Promoting High Value, Patient-Centric Care with Alternative & Complimentary Devices

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Turtle Beach / Hypersound

Who is Brian Taylor?

• 20 years of clinical and business experience
• Employee of Turtle Beach
• Consultant for Fuel Medical
• Adjunct Professor, A.T. Still
• Editor, Audiology Practices
• Editor, Hearing News Section, HHTM Blog
Agenda

• Industry Challenges/Opportunities
• Why Hypersound?
• How Hypersound fits into your clinical practice?
• How Hypersound works?

Healthcare Trends

Value-based

Patient-centered
Health care costs: U.S. spends more for elderly
Annual per capita healthcare costs by age

Source: Paul Fischbeck, Carnegie Mellon University   James Hilston/Post-Gazette
4 in 10
60-69

5 in 10
70-79
8 in 10
>80

Value-based Care

- Best outcomes at the lowest costs
- Safe, appropriate, and effective care with enduring results, at reasonable cost.
- Use evidence-based decision making and proven treatments and techniques that take into account the patients’ wishes and preferences.
Leaders of Patient Centered Care Movement

- Laya Poost-Foroosh, St. Michael’s Hospital, Toronto
- Jill Preminger, U of Louisville
- Caitlin Grenness, University of Melbourne, Australia

Figure 1. Operationalized Model of Patient-centered Audiologic Rehabilitation (Grenness et al, 2014a)
Dimension 1. Components (and subcomponents) of Trust

Relational Competence
- Communication Style “She talks serious business but she also jokes.”
- Empathy “They listened carefully at what I experienced and how I was.”
- Instruction for Self-Management “They’re more interested in selling hearing aids and not the maintenance of hearing aids.”
- Promotion of Shared Decision Making “He was quite curt and abrupt... well there was nothing I could say, he was the one who decided everything.”

Technical Competence
- Based on Services Received “She didn’t close the door completely. I could see her reflection on the glass so I knew when she was pushing button.”
- Based on Reputation or Education “I suppose they’re like opticians. They haven’t got a proper medical degree or anything like that, but they are expert in their field.”

Commercialized Approach
- Solicitation “I notice they’re offering free hearing tests. I rather imagine it is so they can flog them a very expensive hearing aid.”
- Focus on Service versus Focus on Sales “Some people in some professions... they’re just money-grubbing.”
- Cost of Hearing Aid “I trusted his advice, because he said ‘no need to go for the gold. Just go for one in the middle of the market.’”
- Public versus Private Healthcare System “I never thought for a minute that National Health would be as good. I thought they’d be just basic hearing aids.”

Clinical Environment
- Clinic Setting “When I walked in I thought to myself, what have I gotten myself into? Because it was not very professional at all... He wasn’t professional looking himself.”
- Clinical Services “Well they (hearing clinic) don’t care whether you use them or not, once you have bought them there is no follow-up unless you go in and ask for it.”
- Public versus Private Hearing Healthcare “I think they (private hearing center) must have a bias towards a hearing aid or a firm who’s supplying them, so I would have thought the other (public) would give you a wider range or a more independent view of them.”

Dimension 2. Assignment of Trust
- Interpersonal Trust
- Institutional Trust

Dimension 3. Level of Trust
- Varies from Low to High

Dimension 4. Time Course of Trust
- The Level of Trust prior to receiving Hearing Healthcare Services
- The Level of Trust after receiving Hearing Healthcare Services

Ensure patient comfort

Facilitate shared decision making

1. Define scale and scope of condition
2. Generate and evaluate alternative solutions
3. Decide on a mutually acceptable solution
4. Implement a solution
5. Evaluate the effectiveness of a solution
6. Provide feedback and service over time

Consider patient motivation and readiness

Provide useful information

Acknowledge and understand the patient as an individual
The Graying of America

(Stanford Center on Longevity)
Take 100 individuals from our village of 10,000 people

12 individuals are 65 or older
8 of these individuals has a hearing loss

In less than 20 years......

(Hamdy, 2015)
Take 100 individuals from our village of 10,000 people

20 individuals are 65 or older
14 of these individuals has a hearing loss
Profound or residual: 5%

Moderate to Severe: 20%

Mild to Moderate: 75%

Hearing aids not valued by patients with mild loss

Profound or residual: 5%

Moderate to Severe: 20%

Mild to Moderate: 75%

Quasi-Medical Channel

Consumer Electronic Channel
Mild Losses

• Many individuals with a slight hearing loss of up to 25dB HL experience activity limitations and participation restrictions (Bess et al 1991), yet 43% of patients with milder losses are given a “wait and re-test” approach (Kochkin, 2012)
Hearing Difficulties (HD) and Normal Audiograms

- 12% of adults between 21 to 84 have HD and normal hearing test results. Overall prevalence is 3%. (Trembley, et al 2015)
- 51% of adults 49 years of age or older report HD, ½ of this group have normal audiograms (Chai, et al 2007)
- 60% of adults between 54 to 66 reported finding it difficult to follow conversations in noise (radio, TV, restaurants) (Hannula, et al 2011)
- Decline in speech recognition often begins between ages of 30-39 when audiogram is normal. (Fullgrabe, et al, 2015)

Options and Alternatives are Important

- Help seeking does not automatically imply patient is seeking hearing aids (Claesen & Pryce, 2012)
- When offered options ‘more than half of patients’ with hearing loss will choose an alternative to hearing aids. (Laplante-Levesque, et al 2012)
How does the typical adult spend their leisure time?

TV Watching in Popular

- American adults on average watch 34 hours of television per week + 3-6 hours watching taped (DVR) programs. Five hours per day. (NY Times, 2012)

- Both young and older subjects spend the same amount of time “listening to media at home” (Wu and Bentler, 2012)
Leisure Activities for Ages 55 and Over

Percent of total leisure time that people age 55 and over spend doing selected leisure activities on an average day, by age group, 2010

<table>
<thead>
<tr>
<th>Activity</th>
<th>55-64</th>
<th>65-74</th>
<th>75 and over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socializing and communicating</td>
<td>11</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Watching TV</td>
<td>56</td>
<td>56</td>
<td>58</td>
</tr>
<tr>
<td>Participation in sports, exercise and recreation</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Relaxing and thinking</td>
<td>9</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Reading</td>
<td>14</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Other leisure activities</td>
<td>7</td>
<td>9</td>
<td>11</td>
</tr>
</tbody>
</table>

NOTE: "Other leisure activities" includes activities such as playing games, using the computer for leisure, arts and crafts as a hobby, arts and entertainment (other than sports) and related travel. Reference population: These data refer to the civilian noninstitutionalized population. SOURCE: Bureau of Labor Statistics, American Time Use Survey.

Patient Categories

- **Existing Hearing Aid Users Who Struggle with TV**
- **Younger Patients with Milder Losses**
- **Patients who cannot wear hearing aids due to a cognitive or physical condition**
Patient Benefits

Inclusiveness

Participation

Enjoyment

How to implement Hypersound in your clinic
Market to Younger Adults

- Baby boomers
- 65 and younger
- People who struggle with dialogue on TV

Identify the Need

<table>
<thead>
<tr>
<th>Reported Assessment of Communication Abilities</th>
<th>Name: MC</th>
<th>Date: 06/06/14</th>
<th>Aided or Unaided (circle one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much difficulty do you have hearing in the following situations?</td>
<td>No difficulty</td>
<td>Slight difficulty</td>
<td>Moderate difficulty</td>
</tr>
<tr>
<td>One to one conversation</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Conversation in small groups</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Conversation in large groups</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Outdoors</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Concert/movie</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Place of worship/lectures</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Watching TV</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In a car</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Workplace</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Telephone - Landline</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Mobile</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Restaurant/café</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Other (specify)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
### What is involved?

**Pros/Cons**

- Buying hearing aids.
- Professional adjustment of the hearing aids.
- Wearing hearing aids to help with my hearing problems.
- Wearing in all listening situations.

### Options I want to know more about

- Hearing Aids
- Hearing Management Group
- Directed Audio
- Hearing Assistive Technology
- Cochlear Implant
- No Treatment

- Continue my daily life without making any changes.
Demonstrate it in fitting room

**Patient Preference Study**

- 2 independent practices
- 58 participants with hearing loss
- Listened to 2 minutes – variety of audio clips (unaided)
- Written comments were gathered, then coded on 5 point Likert scale by blinded investigator
**Overall Listening Experience**

How Do You Rate Your Listening Experience Using HyperSound?

<table>
<thead>
<tr>
<th>Quality</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>1</td>
</tr>
<tr>
<td>Fair</td>
<td>4</td>
</tr>
<tr>
<td>Good</td>
<td>13</td>
</tr>
<tr>
<td>Very good</td>
<td>20</td>
</tr>
<tr>
<td>Excellent</td>
<td>20</td>
</tr>
</tbody>
</table>

**Perceived intelligibility improvements**

Did HyperSound Improve Your Speech Recognition Ability?

<table>
<thead>
<tr>
<th>Improvement Level</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>No improvement</td>
<td>2</td>
</tr>
<tr>
<td>Some improvement</td>
<td>2</td>
</tr>
<tr>
<td>Improvement</td>
<td>8</td>
</tr>
<tr>
<td>Marked improvement</td>
<td>37</td>
</tr>
<tr>
<td>Tremendous</td>
<td>9</td>
</tr>
<tr>
<td>(Heard every word)</td>
<td></td>
</tr>
</tbody>
</table>
Send the patient home with the unit
How Hypersound Works

How sound travels through the air conventionally
How sound travels through the air conventionally

How sound travels through the air ultrasonically
**How sound travels through the air ultrasonically**

- Utilizes a 100kHZ ultrasonic carrier frequency
- Modulates audio on top of carrier frequency
- Transmits a very tight beam of sound – virtual reality surround sound zone
- Utilizes the non-linear coefficient of air for audible range
- Eliminates background noise when in beam
HOW HYPERSOND WORKS

Figure 1: Diagram of HyperSound Process
Figure 1 displays a functional diagram of HyperSound’s audio beam system. First, the emitted ultrasonic wave is inaudible, but as it impresses audio signals onto the carrier in the air, the audio signal is demodulated by the parametric array effect and becomes audible. This demodulated audio wave retains the directivity of the ultrasonic wave, thus producing an audio beam.

Similar to hearing aids

- Programmable with NOAH-compatibility
- Uses NAL targets as starting point for average level inputs
- Multiple channels
Hold for slide on Hyperfit Programming

Do we want to include this in the first course??
Benefits to Practice

- Improved Patient Experience: Grow patient traffic, referrals, and HI volume, builds trust
- Shorten 5-7 year decision to purchase (dispense more HA's)
- New Revenue Streams:
  - Attracts new people into HHCP office (non-HA wearers)
  - Grow TLNS revenue (database and new patients)
  - Offer to existing HA patients still struggling with TV

Clinical Studies
**HYPERSOUND – 2015 SAFETY CLINICAL STUDY**

- 20 normal hearing patients – 2 hour exposure – 2 meters
- No TTS (Temporary Threshold Shift) - no new-onset otological symptoms
- Manuscript submitted for publication in peer reviewed journal

**COMPARATIVE STUDY**

- Mehta, et al., California Hearing & Balance Center, La Jolla
- Comparison of HyperSound to Conventional Audio in SF
- Unaided condition
- 10 adult participants with range of hearing losses
- Word and sentence recognition testing using AZBio and CNC word lists
- 50 and 70 dB SPL intensity levels, quiet and noise (+10dB SNR)
- Submitted for publication
RESULTS

<table>
<thead>
<tr>
<th>Condition</th>
<th>HSS</th>
<th>Conventional Speaker</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Median</td>
<td>Range</td>
</tr>
<tr>
<td>AzBio†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 dB, quiet</td>
<td>2.3 ± 5.0</td>
<td>0.0</td>
<td>0.0-13.3</td>
</tr>
<tr>
<td>70 dB, quiet</td>
<td>18.2 ± 33.4</td>
<td>34.9</td>
<td>0.0-84.0</td>
</tr>
<tr>
<td>70 dB, noise</td>
<td>42.6 ± 33.7</td>
<td>51.6</td>
<td>0.0-79.6</td>
</tr>
<tr>
<td>CNC Word test‡</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 dB, quiet (whole word)</td>
<td>4.0 ± 6.5</td>
<td>0.0</td>
<td>0.0-14.0</td>
</tr>
<tr>
<td>50 dB, quiet (phonemes)</td>
<td>8.7 ± 13.5</td>
<td>0.0</td>
<td>0.0-33.3</td>
</tr>
<tr>
<td>70 dB, quiet (whole word)</td>
<td>44.4 ± 29.5</td>
<td>54.0</td>
<td>0.0-80.0</td>
</tr>
<tr>
<td>70 dB, quiet (phonemes)</td>
<td>56.5 ± 31.5</td>
<td>63.4</td>
<td>0.0-92.7</td>
</tr>
</tbody>
</table>

CONFIDENTIAL

SO WHAT DO WE KNOW?

- An estimated 360 million people worldwide suffer from some form of hearing loss.
- “80% of all patients want to hear the television better. Even after purchase, many still complain about battery life, dongle, neck loops, etc.
- The average time between the first visit with a hearing healthcare professional to purchasing a hearing aid is approximately 5-7 years.
- Over the last 40 years, the penetration rate for adopting hearing aids has been approx. 20 – 25%.
A NEW PRODUCT CATEGORY: Directed Audio Solution

- HyperSound Clear™ is the first-of-its kind directed audio solution designed specifically to help people with hearing loss hear the television better.
- As indicated by clinical research*, HyperSound® speakers improve sound clarity and speech intelligibility for patients without the need to wear headphones.
- By beaming sound in a narrow column, patients get crystal clear sound where they want it and their families get normal television volume everywhere else.

Mehta, RP. Novel ultrasonic sound carrier significantly improves speech discrimination in subjects with hearing loss. Otology/Neurotology Scientific Session presented at the Combined Sections Meeting of the Triological Society. January 22, 2015, San Diego, CA. (Ten patients with mild to severe hearing loss in a single-blind, randomized crossover study demonstrated improvement in sound clarity, measured with standard speech tests, over conventional speakers at 70 dB at 1 meter, including in background noise.)

Questions

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