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2014 Siemens Expert Series
with Catherine Palmer, Ph.D.

Matching Technology & Features to Patient Needs

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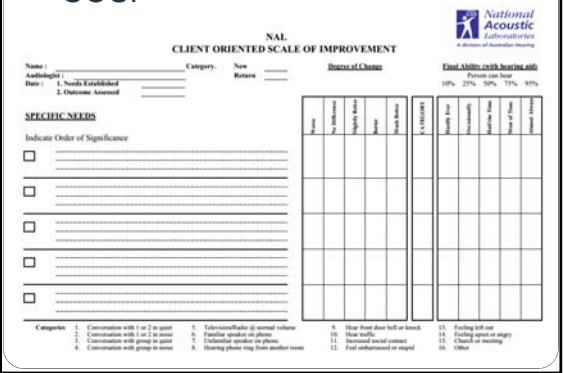
Matching Technology and Features to Patient Needs

Catherine V. Palmer, PhD
Jenifer Fruit, AuD

- Review of techniques to assess individual patient communication needs
- The current evidence base to support various signal processing strategies
- Challenge of applying the evidence base to individual patients
- Case Studies

Assessing patient needs

COSI



NAL
CLIENT ORIENTED SCALE OF IMPROVEMENT

National Acoustic Laboratories

Name :
Audiologist :
Date : 1. Needs Established
2. Outcome Assessed
Category. New
Return
Degree of Change
Final Ability (with hearing aid)
Person can hear
10% 25% 50% 75% 95%

SPECIFIC NEEDS

Indicate Order of Significance

Worse | No Difference | Slightly Better | Better | Much Better | A Difficulty | Rarely Ever | Occasionally | Half the Time | Most of Time | Almost Always

Categories
1. Conversation with 1 or 2 in quiet
2. Conversation with 1 or 2 in noise
3. Conversation with group in quiet
4. Conversation with group in noise
5. Television/Radio @ normal volume
6. Familiar speaker on phone
7. Unfamiliar speaker on phone
8. Hearing phone ring from another room
9. Hear front door bell or knock
10. Hear traffic
11. Increased social contact
12. Feel embarrassed or stupid
13. Feeling left out
14. Feeling upset or angry
15. Church or meeting
16. Other

Patient (Family) Expectation Worksheet

I am successful in this situation…

Goal (list in order of priority)	Hardly Ever	Occasionally	Half the Time	Most of the Time	Almost Always
1. To hear my adult children on the telephone.		C		E	
2. To enjoy television while I m sitting at my table.	C				E
3.					
4.					
5.					

C = how the patient functions currently (pretreatment or with current technology/strategies)

E = how the patient expects to function postintervention (HA, ALD, strategies, etc.)

✓= level of success that the audiologist realistically targets

I = how the patient actually perceives level of success postintervention

Abbreviated Profile of Hearing Aid Benefit (APHAB)

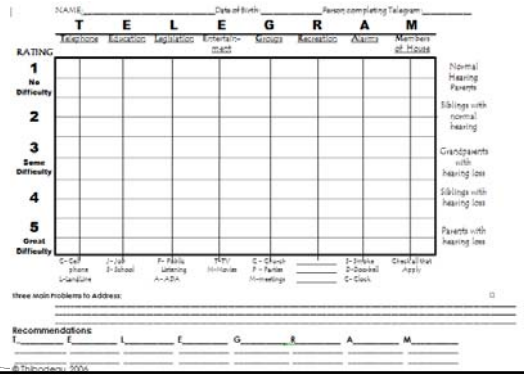
- 4 subscales, completed “with HA” and “without HA”:
- Ease of Communication (EC),
- Reverberation (RV),
- Background Noise (BN)
- Aversiveness of Sounds (AV).

 EC, RV and BN describe speech understanding in different listening environments.
 AV describes negative reactions to environmental sounds.

A Always (99%)
B Almost Always (87%)
C Generally (75%)
D Half-the-time (50%)
E Occasionally (25%)
F Seldom (12%)
G Never (1%)

	Without Hearing Aid	With Hearing Aid
1. When I am in a crowded grocery store, talking with the cashier, I can follow the conversation.	A B C D E F G	A B C D E F G
2. I miss a lot of information when I'm listening to a lecture.	A B C D E F G	A B C D E F G
3. Unexpected sounds, like a smoke detector or alarm bell are uncomfortable.	A B C D E F G	A B C D E F G
4. I have difficulty hearing a conversation when I'm with one of my family at home.	A B C D E F G	A B C D E F G
5. I have trouble understanding the dialogue in a movie or at the theater.	A B C D E F G	A B C D E F G
6. When I am listening to the news on the car radio, and family members are talking, I have trouble hearing the news.	A B C D E F G	A B C D E F G

TELEGRAM



Reviewing the Evidence

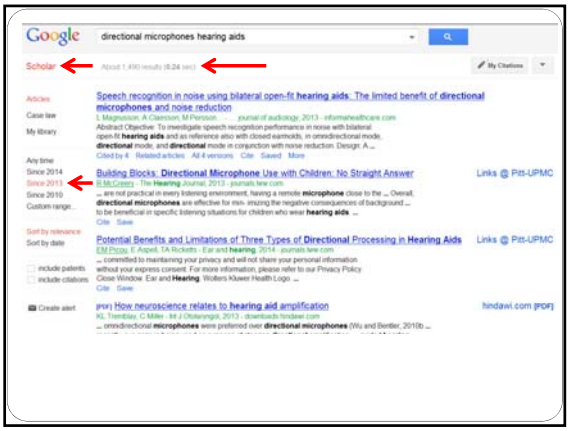
- Efficacy vs Effectiveness vs Efficiency
  - Can it work?
  - Does it work?
  - Can/does it work *for my patient*?
  - Is it worth it *for my patient*?

- Meta analyses
- Systematic Reviews
- Scoping Studies

Levels of Evidence
1. Systematic reviews and meta-analyses of randomized controlled trials
2. Randomized controlled trials
3. Non-randomized intervention studies
4. Descriptive studies (cross-sectional surveys, cohort studies, case-control designs)
5. Case studies
6. Expert opinion
Grades of Recommendation
A. Consistent level 1 or 2 studies
B. Consistent level 3 or 4 studies or extrapolations from level 1 or 2 studies
C. Level 5 studies or extrapolations from level 3 and 4 studies
D. Level 6 evidence or troubling inconsistencies or inconclusive studies at any level

Simplify your search

- Limit your time frame
- Google Scholar (scholar.google.com)
- PubMed (pubmed.gov)



Current Evidence

Time to vote!

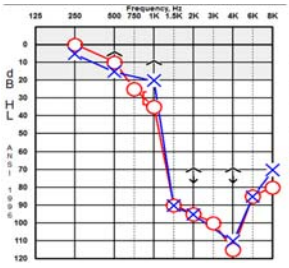
- True or False: We currently have evidence to support the use of:
- - Open fittings when possible True
- - Frequency Shifting False
- - Automatic Adaptation False
- - Gain Training True
- - Noise Reduction for Comfort True
- - Noise Reduction for Speech Intelligibility False
- - Directional Microphones True
- - Adaptive Directionality False
- - Remote Microphones True
- - Ear – to – Ear False
- - Increased # channels for speech understanding False
- - Real Ear Measurements True

Frequency Shifting

Search Terms:	Articles found:	Level	Grade	EF or EV?
Frequency shifting/ transposition/ compression/ lowering and adults and hearing aids, since 2012	Ching, T. et al (2013). A randomized controlled trail of nonlinear frequency compression versus conventional processing in hearing aids: speech and language of children at three years of age. International Journal of Audiology, 52, S46-S54.	2	B*	EF
	Alexander, J. M. (2013). Individual variability in recognition of frequency-lowered speech. Seminars in Hearing, 34(2), 86-109.	1	A	EF
	McCreery, R., et al (2013). Maximizing audibility and speech recognition with nonlinear frequency compression by estimating audible bandwidth. Ear and Hearing, 34(2), 24-27.	2	B**	EF

* Grade lowered due to application of pediatric data to adult patient
** Normal hearing individuals

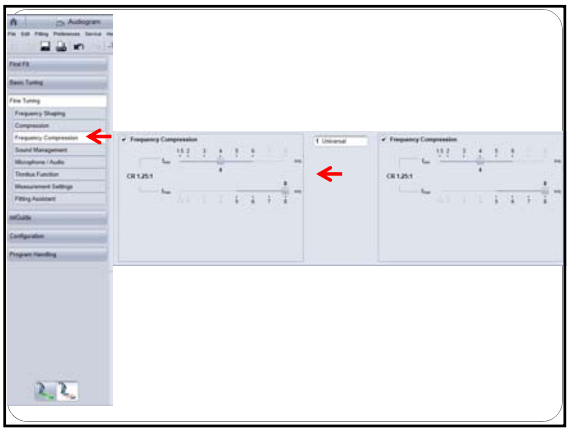
Patient with Precipitously Sloping Hearing Loss

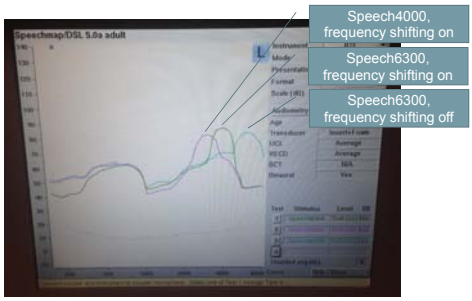


	RE			LE		
		Level (dB)	Mask (dB)		Level (dB)	Mask (dB)
PTA	47			43		
SRT	22			22		
WRS	36%	90 (mcl)		28%	88 (mcl)	

- 74 y/o male
- 40+ year history of noise exposure (music teacher)

How you interpret the current evidence depends on your goal.



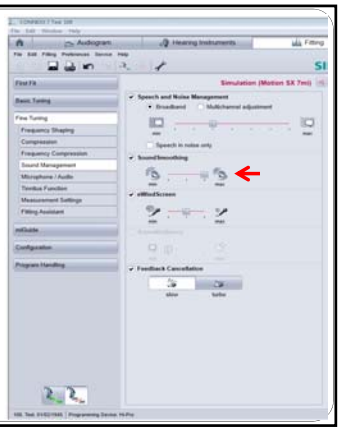


Noise Reduction

Search Terms:	Articles found:	Level	Grade	EF or EV?
noise reduction and hearing aids, since 2012	Liu, H., Zhang, H., Bentler, R. A., Han, D., & Zhang, L. (2012). Evaluation of a Transient Noise Reduction Strategy for Hearing Aids. Journal of the American Academy of Audiology, 23(8), 606-615.	3	B	EF
	Magnusson, L., Claesson, A., Persson, M., & Tengstrand, T. (2013). Speech recognition in noise using bilateral open-fit hearing aids: The limited benefit of directional microphones and noise reduction. International Journal of Audiology, 52(1), 29-36.	4	B	EF
	Brons, I., Houben, R., & Dreschler, W. A. (2013). Perceptual effects of noise reduction with respect to personal preference, speech intelligibility, and listening effort. Ear and Hearing, 34(1), 29-41.	4	C	EF

- Mr. Smith has been wearing his hearing aids for about a month and describes benefit in many situations. He has now moved into an Independent Living Residence and says that the sounds of silverware and dishes at dinner each evening are uncomfortable and get in the way of understanding others.

- Transient noise reduction for comfort



Remote Microphones

Search Terms:	Articles found:	Level	Grade	EF or EV?
Remote microphone and hearing aids, since 2009	Fitzpatrick, E. M., Séguin, C., Schramm, D. R., Armstrong, S., & Chénier, J. (2009). The benefits of remote microphone technology for adults with cochlear implants. Ear and Hearing, 30(5), 590-599.	4	C	EF
Also referenced:	Hawkins, D.B. (1984). Comparisons of speech recognition in noise by mildly-to-moderately hearing-impaired children using hearing aids and FM systems. Journal of Speech and Hearing Disorders, 49, 409-418.	4	C	EV

Acoustic Fact : a microphone placed by the signal of interest and directed to the ear will improve signal to noise ratio.

Remote microphones

Signal – to – noise ratio

Accessories

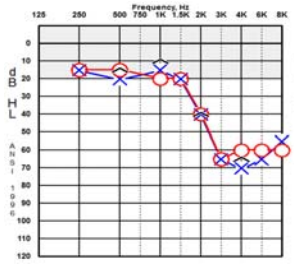
Various price points and models

Automatic Adaptation

Search Terms:	Articles found:	Level	Grade	EF or EV?
Automatic adaptation, adaptation management, automatic acclimatization and hearing aids, since 2000	Schum, D.J. (2001). Adaptation management for amplification. Seminars in Hearing, 22(2), 173-182.	6	D	EF

Are we pre-data with regard to some features?

Patient with High Frequency SNHL



	RE			LE		
		Level (dB)	Mask (dB)		Level (dB)	Mask (dB)
PTA	25			25		
SRT	16			18		
WRS	92%	80	60	82%	80	60

- 63 y/o male
- Uses cell phone frequently at work
- c/o bilateral tinnitus

Increasing patient participation

- Gain training
- Adaptation features
- Volume control
- Programs

Patient-centered care

- Better uptake of device use
- Adherence to recommendations (compliance)
- Greater hours of hearing aid use

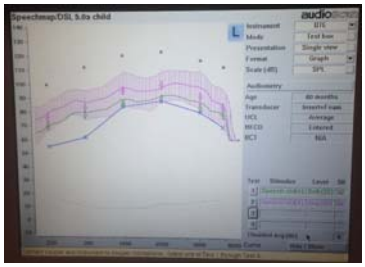
Verification

Verification is how we determine if we have achieved our treatment (audibility).

Search Terms:	Articles found:	Level	Grade	EF or EV?
verification and hearing aids, since 2012	Abrams, H. B., Chisolm, T. H., McManus, M., & McArdle, R. (2012). Initial-fit approach versus verified prescription: Comparing self-perceived hearing aid benefit. Journal of the American Academy of Audiology, 23(10), 768-778.	3	C	EV
	Leavitt, R.J., Flexer, C. (2012). The importance of audibility in successful amplification of hearing loss. Hearing Review, www.hearingreview.com	3	B	EV
	Aazh, H., Moore, B. C., & Prasher, D. (2012). The accuracy of matching target insertion gains with open-fit hearing aids. *American Journal of Audiology*, 21(2), 175-180.	3	B	EV
	Boymans, M., & Dreschler, W. A. (2012). Audiologist-driven versus patient-driven fine tuning of hearing instruments. Trends in Amplification, 16(1), 49-58.	3	B	EF/EV

Audibility (treatment)

- Without ensuring audibility, patient cannot benefit from features



Measuring hearing aid features

Directionality

Telecoil

Outcomes

- Have we been successful?
- Have we accomplished our goals?
- Is the patient satisfied?

Psychosocial Impact of Assistive Devices Scale (PIADS)

- Three subscales in the domains of:
  - Competence
  - Adaptability
  - Self-Esteem

Table 1. Composition of the three subscales and item means on -3 to +3 scales

Competence	M	Adaptability	M	Self-esteem	M
competence	1.71	willingness to take chances	0.50	self-esteem	0.61
adequacy	1.27	ability to participate	1.06	security	1.25
efficiency	1.83	eagerness to try new things	0.63	sense of power	0.62
productivity	1.70	ability to adapt to ADL	1.26	embarras(rev.)	0.38
usefulness	1.59	ability to take advantage of opportunities	1.02	happiness	0.81
expertise	1.10	well being	1.05	sense of control	0.99
capability	1.69			frustration(rev.)	0.85
performance	1.79			self-confidence	0.90
skilfullness	1.35				
independence	1.33				
quality of life	1.32				
confusion(rev.	1.09				
Total subscale	1.44	Total subscale	0.89	Total subscale	0.77

Device Oriented Subjective Outcome Scale (DOSO)

- subscales: Speech Cues, Listening Effort, Pleasantness, Quietness, Convenience, and Use

A Not at all
B A little
C Somewhat
D Medium
E Considerably
F Greatly
G Tremendously

How good are the hearing aids at...							
1 Not whistling during use?	A	B	C	D	E	F	G
2 Providing a pleasing sound quality?	A	B	C	D	E	F	G
3 Making loud speech clear?	A	B	C	D	E	F	G
4 Making music pleasant?	A	B	C	D	E	F	G
5 Eliminating the need to have someone else explain what was said?	A	B	C	D	E	F	G
6 Making other people's voices sound clear in a moving car?	A	B	C	D	E	F	G
7 Making children's voices understandable?	A	B	C	D	E	F	G

Satisfaction with Amplification in Daily Life (SADL)

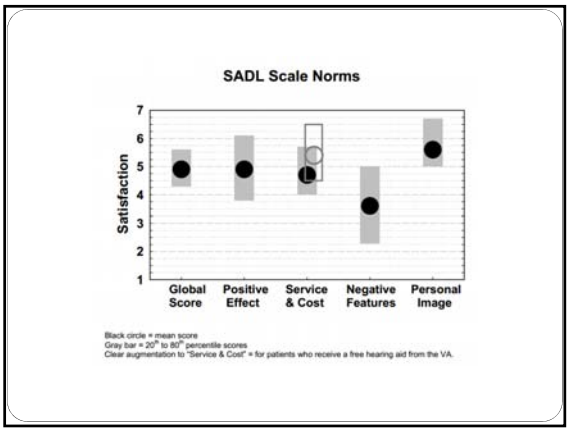
INSTRUCTIONS

Listed below are questions on your opinions about your hearing aid(s). For each question, please circle the letter that is the best answer for you. The list of words on the right gives the meaning for each letter.

Keep in mind that your answers should show your general opinions about the hearing aids that you are wearing now or have most recently worn.

A Not At All
B A Little
C Somewhat
D Medium
E Considerably
F Greatly
G Tremendously

1. Compared to using no hearing aid at all, do your hearing aids help you understand the people you speak with most frequently?	A	B	C	D	E	F	G
2. Are you frustrated when your hearing aids pick up sounds that keep you from hearing what you want to hear?	A	B	C	D	E	F	G
3. Are you convinced that obtaining your hearing aids was in your best interests?	A	B	C	D	E	F	G
4. Do you think people notice your hearing loss more when you wear your hearing aids?	A	B	C	D	E	F	G
5. Do your hearing aids reduce the number of times you have to ask people to repeat?	A	B	C	D	E	F	G



Post-fitting versions of:

- COSI
- PEW
- APHAB

PEW – post-treatment

I am successful in this situation…

Goal (list in order of priority)	Hardly Ever	Occasionally	Half the Time	Most of the Time	Almost Always
1. To hear my adult children on the telephone.		C		E ✓ I	
2. To enjoy television while I m sitting at my table.	C				✓ E I
3.					
4.					
5.					

C = how the patient functions currently (pretreatment or with current technology/strategies)

E = how the patient expects to function postintervention (HA, ALD, strategies, etc.)

✓= level of success that the audiologist realistically targets

I = how the patient actually perceives level of success postintervention

International Outcome Inventory – Hearing Aids (IOI-HA)

1. Think about how much you used your present hearing aid(s) over the past two weeks. On an average day, how many hours did you use the hearing aid(s)?

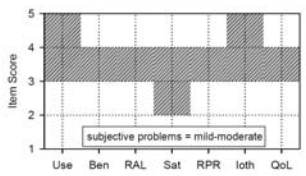
none	less than 1 hour a day	1 to 4 hours a day	4 to 8 hours a day	more than 8 hours a day
☐	☐	☐	☐	☐

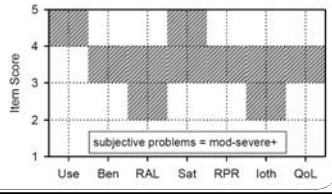
2. Think about the situation where you most wanted to hear better, before you got your present hearing aid(s). Over the past two weeks, how much has the hearing aid helped in those situations?

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

3. Think again about the situation where you most wanted to hear better. When you use your present hearing aid(s), how much difficulty do you STILL have in that situation?

very much difficulty	quite a lot of difficulty	moderate difficulty	Slight difficulty	no difficulty
☐	☐	☐	☐	☐





The young man knows the rules,
but the old man knows the exceptions.

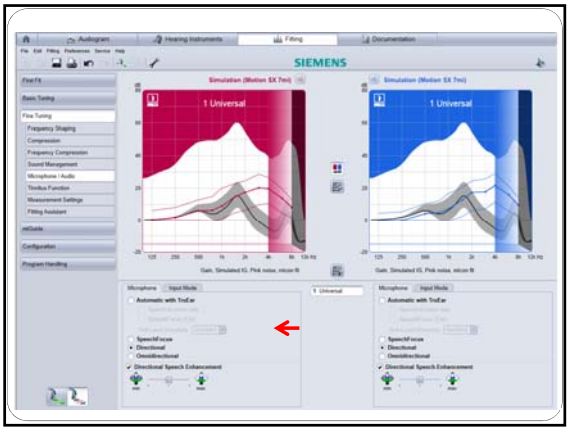
-Oliver Wendell Holmes, Sr.

Patient with macular degeneration

Automatic Adaptive Directionality

Siemens miFocus

Speaker



Patient with limited right arm mobility (stroke/CVA)

- Audibility
- Comfort
- Signal to Noise Ratio

- Cox, R. M., & Alexander, G. C. (1999). Measuring satisfaction with amplification in daily life: The SADL scale. *Ear and hearing*, *20*(4), 306.
- Dillon, H., James, A., & Ginis, J. (1997). Client Oriented Scale of Improvement (COSI) and its relationship to several other measures of benefit and satisfaction provided by hearing aids. *Journal of the American Academy of Audiology*, *8*(1).
- www.harlmemphis.org
- Jutai, J., & Day, H. (2002). Psychosocial impact of assistive devices scale (PIADS). *Technology and Disability*, *14*(3), 107-111.
- Palmer CV, Mormer E. (1997) A systematic program for hearing aid orientation and adjustment. *Hear Rev* 1:45–52.
- Thibodeau, L. M. (2004). Plotting beyond the audiogram to the TELEGRAM, a new assessment tool. The Hearing Journal, 57(11), 46-51.

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