

# Quality Improvement in Otolaryngology–Head and Neck Surgery: Age-Related Hearing Loss Measures

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## Abstract

**Background and Significance.** There is a high and growing prevalence of age-related hearing loss (ARHL), defined as presbycusis or bilateral, symmetric sensorineural hearing loss in older adults. Due to the increasing prevalence of ARHL, the potential delays in its diagnosis and treatment, and the significant disability associated with ARHL, the American Academy of Otolaryngology–Head and Neck Surgery Foundation (AAO-HNSF) convened a Measures Development Group (MDG) to develop quality measures (QMs) of clinical practice that could be incorporated into the AAO-HNSF's data registry Reg-ent. Although the AAO-HNSF has been engaged in robust clinical practice guideline development since 2006, the development of quality and performance measures is more recent.

**Methods.** We report the process, experience, and outcomes in developing a de novo QM set for ARHL in the absence of a preexisting clinical practice guideline on this topic. Steps include the MDG review of evidentiary literature on ARHL, followed by stakeholder discussions to develop measure specifications. Key considerations included discussion on the relative importance, usability, and feasibility of each measure within the Reg-ent or similar databases.

**Results.** The MDG created 4 QMs for the diagnosis and treatment of ARHL. These measures represent the AAO-HNSF's quality initiatives to develop evidence-based QMs and improve patient care and outcomes, and they are intended to assist providers in enhancing quality of care.

**Conclusion.** Development of the ARHL measures is intended for clinicians to evaluate the patient perception, structure, process, and outcomes of care. This process represents a new stage in the AAO-HNSF's measure development efforts to facilitate future efforts in evidence-based QM.

## Keywords

age-related hearing loss, hearing screening, audiometric evaluation, advanced diagnosis imaging, presbycusis, quality measures, performance measures, quality assessment, implementation science

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Despite its prevalence, impact on quality of life, and morbidity, age-related hearing loss (ARHL) is under-recognized and undertreated.<sup>1</sup> As defined in this article and the related quality measures, ARHL is defined as bilateral presbycusis or symmetric sensorineural hearing loss in an individual  $\geq 60$  years old caused by the natural aging of the auditory system. For the purpose of these measurements and according to previously published position statements of the American Academy of Otolaryngology–Head and Neck Surgery Foundation (AAO-HNSF),<sup>2</sup> symmetric hearing loss is characterized by audiometric results that are within 15 dB for the pure tone average between ears and word recognition scores are within 15% between ears, though exact definitions of asymmetry have differed in the literature.<sup>3–5</sup> The pure tone average is an average of hearing thresholds at multiple frequencies. To accurately represent the average hearing, a 4-frequency pure tone average is often utilized. The most typical frequencies averaged are 500, 1000, 2000, 3000, and 4000 Hz. These definitions represent the consensus opinion of the measure development group based on consideration of the lack of a universal process for hearing loss screening.

Hearing loss is often viewed in the older age population as part of normal aging rather than as a medical condition upon which to intervene and treat. There is often a lengthy delay between the time when individuals first notice that they are having hearing difficulties and when they actually seek help from a hearing professional.<sup>6</sup> Approximately one-third of persons aged  $>65$  years are affected by disabling hearing loss.<sup>7</sup> It is estimated that only 9% of internists offer hearing testing to patients aged  $\geq 65$  years.<sup>8</sup> Patients may experience social isolation, depression, cognitive impairment, or decreased workforce participation when hearing loss is not treated.<sup>9</sup>

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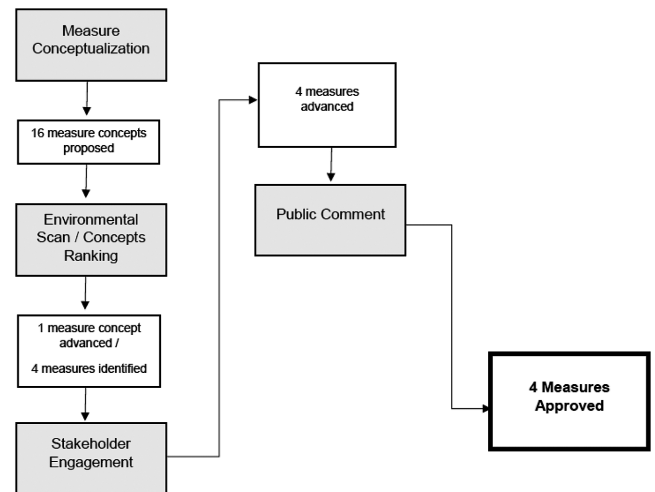
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The high prevalence of ARHL, potential diagnostic delays, and significant associated disability prompted the AAO-HNSF to convene a group to develop quality measures of clinical practice that could be incorporated into electronic health records and the academy's qualified clinical data registry, Reg-ent. Although the AAO-HNSF has been engaged in robust clinical practice guideline development since 2006,<sup>10</sup> the development of quality and performance measures is more recent. In this article we report the process, experience, and outcomes in developing a de novo quality measure set for ARHL in the absence of a preexisting clinical practice guideline on this topic.

## Methods

The AAO-HNSF convened a Performance Measure Task Force with representation from its established infrastructure for measures and registries—the Clinical Advisory Committees and the Reg-ent Executive Committee—to identify and define new measures for quality improvement, to use in the AAO-HNSF's qualified clinical data registry Reg-ent, and to be considered for use in accountability programs, such as the Centers for Medicare and Medicaid Services (CMS) quality payment program under the Merit-Based Incentive Payment System. The Performance Measure Task Force identified 31 topics that are relevant to otolaryngologists or physicians who treat the ear, nose, throat, and related structures of the head and neck.

After identifying the clinical topics, the Clinical Advisory Committees prioritized 16 topics by feasibility and importance. These topics were reviewed and ranked for measure development. The primary purpose of these measures is to address quality improvement opportunities for all clinicians, in any setting, who manage patients. The AAO-HNSF develops quality measures a priori, based on clinical practice guideline key action statements, and in conjunction with other surgical and medical specialties on cross-cutting conditions. ARHL was a measurement topic that was identified as an important health issue and selected to undergo an inaugural measure development process. Henceforth, in July 2017, an ARHL cross-specialty Measure Development Group (MDG) was identified and convened an in-person meeting for the development of de novo measures. The MDG included the chair, assistant chair, methodologist, representatives within the AAO-HNSF, external organizations, and consumers in the fields of otolaryngology, audiology, geriatrics, and neurology. In addition to the AAO-HNSF measures staff, a consultant was utilized to facilitate group work and to set priorities on ARHL for the draft measures. An information specialist conducted 2 literature searches (May–June 2017) using a validated filter strategy to identify clinical practice guidelines, systematic reviews, and randomized controlled trials. The search terms were as follows: all hearing disorders, all hearing loss, all presbycusis, with various limitations on the population/type of study/language. A supplemental search was conducted on presbycusis epidemiology and expanded to audiometry, auditory terms, and partially hearing impaired.



**Figure 1.** Age-related hearing loss measure development process.

These search terms were used to capture all evidence on the population by incorporating all relevant treatments and outcomes.

Following the review of the evidentiary literature on ARHL and extensive stakeholder discussions, which included multiple conference calls and an in-person meeting, the MDG began work on the development of preliminary measure specifications. Key considerations for each measure included discussion around its importance, usability, and feasibility. The measures developed for ARHL include the numerator, denominator, exceptions, exclusions, rationale, and other technical specifications for each measure. Exceptions are situations in which an exception to the general denominator rule can be made. Exclusions are situations in which patients with a certain condition are excluded from the denominator. Additionally, the measure specifications document includes associated diagnosis and procedure codes and measure algorithm. The initial draft measure specifications were released for public comment to the American Academy of Otolaryngology—Head and Neck Surgery (AAO-HNSF) membership and committees. Public comment was available over a 4-week period and was advertised to the AAO-HNSF membership and committees and the wider medical community through email to persons in various organizations and social media. The comments were reviewed by the MDG, and the measures were modified as necessary. Simultaneously, the Value Set Authoring Center, a repository and authoring tool for public value sets, was used to identify the initial list of codes to include in the data dictionary.<sup>11</sup> Specifications and code sets were given to the registry vendor of Reg-ent, and the measures were tested. Data from the Reg-ent registry will be utilized to study the feasibility, reliability, and validity of the draft measures. Continued testing and evaluation will inform necessary measure modifications. The measure development process is illustrated in **Figure 1**.

The MDG created 4 quality measures that prioritize screening for hearing loss on older adults, referral for a

comprehensive audiometric evaluation, diagnostic imaging of bilateral presbycusis or age-related symmetric sensorineural hearing loss, and shared decision making (SDM) of treatment options for hearing loss (**Table 1**).

## Results

The MDG defined the target audience of the ARHL measures as clinicians who see adult patients aged  $\geq 60$  years, and they are intended to be used to evaluate the patient perception, structure, process, and outcomes of care. There was significant discussion at the in-person meeting about the patient age to be included; some group members advocated for as low as 50 years, but 60 years was agreed on as the minimum age. The central issue was balancing sensitivity and specificity of the screening test, as well as the positive and negative predictive values, which change according to the pretest probability of a condition in a population. Ultimately, the group felt that while screening at a younger age (50 years) would have some value in identifying more people with hearing loss, the age was too young, with a lower pretest probability of ARHL. By the time that an individual reaches the age of 60 years, the probability of ARHL is higher. The age of 60 years is still young enough to intervene and, hopefully, make a meaningful difference with treatment. These measures can be applied to any clinical practice setting, including but not limited to ambulatory clinics, inpatient admissions, and emergency rooms. The MDG has created quality measures for the diagnosis and treatment of ARHL, including bilateral presbycusis and symmetric sensorineural hearing loss in older adults (**Table 1**).

The MDG convened July 2017 with 1 in-person meeting assisted by an experienced measure development methodologist. Initial discussions focused on defining the target patient for the measures, the clinicians and settings to which they would apply, the measure priorities as defined through group consensus and ranking, and the attributes of valid measures. For each proposed measure, the group then proceeded to define the numerator, denominator, exclusions, and exceptions, with an emphasis on pragmatism regarding the specifications and data collection requirements. Specific challenges or obstacles encountered by the group included lack of adequate data—specifically, a lack of high-level evidence from clinical trials—that could inform decision making and measure creation.

### Measure 1: Screening for Hearing Loss in Older Adults

There is no universal process for hearing loss screening. Screening for hearing loss may include the whisper voice test, finger rub, watch tick, tuning fork examination, asking “Do you have difficulty with your hearing?” Hearing Handicap Inventory for the Elderly—Screening, online screening, phone screening (eg, National Hearing Test), NHANES survey questions (National Health and Nutrition Examination Survey), handheld audiometric devices (eg, the AudioScope),<sup>12</sup> or other tools or questions to determine if the patient has potential hearing loss and needs further evaluation or diagnostic

studies. The purpose of all screening tests is to identify those at higher risk for hearing loss who should be referred for formal audiometry.

A process measure was created to identify patients who are screened for hearing loss during a face-to-face visit. The intent of this measure is to identify opportunities for individuals at higher risk for hearing loss who should be routinely screened. There may be multiple medical reasons for not screening for hearing loss, such as patients who had an audiogram and patients with an active diagnosis of deafness, hearing impairment, head or ear trauma, or history of other hearing impairment. These are denominator exclusions for this measure. Patient refusals or reports of having a recent screening are denominator exceptions for this measure.

### Measure 2: Audiometric Evaluation for Older Adults With Hearing Loss

Measure 2 is process measure addressing patients present for a face-to-face visit who were ordered, referred, or received a comprehensive audiometric evaluation within 4 weeks of failing the hearing screening. The intent of this measure is to increase audiometric testing to evaluate suspected hearing loss to improve a patient’s quality of life once hearing loss has been diagnosed and appropriately treated. An audiometric evaluation should first include an examination of the patient’s ears with an otoscope to rule out ear cerumen (wax), tympanic membrane problems, infection, and fluid in the middle ear. Upon determining if a medical condition may exist, an evaluation of the sensitivity of the patient’s sense of hearing should be performed with an audiometer in a sound booth, preferably by an audiologist. Pure tone audiometry is the standard and most common type of hearing test. Pure tone audiometry tests the hearing of both ears with the audiometer to produce sounds at various volumes and frequencies (pitches). Other hearing tests may include, but are not limited to, the bone conduction hearing test, Hearing in Noise Testing, speech tests, auditory brainstem response testing (eg, when a patient is not able to complete behavioral audiometry), or acoustic reflex testing. As noted in the denominator exceptions, reasons for not evaluating for hearing loss include patients who had an audiogram within last year; patients with an active diagnosis of deafness, hearing impairment, head or ear trauma, or history of other hearing impairment; or patient refusal.

### Measure 3: Advanced Diagnostic Imaging for ARHL—Avoidance of Inappropriate Use

Measure 3 is a process measure for patients with a diagnosis of bilateral presbycusis or symmetric sensorineural hearing loss who were not ordered magnetic resonance imaging or a computed tomography scan of the brain, temporal bone, or internal auditory canal for the primary indication of ARHL. The intent of this measure is to change clinician perceptions and ordering practices surrounding diagnostic imaging for ARHL. Patients with a diagnosis of bilateral presbycusis or symmetric sensorineural hearing loss should not be referred

**Table 1.** Age-Related Hearing Loss Quality Measures.

Measure Title	Denominator	Numerator	Denominator Exceptions
Screening for Hearing Loss in Older Adults	All patients age 60 years and older.	Patients who were screened for hearing loss within the past 5 years. Screening for hearing loss: There is no universal definition or process for screening for hearing loss. For screening tests, focus on clinical tests (eg, detection of a whispered voice, finger rub, or watch tick), a single question (eg, “Do you have difficulty with your hearing?”), questionnaires	Patient reason for not screening for hearing loss (eg, patient refuses to complete the hearing screening or reports having a recent screening). <sup>a</sup>
Audiometric Evaluation for Older Adults With Hearing Loss	Patients age 60 years and older who failed a hearing screening and/or report suspected hearing loss at the physician office visit.	Patients who received, were ordered, or were referred for comprehensive audiometric evaluation. Audiometric evaluation: The hearing evaluation should include a physical examination of the patient’s ears and an evaluation of the patient’s hearing acuity using an audiometer in a sound booth. The hearing evaluation may include the use of pure tone audiometry, bone conduction hearing testing, Hearing in Noise Testing, speech tests, acoustic reflex text, auditory brainstem response testing (eg, when patient is not able to complete behavioral audiometry), or other appropriate hearing evaluations tests.	Medical reasons for not evaluating for hearing loss include patients who had an audiogram within last year; patients with an active diagnosis of deafness, hearing impairment, head or ear trauma, or history of other hearing impairment. Patient refusal.
Advanced Diagnostic Imaging for Age-Related Hearing Loss—Avoidance of Inappropriate Use	Patients age 60 years and older diagnosed with bilateral presbycusis or symmetric sensorineural hearing loss.	Patients who were NOT ordered magnetic resonance imaging (MRI) or a computed tomography scan (CT scan) of the brain, temporal bone, or internal auditory canal for the primary indication of age-related hearing loss. This restriction is relevant at any time interval after the diagnosis of age-related hearing loss.	Medical reason that may require MRI or CT scan of the brain, temporal bone, or internal auditory canal: <ul style="list-style-type: none"> <li>● Evaluation for cochlear implantation or surgical management of hearing loss</li> <li>● Unilateral or pulsatile tinnitus</li> <li>● Vertigo, disequilibrium, dizziness</li> <li>● Asymmetric hearing loss</li> <li>● Acquired hearing loss following meningitis, measles, mumps</li> <li>● Chronic otitis media, otosclerosis</li> <li>● Head injury or trauma</li> </ul>

(continued)

**Table 1.** (continued)

Measure Title	Denominator	Numerator	Denominator Exceptions
Shared Decision Making for Treatment Options for Age-Related Hearing Loss	(1) Patients age 60 years and older with a diagnosis of bilateral presbycusis or symmetric sensorineural hearing loss. (2) Patients who report participation in shared decision making.	(1) Patients (or their caregivers) who report participation in shared decision making regarding treatment options for their hearing loss using a standardized tool. (2) Patients (or their caregivers) who report a treatment plan or documentation of a treatment plan in the medical record.	No response from patient after 2 electronic communications and 3 weeks after last communication; patient refusal.

<sup>a</sup>Denominator exclusion: medical reason for not screening for hearing loss (eg, patients who had an audiogram; patients with an active diagnosis of deafness, hearing impairment, head or ear trauma, or history of other hearing impairment).

for diagnostic imaging of hearing loss unless there is a medical reason as noted in the denominator exceptions. Bilateral symmetric hearing loss is characterized by audiometric and speech discrimination results that are similar. The AAO-HNSF position statement “Red Flags—Warning of Ear Disease” identifies asymmetric hearing loss as a difference >15 dB in pure tone average between ears and asymmetric speech discrimination scores as a difference >15% between ears.<sup>2</sup> This degree of asymmetry warrants a denominator exception to order imaging, but even milder forms of asymmetry—for example, 15-dB differences at 1 frequency rather than across the pure tone average—may also warrant an exception to imaging, which must be determined and justified by clinical judgment.<sup>3</sup> Clinicians should feel empowered to order imaging when clinically indicated. Denominator exceptions for this measure may include medical reasons, such as an evaluation for cochlear implantation or surgical management of hearing loss, unilateral or pulsatile tinnitus, vertigo, disequilibrium, dizziness, asymmetric hearing loss, acquired hearing loss following meningitis/measles/mumps, chronic otitis media, otosclerosis, or head injury or trauma.

#### Measure 4: SDM for Treatment Options for ARHL

Measure 4 is process measure where a report of SDM regarding treatment options for bilateral presbycusis or sensorineural hearing loss is documented of patients with a diagnosis of symmetric sensorineural hearing loss during a visit. The intent of this measure is to engage patients in SDM, which can ensure that treatment decisions align with patients’ preferences and values. To meet this measure, patients must report that they participated in SDM with regard to treatment options for symmetric sensorineural hearing loss, also known as bilateral presbycusis. This may include the use of an SDM tool, option grid, or other decision aid. SDM regarding treatment options for symmetric sensorineural hearing loss should include a discussion between the clinician and the patient (and/or caregiver) of the risks and benefits of treatment options, including the option of no treatment, an elicitation of patient values and preferences, and a notation of arriving at a mutually agreed-on decision regarding treatment options.

The AAO-HNSF recommends the use of the Treatment Option Grid for Symmetric Sensorineural Hearing Loss (**Figure 2**). The option grid is intended to prompt discussion on the advantages and disadvantages of assistive listening devices, hearing aids, cochlear implants,<sup>13</sup> aural rehabilitation, lifestyle factors, and not pursuing treatment.

These 4 ARHL measures represent the AAO-HNSF’s quality initiatives to develop evidence-based quality measures to improve patient care and outcomes and are intended to assist providers in enhancing quality of care.

#### Discussion

These measures represent an effort by the AAO-HNSF to set forth parameters by which clinicians can quantify their care of patients with ARHL. The measures are meant to provide a set of parameters by which patients with ARHL can be identified through screening and correct diagnosis, avoid unnecessary workup, and receive correct information about treatment through SDM. To improve health care quality related to ARHL and provide opportunities for improvement for all clinicians who manage patients with presbycusis, the AAO-HNSF has prioritized the ARHL measures in **Table 1**.

There are limitations related to these measures. There was a paucity of high evidence-level data from randomized clinical trials on the screening of older adults for ARHL. These measures were developed through expert consensus. While a broad and diverse group of shareholders participated in the MDG process, we recognize that the MDG group may have limitations in understanding all facets of ARHL. There are also barriers in the implementation of these measures. The measures ideally created data that are extractable from large patient populations. This type of data extraction and analysis, however, requires a sophisticated biomedical informatics infrastructure in the form of databases and data managers. As large health care networks coalesce, however, that have the capacity to mine clinical data and as national registries mature and become more accessible, quality measures such as these will make an important contribution to the improvement of evidence-based clinical practice.

Hearing plays a critical role in our ability to communicate and perceive our environment. Age-related hearing loss may increase over time and have been associated with negative consequences that may include depression, social isolation, falls, and dementia. If you have hearing loss, there are options to help you. This tool describes some of those options and, in addition to talking with your healthcare provider, can assist you in making informed decisions about your hearing health.

Frequent Questions	Watchful Waiting (Observation for a time)	Coping Strategies	Hearing aids	Cochlear implantation
What are my options?	Get regular hearing check-ups.	Take training to improve your listening skills or learn speech/lip reading, lifestyle changes and other strategies (such as like sitting closer to the person speaking or telling others you have trouble hearing)	Use a hearing aid or an assistive listening device (ALD) such as a personal amplifier.	A cochlear implant may help if you hear very little or not at all. This option involves a surgery with general anesthesia.
What are the benefits?	Watchful waiting gives you time to think about your options.	These strategies have low or no cost and let you to choose the one that is right for you. Many of these can be used alone or together with other options.	Hearing aids and ALDs can improve your hearing or make it less of an effort. They may also improve your quality of life by making it easier to talk with people and other benefits.	Cochlear implants may improve your hearing when regular hearing aids or ALDs do not help.
What downsides should I consider?	Watchful waiting can delay you in getting help for your hearing. Waiting can also make it harder for you to get used to hearing sounds in the future.	These strategies rely on you and your social group. You must be motivated to make these strategies work for you. These options can take time. Many people get discouraged if it does not help right away.	Hearing aids need care and battery changes. Some people see more ear wax build-up with hearing aid use. Keep your ears and hearing aids clean to avoid an ear infection or poor device function. Hearing devices can improve hearing, but you may still have some problems understanding speech.	Surgical risks are rare, but can include infection, bleeding, failure of the device, weakness in the face, and hearing that gets worse. An ear, nose, and throat specialist (ENT) and implant team should go over the possible risks with you.
What are the related costs?	Regular check-ups and hearing tests are the only costs.	Training may be needed to gain skill in some strategies. This may have some costs.	Hearing aids can be costly, and they are not always covered by insurance. ALDs are less costly but not as personalized as hearing aids.	Surgical costs include the cost of the device. Many insurance carriers and Medicare cover these services when a doctor advises it. There are costs after surgery for programming the implant and making sure it continues to work best for you.
Who can I talk to about this option?	Talk with your doctors and family about how your hearing loss affects them.	Your primary care doctor, an audiologist, or an ear, nose, and throat specialist (ENT) can give you advice about coping with hearing loss.	An audiologist, audiology assistant, or hearing aid technician can help you pick a device that is right for you.	An ear, nose, and throat specialist (ENT) may be asked to discuss if surgery is right for you. An audiologist may also be part of the discussion.

**Glossary:**

**General Anesthesia (ann-es-TEE-shuh):** This is medication-based sleep. This is done during surgeries to ensure safety and comfort for patients.  
**Cochlear Implant:** Electrical device that requires surgery for placement close to the nerve of hearing.  
**ENT:** Ear, nose, and throat doctor also known as an otolaryngologist (“oh-TOH-lar-en-GOL-low-gist”).  
**Audiologist (aw-DEE-ah-low-gist):** a doctor who assesses hearing disorders and may offer non-surgical treatments.

**Figure 2.** Age-related hearing loss shared decision-making tool.

### Measure 1: Screening for Hearing Loss in Older Adults

Disabling hearing loss, defined as hearing loss >40 dB in the better-hearing ear, affects approximately one-third of all adults aged >65 years according to the World Health Organization.<sup>7</sup> Surveys indicate that although physicians overwhelmingly (92%-98%) believe that hearing loss negatively affects quality of life in older adults, many do not routinely screen patients (40%-86%).<sup>14</sup> Despite numerous opportunities that the patient–primary care provider relationship can present for helping to identify, inform, and possibly treat hearing loss, substantial evidence shows that hearing loss is often underdetected and undertreated in primary care settings.<sup>15-17</sup>

Hearing screening measures can be administered in a verbal, written, or computerized format, but there is no universal process for hearing loss screening. Some patient report measures can be completed by family members or significant others. In the absence of an audiometer or other screening technology, these questionnaires can be useful in the identification of individuals at risk for hearing loss and requiring audiologic follow-up.<sup>18</sup> Screening for hearing loss may include many methods, as outlined in measure 1, to determine if the patient has potential hearing loss and needs further evaluation or diagnostic studies.

The purpose of all screening tests is to identify patients at higher risk for hearing loss who should be referred for formal audiometry. The American Speech-Language-Hearing Association recommends that adults be screened at least every decade through age 50 years and at 3-year intervals thereafter.<sup>19</sup> As part of the Patient Protection and Affordable Care Act, the Medicare Initial Preventive Physical Examination and the Annual Wellness Visit include provisions for reviewing patient hearing status in the primary care setting.<sup>20</sup> The US Preventive Services Task Force has affirmed the effectiveness of screening questionnaires and clinical techniques, such as the whispered voice, finger rub, and watch tick, and that they can be performed by primary care providers.<sup>21</sup>

### Measure 2: Audiometric Evaluation for Older Adults With Hearing Loss

Approximately one-third of persons aged >65 years are affected by disabling hearing loss.<sup>7</sup> Patients who do not pass a hearing screening should receive, have an order placed for, or be referred for an audiometric evaluation within 4 weeks of failing the hearing screening. Please note that completion of the testing does not have to happen within 4 weeks, as this may not be logistically possible, but the provider assessing the hearing screen should at least place an order or referral audiometric evaluation within 4 weeks of failing a screen. When hearing loss is suspected, pure tone audiometry may be used to evaluate hearing deficits by checking hearing levels at specific frequencies.<sup>22</sup> The hearing evaluation should include a physical examination of the patient's ears and an evaluation of the patient's hearing acuity with an audiometer in a sound booth. The hearing evaluation may include the use of pure tone audiometry, bone conduction hearing testing, Hearing in Noise Testing, speech tests, acoustic reflex test, auditory

brainstem response testing (eg, when patient is not able to complete behavioral audiometry), or other appropriate hearing evaluations tests.

The overall desired outcome for this measure is to increase the appropriate referrals of patients for an audiometric evaluation after they have failed a hearing loss screening or a patient report of hearing problems. Hearing loss is often viewed in the older age population as normal aging rather than as a medical condition that can be intervened upon or treated. Patients may experience social isolation, depression, cognitive impairment, or decreased workforce participation when hearing loss is not treated.<sup>9</sup> Increasing audiometric testing to evaluate suspected hearing loss may improve a patient's quality of life once hearing loss has been diagnosed and appropriately treated.

### Measure 3: Advanced Diagnostic Imaging for ARHL—Avoidance of Inappropriate Use

The focus of this measure is on the reduction of unnecessary imaging studies for patients with a diagnosis of bilateral presbycusis and no underlying reason to justify imaging, as noted in the medical exceptions for this measure (see exceptions in **Table I**). Cases of explained progressive, symmetric sensorineural hearing loss in the context of an aging individual, which account for most hearing loss referrals in older adults, do not warrant imaging evaluation.

The extent to which imaging is used to evaluate ARHL is unknown, and there are limited research studies to support the perception that there may be overuse. Thus, this measure is intended to discourage clinicians from ordering unnecessary testing when the diagnostic yield is likely very low. There are clinical situations that warrant imaging to evaluate hearing loss in older adults (**Table I**).

### Measure 4: SDM for Treatment Options for ARHL

SDM has been defined by the United Kingdom's National Health System as an approach where clinicians and patients share the best available evidence when faced with the task of making decisions and where patients are supported to consider options to achieve informed preferences.<sup>23</sup> The CMS identifies strengthening beneficiary (patient) engagement as one of the CMS's goals to help transform the US health care system into one that delivers better care, smarter spending, and healthier people and puts patients at the center. This measure aligns with the CMS's strategic framework on meaningful measures that envision health and care that are patient centered, provide incentives for the right outcomes, are sustainable, emphasize coordinated care and SDM, and rely on transparency of quality and cost information.<sup>24</sup> The CMS Innovation Center is also encouraging SDM through its Beneficiary Engagement and Incentives Models.<sup>25</sup>

Despite wanting to play a more active role in health care decision making, many patients report not being sufficiently involved in the decision process.<sup>26,27</sup> Engagement of patients in SDM can ensure that treatment decisions align with patient's preferences and values. Patients participate in making health care decisions in multiple ways. There are multiple treatment options or paths for symmetric sensorineural

**Table 2.** 2018 CMS-Approved AAO-HNSF QCDR Measures.

ID	Title	Description
AAO16	Age-Related Hearing Loss: Audiometric Evaluation	Percentage of patients age 60 years and older who failed a hearing screening and/or who report suspected hearing loss who received, were ordered, or were referred for comprehensive audiometric evaluation within 4 weeks the office visit.
AAO17	Age-Related Hearing Loss: Advanced Diagnostic Imaging of Bilateral Presbycusis or Symmetric SNHL	Percentage of patients age 60 years and older with a diagnosis of bilateral presbycusis or symmetric sensorineural hearing loss who were NOT ordered magnetic resonance imaging (MRI) or a computed tomography scan (CT scan) of the brain, temporal bone, or internal auditory canal for the primary indication of hearing loss.
AAO33	Age-Related Hearing Loss: Shared Decision Making	Patients age 60 years and older with a diagnosis of bilateral presbycusis or symmetric sensorineural hearing loss or their caregiver(s) who report shared decision making with a healthcare provider regarding treatment options for their hearing loss using a standardized tool and a subsequent plan of care.

Abbreviations: AAO-HNSF, American Academy of Otolaryngology—Head and Neck Surgery Foundation; CMS, Centers for Medicare and Medicaid Services; QCDR, qualified clinical data registry; SNHL, sensorineural hearing loss.

hearing loss, with their own sets of advantages and disadvantages. Patients may not know which questions to ask their providers or where to get relevant health information. Moreover, patients may not feel that their personal values or preferences were considered or respected when making the final decision about treatment options—to treat symmetric sensorineural hearing loss or not. By empowering patients to take ownership of their health care with the tools needed to navigate the health care system, health care information becomes more accessible.<sup>28</sup>

Studies assessing the use of SDM in clinical practice find that <10% of providers utilize SDM correctly.<sup>29</sup> The desired outcome for this measure is to increase the percentage of patients who participate in SDM to discuss and decide on the appropriate treatment option for their diagnosis of bilateral presbycusis and to provide resources and incentives for providers to offer SDM for hearing health. This measure is focused on ensuring that each patient (and/or caregiver) is engaged as a partner in care. For this purpose, a tool was developed to assist clinicians and patients in SDM for ARHL (see **Figure 2**).

We recognize that there may be obstacles to the feasibility and implementation of measuring SDM. There are difficulties in reliably codifying this in the medical record or in patient-reported outcomes. Clinicians can document SDM in their notes by stating that shared decision was discussed or the SDM tool was utilized to help patients make decisions about their care. Natural language processing algorithms would likely be able to recognize this with key search terms such as “shared decision” being used. Some conditions have utilized *Current Procedural Terminology* coding to reflect SDM, and a number of published studies have shown that SMD can be quantified and reliably measured.<sup>30-33</sup> Patients who participate in SDM have shown greater satisfaction with hearing interventions.<sup>34</sup>

## Submission

The measures were submitted to the CMS for the 2018 qualified clinical data registry; 3 were approved, with the screening measure not approved as a stand-alone measure. CMS had

requested that the screening measure be combined with the approved measure on audiometric evaluation. After a year of testing in the Reg-ent registry with data pulled from electronic health records, modifications were required to capture the necessary data. Subsequent consultation with the CMS Center for Clinical Standards and Quality resulted in modifications that would meet CMS measure requirements for the 2019 Qualified Clinical Data Registry. See **Table 2** for the list of CMS-approved 2018 qualified clinical data registry measures.

## Conclusions

This project shows the importance of ARHL as the top-ranked topic by the Performance Measure Task Force and illustrates the ability of the MDG to reach consensus on 4 de novo measures with the opportunity for quality improvement.

In developing this de novo measure set, the first undertaken by the AAO-HNSF, ARHL measures are intended for clinicians to evaluate the patient perception, structure, process, and outcomes of care. These measures were one of several efforts in measure development and were created for the diagnosis and treatment of ARHL disorders, including bilateral presbycusis and symmetric sensorineural hearing loss, and they are intended to assist providers in enhancing quality of care. Important lessons learned through this process include the following:

1. Identifying relevant clinical topic and knowledge gaps by a group of experts in the field.
2. Verifying the knowledge gaps by a systematic review of the available medical literature.
3. Convening a panel of multiple stakeholders who represent different segments of care delivery and receipt. For our MDG focused on ARHL, we included representatives from the fields of otolaryngology, audiology, geriatrics, and neurology. Representatives from nursing and the American Association of Retired Persons, as well as search strategists and AAO-HNSF staff, were included in the group.



4. Finding consensus on specific definitions of terms and inclusion criteria for numerators and denominators of measurements.
5. Vetting by public comment and input from executive committee leadership.
6. Implementation of measurement sets into clinical registries. Dissemination of process and results in peer-reviewed literature.

This process has helped further the AAO-HNSF quality agenda and represent a new stage in the AAO-HNSF's measure development efforts to facilitate future efforts in evidence-based quality measures that actively seek to improve patient care and outcomes.

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### Author Contributions

**Richard K. Gurgel**, writer, chair; **Selena E. Briggs**, writer, assistant chair; **Nui Dhepyasuwan**, writer, AAO-HNSF staff liaison; **Richard M. Rosenfeld**, writer, senior advisor.

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