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# Hearing loss is often undiscovered, but screening is easy

## ■ ABSTRACT

Screening for hearing loss should be part of the routine physical examination, but it is often not done because of time constraints. We present a quick and easy office screening test that measures the functional impact of hearing loss. We also review the steps of audiologic management that follow referral by the primary care physician.

## ■ KEY POINTS

Hearing loss may be less noticeable in a quiet office and in one-on-one conversation. Thus, physicians must screen patients.

The Hearing Handicap Inventory for the Elderly consists of 10 questions. It is sensitive and specific, can be given in less than 2 minutes, and can help determine if referral for audiologic evaluation is warranted.

Only about 20% of people with hearing loss use hearing aids. Most people who use them do so because their physician referred them for an audiologic evaluation.

Today's digital hearing aids offer greater patient satisfaction and performance than conventional analog models.

**D**OES YOUR PATIENT NEED a hearing aid? Hearing loss is common, especially in the elderly. It lowers quality of life, it is easily detected, and effective treatment is available. Yet it too often goes undetected and untreated.

The purposes of this review are to:

- Promote awareness of the consequences of undetected hearing loss
- Present an efficient and effective screening method
- Briefly review audiologic management following referral.

We hope this review will encourage primary care physicians—the de facto gatekeepers of audiologic care—to play a more active role in improving the hearing of their adult patients.

## ■ HEARING LOSS IS COMMON

Most people with hearing impairment are 65 years of age or older. The prevalence of hearing impairment in older adults is estimated to be between 25% and 80% (the wide range is due to differences in sampling techniques).<sup>1,2</sup> Hearing impairment ranks third on the list of chronic health conditions of older adults, after arthritis and hypertension.<sup>3</sup> As the population continues to age and to live longer, the number of people with hearing loss will continue to rise.

But hearing loss is not only a problem of the elderly. More than 28 million Americans of all ages are thought to have some degree of hearing impairment.<sup>4,5</sup> Approximately 3 of every 1,000 babies are born with hearing difficulties.<sup>5</sup> Since 1994, more than 1 million “baby boomers” between ages 45 and 54 have acknowledged a hearing problem also requiring audiologic management.<sup>6</sup>

## ■ CONSEQUENCES OF HEARING LOSS

Although we define hearing loss as a loss of the ability to hear pure tones across the range of audio frequencies important for understanding speech, measurable with audiometry, we must also define it in terms of its personal and psychosocial consequences.<sup>7</sup>

Hearing loss can seriously affect a person's quality of life.<sup>8</sup> It limits the ability to perform certain functions, such as listening in a noisy, crowded restaurant. It restricts participation in social activities and can lead a person to withdraw from situations that require communication with others, including spouse, family, and friends.

The psychosocial effects of hearing loss should not be underestimated. People with hearing loss often show signs of withdrawal, cognitive loss, depression, social isolation, or psychosis.<sup>9,10</sup> The risk of dementia in older adults increases as a function of increasing hearing loss, even after adjusting for potentially confounding variables such as depression, medications, and age.<sup>11</sup> In fact, there is a greater risk of misclassification of the severity of senile dementia in people with undetected and unremediated hearing loss.<sup>12</sup> Even younger adults with mild hearing loss have reported a variety of psychosocial problems affecting everyday life.<sup>13</sup>

Family, friends, and coworkers may experience frustration, impatience, anger, pity, and guilt when interacting with a person with hearing loss.<sup>14</sup> These reactions are a source of stress in the relationship.

Hearing loss can also affect the physician-patient relationship and the patient's health, as it can lead to misunderstandings about the patient's diagnosis, prescribed treatment, including drug regimens, and other health care recommendations.

## ■ TREATMENT IMPROVES QUALITY OF LIFE

Sensorineural hearing loss, involving the cochlea (inner ear), cranial nerve VIII, or both, is permanent and is the most common type of hearing loss in older adults. It is one of the few chronic conditions for which, in most cases, there is no effective medical or surgical treatment. (Conductive hearing loss involves

the outer ear, middle ear, or both, and can be treated medically or surgically.) The primary treatment for sensorineural hearing loss is amplification devices, eg, hearing aids.

Hearing aids are unequivocally beneficial and cost-effective in both the short term and the long term.<sup>15-22</sup> A recent National Council on Aging study<sup>23</sup> of 2,069 people with hearing loss and 1,710 family members provides compelling evidence of the benefits of hearing aids, including improvement in emotional stability, interpersonal relationships, overall health, and cognitive function, and a reduction in anger, frustration, anxiety, social phobias, and depression.

## ■ BARRIERS TO RECOGNITION OF HEARING LOSS

Even though hearing loss is easily detected, and hearing aids improve quality of life,<sup>15,16</sup> only 16% of people age 65 and older—the age group most commonly affected by hearing loss—received a hearing screening during their last physical examination, according to a recent report.<sup>24</sup> Moreover, this number has declined by 28% in the past 10 years.

Primary care physicians are the gatekeepers of audiologic care, yet they are often unaware of or do not screen for hearing loss in their patients. Furthermore, in an elderly patient with multiple comorbid conditions, investigating hearing loss may take a back seat to management of life-threatening conditions.

To the physician, hearing loss is invisible: it cannot be seen, heard, or touched. It may not be noticeable in a quiet office environment and in one-to-one conversation.

Therefore, it is imperative that primary care physicians screen patients—especially those age 65 and older—for hearing loss, and refer them to an audiologist if hearing loss is suspected. Kochkin<sup>25</sup> showed that patients are more likely to undergo audiologic rehabilitation if their physician recommends it.

## ■ SCREENING FOR HEARING LOSS

One of the objectives of Healthy People 2010, a nationwide agenda for health promotion from the US Department of Health and Human Services,<sup>26</sup> is to increase the number of

**Up to 80%  
of elders have  
some degree  
of hearing loss**



**TABLE 1**

### **Hearing Handicap Inventory for the Elderly—Screening Version**

Answer each question “yes,” “sometimes,” or “no.”

Does your hearing problem cause you to feel embarrassed when meeting new people?

Does a hearing problem cause you to feel frustrated when talking to members of your family?

Do you have difficulty hearing when someone speaks in a whisper?

Do you feel handicapped by a hearing problem?

Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbors?

Does a hearing problem cause you to attend religious services less often than you would like?

Does a hearing problem cause you to have arguments with family members?

Does a hearing problem cause you difficulty when listening to TV or radio?

Do you feel that any difficulty with your hearing limits or hampers you personal or social life?

Does a hearing problem cause you difficulty when in a restaurant with relatives or friends?

**Scoring: 4 points for each yes, 2 points for each sometimes, 0 points for each no (possible total score = 40 points).**

**TOTAL SCORE \_\_\_\_\_ points**

**REFER if score is  $\geq 10$  points**

SOURCE: FROM VENTRY JM, WEINSTEIN BE. IDENTIFICATION OF ELDERLY PEOPLE WITH HEARING PROBLEMS. ASHA 1983; 25:37–42. COPYRIGHT BY THE AMERICAN SPEECH-LANGUAGE-HEARING ASSOCIATION. REPRINTED WITH PERMISSION.

persons referred by their primary care physicians for hearing evaluation and treatment. It further recommends a hearing screening for everyone in every decade from age 18 to age 50, with more frequent screenings after age 50.

To achieve these goals, primary care physicians need a screening tool that is quick, easy to use, and psychometrically robust (ie, highly sensitive and specific, with high positive and negative predictive values). Although simple screening tests such as the whispered voice test and the finger-rubbing test have been traditionally used as part of the physical examination, they are limited by their subjectivity. In addition, these two tests have poor test-retest reproducibility.<sup>27</sup>

These simple screening tests were designed to provide an estimate of hearing sensitivity. Yet for the purposes of screening, it may be more valid to assess the impact of the impairment rather than the degree of the impairment itself, since the ultimate goal is to ameliorate the handicap. Therefore, a number of self-report measures have been designed to ascertain the extent of the impact of hearing

loss on the patient’s day-to-day function.

#### **Hearing Handicap Inventory for the Elderly**

A screening tool that has gained widespread acceptance is the Hearing Handicap Inventory for the Elderly—Screening Version (TABLE 1).<sup>28,29</sup> This 10-question test is valid, repeatable, highly sensitive, and highly specific,<sup>30</sup> and it can be given in less than 2 minutes using a paper and pencil.<sup>31</sup>

**Scoring.** The patient responds to each question item with a “yes,” “sometimes,” or “no.” Each yes is worth 4 points, each sometimes is worth 2, and each no is worth 0. Possible scores range from 0 (no handicap) to 40 (maximum handicap). A score of 10 or more suggests a significant, self-perceived hearing handicap and should prompt a referral for complete hearing testing and rehabilitative management by an audiologist.<sup>32</sup>

Again, the Hearing Handicap Inventory for the Elderly screens for functional hearing handicap, not for physiologic hearing loss itself. To screen hearing loss directly, one must use a pure-tone screening measure.

**A score of 10 points or more is cause for audiologic referral**

TABLE 2

## Types, degrees, and configurations of hearing loss

## TYPE

Type describes the site of the lesion: outer ear, middle ear, inner ear, eighth cranial nerve, and central auditory pathways

- Conductive hearing loss involves the outer ear, middle ear, or both. It typically requires medical or surgical treatment, and generally is not a permanent loss.
- Sensorineural hearing loss involves the cochlea (inner ear), cranial nerve VIII, or both. It is permanent and is most common in older adults.
- Mixed hearing loss is the combination of conductive and sensorineural hearing loss.
- Central auditory disorders reflect either pathologic conditions or aging-related changes of the central auditory nervous system.

## MAGNITUDE

Thresholds for hearing pure tones provide insight into the severity of the hearing loss and are useful in determining if hearing aids should be recommended.

**A hearing loss of:**

0–25 decibels (dB)  
25–40 dB  
40–55 dB  
55–70 dB  
70–90 dB  
> 90 dB

**Indicates:**

Normal hearing sensitivity  
Mild hearing loss  
Moderate hearing loss  
Moderately severe hearing loss  
Severe hearing loss  
Profound hearing loss

## CONFIGURATION

The pattern of pure-tone hearing thresholds from low frequencies (250 Hertz [Hz]) to high frequencies (8,000 Hz) may be pathognomonic of certain otologic disease, eg, Meniere disease (fluctuating low-frequency loss), noise-induced hearing loss (reduction in hearing in the region of 4,000 to 6,000 Hz). The audiometric configuration also provides insight into the type of speech-understanding errors that patients may be experiencing.

- Flat—no more than a 20-dB difference across the frequencies
- Gradually sloping—falls from low frequency to high frequency at a rate of approximately 5 to 10 dB per octave
- Precipitously sloping—thresholds increase approximately 15 to 20 dB per octave
- Cookie-bite or trough—thresholds better at the low and high frequencies than in mid-frequencies

**No one questions the need for an eyeglass lens for each eye. For hearing aids, binaural is best**

## ■ THE STEPS OF AUDIOLOGIC MANAGEMENT

If you refer a patient to an audiologist, what can he or she expect?

### Step 1: Comprehensive audiologic assessment

First, the patient undergoes a comprehensive audiologic assessment to determine the type, magnitude, and configuration of the hearing

loss (TABLE 2). The assessment indicates whether the patient needs a medical consultation to investigate a potential medically or surgically treatable condition that is causing or contributing to the hearing loss. If not, he or she may proceed with selection and fitting of a hearing aid.

In certain situations, the US Food and Drug Administration requires an otologic evaluation by a licensed physician (preferably an otolaryngologist) before selection of a hearing aid.<sup>33</sup> These include:



- Visible congenital or traumatic deformity of the ear
- History of active drainage from the ear within the previous 90 days
- History of sudden or rapidly progressive hearing loss within the previous 90 days
- Acute or chronic dizziness
- Unilateral hearing loss of sudden or recent onset within the previous 90 days
- Audiometric air-bone gap equal to or greater than 15 dB at 500 Hz, 1,000 Hz, and 2,000 Hz
- Visible evidence of significant cerumen accumulation or foreign body in the ear canal
- Pain or discomfort.

### Step 2: Hearing aid evaluation

The hearing aid evaluation is conducted once the patient has received medical clearance: ie, is determined to be free of any medical conditions that would contraindicate the use of a hearing aid. During this appointment, the audiologist assesses the patient's communication needs and counsels him or her about the relative benefits and limitations of hearing aids and the options available.

Extensive counseling is required to determine the best amplification system for the patient, taking into consideration factors such as the degree of hearing loss, lifestyle, physical function, communication needs, and financial constraints. At a minimum, three important questions must be addressed during the evaluation:

**Should the patient use one or two hearing aids?** It is curious that no one questions the need for an eyeglass lens for each eye! Yet patients are often surprised to learn that they need a hearing aid for each ear. Most people receive maximum benefit from binaural amplification. Benefits of binaural hearing aids:

- Better hearing in noisy environments
- Enhanced "stereophonic" listening
- Improved directional hearing
- Possible prevention of further deterioration of the unaided ear
- Reduced fatigue, owing to easier hearing with both ears
- Reduced need to turn up the volume of the hearing aids, thereby reducing feedback (whistling).

## Hearing aid styles

Behind-the-ear



In-the-ear



In-the-canal



Completely-in-the canal



FIGURE 1

Some patients would not benefit from two hearing aids, however, owing to certain audiologic conditions (eg, extremely poor word recognition ability; profound hearing loss), while others may have a medical condition, such as active drainage, that might preclude the use of a hearing aid in the affected ear. In addition, some patients may not be able to afford two hearing aids.

**Which style of hearing aid best meets the patient's needs?** A variety of styles are available (FIGURE 1), including behind-the-ear, in-the-ear, in-the-canal, and completely-in-the-canal. The best style for a given patient depends on a number of factors—audiologic (severity of hearing loss, speech recognition ability, configuration of audiometric thresholds), physical (size and shape of the pinna or external auditory meatus, manual dexterity, upper arm mobility, touch sensation), and personal (cosmetic preference, cost)<sup>34</sup>—and should be the result of a mutual decision by the audiologist and patient.

**Which options are best for the patient?** Digital signal processing has become the standard technology used in hearing aids.<sup>35</sup> Digital signal processing offers advantages

**Newer digital signal processing offers significant advantages over earlier technology**

such as reduced noise and feedback, greater fine-tuning and fitting control, and smaller size, all of which contribute to improved sound reproduction, overall performance, and patient satisfaction.<sup>34,36</sup> Options available include:

- Directional microphones to enhance listening in background noise
- Noise-reduction processing, also to enhance listening in background noise
- Digital signal processing to enhance fine-tuning and fitting flexibility; it allows the use of complex signal processing
- Multiple frequency channels to enhance fine-tuning and feedback control
- Telecoils to facilitate telephone listening
- Volume control
- Multiple memories to provide different listening programs for different listening environments
- Remote control, for patients with problems with manual dexterity.

The features most appropriate for a specific patient depend on his or her degree of hearing loss, lifestyle, physical function, and communication needs. To help make these decisions, audiologists use tools such as the Hearing Aid Selection Profile<sup>37</sup> or the Client-Oriented Scale of Improvement.<sup>38</sup> The Client-Oriented Scale of Improvement, for example, asks the patient to rate the difficulty of various listening situations.

If a patient indicates that his or her greatest difficulty is hearing the television, then a basic hearing aid with few options may be all that is needed. Another option would be to use an assistive listening device. On the other hand, a patient who encounters a variety of listening situations and has high communication demands usually requires one with more options.

### Step 3: Fitting and follow-up

During the fitting appointment, the hearing aid is programmed to the specific listening needs of the patient. In addition, the patient is instructed about its care and maintenance and how to use all of its options. Much of the appointment is dedicated to reaffirming the need to have realistic expectations about the hearing aids, including dispelling four common myths, which we describe next.

## ■ COMMON MYTHS ABOUT HEARING AIDS

### Myth 1:

#### Hearing aids restore hearing to normal

Patients with hearing aids may continue to have difficulty hearing whispers, find noisy environments to be loud, and miss some sounds. A key role of the audiologist is to educate patients so that they have realistic expectations about improvements in their hearing.

### Myth 2:

#### Hearing aids eliminate all communication problems

Hearing aids are most effective in a quiet environment and in a one-on-one listening situation. They are less effective in noisy situations. In difficult listening environments, the patient will need to use strategies such as watching the talker's face.

### Myth 3: Hearing aids make speech clearer

The ability to recognize speech depends on adequate hearing sensitivity and distortion-free processing in the cochlea and central nervous system. Many people with sensorineural hearing loss experience a loss of both hearing sensitivity and clarity, resulting in decreased speech understanding.

While hearing aids can make sounds audible, they may not make sounds clearer. Patients need to rely on other communication strategies, including lipreading or a knowledge of the conversation topic. Many older patients have a concomitant slowing of cognitive and auditory function that affects their ability to process rapid speech independent of the hearing loss.

### Myth 4: Most people do not like how their own voices sound

Many people who use a hearing aid for the first time find that their own voices are also amplified, and some find this annoying. With time and further adjustments by the audiologist, this becomes less of a problem.

## ■ GETTING USED TO HEARING AIDS

After being fitted with hearing aids, the patient is asked to use them in day-to-day activities to

**The hearing aid is programmed to the needs of the individual patient**





see if it helps. The patient returns for a follow-up consultation within 2 to 3 weeks for further instruction, adjustments, and counseling. If within the first 30 days the patient decides that the hearing aids are not helping, they can be returned for a refund in most US states.

The period of acclimatization varies greatly from patient to patient. At The Cleveland Clinic, the audiologist sees the patient over the course of 1 year at no additional expense to the patient. This encourages patients to return for additional “fine-tuning” adjustments and further counseling as needed.

### ■ HEARING AIDS ARE NOT THE TOTAL SOLUTION

The dispensing of hearing aids is only one part of the audiologic rehabilitation process. Other parts that we work on are overall communication skills, the psychosocial aspects of hearing impairment, education of “significant others” (partners, family), hearing aid orientation, improving conversational and interactive skills, and the use of assistive devices. A comprehensive program may provide services to

patients on an individual, group, or combination basis.

Unfortunately, the lack of approved billable services and reimbursement restricts the offering of these other audiologic rehabilitation services, despite strong evidence that counseling-oriented audiologic rehabilitation increases the benefits derived from hearing aids.<sup>8,23</sup>

In addition, while hearing aids are quite effective in most situations, they are not as effective for hearing the television, telephone conversation, or events that take place in large areas, such as movie theaters and classrooms. These situations require the use of an assistive listening device, such as an infrared personal listening system for the television or an amplifier for the telephone receiver. These can be used alone or in conjunction with the patient’s existing hearing aids. In some cases, an alerting device such as a smoke alarm that emits a visual signal (strobe light) may be appropriate.

The audiologist will discuss the need for assistive listening devices and alerting devices when fitting the patient for hearing aids. ■

### ■ REFERENCES

1. Gates GA, Cooper JC, Kannel WB, Miller NJ. Hearing in the elderly: The Framingham cohort, 1983-1985. Part 1: Basic audiometric test results. *Ear Hear* 1990; 11:247-256.
2. Ciurlia-Guy E, Cashman M, Lewsen B. Identifying hearing loss and hearing handicap among chronic care elderly people. *Gerontologist* 1993; 33:644-649.
3. Adams P, Benson V. Current estimates from the National Health Interview Survey. National Center for Health Statistics. *Vital Health Statistics* 1991; 10:184.
4. National Institute of Deafness and Other Communication Disorders. National strategic research plan: Hearing and hearing impairment. Bethesda, MD: US Department of Health and Human Services, National Institutes of Health, 1996.
5. Yoshinago-Itano C, Sedey A, Coulter KD, Mehl AL. Language of early- and later-identified children with hearing loss. *Pediatrics* 1998; 102:1161-1171.
6. Kochkin S. “Baby boomers” spur growth in potential market, but penetration rate declines. *Hear J* 1999; 52:2-11.
7. Stephens D, Gianopoulos I, Kerr P. Determination and classification of the problems experienced by hearing-impaired elderly people. *Audiology* 2001; 40:294-300.
8. Crandall C. Hearing aids and functional health status. *Audiology Today* 1998; 10:20-23.
9. Valla AF, Sweetow RW. Psychology of individuals with hearing impairment. In: Sandlin RE, editor. *Hearing Aid Amplification*. San Diego, CA: Singular Publishing Group, 2000:557-570.
10. Weinstein BE. Hearing aids and the elderly: audiologic and psychologic considerations. In: Studebaker GA, Bess FH, Beck LB, editors. *The Vanderbilt Hearing-Aid Report II*. Parkton, MD: York Press Inc, 1991:261-267.
11. Uhlmann R, Larson E, Rees T, Koepsell T, Duckert L. Relationship of hearing impairment to dementia and cognitive dysfunction in older adults. *JAMA* 1989; 261:1916-1919.
12. Weinstein B, Amsel L. Hearing loss and senile dementia in the institutionalized elderly. *Clin Gerontologist* 1986; 4:3-15.
13. Newman CW, Jacobson GP, Hug SA, Sandridge SA. Perceived hearing handicap of patients with unilateral or mild hearing loss. *Ann Otol Rhinol Laryngol* 1997; 106:210-214.
14. Wayner DS, Abrahamson JE. The golden thread of hearing care: audiologic rehabilitation. *Hear J* 2001; 54:66-69.
15. Mulrow CD, Aguiler C, Endicott J, et al. Quality of life changes in hearing impairment: results of a randomized trial. *Ann Intern Med* 1990; 113:188-194.
16. Yueh B, Souza P, McDowell J, Bryant M, Loovis CF, Deyo R. Randomized trial of amplification strategies. *Arch Otolaryngol Head Neck Surg* 2001; 127:1197-1204.
17. Newman C, Weinstein B. The Hearing Handicap Inventory for the Elderly as a measure of hearing aid benefit. *Ear Hear* 1988; 9:81-85.
18. Mulrow C, Michael T, Aguilar C. Correlates of successful hearing aid use in older adults. *Ear Hear* 1992; 13:108-113.

**Some patients may require a visual alerting device at home, such as a strobe light smoke alarm**



19. **Mulrow C, Tuley M, Aguilar C.** Sustained benefit of hearing aids. *J Speech Hear Res* 1992; 35:1402-1405.
20. **Malinoff R, Weinstein B.** Measurement of hearing aid benefit in the elderly. *Ear Hear* 1989; 10:354-356.
21. **Weinstein BE.** Treatment efficacy: hearing aids in the management of hearing loss in adults. *J Speech Hear Res* 1996; 39:S37-S45.
22. **Newman CW, Sandridge SA.** Benefit from, satisfaction with, and cost-effectiveness of three different hearing aid technologies. *Am J Audiol* 1998; 7:115-128.
23. **Kochkin S, Rogin C.** Quantifying the obvious: the impact of hearing instruments on quality of life. *Hear Review* 2000; 7:6-34.
24. **Kochkin S.** The VA and direct mail sales spark growth in hearing aid market. *Hear Rev* 2001; 8:16-65.
25. **Kochkin S.** MarkeTrak III: why 20 million in US don't use hearing aids for their hearing loss. *Hear J* 1993; 46:20-27.
26. **US Department of Health and Human Services.** Healthy People 2010 Volume II. 2nd ed. Objective for Improving Health (Part B: Focus Areas 15-28). Washington, DC: January 2000. Available from [www.healthypeople.gov/publications](http://www.healthypeople.gov/publications).
27. **Yueh B, Shapiro N, MacLean CH, Shekelle PG.** Screening and management of adult hearing loss in primary care: scientific review. *JAMA* 2003; 289:1976-1985.
28. **Weinstein B.** Hearing screening in the elderly: what to do? *Amer Speech Hear Assoc Reports* 1992; 21:112-114.
29. **Ventry I, Weinstein B.** Identification of elderly people with hearing problems. *Am Speech Hear Assoc* 1983; 25:37-42.
30. **Lichtenstein M, Bess F, Logan S.** Validation of screening tools for identifying hearing impaired elderly in primary care. *JAMA* 1988; 259:2875-2878.
31. **McBride W, Aguilar C, Mulrow C, Tuley M.** Screening tests for hearing loss in the elderly. *Clin Res* 1990; 28:707A.
32. **Weinstein BE.** *Geriatric Audiology*. New York, NY: Thieme Medical Publishers Inc, 2000.
33. Code of Federal Regulations Title 21, Volume 8. Special requirements for specific devices. Washington, DC: US Government Printing Office, 2002 (21CFR801.421).
34. **Sandlin RE.** *Textbook of Hearing Aid Amplification*. 2nd ed. San Diego, CA: Singular Publishing Group Thompson Learning, 2000.
35. **Kirkwood D.** HJ Report. *Hear J* 2003; 56:6.
36. **Newman CW, Sandridge SA.** A review of research on digital signal processing. In: Valente M, editor. *Hearing Aids: Standards, Options, and Limitations*. 2nd ed. New York, NY: Thieme Publishing, 2002.
37. **Jacobson GP, Newman CW, Fabry DA, Sandridge SA.** Development of the Three-Clinic Hearing Selection Profile (HASP). *J Am Acad Audiol* 2001; 12:128-141.
38. **Dillon H, James A, Ginis J.** Client-Oriented Scale of Improvement (COSI) and its relationship to several other measures of benefit and satisfaction provided by hearing aids. *J Am Acad Audiol* 1997; 8:27-43.

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