct, although the mechanism is not yet proven.[16] While other forms of hearing loss (ie, drug-induced hearing loss, noise-induced hearing loss, congenital hearing loss, conductive hearing loss, and iatrogenic hearing loss) may compound hearing loss due to the aging process, they are excluded from this guideline.

Despite the high prevalence of ARHL and its effect on health outcomes, there are no evidence-based, multidisciplinary clinical practice guidelines (CPGs) to assist clinicians with identification, education, and management of this condition. In 2021, the AAO-HNSF published quality improvement measures for ARHL but did not provide guidance to clinicians for evaluating and managing this condition.[22] This guideline provides actionable recommendations based on current best research evidence and multidisciplinary consensus while also incorporating previously proposed quality improvement measures. While the previously proposed measures defined ARHL as starting at 60 years of age, the authors of this guideline have broadened the age of inclusion for this guideline down to age 50 to promote screening for hearing loss, which is recommended by the American Speech-Language-Hearing

Table 1. Abbreviations and Definitions of Common Terms

Term	Definition
Age-related hearing loss/presbycusis	Progressive bilateral sensorineural hearing loss associated with the process of aging.
Sensorineural hearing loss	Hearing loss from an abnormality of the cochlea, auditory nerve, or higher aspects of central auditory perception or processing.
Progressive sensorineural hearing loss	Sensorineural hearing loss that worsens over time.
Health outcomes	Definition from the World Health Organization (WHO): A change in the health of an individual, group of people, or population that is attributable to an intervention or series of interventions.[17]
Cognition	Definition from the American Psychological Association: All forms of knowing and awareness, such as perceiving, conceiving, remembering, reasoning, judging, imagining, and problem solving.[18]
Quality of life	Definition from the WHO: An individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns.[19]
Healthy aging	Definition from the WHO: The process of developing and maintaining the functional ability that enables wellbeing in older age. Functional ability is about having the capabilities that enable all people to be and do what they have reason to value. This includes a person's ability to: • meet their basic needs; • learn, grow, and make decisions; • be mobile; • build and maintain relationships; and • contribute to society.[20]
Amplification	Any device, system, or strategy that improves access to sound through increased intensity (eg, hearing aids).
Auditory rehabilitation	Definition from the American Speech-Language-Hearing Association: A person-centered approach to assessment and management of hearing loss that encourages the creation of a therapeutic environment conducive to a shared decision process which is necessary to explore and reduce the impact of hearing loss on communication, activities, and participations.[21]

Association, despite the limited evidence noted by the US Preventive Services Task Force.[23,24] Much of the focus of this CPG is on the education of the clinician and patient in identification and treatment options for those with ARHL to abate its harmful impact on healthy aging.

Guideline Scope and Purpose

The main purpose of this CPG is to guide clinicians regarding the identification and management of ARHL as a recognized risk factor affecting health outcomes and quality of life in the aging population. The goals of this CPG are to use the best available published scientific and/or clinical evidence to educate clinicians and patients and to improve access to hearing health care while reducing sociodemographic and socioeconomic barriers. Where evidence is lacking, expert consensus is provided and detailed in the guideline.

The target patient for the CPG is anyone at least 50 years old, regardless of whether they have been diagnosed with hearing loss. The CPG makes specific recommendations about screening, hearing testing, and indications for referrals to an appropriate hearing health specialist. It also covers amplification, communication strategies, cochlear implantation, and other assistive technologies. Because ARHL affects patient communication in all aspects of life, this guideline applies to all settings, medical and nonmedical. The CPG focuses only on ARHL, recognizing that there are many potential causes of hearing loss over a person's lifetime. This CPG does not discuss the management of noise-induced hearing loss, which often presents in conjunction with ARHL. While genetics plays a role in ARHL, this CPG does not focus on known genetic causes of congenital hearing loss or syndromic hearing loss. This CPG is not intended for comprehensive management of ARHL and is not intended to limit or define the care of patients. You can access this executive summary, the ARHL CPG, and related handouts online at www.entnet.org/arhlcpg.

The target audience of this guideline is any clinician who encounters patients over 50. A plain language summary will be produced for use by patients and nonclinicians. In 2021, the AAO-HNSF published an article on quality improvement measures for ARHL due to its increasing prevalence and the significant disabilities from delays in diagnosis and treatment despite the lack of formal CPGs.[22] These previously published measures include screening for hearing loss in older patients during a face-to-face visit, ordering,

referring, or obtaining a comprehensive audiometric evaluation within 4 weeks of failing a hearing screening, and documentation of shared decision-making regarding treatment options for patients with diagnosed symmetric sensorineural hearing loss during a visit.

As such, the current multidisciplinary group was convened to review the most recent and updated published scientific and clinical evidence available to craft the CPG. By using a published, transparent CPG process to develop recommendations and identifying quality improvement opportunities deemed most important by the Guideline Development Group (GDG) after considering public comments, the primary goal was to create actionable statements (key action statements [KASs]) that reflect current evidence-based advances in knowledge with respect to ARHL with a balance of benefits and harms.[25]

Health Care Burden

Epidemiology

Hearing loss is a global public health problem affecting approximately 466 million people worldwide.[26] This is expected to increase to 630 million by 2030 and to over 900 million by 2050.[26] Within the United States alone, an estimated 65.3% of adults 71 years and older, or 21.5 million people, has at least some degree of hearing loss.[27] Modeling projections using National Health and Nutrition Examination Surveys data, it is estimated that 78 million people may have hearing loss. Age is a significant risk factor for the development of hearing loss.[28] ARHL is a multifactorial degenerative condition of the auditory system including the ear and brain presenting as difficulty in perception of sound and understanding of speech.[29] ARHL is the most common sensory disorder[30] and the third most common chronic health condition of older adults.[31] The prevalence of hearing loss doubles with each decade of life and affects more than 60% of individuals by age 70 and 80% of individuals older than 85 years of age.[32,33] The rise of hearing loss among older adults deserves the medical community's attention as the population ages and life expectancy has risen steadily over the past 40 years.[34,35] The US population aged 65 and older will outnumber those younger than 18 by 2038.[36] By 2060, almost 92 million individuals will be 65 or older.[36] With an aging population, degenerative geriatric conditions, such as ARHL, will become increasingly prominent on a global level.[37] Hearing loss also has a significant professional and psychological impacts. Adults with hearing loss are twice as likely to be unemployed or partly unemployed and receive 25% lower wages compared to normal-hearing adults.[38] Hearing loss is also associated with an increase in depression by 50% compared to normal-hearing adults.[39]

Population-level research has identified sociodemographic factors linked to ARHL. There is evidence of a higher prevalence of ARHL in males compared with females.[40-46] Additionally, there is evidence that hearing loss progression is twice as fast in men than in women.[47] Although considered to be secondary to occupational and noise exposures, ARHL is independently influenced by biological sex.[48] Animal and human research suggest estrogen may have a protective effect, preventing the development and progression of hearing loss in women.[49-51]

There are limited data regarding differences in the prevalence of ARHL based on race and ethnicity. Large cohort data indicate that African Americans have a lower risk of ARHL compared to white and Hispanic populations.[33] Similar to sex differences, the mechanisms behind these findings may be due to differences in environmental or occupational exposures. However, data from animal studies have described melanin expression in the stria as having a protective effect against ARHL, and the lack of melanin may contribute to marginal cell loss with age.[52] It is unknown if or how this translates to skin pigmentation. These racial and ethnic ARHL prevalence estimates may not be accurate due to longstanding inequitable access to hearing care,[43] underreporting of sociodemographic data of participants in hearing research,[53] and underrepresentation in hearing-related clinical trials[54] among some populations.

Risk Factors

ARHL arises from mixed pathology of the auditory system due to intrinsic and extrinsic factors, including interactions resulting in degenerative changes to a variety of different cochlear and neural structures. It is estimated that approximately half of the variance in ARHL may be heritable.[55] Several genetic polymorphisms have been examined with mixed conclusions. In 1 meta-analysis, the polymorphisms rs10955255 and rs1981361 may be risk factors for ARHL among various racial groups[56] while no relationship has been noted between GST M1 and T1 polymorphisms and ARHL.[57] In temporal bone specimens, mitochondrial mutations are noted among patients with ARHL versus normal-hearing individuals.[58] Mitochondrial dysfunction associated with reactive oxygen species and apoptosis has also been proposed as a mechanism for ARHL.[59]

While the mechanisms underlying ARHL may be primarily due to genetic predisposition and aging-related cellular changes, there may be a variety of additional intrinsic metabolic and medical factors that influence the development and progression of ARHL.[60] Chronic medical conditions, such as hypertension, diabetes, and hypercholesterolemia, may influence the development of hearing loss.[61,62] Independent of age, adults with diabetes, either type 1 or type 2, have a 2 times higher prevalence of hearing loss compared to patients without diabetes.[63,64]

Extrinsic factors such as lifestyle behaviors, medication side effects, and environmental exposures may also influence the development of ARHL. The impact of diet on the development of ARHL is uncertain and complicated by poor study designs, heterogeneity of outcomes, and research examining individual nutrients. Smoking and passive smoke exposure have deleterious effects on

hearing and increase the risk of hearing loss based on cross-sectional research.[65] Ototoxic medications are an independent risk factor for hearing loss[66]; however, exposure to these medications may be difficult to avoid and their role in synergistically worsening ARHL can be difficult to determine. ARHL is further compounded by recreational and/or occupational noise exposure and its influence on hearing thresholds. In 1 large retrospective cohort study, age had a significant impact on hearing loss in both chronic occupational noise exposure and control groups.[67] Impulse noises, such as fireworks and gunfire, accelerate the progression of ARHL. Individuals exposed to gunfire at young ages demonstrate poorer pure-tone thresholds in older age compared to those not exposed.[68]

Impairments

Aging is associated with multiple related medical problems, which have been referred to as geriatric syndromes. These include impairment in vision, hearing, and balance, which synergistically negatively impact the functional status of an individual.[69] ARHL presents initially with increased hearing thresholds at higher frequencies but progresses at a variable rate to impact midrange and lower frequencies over time.[70] As hearing loss progresses, speech recognition is also affected, leading to difficulty in communication (especially, in the presence of background noise). Compared to normal-hearing controls, adults with hearing impairment also report significantly increased listening effort and fatigue.[71] Impaired communication due to ARHL has direct effects on social engagement and quality of life.[72,73]

Based on prospective cohort studies, ARHL is a significant risk factor for the development of dementia.[74] The mechanism underlying cognitive decline is not fully understood but may be due, in part, to hearing loss-related social isolation, structural changes of the brain, and depletion of cognitive reserve.[75] Due to communication difficulty, adults with ARHL face social isolation and a decrease in social support.[76,77] Cross-sectional data in the United States among older adults demonstrate that greater hearing loss is associated with increased odds of being socially isolated, regardless of whether they receive hearing loss treatment or not.[78] Social isolation is a known independent risk factor for cognitive decline and may impair coping mechanisms, limit brain stimulation, and prevent physical exercise.[79,80]

Furthermore, social isolation effectively compounds ongoing cellular and cognitive decline. The neurobiological basis for hearing loss-related brain structural changes is still unknown; however, there is a correlation between hearing loss and gray matter atrophy.[81] Among older adults, after adjusting for age, sex, and education, greater hearing loss is associated with reduced total hours per week of mental activity (−3.0 hours per 10 dB of hearing loss, 95% confidence interval: −5.8 to 0.2).[82] Hearing loss significantly increases cognitive load, resulting in significant depletion of cognitive reserves.[83]

Older individuals with hearing loss are also at increased risk of depression. This association is likely related to a complex interaction of the impairments of hearing loss, declining cognition, and social isolation. Among community-dwelling older adults, depression was reported among 69% of hearing-impaired individuals versus 31% of non-hearing-impaired individuals.[6,84] ARHL tends to be associated with major depression that develops in late life (after age 60) as opposed to early onset depression diagnosed before age 60.[85] There is also a significant relationship between the loss of more than 1 sensory function loss and poorer mental health.[86]

Social isolation and hearing loss have also been linked with decreased physical activity. Adults with hearing loss are less likely to participate in physical activity[87-89] and tend to be more sedentary.[90,91] In addition to social isolation, hearing loss' impact on physical activity may be due to increased cognitive load (the amount of information one can process at any given time), walking limitations, reduced gait speed, fear of losing or breaking hearing devices, inability to hear surroundings/individuals, safety concerns, and the social stigma of hearing loss.[87,88,92-94] This lack of physical activity may also contribute to frailty among older individuals. In cross-sectional studies, hearing loss is associated with an 87% increase in the risk of frailty (risk ratio [RR]: 1.87; 95% confidence interval: 1.63-2.13) and 56% among longitudinal studies (RR: 1.56; 95% confidence interval: 1.29-1.88).[95] There is a 2-fold increased risk of falls among older individuals with hearing loss and women have a 31% greater risk for incident disability than males.[96]

Health Care Costs

ARHL results in a significant economic burden on the health care system, which includes the cost of the disorder (and the associated adverse outcomes), excess medical expenditures, and disability burden. These costs may be difficult to accurately estimate partly due to the underdiagnosis and undertreatment of hearing loss. It may also be underestimated due to the omission of costs related to medical frailty, depression, and cognitive decline.[97] Based on estimates in a systematic review, the total annual costs of hearing loss in Australia is estimated at $10.9 billion Australian dollars.[97] Research among a sample of US adults (≥65 years) with severe hearing loss estimates the overall lifetime cost of around $70,000 per person.[98] Research calculating overall actual or projected medical expenditures (which differs from cost) attributed to hearing loss in the United States are estimated to range from $3 to $12 billion.[99-101] Another study among a sample of US adults (≥65 years) estimated the overall lifetime hearing loss-related expenditure to be around $34,000 per person.[98] The disability burden of hearing loss can also be estimated using disability-adjusted life years (DALYs). Studies that have estimated disease-related burden DALYs have ranked the burden of

hearing loss above that of blindness and at a burden level similar to that of stroke or cardiac arrythmia.[102]

Indirect Costs

Indirect costs from ARHL are related to adverse employment outcomes (lost income, productivity, or opportunities), the economic impact of family and social support, and overall quality of life. Untreated hearing loss may result in a loss of annual income estimated as high as $15,000; however, treatment of hearing loss may result in income increases estimated to be as high as $5,000 for those who receive cochlear implants (CI) and $22,000 for those who receive hearing aids.[38,103] The economic estimates of lost productivity in the US are reported up to $200 billion.[99,101,103]

Methods

This guideline was developed using an explicit and transparent *a priori* protocol for creating actionable statements based on supporting evidence and the associated balance of harm as outlined in the third edition of *Clinical Practice Guideline Development Manual: A Quality-Driven Approach for Translating Evidence into Action*.[25]

Stakeholder Involvement

The GDG consisted of 18 panel members representing experts in otolaryngology (including the subspecialty of otology and neurotology), audiology, primary care, and geriatrics. The GDG also included a consumer/patient representative. The GDG had 3 conference calls and 2 virtual meetings during which they defined the scope and objectives of the guideline, evaluated the systematically reviewed evidence, identified quality improvement opportunities, crafted the KASs, reviewed the relevant evidence, reviewed comments from the expert panel review for each KAS, and drafted/revised the document.

Literature Search and Selection

An information specialist conducted 2 literature searches from September through December 2022 using a validated filter strategy to identify CPGs, systematic reviews (SRs), meta-analyses (MAs), and randomized controlled trials (RCTs).

The following databases were searched for relevant studies: AHRQ EPC Reports, Biosis Citation Index, CINAHL, ClinicalTrials.gov, CMA Infobase, Cochrane CENTRAL, Cochrane Database of SRs, CRD Web (DARE, NHS EED, HTA), ECRI Trust, Embase, Google Scholar, Guidelines International Network, HSTAT, New Zealand Guidelines Group, NICE Guidance & Advice, Proquest Central, PubMed, Scopus, SIGN, TRIPdatabase.com, and WHO ICTRP. The databases were searched using both controlled vocabulary words and synonymous free-text words for the topic of interest (age-related hearing loss). The search strategies were adjusted for the syntax appropriate for each database/platform. The search was not limited to clinical study design and was limited to English language. The full strategy is found in Supplemental Appendixes A and B, available online. These search terms were used to capture all evidence on the population, incorporating all relevant treatments and outcomes.

The initial English-language searches identified 34 CPGs, 185 SRs/MAs, and 220 RCTs published from inception through December 2022. CPGs were included if they met quality criteria of: (a) an explicit scope and purpose, (b) multidisciplinary stakeholder involvement, (c) systematic literature review, (d) explicit system for ranking evidence, and (e) explicit system for linking evidence to recommendations. SRs were emphasized and included if they met quality criteria of: (a) clear objective and methodology, (b) explicit search strategy, and (c) valid data extraction methods. RCTs were included if they met quality criteria of: (a) trials involved study randomization, (b) trials were described as double-blind, and (c) trials denoted a clear description of withdrawals and dropouts of study participants. After removing duplicates, irrelevant references, and non-English-language articles, the 4 reviewers retained 18 CPGs, 88 SRs/MAs, 132 RCTs, that met inclusion criteria and 48 other studies that did not meet the inclusion criteria for CPGs, SRs, MAs, or RCTs. The recommendations in this CPG are based on SRs identified by a professional information specialist using an explicit search strategy. Additional background evidence was identified including targeted searches for KAS 4 and 5 in May to June 2023 to support the needs of the GDG to supplement and fill knowledge gaps. Therefore, in total, the evidence supporting this guideline includes 12 CPGs, 46 SRs/MAs, 13 RCTs, and 90 observational and other studies.

Classification of Evidence-Based Statements

Guidelines are intended to produce optimal health outcomes for patients, to minimize harm and to reduce inappropriate variations in clinical care. The evidence-based approach to guideline development requires the evidence supporting a policy be identified, appraised, and summarized and that an explicit link between evidence and statements be defined. Evidence-based statements reflect both the *grade (level) of aggregate evidence* and the *balance of benefit and harm* that is anticipated when the statement is followed. **Table 2** defines the grades of aggregate evidence[104] and **Table 3** defines the strength of action (obligation) based on the interaction of grade and benefit-harm balance.[105] Treatment, harm, diagnosis, and prognosis refer to the types of evidence.

Development of KASs

KAS were developed following the 2 literature searches and the assessment of the evidence. The GDG proposed topics within the scope of the guideline supported by the evidence and where there is a perceived gap in care. A

Table 2. Grades of Aggregate Evidence

Grade	OCEBM level	Treatment	Harm	Diagnosis	Prognosis
A	1	Systematic review[a] of randomized trials	Systematic review[a] of randomized trials, nested case-control studies, or observational studies with dramatic effect[a]	Systematic review[a] of cross-sectional studies with consistently applied reference standard and blinding	Systematic review[a] of inception cohort studies[b]
B	2	Randomized trials, or observational studies with dramatic effects or highly consistent evidence	Randomized trials, or observational studies with dramatic effects or highly consistent evidence	Cross-sectional studies with consistently applied reference standard and blinding	Inception cohort studies[b]
C	3-4	Nonrandomized or historically controlled studies, including case-control and observational studies	Nonrandomized controlled cohort or follow-up study (postmarketing surveillance) with sufficient numbers to rule out a common harm; case-series, case-control, or historically controlled studies	Nonconsecutive studies, case-control studies, or studies with poor, nonindependent, or inconsistently applied reference standards	Cohort study, control arm of a randomized trial, case series, or case-control studies; poor quality prognostic cohort study
D	5	Case reports, mechanism-based reasoning, or reasoning from first principles			
X	n/a	Exceptional situations where validating studies cannot be performed and there is a clear preponderance of benefit over harm			

Adapted with permission from The Oxford Levels of Evidence 2 developed by the OCEBM Levels of Evidence Working Group.[104]
Abbreviation: OCEBM, Oxford Centre for Evidence-Based Medicine.
[a]A systematic review may be downgraded to level B because of study limitations, heterogeneity, or imprecision.
[b]A group of individuals identified for subsequent study at an early, uniform point in the course of the specified health condition, or before the condition develops.

Table 3. Strength of Action Terms in Guideline Statements and Implied Levels of Obligation

Strength	Definition	Implied obligation
Strong recommendation	A strong recommendation means the benefits of the recommended approach clearly exceed the harms (or, in the case of a strong negative recommendation, that the harms clearly exceed the benefits) and that the quality of the supporting evidence is high (Grade A or B). In some clearly identified circumstances, strong recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits strongly outweigh the harms.[105]	Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present.
Recommendation	A recommendation means the benefits exceed the harms (or, in the case of a negative recommendation, that the harms exceed the benefits), but the quality of evidence is not as high (Grade B or C). In some clearly identified circumstances, recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits outweigh the harms.[105]	Clinicians should also generally follow a recommendation but should remain alert to new information and sensitive to patient preferences.
Option[a]	An option means that either the quality of evidence is suspect (Grade D) or that well-done studies (Grade A, B, or C) show little clear advantage to one approach versus another.[105]	Clinicians should be flexible in their decision making regarding appropriate practice, although they may set bounds on alternatives; patient preference should have a substantial influencing role.

Refer to Table 2 for definitions of evidence grades.
[a]Option resembles the "Weak Recommendation" utilized in the GRADE classification system: Grading of Recommendations Assessment, Development and Evaluation.

preliminary list of quality improvement topics was released for public comment. The resulting topics gathered from the public comment were ranked based on importance among the GDG members. In total, 57 topics were determined and ranked by the GDG prior to the first meeting. An explicit and transparent *a priori* protocol for creating actionable statements based on supporting evidence and the associated balance of benefit and harm was used. Electronic decision support software (BRIDGE-Wiz, Yale Center for Medical Informatics) was used to facilitate creating actionable recommendations and evidence profiles.[106]

After the KASs were derived, the workgroup debated the strength of the recommendation and the strength of evidence. The evidence-based approach to guideline development requires the evidence supporting a policy be identified, appraised, and summarized and that an explicit link between evidence and statements be defined. Evidence-based statements reflect both the *quality of evidence* and the *balance of benefit and harm* that is anticipated when the statement is followed. Therefore, the strength of recommendation was determined with the classification scheme in **Table 3**.[105]

AAO-HNSF staff used the GuideLine Implementability Appraisal to appraise adherence to methodologic standards, to improve clarity of recommendations, and to predict potential obstacles to implementation.[107] The GDG received summary appraisals and modified an advanced draft of the guideline based on the appraisal. The final draft of the CPG was revised based on comments received during multidisciplinary peer review, open public comment, and journal editorial peer review. A scheduled review process will occur 5 years from publication, or sooner if new compelling evidence warrants earlier consideration.

Guidelines are not intended to supersede professional judgment, but rather may be viewed as a relative constraint on individual clinician discretion in a particular clinical circumstance. Less frequent variation in practice is expected for a "strong recommendation" than might be expected with a "recommendation." "Options" offer the most opportunity for practice variability.[108] Clinicians should always act and decide in a way that they believe will best serve their patient's interests and needs, regardless of guideline recommendations. They must also operate within their scope of practice and according to their training. Guidelines represent the best judgment of a team of experienced clinicians and methodologists addressing the scientific evidence for a particular topic.[105] Making recommendations about health practices involves value judgments on the desirability of various outcomes associated with management options. Values applied by the guideline panel sought to minimize harm and diminish unnecessary and inappropriate therapy. A major goal of the panel was to be transparent and explicit about how values were applied and to document the process.

Financial Disclosure and Conflicts of Interest

The cost of developing this guideline was covered in full by the AAO-HNSF. Potential conflicts of interest for all panel members in the past 2 years were compiled and distributed before the first conference call. After review and discussion of these disclosures,[109] the panel concluded that individuals with potential conflicts could remain on the panel if they: (1) reminded the panel of potential conflicts before any related discussion, (2) recused themselves from a related discussion if asked by the panel, and (3) agreed not to discuss any aspect of the guideline with industry before publication. Lastly, panelists were reminded that conflicts of interest extend beyond financial relationships and may include personal experiences, how a panelist earns a living, and the panelist's previously established "stake" in an issue.[110] Conflicts were again delineated at the start of the in-person meeting and at the start of each teleconference meeting, with the same caveats followed. All conflicts are disclosed at the end of this document.

Guideline KASs

Each evidence-based statement is organized in a similar fashion: a KAS is in bold, followed by the strength of the recommendation in italics. Each KAS is followed by an "action statement profile" that explicitly states the quality improvement opportunity, aggregate evidence quality, level of confidence in evidence (high, medium, low), benefit, harms, risks, costs, and a benefits-harm assessment. Additionally, there are statements of any value judgments, the role of patient preferences, clarification of any intentional vagueness by the panel, exceptions to the statement, any differences of opinion, and a repeat statement of the strength of the recommendation. Several paragraphs subsequently discuss the evidence supporting the statement. An overview of each evidence-based statement in this guideline can be found in **Table 4**; for a flowchart showing KASs and process of care on the CPG and KASs, refer to **Figure 1**.

For the purposes of this guideline, *shared decision-making* refers to the exchange of information regarding treatment risks and benefits, as well as the expression of patient preferences and values, which result in mutual responsibility in decisions regarding treatment and care.[111]

Statement 1: Screening for Hearing Loss

Clinicians should screen patients aged 50 years and older for hearing loss at the time of a health care encounter.

Evidence Strength: *Recommendation based on 1 RCT and multiple observational studies with a preponderance of benefit over harm.*

Action Statement Profile: 1

- *Quality improvement opportunity*: Promote efficiency and effectiveness of early identification of ARHL among adults (National Quality Strategy Domain: Coordination of Care)
- *Aggregate evidence quality*: Grade C, based on 1 RCT and observational studies
- *Level of confidence in the evidence*: High
- *Benefits*: Promotes earlier identification of hearing loss; supports early and time-appropriate intervention; enrolls patients into appropriate pathway to care; aids communication and health care interaction in real-time with patient and family/care partner; provides opportunity for patient education and counseling; improves patient and family/care partner awareness of hearing and importance in functioning in daily life; raises clinician awareness of prevalence and impact of hearing loss on health and health care; aids prevention of adverse events and improves patient safety; and normalizes and increases acceptance of hearing loss
- *Risks, harms, costs*: Time spent and financial impact on clinicians and patients including cost of equipment, additional training, and possible additional staff for screening; stigma of hearing loss combined with age; false positives causing stress, false negatives missing hearing loss, and true positives causing stress and anxiety; screening fatigue and potentially increased demand of resources, such as audiology services, provider education on screening and downstream services that may be needed
- *Benefits-harm assessment*: Preponderance of benefit over harm
- *Value judgments*: identifying hearing loss by screening is critical to prevent harmful effects of untreated hearing loss. GDG feels that despite limited literature on screening, there is preponderance of evidence supporting early treatment of hearing loss to prevent harmful effects of untreated hearing loss.
- *Intentional vagueness*: Type, method, setting, and timing of screening was not delineated. Hearing impairment can impact any health care encounter.
- *Role of patient preferences*: Limited
- *Exceptions*: Known hearing loss
- *Policy level*: Recommendation
- *Differences of opinion*: GDG was divided on the best term to use to describe the evaluation of hearing: assessing versus screening patients.

Statement 2: Ear Exam and Other Ear Conditions

If screening suggests hearing loss, clinicians should examine the ear canal and tympanic membrane with otoscopy or refer to a clinician who can examine the ears for cerumen impaction, infection, or other abnormalities.

Evidence Strength: *Recommendation based on RCTs, cohort studies, and expert opinion with a preponderance of benefit over harm.*

Table 4. Summary of Guideline KASs

Statement	Action	Strength
KAS 1: Screening for Hearing Loss	Clinicians should screen patients aged 50 years and older for hearing loss at the time of a health care encounter.	Recommendation
KAS 2: Ear Exam and Other Ear Conditions	If screening suggests hearing loss, clinicians should examine the ear canal and tympanic membrane with otoscopy or refer to a clinician who can examine the ears for cerumen impaction, infection, or other abnormalities.	Recommendation
KAS 3: Sociodemographic Factors and Patient Preferences	If screening suggests hearing loss, clinicians should identify sociodemographic factors and patient preferences that influence access to and utilization of hearing health care.	Recommendation
KAS 4: Hearing Test	If screening suggests hearing loss, clinicians should obtain or refer to a clinician who can obtain an audiogram.	Strong recommendation
KAS 5: Identifying Conditions Other than ARHL	Clinicians should evaluate and treat or refer to a clinician who can evaluate and treat patients with significant asymmetric hearing loss, conductive or mixed hearing loss, or poor word recognition on diagnostic testing.	Recommendation
KAS 6: Patient Education and Counseling	Clinicians should educate and counsel patients with hearing loss and their family/care partner(s) about the impact of hearing loss on their communication, safety, function, cognition, and quality of life.	Recommendation
KAS 7: Communication Strategies and Assistive Technologies	Clinicians should counsel patients with hearing loss on communication strategies and assistive listening devices.	Recommendation
KAS 8: Amplification	Clinicians should offer, or refer to a clinician who can offer, appropriately fit amplification to patients with ARHL.	Strong recommendation
KAS 9: Candidacy for Cochlear Implants	Clinicians should refer patients for an evaluation of cochlear implantation candidacy when patients have appropriately fit amplification and persistent hearing difficulty with poor speech understanding.	Strong recommendation
KAS 10: Assessing Goals and Improvement	For patients with hearing loss, clinicians should assess if communication goals have been met and if there has been improvement in hearing-related quality of life at a subsequent health care encounter or within 1 year.	Recommendation
KAS 11: Retesting	Clinicians should assess hearing at least every 3 years in patients with known hearing loss or with reported concern for changes in hearing.	Option

Abbreviations: ARHL, age-related hearing loss; KAS, key action statement.

Action Statement Profile: 2

- *Quality improvement opportunity*: Identify and treat correctable causes of hearing loss
  (National Quality Strategy Domain: Coordination of Care, Patient Safety)
- *Aggregate evidence quality*: Grade B, based on CPGs, randomized controlled trials, cohort studies, and expert opinion
- *Level of confidence in the evidence*: High
- *Benefits*: Identify medical and/or correctable causes of hearing loss; prevent unnecessary referrals and guide appropriate referrals; possible time or cost saving from obviating need for unproductive care; allow earlier intervention for reversible causes of hearing loss
- *Risks, harms, costs*: Possible additional time or financial expense to clinician or patient, cost of equipment; additional training or staff involved in exams; incorrect diagnosis could cause distress; missed diagnosis by inexperienced personnel could give false assurances; accurate diagnosis could also cause stress, distress, or anxiety
- *Benefits-harm assessment*: Preponderance of benefit over harm
- *Value judgments*: examining the ear is low-risk and can identify medical conditions; therefore, it is an important part of assessing patients who screen positive for hearing loss
- *Intentional vagueness*: The type of clinician examining the patient, the type and elements of

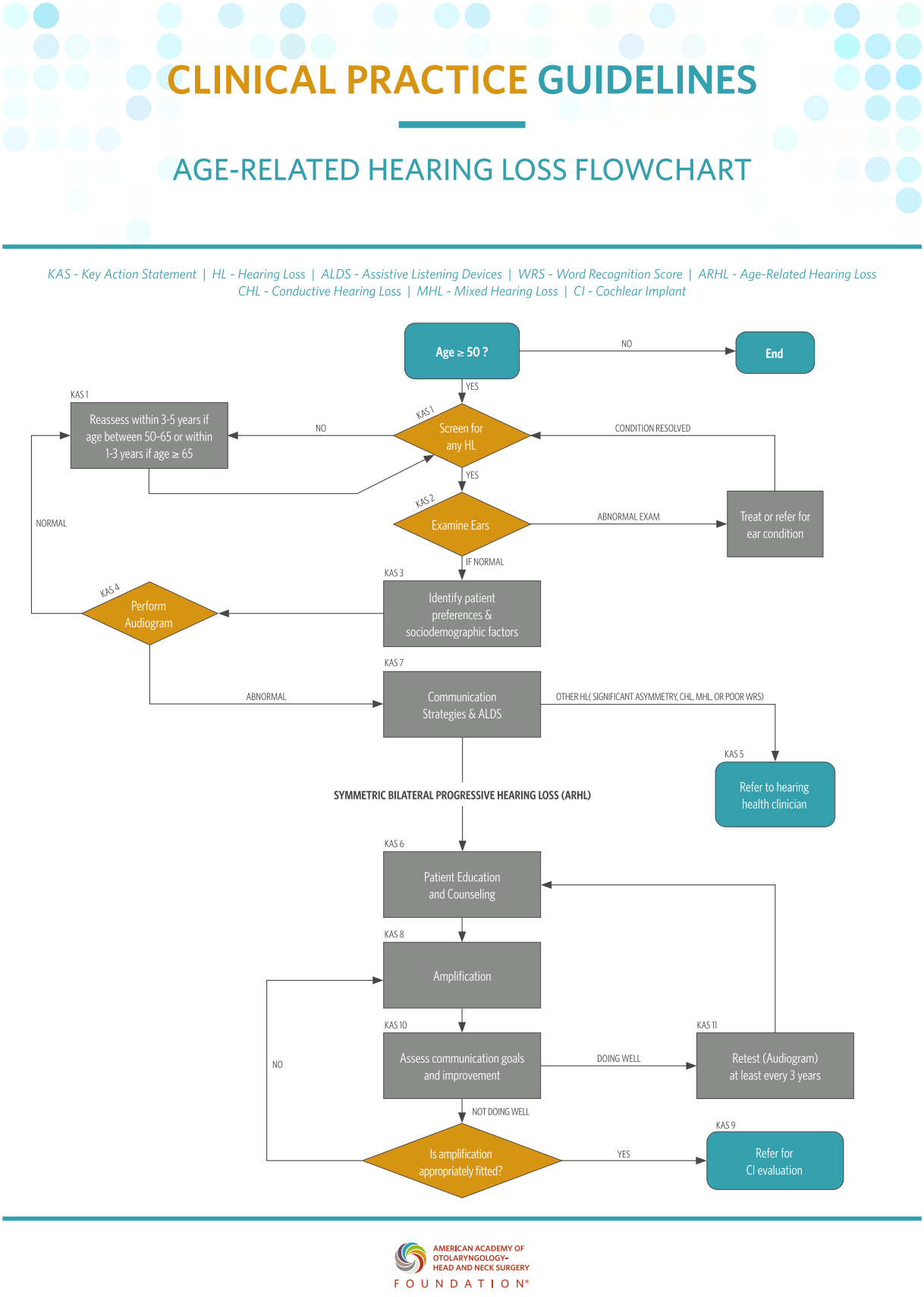

Figure 1. Flowchart Showing Key Action Statements (KASs) and Process of Care.

examination, and the equipment being used to conduct the examination
- *Role of patient preferences*: Limited
- *Exceptions*: None
- *Policy level*: Recommendation
- *Differences of opinion*: None

Statement 3: Sociodemographic Factors and Patient Preferences

If screening suggests hearing loss, clinicians should identify sociodemographic factors and patient preferences that influence access to and utilization of hearing health care.

Evidence Strength: *Recommendation based on randomized trials, SRs, database analyses, cross-sectional surveys, and qualitative or mixed methods studies with a preponderance of benefit over harm.*

Action Statement Profile: 3

- *Quality improvement opportunity*: Recognize how social determinants of health relate to ARHL and use data on sociodemographic factors and patient preference to address barriers to access and utilization of hearing health care
  (National Quality Strategy Domain: Coordination of Care, Person- and Family-Centered Care)
- *Aggregate evidence quality*: Grade C, based on studies including large databases, retrospective case control, prospective cohort studies, SRs, and observational studies of limited quality
- *Level of confidence in the evidence*: High
- *Benefits*: Advocacy for the patient and to influence policy change, identify barriers to access, alignment with patient preferences, shared decision making, promote equity of care, alleviate stigma of hearing loss, improve communication, educate, and counsel patients and family/care partners on resources
- *Risks, harms, costs*: Time; potential exposure of personal details; inability to mitigate barriers; family/care partner, patient, and clinician's frustration with inability to mitigate barriers; generating or worsening bias based on identifying these factors that can impact patient treatment; antagonizing or offending patient
- *Benefits-harm assessment*: Preponderance of benefit over harm
- *Value judgments*: That understanding sociodemographic factors and patient preferences is important to ensuring adequate hearing health care
- *Intentional vagueness*: Which sociodemographic factors are being queried and how the assessment is to be done
- *Role of patient preferences*: Limited
- *Exceptions*: None
- *Policy level*: Recommendation
- *Differences of opinion*: None

Statement 4: Hearing Test

If screening suggests hearing loss, clinicians should obtain or refer to a clinician who can obtain an audiogram.

Evidence Strength: *Strong recommendation based on randomized controlled studies and SRs with a preponderance of benefit over harm.*

Action Statement Profile: 4

- *Quality improvement opportunity*: Identification of degree and type of hearing loss allows for appropriate intervention for the management of hearing loss
  (National Quality Strategy Domain: Prevention and Treatment of Leading Causes of Morbidity and Mortality)
- *Aggregate evidence quality*: Grade A for the accuracy of audiograms with diagnosing hearing loss, based on multiple RCTs and SRs; Grade B for use of app-based testing, online testing, tablet-based testing, and other objective modalities, based on large variations in cross-sectional studies and limited RCTs
- *Level of confidence in the evidence*: High for audiograms, moderate for other modalities
- *Benefits*: Earlier identification of severity of hearing loss; support early and time-appropriate intervention; enroll patients into appropriate pathway to care; aid communication and health care interaction in "real-time" with patient and family/care partner; provide opportunity for patient education and counseling; improve patient and family/care partner awareness of hearing and importance in functioning in daily life; provide ability for clinician awareness of impact and prevalence of hearing loss on health care; prevention of adverse events and improving patient safety; normalization and acceptance of hearing loss validation of disability for the patient and family/care partner
- *Risks, harms, costs*: Time; financial impact on clinicians and patients; cost of equipment; additional training and possible additional staff for screening; stigma of hearing loss combined with age; false positives causing stress or distress; false negatives missing hearing loss; increased demand of resources such as audiology services; true positives causing stress; distress; anxiety; provider education on screening and downstream services that may be needed
- *Benefits-harm assessment*: Preponderance of benefit over harm
- *Value judgments*: Pure tone audiometry is the gold standard and it is critical to know the severity and type of ear-specific hearing loss to be able to provide guidance and further care. While access to

audiometric testing may be limited, when possible, this is the gold standard and should be completed.
- *Intentional vagueness*: None
- *Role of patient preferences*: Moderate
- *Exceptions*: None
- *Policy level*: Strong recommendation
- *Differences of opinion*: While the GDG agreed that an audiogram is the gold standard, some felt that the CPG should specify the different components in a comprehensive evaluation, whereas others felt that the CPG should allow for other forms of hearing reassessments, including app-based and online testing, to encourage better access to hearing testing.

Statement 5: Identifying Conditions Other Than ARHL

Clinicians should evaluate and treat or refer to a clinician who can evaluate and treat patients with significant asymmetric hearing loss, conductive or mixed hearing loss, or poor word recognition on diagnostic testing.

Evidence Strength: *Recommendation based on 1 RCT for sudden sensorineural hearing loss, and multiple observational studies with a preponderance of benefit over harm.*

Action Statement Profile: 5

- *Quality improvement opportunity*: Identify and treat conditions that can complicate the management of ARHL
  (National Quality Strategy Domain: Patient Safety, Coordination of Care)
- *Aggregate evidence quality*: Grade C, based on evidence for the effectiveness of treating these conditions and harms associated with failure to treat, including a randomized trial for sudden hearing loss and numerous observational studies demonstrating treatment effect
- *Level of confidence in the evidence*: High
- *Benefits*: Identify other treatable causes of hearing loss; identify situations where hearing loss requires medical/surgical management; more appropriate referrals to specialists; increase provider awareness
- *Risks, harms, costs*: Time to see additional providers; cost of additional visits; patient anxiety
- *Benefits-harm assessment*: Preponderance of benefit over harm
- *Value judgments*: Primary care providers need better guidance on when to refer patients with hearing loss
- *Intentional vagueness*: What defines "asymmetry" and "poor" discrimination will be discussed further in the full CPG.
- *Role of patient preferences*: Limited
- *Exceptions*: None
- *Policy level*: Recommendation
- *Differences of opinion*: Some members of the group wanted to specify that this should be a referral to an otolaryngologist. The GDG elected to keep it slightly vague to allow for different referrals that could be appropriate based on what is available locally.

Statement 6: Patient Education and Counseling

Clinicians should educate and counsel patients with hearing loss and their family/care partner(s) about the impact of hearing loss on their communication, safety, function, cognition, and quality of life.

Evidence Strength: *Recommendation based on numerous MAs of prospective cohorts, cross-sectional studies, SRs, and 1 RCT with a preponderance of benefit over harm.*

Action Statement Profile: 6

- *Quality improvement opportunity*: Promotion of education of the impact of ARHL on patient-centered outcomes
  (National Quality Strategy Domain: Patient Safety, Person- and Family-Centered Care, Coordination of Care, Prevention and Treatment of Leading Causes of Morbidity and Mortality, Health and Well-Being of Communities)
- *Aggregate evidence quality*: Grade B, based on numerous MAs of prospective cohorts, cross-sectional studies, SRs, and 1 RCT regarding the impact of hearing loss on these domains, but there is very little data on the benefits of counseling specifically
- *Level of confidence in the evidence*: Medium, as we are combining multiple domains (evidence strength varied for safety, communication, and quality of life)
- *Benefits*: Empower patients to adapt to their ARHL, including communication within their family; promote adherence to hearing amplification and support may be increased; provide an opportunity for improved health care communication
- *Risks, harms, costs*: Time for counseling, time required for clinicians to be educated on the topic; create anxiety regarding the risk of cognitive decline; risk of family discord if there are differences of opinion among the patient and their family/care partner
- *Benefits-harm assessment*: Preponderance of benefit over harm
- *Value judgments*: None
- *Intentional vagueness*: None
- *Role of patient preferences*: Limited
- *Exceptions*: None
- *Policy level*: Recommendation
- *Differences of opinion*: None

Statement 7: Communication Strategies and Assistive Technologies

Clinicians should counsel patients with hearing loss on communication strategies and assistive listening devices.

Evidence Strength: *Recommendation based on limited studies with a preponderance of benefit over harm.*

Action Statement Profile: 7

- *Quality improvement opportunity*: Provision of evidence-based recommendations from providers and medical research to support patient-informed decision making
  (National Quality Strategy Domain: Patient Safety, Person-and Family-Centered Care, Coordination of Care, Prevention and Treatment of Leading Causes of Morbidity and Mortality, Health and Well-Being of Communities)
- *Aggregate evidence quality*: Grade B, SR of 15 RCT concluding that counseling-based aural rehabilitation reduced activity limitations and participation restrictions.
- *Level of confidence in the evidence*: High
- *Benefits*: Education on supportive measures outside of amplification; affordability of supportive measures; immediate intervention; family/care partner, provider, and patient awareness; patient empowerment; safety; augmented support for hearing loss; opportunity for shared opportunities and accessibility; ease in implementation
- *Risks, harms, costs*: Costs; time; potentially overwhelming to patients and family/care partners
- *Benefits-harm assessment*: Preponderance of benefit over harm
- *Value judgments*: There are numerous communication strategies that can be immediately effective and implemented in real time to support patient/family/care partners/clinician communication
- *Intentional vagueness*: What are assistive technologies, communication strategies
- *Role of patient preferences*: Moderate
- *Exceptions*: None
- *Policy level*: Option
- *Differences of opinion*: None

Statement 8: Amplification

Clinicians should offer, or refer to a clinician who can offer, appropriately-fit amplification to patients with ARHL.

Evidence Strength: *Strong recommendation based on multiple RCTs with a preponderance of benefit over harm.*

Action Statement Profile: 8

- *Quality improvement opportunity*: Timely management of ARHL can decrease the burden of disease
  (National Quality Strategy Domain: Patient Safety, Person-and Family-Centered Care, Coordination of Care, Prevention and Treatment of Leading Causes of Morbidity and Mortality, Health and Well-Being of Communities)
- *Aggregate evidence quality*: Grade A, based on multiple well-designed RCTs
- *Level of confidence in the evidence*: High
- *Benefits*: Potential delay in cognitive decline, improve functioning, improve communication, improve mental health, improve social functioning, improve safety, potential mitigation of tinnitus
- *Risks, harms, costs*: Cost, dissatisfaction if mis-fit initially, exacerbate underlying otologic conditions (eg, otitis externa, myringitis, etc), rare medical complications of hearing aids (eg, mold material getting stuck, obstructing cerumen, etc)
- *Benefits-harm assessment*: Preponderance of benefit over harm
- *Value judgments*: Amplification can be beneficial even with minimal hearing loss
- *Intentional vagueness*: Amplification may mean more than just hearing aids
- *Role of patient preferences*: High. While the clinician should offer amplification to everyone, patients have a choice regarding if they pursue it and whether they choose to see an audiologist or look into direct-to-consumer options (eg, over the counter)
- *Exceptions*: None
- *Policy level*: Strong recommendation
- *Differences of opinion*: None

Statement 9: Candidacy for Cochlear Implants

Clinicians should refer patients for an evaluation of cochlear implantation candidacy when patients have appropriately fit amplification and persistent hearing difficulty with poor speech understanding.

Evidence Strength: *Strong recommendation based on several SRs and MAs of prospective clinical trials with a preponderance of benefit over harm.*

Action Statement Profile: 9

- *Quality improvement opportunity*: Promote effective management of ARHL to reduce the burden of disease
  (National Quality Strategy Domain: Prevention and Treatment of Leading Causes of Morbidity and Mortality)
- *Aggregate evidence quality*: Grade A, based on high-level SRs of prospective clinical trials on CI efficacy
- *Level of confidence in the evidence*: High
- *Benefits*: Capturing patients with hearing loss that may need CI; early identification of CI candidates; early discussion and introduction of CI even if not

candidate; provider education on benefits and safety of CI; patient validation of the reason for difficulty in hearing; normalizing CI use in society
- *Risks, harms, costs*: Time; cost; potential overutilization of resources; patient anxiety and stress; need to address provider knowledge gaps
- *Benefits-harm assessment*: Preponderance of benefit over harm
- *Value judgments*: there is under referral of patients who would benefit from CI
- *Intentional vagueness*: Severity of hearing loss and speech understanding, appropriate fit amplification, who will assess cochlear implant candidacy
- *Role of patient preferences*: Moderate
- *Exceptions*: Candidates who are unable or unwilling to have surgery
- *Policy level*: Strong recommendation
- *Differences of opinion*: None

Statement 10: Assessing Goals and Improvement

For patients with hearing loss, clinicians should assess if communication goals have been met and if there has been improvement in hearing-related quality of life at a subsequent health care encounter or within 1 year.

Evidence Strength: *Recommendation based on limited evidence with a preponderance of benefit over harm.*

Action Statement Profile: 10

- *Quality improvement opportunity*: Articulation of common goals and success in reaching those goals between providers and patients can support effective, efficient, and patient-centered care
  (National Quality Strategy Domain: Patient Safety, Person-and Family-Centered Care, Coordination of Care)
- *Aggregate evidence quality*: Grade C, based on observational studies and a single RCT
- *Level of confidence in the evidence*: High
- *Benefits*: Identifying non-users of technology; opportunity to reassess hearing; opportunity to move to a different technology if they are not getting adequate benefit; opportunity to reeducate patients who chose not to address hearing at the initial visit; prioritize hearing health during health care encounters
- *Risks, harms, costs*: Overuse of resources; unnecessary visits; premature assessment before adequate adjustment to new technology; patient time; clinician time
- *Benefits-harm assessment*: Preponderance of benefit over harm
- *Value judgments*: Assessing outcomes of interventions provides opportunities to improve hearing health outcomes
- *Intentional vagueness*: How should the assessment be done and timing of the actual assessment
- *Role of patient preferences*: Moderate
- *Exceptions*: None
- *Policy level*: Recommendation
- *Differences of opinion*: There was significant discussion among the GDG related to when the follow up should occur. Some favored a shorter time interval and others preferred to leave it more open

Statement 11: Retesting

Clinicians should assess hearing at least every 3 years in patients with known hearing loss or with reported concern for changes in hearing.

Evidence Strength: *Option based on prospective and retrospective studies with a preponderance of benefit over harm.*

Action Statement Profile: 11

- *Quality improvement opportunity*: Promotion of retesting can detect progression of disease and facilitate efficient management of ARHL
  (National Quality Strategy Domain: Patient Safety, Person-and Family-Centered Care, Coordination of Care, Prevention and Treatment of Leading Causes of Morbidity and Mortality, Health and Well-Being of Communities)
- *Aggregate evidence quality*: Grade C, based on prospective and retrospective studies
- *Benefits*: Identify progressive hearing loss; opportunity for earlier intervention; opportunity for enrolling patient into appropriate pathway to care; provide opportunity to appropriately aid communication and heath care interaction in "real-time" with patient and family/care partner; provide opportunity for patient education and counseling (specifically regarding the progressive nature of hearing loss over time and the need for retesting at regular time interval); improved awareness of hearing and importance of functioning in daily life; improved patient safety as it relates to hearing loss and impacts thereof, improved acceptance of hearing loss
- *Risks, harms, costs*: Time and cost of additional testing, stigma of hearing loss; testing fatigue; potential increased demand of resources such as audiology services; stress; distress; anxiety associated with new diagnosis of hearing loss
- *Benefits-harm assessment*: Preponderance of benefit over harm
- *Value judgments*: While there is limited/no evidence for the benefit of reevaluation, the expert opinion of the group is that there is significant value in reassessment for a known progressive condition such as hearing loss

- *Intentional vagueness*: Time interval for rescreening is wide (at least every 3 years), specific method of testing used for reassessment
- *Role of patient preferences*: Limited
- *Exceptions*: Patients already under the care of a hearing health specialist
- *Policy level*: Option
- *Differences of opinion*: None

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Author Contributions

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Supplemental Material

Additional supporting information is available in the online version of the article.

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