

# Choosing a Self-Report Measure for Hearing Aid Fitting Outcomes

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## ABSTRACT

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A five-step guideline is presented for choosing a self-report measure to evaluate hearing aid outcomes. The steps are prioritizing goals, appreciating fundamentals, specifying essential features, limiting the choices, and selecting the best compromise. The rationale for each step is explained and potentially useful questionnaires are suggested where appropriate. A simple example is used to illustrate the process.

**KEYWORDS:** Hearing aid, subjective, questionnaire, hearing loss, outcomes

**Learning Outcomes:** As a result of this activity, the reader will be able to (1) identify the steps in choosing an appropriate self-report measure and (2) list three self-report measures currently available for measuring hearing aid outcomes.

Presently, there is considerable pressure for hearing aid dispensers to evaluate the hearing care they provide using some form of patient-centered outcome measure. The patient's opinion about the value of the treatment (devices, associated counseling, and other services) is regarded as a highly significant indicator of treatment excellence. Measuring the patient's opinion in a systematic way involves use of a self-report measure. This could be achieved with a face-to-face interview, but because of practical and theoretical considerations, it is usually done with a self-administered

standardized questionnaire. Thus, practitioners are faced with the task of selecting a suitable questionnaire. In this undertaking, they may identify a bewildering array of potential choices (e.g., see Table 4.2 in Noble<sup>1</sup> or Table 1 in Bentler and Kramer<sup>2</sup>). However, in its application to amplification, the science of self-report is still evolving, and there are no clear guidelines about how to select an instrument to collect these important data. This article describes a five-step approach to choosing a self-report outcome measure for application in hearing health care. In the process, some of the

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**Table 1 Applications of Self-Report Data That Relate to Improving Individual Hearing Aid Fittings**

1. Measure the benefit of the fitting.
2. Diagnose problems or fine-tune the fitting.
3. Predict fitting success (from prefit measures).
4. Evaluate success of fitting compared with norms.
5. Compare different hearing aids.
6. Find out whether you have helped the patient with his or her problems.

considerations that need to be addressed are presented.

### STEP 1: PRIORITIZING GOALS

The first step in choosing an outcome measure is to prioritize goals. The practitioner must answer the question, "What do I want the data to do for me?" There is a wide diversity of potential functions for self-report data, and narrowing them down to the most important two or three can be quite a challenge. This is essential, however, because your goals for the data have an important impact on the questionnaire or questionnaires you select.

To illustrate this point, Table 1 lists several goals. All of them relate to improving individual hearing aid fittings, yet each goal might be best served using a different questionnaire. To achieve goal 1 in Table 1 (measure the benefit of the hearing aid fitting), it is necessary to determine how much that fitting has reduced the activity limitations or participation restrictions that are experienced by the patient without amplification. Although many existing questionnaires can be used for this, it is efficient to use a questionnaire that produces a direct measure of benefit, such as the Hearing Aid Performance Inventory (HAPI) by Walden et al.<sup>3</sup> However, if the goal is to diagnose problems with the fitting (goal 2), a

questionnaire is needed that produces scores for several dimensions of experience, such as sound quality, loudness of environments, and fit and comfort. There are not very many available questionnaires for this purpose, so it may be necessary to use more than one (e.g., the Profile of Aided Loudness [PAL]<sup>4</sup> or the Amsterdam Inventory<sup>5</sup>). To achieve goal 3 (predicting fitting success before the fitting), variables need to be measured that are available before the fitting, such as unaided hearing problems (e.g., Hearing Handicap Inventory for the Elderly [HHIE]<sup>6</sup>) or expectations about hearing aids (e.g., Expected Consequences of Hearing Aid Ownership [ECHO]<sup>7</sup>). Goal 4 calls for an evaluation of the fitting by comparing it with other similar fittings. This requires a questionnaire for which norms that are relevant to your population have been published. A potentially useful instrument for this goal would be the International Outcome Inventory for Hearing Aids (IOI-HA).<sup>8</sup> If your plans call for systematic comparisons of different hearing aids (goal 5), you require a questionnaire that provides critical differences<sup>9</sup> to facilitate interpretation of differences between scores (e.g., the Abbreviated Profile of Hearing Aid Benefit [APHAB]<sup>10</sup>). Finally, goal 6 implies that your main focus is on the hearing-impaired patient and whether you have addressed his or her real-life concerns. This emphasis may be well served using a personalized questionnaire such as the Client Oriented Scale of Improvement (COSI).<sup>11</sup>

Keep in mind that although self-report data have important applications in optimizing individual fittings, they also are valuable indicators in service of more general objectives. Some of these are listed in Table 2. Note that goals 1 through 5 in Table 2 have a more global focus than the goals in Table 1. Achieving these goals can call for additional considerations. For example, if you wish to evaluate the success of

**Table 2 Applications of Self-Report Data That Relate to Global Objectives**

1. Assess the success of your practice overall.
2. Compare the effectiveness of services in a given year with previous years.
3. Determine whether new technologies or management programs seem to improve effectiveness.
4. Provide documentation of fitting quality to a third-party payer.
5. Provide documentation of performance excellence for administrators.

your practice overall (Table 2, goal 1), it might be necessary for several audiologists in your practice to administer the self-report questionnaire that you choose. In this case, you have to ensure that all the stakeholders are convinced of the feasibility and merit of the questionnaire. For goal 2 or 3 (Table 2), it is especially important to be able to accumulate data conveniently across groups of patients. For goal 4 or 5 (Table 2), the best approach might be an indicator of overall outcome such as the Satisfaction with Amplification in Daily Life (SADL) scale.<sup>12</sup>

Tables 1 and 2 illustrate the diversity of potential goals for self-report data. It is probably possible to accommodate several major objectives in your outcomes program.

## STEP 2: APPRECIATING FUNDAMENTALS

In step 2, the features of self-report measures are considered. These measures share several characteristics that can usefully be divided into technical and practical elements. The practical elements of a questionnaire encompass pragmatic issues that influence everyday success in employing the questionnaire. The technical elements include the data-based aspects of the measure that are recorded in the published literature or the manual that comes with the questionnaire. Some important elements are listed in Table 3.

The clinician burden encompasses the challenges for the practitioner in learning about and using the questionnaire. Does administer-

ing it and interpreting it require a 3-day instructional course, a 5-minute online tutorial, or something in between? If there is not adequate time and opportunity available to learn about the questionnaire, it cannot be used optimally and even may become a negative influence. In addition, it is important to consider the space demands. Will you need a quiet room for the patient or can the questionnaire be completed in the waiting area? Can these requirements be accommodated in your particular setting?

The patient burden refers to the difficulty encountered by the patient in reading, understanding, and completing the items of the questionnaire. The reading level and cognitive level of both items and instructions should be considered. What is suitable for one clinic population may not work in another. Also, assess how hard it will be for the patients physically to complete the questionnaire. For example, some self-report measures have been developed specifically for internet administration. This can be very convenient for the practitioner but may present a hurdle for the patient who lacks knowledge or confidence about computers. Many older patients are intimidated by computers. To help them concentrate on the task, they may need the opportunity to complete a paper-and-pencil questionnaire.

Scoring for a questionnaire in a clinical setting needs to be convenient, quick, and objective. Automated scoring is preferred but not always available. This can be accomplished through direct keyboard entry by the patient, or (more typically) the practitioner can key in answers from a completed paper-pencil measure. Computer-based scoring has at least three advantages: (1) the scores are obtained quickly and accurately; (2) comparison with norms, previous sessions, and so on can be accomplished readily; and (3) a database of patient records can be built up without additional effort or time.

The utility of the questionnaire relates to the extent to which the data it yields are relevant and useful for planning and counseling for the individual patient. It has been reported that a clinician is more likely to devote the time needed to administer a self-report measure

**Table 3 Fundamental Characteristics of Self-Report Measures**

### Practical Elements

- Clinician burden
- Patient burden
- Scoring
- Utility

### Technical Elements

- Norms
- Reliability
- Validity
- Sensitivity

if there is an immediate return on the time invested.<sup>13</sup> Therefore, even when the first priority of your outcomes program does not concern optimizing fittings for each individual (for instance, when your goal is to document service effectiveness overall), the data will be accumulated with more enthusiasm when the scores are helpful and relevant to the practitioner.

One of the most valuable technical aspects of a questionnaire is the availability of published normative data for relevant comparison groups. Norms provide the practitioner with interpretation guidelines. Patients are also intensely interested in weighing their own responses against those of others who are comparable to them in some key respect. Interesting normative groups include individuals of similar age who have age-normal hearing, other hearing aid wearers, or even young normal hearers (who provide a gold standard).

Reliability is the empirically determined consistency of responses across different tests and different testers. This is a critical technical issue from the point of view of the practitioner. To interpret responses obtained on a given occasion or with a given device, it is essential to know the extent to which you could expect the patient's response to items to vary on a purely chance basis from one time to the next (patients do not normally give exactly the same responses on successive test administrations). Test-retest data can provide interesting statistically based values such as critical differences (CDs).<sup>9</sup> CDs provide a data-based way to interpret differences in scores from the same individual. Perhaps the same questionnaire has been given to the patient under two amplification conditions or on two occasions over time. You may want to make an informed decision about whether a difference in scores is likely to be a chance occurrence or indicative of a true change in the patient's opinion. You must have critical differences for the questionnaire to make this determination.

A questionnaire with high validity is one that truthfully measures what it purports to measure. There are several recognized and distinguishable outcome domains that are important in hearing aid fitting.<sup>14</sup> They include, for example, benefit, satisfaction, and use. Results

for a given individual usually differ somewhat across outcome domains, so it is important to know which outcome domains are measured by the questionnaire and to make sure that these are the domains you wish to target. A preliminary estimate can be made on the basis of the content of the items. In addition, validity evidence should show that the questionnaire produces scores with sensible and predictable relationships with other outcome measures that reputedly measure the same domain.

A final technical issue that should be considered is the sensitivity of the questionnaire. This is its ability to detect changes that are meaningful and interesting to you. Such changes might include, for example, differences in benefit between a monaural fitting and a binaural fitting or differences in satisfaction between an older device and a new high-technology device. Sensitivity varies as a function of the selection of items, the outcome domain, and, especially, the number of items. Do not expect a short questionnaire to be able to detect small differences on an individual basis. The size of the critical differences is an indicator of the sensitivity of the questionnaire for individual patients. If it is not sensitive enough to detect the changes you are interested in, it is not of much use to you, even though it might have other desirable features.

### STEP 3: SPECIFYING ESSENTIAL FEATURES

Now that you have prioritized your goals, made a short list, and considered the features, both technical and practical, of self-report questionnaires, you need to decide which features of self-report measures are essential for achieving *your* goals in *your* setting. This step can be explained most readily using an example. Assume that you work 1 day a week with older adults in an assisted living facility and that any questionnaire you choose must be administered in your absence by a nonaudiologist nurse. Your goal for the self-report program is to document fitting outcomes for a third-party payer, as required by their protocol, so that you can be reimbursed for the hearing aid fittings. Based on this, you may decide that you require the features shown in Table 4.

**Table 4 Example of Selected Essential Features to Achieve High-Priority Goals in a Particular Work Setting**

Required	Don't Care
Easy for patient and nurse	Time—up to 30 minutes
Automated (or easy) scoring	No need for critical differences (CDs)
Norms for elderly hearing aid wearers	Utility

Table 4 shows a short list of required features and another short list of “don’t care” features that you have decided are not relevant for you at this time. Among the required features, it is important that the burden on patients is low. The patients may have health problems and may be cognitively compromised, so the reading level and cognitive demands are your first priority. Also, the questionnaire should be self-explanatory because the administering nurse cannot provide audiological expertise. You want automated scoring so that the nurse can key in the responses from the paper-and-pencil form and then print out the results for your examination during your next visit to the facility. It is also important that there are published norms for elderly individuals wearing hearing aids so that you can establish how each patient’s outcomes compare with those of the typical person of the same age. This gives you access to convincing documentation about the effectiveness of the fitting.

The administration time of the questionnaire is not a critical feature in this scenario because the patient is going to have at least 30 minutes to complete the questionnaire. This means you can select a questionnaire with 20 to 30 items if you wish (depending on their difficulty). There are many choices in that range. Because you will not be comparing outcomes for different hearing aids on these patients, you may not require published critical differences. Also, because your main interest is in documenting effectiveness rather than modifying the fittings, the immediate utility of the scores may not be a central concern.

This is a simplified example. It is intended to demonstrate the process of specifying which features are essential, and which are not, for accomplishing the defined goals in a specific setting.

#### STEP 4: LIMITING THE CHOICES

At this point, you have generated a prescription for the self-report questionnaire. The next step involves evaluating existing questionnaires to determine which comes closest to meeting all the requirements. The first challenge is to identify potential questionnaires. This can be done most readily and comprehensively using online databases (e.g., PubMed), search engines (e.g., Google), and Web sites maintained by researchers and hearing care providers. This initial review should be based on a list of readily determined descriptive features that you generate on the basis of your analysis in step 3. For example, the illustration in Table 4 might lead to the following list of descriptive requirements for your questionnaire:

- Standardized format (i.e., all users receive the same list of questions)
- Available in English
- Thirty or fewer items
- Suitable for paper/pencil self-administration by older adults
- Items address hearing aid outcomes

Based on this list, select no more than four to six questionnaires to evaluate further. Now obtain a copy of each questionnaire that seems potentially useful in your setting and read the items and instructions carefully. Ask yourself whether this content seems suitable for your patients’ particular circumstances. You might eliminate some questionnaires at this point because the items or instructions do not seem appropriate. For example, suppose that you generate the following list of questionnaires to evaluate based on the descriptive requirements listed above: APHAB, SHAPIE, HHIE, IOI-HA. When you read the items, you will discover that the SHAPIE<sup>15</sup> describes some specific listening situations (e.g., “riding in a

**Table 5 Report Card for APHAB Questionnaire**

Features	Poor	Fair	Good	Very Good
Burden	√(Pt)	√(Clin)		
Scoring				√
Utility			√	
Norms				√
CDs				√
Problem sensing			√	
Device sensing		√		

APHAB, Abbreviated Profile of Hearing Aid Benefit; Pt, patient; Clin, clinician; CDs, critical differences.

crowded bus . . . in conversation with a stranger seated next to you”) that might not be experienced by many of your patients in the assisted living facility. Eliminating the SHAPIE from your list results in three options remaining.

Now that you have a short list of possibilities, review the technical information that is published (journals, magazines, Web sites, manuals) about each questionnaire so that you can compare them. It is useful to prepare a report card on each questionnaire such as those illustrated in Tables 5,6 and 7. In the first column, the report card lists some of the features of questionnaires (add or delete features to suit your setting). Each feature is scored on a scale of “poor” through “very good,” based on the information you obtain about the questionnaire. The grades assigned to each questionnaire in this article might not be the same as those you would assign after reviewing the information about the questionnaire yourself.

Table 5 shows an example of a report card for the APHAB questionnaire.<sup>10,16</sup> This is a

**Table 6 Report Card for HHIE Questionnaire**

Features	Poor	Fair	Good	Very Good
Burden				√√
Scoring			√	
Utility		√		
Norms		√		
CDs	√			
Problem sensing				√
Device sensing	√			

HHIE, Hearing Handicap Inventory for the Elderly; CDs, critical differences.

**Table 7 Report Card for IOI-HA Questionnaire**

Features	Poor	Fair	Good	Very Good
Burden				√√
Scoring				√
Utility	√			
Norms				√
CDs	√			
Problem sensing			?	
Device sensing		?		

IOI-HA, International Outcome Inventory for Hearing Aids; CDs, critical differences.

24-item questionnaire that measures performance in everyday situations for unaided and/or aided listening, using a seven-point response scale.

- The feature labeled Burden encompasses both clinician and patient burden, so there are two grades. The questionnaire was given a grade of “fair” for clinician burden because proper use of the instrument calls for investment of time (a couple of hours) to study the administration and interpretation. The grade for patient burden is “poor” because some items are written so that a high score means few problems whereas for other items a high score indicates many problems. This aspect of the questionnaire makes it difficult for some patients to complete correctly, although appropriate instructions by the clinician can alleviate this difficulty.
- On the feature of Scoring, the APHAB was given a “very good” grade because there is readily available software that quickly computes the scores.
- Under Utility, the APHAB was given a grade of “good” because the scores provide immediate guidance about how to improve the fitting and/or counsel the patient.
- The APHAB was given grades of “very good” for both Norms and Critical Differences because data are published for both features.
- The last two features (Problem sensing, Device sensing) reflect two types of sensitivity. A questionnaire that receives a high grade for problem sensing is one that shows the extent to which the wearer’s problems have been solved by amplification (even

though the hearing aid might not be the best possible fitting). A questionnaire that receives a high grade for device sensing is one that is well suited for showing differences between hearing aids (even though the devices might not solve many of the wearer's problems). Considering published data and item wording, the APHAB was given a "good" grade for problem sensitivity and a "fair" grade for device sensitivity.

Based on this report card, the APHAB would not be an ideal choice for the example illustrated in Table 4 because it obtained relatively low grades for patient and clinician burden. Thus, it does not fulfill the requirement of being easy for the patient and the nurse.

Table 6 shows an example of a report card for the HHIE questionnaire.<sup>17,18</sup> This is a 25-item questionnaire that measures problems in everyday life for unaided and/or aided listening, using a three-point response scale.

- The grades for clinician and patient burden are both "very good." The HHIE is easy to learn to use and to complete.
- The grade for scoring is "good" because, although there is no automated scoring, there are only three response categories (scored 0, 2, and 4 points) and the total score for 25 items can be mentally computed quite easily.
- The grade for utility is "fair" because the scores provide some guidance about the patient's counseling needs but are not much help in improving the fitting.
- The grade for norms is "fair." There are many published studies that report hearing aid outcomes measured with the HHIE, but there are no published norms. The user would need to establish comparative standards based on existing publications.
- The grade for critical differences is "poor." There are very limited data on test-retest reliability or CDs for the HHIE as a hearing aid outcome measure.
- The grade for problem sensitivity is "very good," and this is the major strength of the HHIE. However, the grade for device sensitivity is "poor" because the HHIE is not sensitive to differences between hearing aids.

Based on this report card, the HHIE would not be an ideal choice for the example illustrated in Table 4 because there are no published norms for hearing aid wearers.

Table 7 shows an example of a report card for the IOI-HA questionnaire.<sup>8,19</sup> This is a seven-item questionnaire that measures hearing aid fitting outcomes, using a five-point response scale.

- The grades for patient and clinician burden are both "very good." The IOI-HA is very easy for clinicians to learn and for patients to complete. Patients appreciate the comprehensiveness of the items and seldom leave them blank.
- The grade for scoring is also "very good" because there are only seven items (scored 1 to 5). Each item is usually considered separately. In addition, the overall score can be computed mentally without difficulty.
- The grade for utility is "poor" because the score does not point to specific guidelines for improving the fitting.
- The grade for norms is "very good" because these are published.<sup>8</sup> If the norms are used, it is necessary to supplement the original seven items with one additional item.
- The grade for critical differences is "poor" because no relevant data are yet available on this relatively new instrument.
- The sensitivity of the IOI-HA has not been established. However, tentative grades for problem and device sensitivity have been determined from existing research.<sup>20,21</sup>

Based on this report card, it appears that the IOI-HA might be a reasonable choice for the example situation illustrated in Table 4. The three critical features (burden, scoring, and norms) all received very good grades. However, the reliability of this questionnaire has not been reported.

## STEP 5: SELECTING THE BEST COMPROMISE

As the analysis shown in Tables 5,6 and 7 illustrates, the perfect questionnaire might not be found. Nevertheless, reasonable choices are available and your selection should be based on

a consideration of the best compromise for your situation. If you have resources and time, you could make a valuable contribution to the field by collecting and publishing data to improve or refine a questionnaire or to generate norms that will make it more applicable to a wider range of patients.

It is essential to take time to learn about the questionnaire you have selected. Ascertain how and why it was developed and how the developers recommend that it should be used. Also read articles that illustrate the use of the questionnaire with various groups of patients. Finally, use it enough yourself to become familiar with it and to acquire first-hand knowledge about it. Clinicians are very busy people, and there is a tendency to abandon activities that do not immediately perform as expected. Even if you are not fully satisfied with the questionnaire at the outset, persevere long enough to get responses from at least 20 to 30 patients. During this process, you will accumulate insights into the value of the items and the scores for you and your patients. At that point, you will have enough experience to determine whether it meets your needs.

### ABBREVIATIONS

APHAB	Abbreviated Profile of Hearing Aid Benefit
CDs	critical differences
HHIE	Hearing Handicap Inventory for the Elderly
IOI-HA	International Outcome Inventory for Hearing Aids
PAL	Profile of aided loudness
SHAPIE	Shortened Hearing Aid Performance Inventory for the Elderly

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