Update on self-report measures in hearing aid provision.

Robyn M. Cox
University of Memphis
Memphis, TN
Presented at ASHA Convention, November, 2008
Practitioners increasingly are using self-report in their fitting process.

Why are they doing it?
Modern hearing care is patient-driven, consultative, and evidence-based.

The patient’s opinions are:
1. a positive input to the process, &
2. valid and important evidence of the success of the treatment.
• Some newer self-report outcome measures that have been developed.

• Learning about the patient using self-reports before the fitting.

• The use of generic quality of life measures for hearing aid outcomes.
Newer self-report outcome measures
The Table includes 33 standardized measures with examples, norms and references.

<table>
<thead>
<tr>
<th>Test</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hearing Aid Needs Assessment (HANA)</strong></td>
<td>To examine relationships between perceived communication needs with actual benefit eventually achieved with hearing aids. Schum (1999)</td>
</tr>
<tr>
<td>- 11 items, three ratings per item: 1) How often (hardly ever, occasionally, frequently) 2) How much trouble (very little, some, very much) 3) How much help expected (very little, some, very much)</td>
<td>(Ratings for how often, how much trouble, and how much help expected)</td>
</tr>
<tr>
<td>- Normed on 82 adults (54 male, 28 female; 25 previous users, 57 new users)</td>
<td></td>
</tr>
<tr>
<td><strong>Hearing Aid Performance Inventory (HAPI)</strong></td>
<td>To assess effectiveness of amplification in a variety of listening situations. Walden, Demores</td>
</tr>
<tr>
<td>- 64 items, based on 12 bioplars features (e.g., visual clues present/absent)</td>
<td>Example: You are alone at home talking with a friend on the telephone. (5 point scale: “very helpful” → “hinders performance”)</td>
</tr>
<tr>
<td>- Normed on 128 hearing aid users (119 men, 9 women)</td>
<td></td>
</tr>
</tbody>
</table>
• Intended to fill a specific need not met in existing pre-2000 measures.

• Clinically useful length – 30 items or less.

• Intended for use in HA provision

• In English
Self-report outcome measures - New millennium developments

- IOI-HA and norms
- DAHA
- EAR
- APHAB norms
- DOSO
Developed because researchers use too many different questionnaires → impossible to compare studies.

Encourage addition to research projects.

Goals:
- brief – few items
- widely applicable questions
- translations into other languages
Even though it was developed for research......

The IOI-HA has become very popular in clinical settings.
IOI-HA: International Outcome Inventory for Hearing Aids

- There are 7 items in the IOI-HA questionnaire, each one for a different outcome “domain”.

A typical item

2. Think about the situation where you most wanted to hear better, before you got your present hearing aid(s). Over the past two weeks, how much has the hearing aid helped in those situations?

- helped not at all
- helped slightly
- helped moderately
- helped quite a lot
- helped very much

[Blank box for each option]
Seven outcome domains

- Use
- Benefit
- Residual Limitations
- Satisfaction
- Participation Restrictions
- Impact on others
- Quality of life
IOI-HA: International Outcome Inventory for Hearing Aids

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A typical item

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<th>helped not at all</th>
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<th>helped moderately</th>
<th>helped quite a lot</th>
<th>helped very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>□</td>
<td>□</td>
<td>X</td>
<td>□</td>
</tr>
</tbody>
</table>

• You need to add an 8th item if you want to use the norms.
• The 8th item asks about subjective hearing problems.
8. How much hearing difficulty do you have when you are not wearing a hearing aid?

- severe
- moderately-severe
- moderate
- mild
- none
IOI-HA norms for individual clients are the middle 50% of the data.
Pros & Cons of IOI-HA

- Short and sweet – patients like it.
- Excellent big picture evaluation.
- Good by mail or while in waiting room.
- Norms are available.
- Very low-tech.
- Sensitivity & consistency not known.
- Download it and norms at www.ausp.memphis.edu/harl.
DAHA: Dynamic Assessment of Hearing Aids  
(Baird et al, 2008)

WHAT’S NEW?

• Developed
  – to use visual analogue scaling
  – to promote simultaneous evaluation of different aspects of an outcome focus area such as “communication”.
  – to capitalize on potential advantages of maintaining an online database for instant evaluation of a patient’s outcomes.
What’s visual analogue scaling?

Example:
“Draw an X on the line to show how bad your pain is”

Unbearable

X

None at all
DAHA: Dynamic Assessment of Hearing Aids

• Uses visual analogue scaling (VAS) to obtain HA satisfaction ratings in 4 focus areas:
  – communication, physical features, sound quality, personal reaction.

• Possible advantages of VAS re paper/pencil: more sensitive & accurate, more engaging & “high-tech”.

• Employs a graphical computer interface.

• Database (N>700) allows immediate visual comparisons with other patients with similar demographics.
The patient works with this screen.
Comparison with other patients from the database

COMMUNICATION

PHYSICAL FEATURES

SOUND QUALITY

PERSONAL REACTION
Comparison with same patient at another time

COMMUNICATION

SOUND QUALITY

PHYSICAL FEATURES

PERSONAL REACTION
Pros & Cons of DAHA

- Has upscale appeal.
- Potential availability of large database for assessment and counseling.
- Must be purchased/licensed. Will soon be available. Site license $250.
- Contact them at Psychologicalapplications.com
- Development was supported by an SBIR grant from NIDCD (R44 DC005748-02A2).
WHAT’S NEW?

• Developed because existing scales did not sufficiently address 3 issues that often result in HA rejection:
  – comfort,
  – convenience
  – cosmetics.

• Goals included brevity, and low difficulty for patient.
There are 2 modules

- **Inner EAR** – intrinsic hearing issues that can be measured with or without a hearing aid.

- **Outer EAR** – extrinsic issues that are associated with the use of a hearing aid.

- Each module has 10 items scored as 0-100.
### Example of EAR modules

#### Items from Inner EAR

<table>
<thead>
<tr>
<th>Question</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over the past 2 weeks, how would you rate your ability to understand:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>what family and close friends are saying?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>speech in a quiet room?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>what is said by those at your table in a crowded restaurant?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>what you want to hear, and filter out unwanted noises?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

#### Items from Outer EAR

<table>
<thead>
<tr>
<th>Question</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over the past 2 weeks when you wear your hearing aid(s), how would you rate:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the quality of your own voice?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>how natural your hearing aid(s) sound?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>the physical comfort of your hearing aid(s) after wearing them for a while?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>the convenience of your hearing aid(s)?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>its dependability?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Pros & Cons of EAR

- Not much published about it so far.
- To get a copy, contact the authors.
- Appears to be easy for the patient.
- Inner EAR is not very different from other questionnaires.
- Outer EAR addresses comfort, convenience and cosmetics.
- Norms under development.
APHAB was originally published in 1995 (Cox & Alexander).

It is a 24-item questionnaire in which patients report the frequency of problems with communication or noises in various everyday situations.

The APHAB produces scores for 4 subscales: Ease of Communication (EC), Reverberation (RV), Background Noise (BN) and Aversiveness of Sounds (AV).

- EC, RV and BN describe speech understanding in different listening environments.
- AV describes negative reactions to environmental sounds.
What’s New?

New APHAB norms were determined using wearers of new digital hearing aids.
Why new norms for the APHAB?

• Original norms for the APHAB were published in 1995 based on the linear/peak-clipping HAs of that era.

• Since then digital processing HAs with WDRC, DNR, DM, etc., have become the norm.

• Today’s hearing aids typically include these features.

• Are the 1995 norms still applicable?

• So we developed new norms with the collaboration of several private practice audiologists.........
APHAB norms are in percentiles

95% of group report fewer problems than this

5% of group report fewer problems than this
1995 & 2005 norms for EC unaided

\[ r = .99 \]

**EC**

1995: N = 55
2005: N = 110

**Plot:**
- **Y-axis:** Mean EC Score
- **X-axis:** Norm percentile
- **1995:** Diamond markers
- **2005:** Square markers
1995 & 2005 norms: aided

**EC**
- 1995: N = 55
- 2005: N = 111
- $r = .99$

**RV**
- 1995: N = 55
- 2005: N = 107
- $r = .99$

**BN**
- 1995: N = 55
- 2005: N = 109
- $r = .99$

**AV**
- 1995: N = 55
- 2005: N = 108
- $r = .98$
Conclusions

• Responses for the Aversiveness of Sounds subscale were significantly different for the two groups.

• Aversiveness is lower with new digital hearing aids.

• For the speech communication subscales, APHAB norms for users of digital HAs are not different from those determined years ago with linear analog HAs.
This does not mean there has been no improvement over time. Use has increased.

1995: 43% successful

2005: 82% successful
For the speech communication subscales, it doesn’t matter which norms you use when you interpret responses to the APHAB.

For the AV subscale, you should use the 2005 norms for modern hearing aids.

Both 1995 and 2005 norms are available in the APHAB module in the NOAH3 software.
Work at HARL has shown that responses to many existing questionnaires are influenced by patient personality.

This means that the these questionnaires are not optimally sensitive to differences between hearing aids.

This probably accounts for some of the disconnect often observed between subjective and objective outcomes.

The DOSO is being developed in an attempt to create an outcome measure that is less dependent on patient personality.
WHAT’S NEW?
A new way to look at outcomes..
There are two components (or major categories) of outcomes
Wearer-Oriented
Wearer-oriented Items

• “Do you feel about...?”
• “How well are you able to...?”
• “Do you have problems with...?”
Device-oriented
Device-Oriented Items

• “How does the hearing aid do...?”
• “How well does the hearing aid...?”
• “How much does the hearing aid...?”
Wearer-oriented outcomes show the extent to which the treatment has relieved the patient’s problems in daily life. These are associated with personality.

Device-oriented outcomes show differences between two types of fittings or hearing aids. These are independent of personality.

Item wording is key.
Description of the DOSO

- 28 items
- Six subscales
  - Speech Cues (7).
  - Listening effort (5).
  - Pleasantness (4)
  - Quietness (5)
  - Convenience (4)
  - Use (3)
Two subscales each have 2 equivalent forms:

- Speech Cues
- Listening effort

And these account for most of the outcome variance.

So another way to use the DOSO is to combine these forms to give a 24-item questionnaire with 2 subscales.
Pros & Cons of DOSO

- Not published, but hopefully soon.
- Not fully ready for clinical use yet.
- Appears to be easy for the patient.
- Norms under development.
- Has the potential to be better than most existing questionnaires at discriminating between different types of hearing aids or fittings.
# Summary of new outcome measures

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>What’s new?</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOI-HA</td>
<td>Comprehensive and fun for patient</td>
</tr>
<tr>
<td>DAHA</td>
<td>Upscale method and large online database</td>
</tr>
<tr>
<td>EAR</td>
<td>Addresses comfort, convenience and cosmetics</td>
</tr>
<tr>
<td>APHAB</td>
<td>Norms for new technology devices</td>
</tr>
<tr>
<td>DOSO</td>
<td>More sensitive to differences between fittings (?)</td>
</tr>
</tbody>
</table>
Learning about the patient
Learning about the patient

• We can use self-report measures before the fitting to learn about the patient’s personality.

• Helps us customize the fitting procedures, anticipate problems, and refine counseling methods for this patient.
Why measure personality?

- Personality plays a big part in the patient’s interactions with the hearing aid, and with you.
- Knowledge about a patient’s personality can:
  - help you interpret his/her self-reports about hearing.
  - inform planning for counseling and treatment.
Many pre-fitting self-reports have a personality component
Outcome self-reports also have a personality component

- **Device**
  - Personality: 2%
  - Hearing loss: 8%

- **Success**
  - Personality: 10%
  - Hearing loss: 15%

- **Acceptance**
  - Personality: 5%

% variance accounted for
Five personality dimensions relate to:

- Intellect
- Power
- Affect
- Love
- Work
We know that subjective outcomes are associated with these three dimensions:

- Intellect
- Power
- Affect
- Love
- Work
There are lots of ways to measure the 5 personality dimensions

• Online – instant scoring
• Paper & pencil
• Fast completion of the tests
• Not offensive
Mini-Markers, Saucier (1994)

How Accurately Can You Describe Yourself?

Please use this list of common human traits to describe yourself as accurately as possible. Describe yourself as you see yourself at the present time, not as you wish to be in the future. Describe yourself as you are generally or typically, as compared with other persons you know of the same sex and of roughly your same age. Before each trait, please write a number indicating how accurately that trait describes you, using the following rating scale:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Inaccurate</td>
<td>Very Inaccurate</td>
<td>Moderately Inaccurate</td>
<td>Slightly Inaccurate</td>
<td>Neither Inaccurate nor Accurate</td>
<td>Slightly Accurate</td>
<td>Moderately Accurate</td>
<td>Very Accurate</td>
<td>Extremely Accurate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Bashful</th>
<th>Energetic</th>
<th>Moody</th>
<th>Systematic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Bold</th>
<th>Envious</th>
<th>Organized</th>
<th>Talkative</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Careless</th>
<th>Extraverted</th>
<th>Philosophical</th>
<th>Temperamental</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Cold</th>
<th>Fretful</th>
<th>Practical</th>
<th>Touchy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
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<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Complex</th>
<th>Harsh</th>
<th>Quiet</th>
<th>Uncreative</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Personality impacts the patient’s reaction to treatments

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Related to patient’s….</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affect</td>
<td>level and scope of distress</td>
</tr>
<tr>
<td>Power</td>
<td>enthusiasm and expressiveness</td>
</tr>
<tr>
<td>Intellect</td>
<td>receptiveness to the treatments</td>
</tr>
<tr>
<td>Love</td>
<td>reactions to the practitioner</td>
</tr>
<tr>
<td>Work</td>
<td>willingness to strive for success</td>
</tr>
</tbody>
</table>
### How personality information can inform planning for the patient

<table>
<thead>
<tr>
<th>Affect</th>
<th>very low</th>
<th>Will not have a lot of generalized stress. Concentrate on hearing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>low</td>
<td>Will not enjoy group work. Use one-on-one counseling &amp; solitary activities.</td>
</tr>
<tr>
<td>Intellect</td>
<td>low</td>
<td>You need to use established products &amp; clear instructions. Avoid trial &amp; error.</td>
</tr>
<tr>
<td>Love</td>
<td>high</td>
<td>Will want to please you, so be careful about this in assessing outcomes &amp; understanding of features/limitations.</td>
</tr>
<tr>
<td>Work</td>
<td>very high</td>
<td>Provide lots of reading and listening activities to help with accommodation.</td>
</tr>
</tbody>
</table>
Quality of life as Hearing aid outcome
What is QoL?

• Complex – no single definition.
  – Level of ability to enjoy one’s normal life activities.
  – Degree of physical and psychological well-being felt by an individual.
  – Level of personal satisfaction with the physical, emotional and social conditions under which one lives.

• Why do we care about it?
  – Because treatments for problems should improve QoL.
  – Resources to pay for treatments are allocated based on QoL evidence.
Generic quality of life questionnaires tend to measure daily living activities.

Communication is rarely included (even though communication is important to QoL)

These measures often make it look as though hearing aids are not worth much.

So resources are not allocated to hearing help services.
A typical generic QoL questionnaire deal with things like

- Lifting and carrying groceries
- Walking several blocks
- Bathing and dressing yourself
- Bodily pain
- Having energy
- Social activities
## Generic QoL measures

<table>
<thead>
<tr>
<th>Name</th>
<th># items</th>
<th>What is measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF-36</td>
<td>36</td>
<td>Physical function, bodily pain, general health, vitality, emotional state, mental health.</td>
</tr>
<tr>
<td>EuroQol</td>
<td>5</td>
<td>Mobility, self-care, pain/discomfort, usual activities, anxiety/depression.</td>
</tr>
</tbody>
</table>
Figure 2. Estimated effect size and confidence intervals (vertical bars) for individual studies by design, level of evidence, and type of outcome measure.
# Generic QoL measures

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3 Different QoL Measures & HA Value
(Grutters et al, 2007)

Conclusion: HUI3 can show QoL improvement after HA fitting
WHO DAS II and HHIE problems
(McArdle et al, 2005)

After hearing aid fitting, problems decreased

Conclusion: WHO DAS II can show QoL improvement after HA fitting
Another interesting questionnaire: Psychosocial Impact of Assistive Devices Scale (PIADS)

Measures QoL with any kind of assistive device. Shows changes in:

- **Competence**: feelings of adequacy, capability, independence, not confused.
- **Adaptability**: attitude towards taking risks and trying new things.
- **Self-esteem**: feelings of emotional health and positive self-regard
Using PIADS to compare HAs and other assistive devices
So, things are looking up

It is good to see that newer generic QoL questionnaires do show the benefits of hearing aids.
## Final Comment

Integration of self-report into HA provision protocol – one example

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Self-report</th>
</tr>
</thead>
<tbody>
<tr>
<td>one</td>
<td>Assessment</td>
<td><strong>Hearing abilities questionnaire</strong> <em>(at home)</em></td>
</tr>
<tr>
<td>two</td>
<td>Pre-fit consultation</td>
<td><strong>ECHO, COSI</strong> <em>(both interactive)</em></td>
</tr>
<tr>
<td>three</td>
<td>Selection of amplification</td>
<td>[no formal self-report here]*</td>
</tr>
<tr>
<td>four</td>
<td>Initial fitting &amp; verification of targets</td>
<td></td>
</tr>
<tr>
<td>five</td>
<td>Post-fit management</td>
<td><strong>Fine tuning questionnaire</strong> <em>(at home)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>COSI</strong> <em>(interactive)</em></td>
</tr>
<tr>
<td>six</td>
<td>Validation (long-term outcomes)</td>
<td><strong>IOI-HA</strong> <em>(by mail at home)</em></td>
</tr>
</tbody>
</table>

• Since 2000, work has continued on developing and refining outcome measures.

• Learning about the patient from pre-fitting self-reports can help refine the fitting process.

• Establishing that HAs improve quality of life is an important priority for our field.

• Self-report measures can be integrated into clinical practice to provide a lot of information for relatively little practitioner time.
Thank you

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