Outcomes of Open Canal vs. Traditional Custom Hearing Aids:
A Randomized Controlled Trial

Advances in Audiology
Tomorrow's Solutions for Today's Challenges
2nd – 5th of December 2012

Session II: Factors in Hearing Instrument Adoption & Use
Presented by:
Theresa Chisolm, Ph.D.
Acknowledgements

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• The contents do not represent the views of the Department of Veterans Affairs or the United States Government

34 million Americans with Adult Onset Hearing loss
Hearing Aids

Primary Treatment Option
Low Prevalence of Hearing Aid Use
Only 22% of those over the Age of 50 y/o with HL > 25 dB HL use Hearing Aids
Chien & Lin (2012)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Male (95% CI)</th>
<th>Female (95% CI)</th>
<th>Mild (25-40 dB)</th>
<th>Moderate or Greater (&gt;40 dB)</th>
<th>Overall Prevalence of Hearing Aid Use</th>
<th>No. With Hearing Aids (in Millions)</th>
<th>No. With Hearing Loss (≥25 dB) (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
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<tr>
<td>50-59</td>
<td>4.3 (0-9.5)</td>
<td>4.5 (0-13.5)</td>
<td>2.7 (0-6.6)</td>
<td>11.8 (0-27.5)</td>
<td>4.3 (0-8.8)</td>
<td>0.2</td>
<td>4.5</td>
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<td>60-69</td>
<td>7.3 (2.5-12.1)</td>
<td>7.2 (1.4-13.0)</td>
<td>2.6 (0-5.2)</td>
<td>23.9 (10.6-37.2)</td>
<td>7.3 (3.6-10.9)</td>
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<td>70-79</td>
<td>21.1 (14.5-27.6)</td>
<td>12.7 (6.0-19.5)</td>
<td>3.4 (0-6.5)</td>
<td>47.8 (37.0-58.6)</td>
<td>17.0 (12.4-21.6)</td>
<td>1.5</td>
<td>8.8</td>
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<tr>
<td>≥80</td>
<td>28.1 (20.3-35.9)</td>
<td>17.9 (11.2-24.7)</td>
<td>3.4 (0-7.7)</td>
<td>35.7 (28.7-42.7)</td>
<td>22.1 (18.5-25.8)</td>
<td>1.6</td>
<td>7.3</td>
</tr>
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</table>

Estimated total No. of individuals with hearing aids and with hearing loss (in millions):

- Hearing loss was defined as a speech frequency pure tone average of hearing thresholds at 0.5-, 1-, 2-, and 4-kHz tones presented by air conduction in the better hearing ear of 25 dB or greater.
- Data were derived from the 1999-2006 National Health and Nutrition Examination Survey.
- All values represent prevalence percentage unless otherwise noted.
- Numbers do not sum to group total because of rounding.
12.4% of Adults Who Try Hearing Aids

Factors Associated with Non-Use and Discontinued Use of Traditional Hearing Aids

- Poor fit, comfort and/or cosmetics
- Lack of ease of use
- “A plugged up sensation” related to occlusion
- Poor sound quality of own voice
- Negative side effects of whistling feedback
- Difficulty understanding speech in noise
Popularity of Open Ear Fittings

Improved comfort and cosmetics
Reduced effects of occlusion
May reduce the amount of under and un-use of hearing aids
Potential Limitations/Trade-Offs

Open Ear (OE) | Traditional Custom (TC)

- Maximum low- and high-frequency gain available may be less in OE than in TC fitting
  - Difficulty in meeting targets
  - Reduced speech recognition
- Decreases in Directional Microphones benefits with OE fittings may occur due to decrease in low-frequency gain
What would you fit?
Our Team

- Gene Bratt and Richard Wilson
  - Co-Principal-Investigators
- Mia Rosenfeld
  - Study Coordinator / Research Audiologist
- Theresa Chisolm, Rachel McArdle, Todd Ricketts, Sherri Smith
  - Co-Investigators
- Ginny Alexander, Elizabeth Talmage, Erin Coomes
  - Research Audiologists
Multi-Site Study

Nashville VA Medical Center

James H. Quillen, VAMC, Mt. Home, TN

VAHC – Bay Pines, Florida
3-Period Crossover Design
3-Period Crossover Design

Baseline
3-Period Crossover Design

OE → Baseline
3-Period Crossover Design

- Baseline
- OE
- TC
3-Period Crossover Design

- Baseline
  - OE
  - OE_{RITA}
  - TC
3-Period Crossover Design

- **Baseline**
- **OE**
- **TC**
- **OE_{RITA}**
- **OE_{RITE}**
3-Period Crossover Design

- Baseline
- OE
- OE$_{RITE}$
- OE$_{RITA}$
- TC
- 2-month Trial
3-Period Crossover Design

- Baseline
- OE
- OE_{RITA}
- OE_{RITE}
- TC
- Outcomes
3-Period Crossover Design

Period 2

OE

OE_RITA

OE_RITE

2-Month Trial

TC
3-Period Crossover Design

Period 2

OE

OE

OE

OE

OE

OE

OERITE

OERITE

2-Month Trial

2-Month Trial

TC

TC

TC
3-Period Crossover Design

Period 2

$OE$

$OE_{RITA}$

$OE_{RITE}$

$TC$

2-Month Trial
3-Period Crossover Design

- Period 2
  - $OE$
  - $OE_{RITA}$
  - $OE_{RITE}$
  - Outcomes
  - $TC$
3-Period Crossover Design

Period 3

OE

OE_{RITE}

OE_{RITA}

2-Month Trial

TC
3-Period Crossover Design

Period 3

OE

OERITA

OE_RITE

2-Month Trial

TC
3-Period Crossover Design

Period 3

OE

OE_{RITA}

OE_{RITE}

TC

2-Month Trial
3-Period Crossover Design

Period 3

OE

OE_{RITE}

OE_{RITA}

2-Month Trial

TC
3-Period Crossover Design

Period 3

OE

OE_{RITA}

OE_{RITE}

Outcomes

TC
Rank Preferences for Hearing Aid Styles

#1 Ranked Style to be Used at End of Study Protocol
Participant Characteristics

\((n = 263)\)

- 255 males, 8 females
- Roughly symmetrical (PTA within 15 dB) SNHL
- 139 New Hearing Aid Users
  - 16 (11.5%) tried hearing aids in last 10 years but had rejected them
- 124 Experienced Hearing Aid Users
  - 1-30 years, mean = 7.82 years
- Age
  - New Hearing Aid Users: 66.35 years (SD = 8.69)
  - Experienced Hearing Aid Users: 70.33 years (SD = 8.49)
Recruited to fit into 1 of 3 Hearing Loss Groups
Group 1 Fitting Range

\[ n = 61 \ (43 \text{ New}; \ 18 \text{ Experienced}) \]
Group 2 Fitting Range

\[ n = 62 \ (39 \text{ New}; \ 23 \text{ Experienced}) \]
A space is needed between 500 and Hz; likewise between 1000 and Hz.
Group 3 Fitting Range
n = 82 (28 New; 54 Experienced)

At least 1 threshold in the dark shaded box for 500Hz and/or 1000Hz and at least 3 thresholds in the lower region.
HEARING LEVEL IN dB (ANSI, 2004)

FREQUENCY IN Hz

1

2

3

= 1

= 2

= 3
Group 4 (Other)

$n = 58$ (29 New; 29 Experienced)
Hearing Aids

1. Maintaining consistency of circuit type across the three styles
2. Feedback control system that would maximize ability to meet/approximate target in open fit configuration.

- Traditional Custom
  - Starkey Destiny 1200
Hearing Aids

- $\text{OE}_{\text{RITA}}$
  - Destiny 1200 mini or full BTE, fit with slim tubing and open dome

- $\text{OE}_{\text{RITE}}$
  - Zon .7, fit with open dome
Hearing Aids

- Set to dynamic mode, other noise reduction features disabled
- Any manual controls disabled
- Telephone program options individually selected
- Goal: Match REAR (65dB input, DigSpeech) to NAL-NL1 REAR targets
Best Fit vs. User Fit

- Some patients prefer gain settings lower than NAL-NL1 target
- In these cases, gain reductions made to the patient preferred levels
- Documented “best fit” (closest to NAL-NL1 prior to feedback) and “user fit” (as worn)
- Preliminary data for Best Fit ($n = 111$ participants)
Target RITE RITA TC
Target
RITE
RITA
TC
Target RITE RITA TC
 Emblem: Target  ■ RITE  ◁ RITA  ★ TC
Target RITE RITA TC
Group 3 REAR

Target, RITE, RITA, TC
Group 4 REAR

The graph shows the REAR (dB SPL) over frequency (Hz) for different conditions. The conditions include Target, RITE, RITA, and TC. The graph illustrates the comparison between these conditions across various frequencies, with a peak noted around the 1000 Hz mark.
All 3 Hearing Aid Styles

- Able to fit a wide range of hearing loss with appropriate match to target
- Can match to target through 3000 Hz
- Open-fit BTE’s may undershoot at 4000 Hz, we could frequently meet target even with substantial hearing loss
Outcome Measures

- **Subjective**
  - Style Preference Survey (SPS; Smith, et al., JAAA, in press)

- **Objective**
  - Words-in-Noise (WIN; Wilson 2003)
  - Aided SNR-50

- Preferred Hearing Aid Style
Subjective Outcomes

Style Preference Survey
Style Preference Survey

• 35 items encompassing five subscales related to:
  • (1) Fit, Comfort, and Cosmetics
  • (2) Localization
  • (3) Ease of Use
  • (4) Subjective Occlusion/Own Voice Effects
  • (5) Feedback
Style Preference Survey

Please read each question carefully. Circle a number from 0 to 10 that best represents your agreement with the statement made. If you completely disagree with the statement, then circle 0.

If you completely agree with the statement, then circle 10.
Style Preference Survey

If you neither agree or disagree, then circle 5.
Style Preference Survey
Style Preference Survey

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  - (5) Feedback

  - No significant main effects or interactions
  - Feedback algorithms effective
### Repeated Measures ANOVAs

1. Within Groups Factor: Hearing Aid Style
2. Between Groups Factors: Hearing Loss Group, Hearing Aid Experience
Fit, Comfort, Cosmetics
SPS: Fit, Comfort, & Cosmetics

![Bar chart showing mean scores (+1 SD) for TC, OE-RITA, and OE-RITE categories.]

- TC: Mean Score ± 1 SD
- OE-RITA: Mean Score ± 1 SD
- OE-RITE: Mean Score ± 1 SD

Statistical Analysis:
- F(2, 510) = 60.58, p = .000, η² = .192
SPS: Fit, Comfort, & Cosmetics

![Bar chart showing mean scores (+1 SD) for TC, OE-RITA, and OE-RITE categories.]

- TC: Mean Score
- OE-RITA: Mean Score
- OE-RITE: Mean Score
SPS: Fit, Comfort, & Cosmetics

Mean Score (+1 SD)

TC | OE-RITA | OE-RITE

5  | 8       | 8
SPS: Fit, Comfort, & Cosmetics

Mean Score (+ 1 SD)

- TC
- OE-RITA
- OE-RITE
SPS: Fit, Comfort, & Cosmetics

Mean Score (+ 1 SD)

- TC
- OE-RITA
- OE-RITE
SPS: Fit, Comfort, & Cosmetics

Mean Score (+1 SD)

TC | OE-RITA | OE-RITE

5  | 7       | 8

F(2, 510) = 60.58, p = .000, η² = .192
SPS: Fit, Comfort, & Cosmetics

[Style: $F(2, 510) = 60.58, p = .000, \eta^2 = .192$]
SPS: Fit, Comfort, & Cosmetics

[Style: $F(2, 510) = 60.58, \ p = .000, \ \eta^2 = .192$]

TC < than $O_{E\text{RITA}}$ and $O_{E\text{RITE}}$
SPS: Fit, Comfort, & Cosmetics

[Style: $F(2, 510) = 60.58$, $p = .000$, $\eta^2 = .192$]

TC < than OE_{RITA} and OE_{RITE}
SPS: Fit, Comfort, & Cosmetics

[Style: $F(2, 510) = 60.58, p = .000, \eta^2 = .192$]

OE_{RITA} < OE_{RITE}
SPS: Fit, Comfort, & Cosmetics

[Style: $F (2, 510) = 60.58, p = .000, \eta^2 = .192$]

Mean Score (+ 1 SD)

OE_RITA < OE_RITE

TC

OE-RITA

OE-RITE
Fit, Comfort, Cosmetics

No other significant findings
Localization
SPS: Localization

**[Style: F (2, 510) = 31.40, p = .000, ηp² = .110]**

![Bar chart showing mean (+1 SD) for TC, OE-RITA, and OE-RITE groups.](chart.png)
SPS: Localization

**Style:** $F(2, 510) = 31.40, p = .000, \eta^2 = .110$

TC < than OE_{RITA} and OE_{RITE}
SPS: Localization

[Style: $F(2, 510) = 31.40, p = .000, \eta^2 = .110$]

$TC < \text{than } OE_{RITA} \text{ and } OE_{RITE}$

![Bar chart showing mean values with standard deviation for TC, OE-RITA, and OE-RITE]
SPS: Localization

[Style: $F(2, 510) = 31.40, p = .000, \eta^2 = .110$]

TC < than OE_RITA and OE_RITE

No Difference
Localization

No other significant findings
Ease of Use
SPS: Ease of Use

[Style: $F(2, 510) = 42.39, p = .000, \eta^2 = .143$]
SPS: Ease of Use

[Style: *F*(2, 510) = 42.39, *p* = .000, *ηp*² = .143]

TC < than OE_RITA and OE_RITE
SPS: Ease of Use

[Style: $F(2, 510) = 42.39, p = .000, \eta^2 = .143$]

TC < than OE$_{RITA}$ and OE$_{RITE}$
SPS: Ease of Use

[Style: $F(2, 510) = 42.39, p = .000, \eta^2 = .143$]

TC < than OE\textsubscript{RITA} and OE\textsubscript{RITE}

No Difference
Ease of Use

No other significant findings
Subjective Occlusion/Own Voice

Significant Main Effect of **Style**
Significant Main Effect of **Hearing User Status**
SPS: Subjective Occlusion/Own Voice

Style X User Experience

$[F (1, 255) = 11.86, p = .000, \eta^2 = .044]$
**SPS: Subjective Occlusion/Own Voice**

**Style X User Experience**

\[ F (1, 255) = 11.86, \ p = .000, \ \eta^2 = .044 \]
SPS: Subjective Occlusion/Own Voice

Style X User Experience

$[F (1, 255) = 11.86, p = .000, \eta^2 = .044]$
SPS: Subjective Occlusion/Own Voice

Style X User Experience

\[ F (1, 255) = 11.86, \ p = .000, \ \eta^2 = .044 \]
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SPS: Subjective Occlusion/Own Voice

Style X User Experience

\[ F (1, 255) = 11.86, \ p = .000, \ \eta^2 = .044 \]
Subjective Occlusion/Own Voice

Main Effect of Style
Main Effect of Hearing Status
Interaction of Style x Hearing Status

No other factors significant
## Summary

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Style</th>
<th>HL Group</th>
<th>User Status</th>
<th>Interactions</th>
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</thead>
<tbody>
<tr>
<td>Fit, Comfort, Cosmetics</td>
<td>TC &lt; OE</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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<tr>
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<td>RITA &lt; RITE</td>
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<td>Localization</td>
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<tr>
<td>Ease of USE</td>
<td>TC &lt; OE</td>
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<td></td>
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<tr>
<td>Subjective Occlusion</td>
<td>TC &lt; OE</td>
<td>NS</td>
<td>New &lt; Experienced</td>
<td>New &lt; Experienced ONLY for TC</td>
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<tr>
<td></td>
<td>RITA = RITE</td>
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<tr>
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<td>NS</td>
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<td>Feedback</td>
<td>NS</td>
<td>NS</td>
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</tr>
</tbody>
</table>
Objective Outcome Measures

Words-in-Noise Test
Words-in-Noise Test (WIN)

- 35 NU No. 6 monosyllabic words (female speaker)
  - Presented in soundfield at 0° azimuth
- Multitalker babble
  - Presented at 180° azimuth at 70 dB HL
- Descending paradigm
  - 5 words per each of 7 signal-to-babble ratios from 24-to 0-dB S/N, 4-dB decrements
- Scored in terms of signal-to-noise ratio at the 50% point
  (Spearman-Kärber equation)

Example: Say the word voice

WIN Results
WIN Results

Hearing Loss Group

\[ F (3, 255) = 34.23, \ p = .000, \ \eta^2 = .287 \]

Group 1: 10.36 (SE = .31)
Group 2: 12.34 (SE = .29)
Group 3: 14.44 (SE = .26)
Group 4: 11.93 (SE = .30)
WIN Results

| HA Experience |  
|---------------|---|
| $F (1, 255) = 26.13, p = .000, \eta_p^2 = .093$ |
| New Users     | 11.51 (SE = .19) |
| Experienced   | 13.02 (SE = .21) |
WIN

[Style: $F(2, 510) = 117.68, p = .000, \eta^2 = .316$]
WIN

[Style: \( F(2, 510) = 117.68, p = .000, \eta^2 = .316 \)]
WIN

[Style: $F (2, 510) = 117.68, \ p = .000, \ \eta^2 = .316$]

$TC >$ than $OE_{RITA}$ and $OE_{RITE}$
WIN

[Style: $F (2, 510) = 117.68, \ p = .000, \ \eta^2 = .316$]

$TC > \text{than OE}_{\text{RITA}} \text{ and OE}_{\text{RITE}}$
WIN

[Style: $F (2, 510) = 117.68$, $p = .000$, $\eta^2 = .316$]

TC > than $OE_{RITA}$ and $OE_{RITE}$

Not Significantly Different
**Trade-Off**

**Subjective OE > TC**
- Fit, Comfort, Cosmetics
- Localization
- Ease of Use
- Subjective Occlusion

**Objective TC > OE**
- Speech understanding in noise
Which Drives Patient Preference?

Subjective OE > TC
- Fit, Comfort, Cosmetics
- Localization
- Ease of Use
- Subjective Occlusion

Objective TC > OE
- Speech understanding in noise

Fit, Comfort, Cosmetics
Localization
Ease of Use
Subjective Occlusion
Preferred Hearing Aid Style

<table>
<thead>
<tr>
<th>Style</th>
<th>( n = 263 )</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>Traditional Custom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OE-RITA</td>
<td></td>
<td></td>
</tr>
<tr>
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<tbody>
<tr>
<td>Traditional Custom</td>
<td>52</td>
<td>19.7%</td>
</tr>
<tr>
<td>OE-RITA</td>
<td></td>
<td></td>
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<tr>
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<tr>
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<td>32.3%</td>
</tr>
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<td>85</td>
<td>32.3%</td>
</tr>
<tr>
<td>OE-RITE</td>
<td>126</td>
<td>48.0%</td>
</tr>
</tbody>
</table>
BUT....

Without a 3-arm crossover trial, how do you know what style to recommend to your patients?
BUT....

Without a 3-arm crossover trial, how do you know what style to recommend to your patients?

Can you make the decision based on the audiogram?
Does Style Preference Differ as a Function of Hearing Loss Category?

[Graph showing hearing level in dB (ANSI, 2004) versus frequency in Hz with different categories represented by lines labeled 1, 2, and 3.]
Percentage Preferring Each HA Style within each HL Group

Hearing Loss Group

Percent

1
2
3
4

TC
OE-RITA
OE-RITE

39%
39%
48%
58%

21%
22%
24%
27%

8%
Percentage Preferring Each HA Style within each HL Group

Hearing Loss Group

<table>
<thead>
<tr>
<th>Group</th>
<th>TC</th>
<th>OE-RITA</th>
<th>OE-RITE</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>21%</td>
<td>39%</td>
<td>48%</td>
</tr>
<tr>
<td>2</td>
<td>22%</td>
<td>36%</td>
<td>25%</td>
</tr>
<tr>
<td>3</td>
<td>24%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>27%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Percentage Preferring Each HA Style within each HL Group

Hearing Loss Group

Percent

TC | OE-RITA | OE-RITE

1: 21% 39% 39%
2: 22% 36% 25%
3: 24% 25% 48%
4: 8% 27% 58%
Percentage Preferring Each HA Style within each HL Group

- **Hearing Loss Group 1**: TC (21%), OE-RITA (39%), OE-RITE (48%)
- **Hearing Loss Group 2**: TC (22%), OE-RITA (36%), OE-RITE (25%)
- **Hearing Loss Group 3**: TC (24%), OE-RITA (27%), OE-RITE (27%)
- **Hearing Loss Group 4**: TC (8%), OE-RITA (27%), OE-RITE (58%)
Percentage Preferring Each HA Style within each HL Group

Proportions not significantly different
BUT....

Without a 3-arm crossover trial, how do you know what style to recommend to your patients?

Can you make the decision based on hearing aid experience?
Percentage Preferring Each Style as a Function of HA Experience

<table>
<thead>
<tr>
<th>OE-RITE</th>
<th>OE-RITA</th>
<th>TC</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>35%</td>
<td>15%</td>
</tr>
<tr>
<td>46%</td>
<td>29%</td>
<td>25%</td>
</tr>
</tbody>
</table>

HA User Status
Percentage Preferring Each Style as a Function of HA Experience

<table>
<thead>
<tr>
<th>HA User Status</th>
<th>OE-RITE</th>
<th>OE-RITA</th>
<th>TC</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>50%</td>
<td>35%</td>
<td>15%</td>
</tr>
<tr>
<td>Experienced</td>
<td>46%</td>
<td>29%</td>
<td>25%</td>
</tr>
</tbody>
</table>
Percentage Preferring Each Style as a Function of HA Experience

HA User Status

New

OE-RITE: 50%
OE-RITA: 35%
TC: 15%

Experienced

OE-RITE: 46%
OE-RITA: 29%
TC: 25%
Percentage Preferring Each Style as a Function of HA Experience

- OE-RITE
- OE-RITA
- TC

New
- 15% OE-RITE
- 35% OE-RITA
- 15% TC

Experienced
- 25% OE-RITE
- 29% OE-RITA
- 46% TC
Percentage Preferring Each Style as a Function of HA Experience

- **New HA User Status**
  - OE-RITE: 50%
  - OE-RITA: 35%
  - TC: 15%

- **Experienced HA User Status**
  - OE-RITE: 46%
  - OE-RITA: 29%
  - TC: 25%
Percentage Preferring Each Style as a Function of HA Experience

Proportions not significantly different

New Experience
- GE-RITA: 35%
- TC: 15%

Experienced Experience
- GE-RITA: 29%
- TC: 25%
BUT....

Without a 3-arm crossover trial, how do you know what style to recommend to your patients?

Can you make the decision based on speech understanding in noise?

Aided or Unaided?
Aided WIN as a Function of Preferred Hearing Aid Style

![Bar graph showing mean SNR-50 (+/- 2 SE) for different hearing aid styles: TC, RITA, and RITE. The graph indicates better performance for RITE compared to TC and RITA.]
Aided WIN as a Function of Preferred Hearing Aid Style

![Bar chart showing the mean SNR-50 (+/- 2 SE) for different preferred hearing aid styles. The chart compares TC, RITA, and RITE styles, with TC being the preferred style for all settings. Better performance is indicated by higher SNR-50 values.]
Aided WIN as a Function of Preferred Hearing Aid Style

Preferred Hearing Aid Style

Mean SNR-50 (+/- 2 SE)

Better
Aided WIN as a Function of Preferred Hearing Aid Style

Mean SNR-50 (+/- 2 SE)

Preferred Hearing Aid Style

Better

TC OE-RITA OE-RITE

TC

RITA

RITE

Better
Aided WIN as a Function of Preferred Hearing Aid Style

<table>
<thead>
<tr>
<th>Preferred Hearing Aid Style</th>
<th>Mean SNR-50 (+/- 2 SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>13</td>
</tr>
<tr>
<td>OE-RITA</td>
<td>14</td>
</tr>
<tr>
<td>OE-RITE</td>
<td>13</td>
</tr>
</tbody>
</table>

Better
Aided WIN as a Function of Preferred Hearing Aid Style

Mean SNR-50 (+/- 2 SE)

Better

Preferred Hearing Aid Style

<table>
<thead>
<tr>
<th>TC</th>
<th>OE-RITA</th>
<th>OE-RITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OE-RITA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OE-RITE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Aided WIN as a Function of Preferred Hearing Aid Style

Aided SNR-50 <13 – OE fitting
Aided WIN as a Function of Preferred Hearing Aid Style

Aided SNR-50 > 13 – TC fitting

Aided SNR-50 <13 – OE fitting

Mean SNR-50 (+/- 2 SE)

Better

Preferred Hearing Aid Style

TC

OE-RITA

OE-RITE

TC

RITA

RITE
BUT....

Without a 3-arm crossover trial, how do you know what style to recommend to your patients?

Can you make the decision based on speech understanding in noise?

Aided or Unaided?
BUT....

Without a 3-arm crossover trial, how do you know what style to recommend to your patients?

Can you make the decision based on speech understanding in noise?

Aided or Unaided?
Unaided WIN as a Function of Preferred Hearing Aid Style

The diagram shows the mean SNR-50 & 95% CI for different preferred hearing aid styles: TC, OE-RITA, and OE-RITE. The chart indicates that the mean SNR-50 is highest for TC, followed by OE-RITA and then OE-RITE.
Unaided WIN as a Function of Preferred Hearing Aid Style

Preferred Hearing Aid Style

Mean SNR-50 & 95% CI

TC
OE-RITA
OE-RITE

14.0
15.0
16.0
17.0
18.0
19.0
20.0
Unaided WIN as a Function of Preferred Hearing Aid Style

![Graph showing Unaided WIN as a Function of Preferred Hearing Aid Style]

- **Mean SNR-50 & 95% CI**
- **Preferred Hearing Aid Style**: TC, OE-RITA, OE-RITE

The graph indicates the variation in unaided WIN across different hearing aid styles.
Unaided WIN as a Function of Preferred Hearing Aid Style

TC
OE-RITA
OE-RITE

Preferred Hearing Aid Style

Mean SNR-50 & 95% CI
Unaided WIN as a Function of Preferred Hearing Aid Style

TC Fitting First
Unaided WIN as a Function of Preferred Hearing Aid Style

Mean SNR-50 & 95% CI

Preferred Hearing Aid Style

TC  OE-RITA  OE-RITE
Unaided WIN as a Function of Preferred Hearing Aid Style
Unaided WIN as a Function of Preferred Hearing Aid Style

Preferred Hearing Aid Style

Mean SNR-50 & 95% CI

TC  OE-RITA  OE-RITE
Preliminary Take Home Message

• Measuring Unaided Speech-in-Noise Performance
• Critical to Optimal Amplification Treatment Planning
What would you fit?
Both long-term previous ITE users
Patient 1, 66 years old

Unaided WIN = +15.2 dB
Rank order: 1-RITE, 2-RITA, 3-TC

Unaided WIN = +15.2 dB
Patient 2, 77 years old

Unaided WIN = +24.0 dB
Rank order: 1-TC, 2-RITE, 3-RITA

Unaided WIN = +24.0 dB
More traditional open-ear candidates
Patient 3
Previous ITE user, 67 years old

Unaided WIN = +15.2 dB
Final Ranking: 1-RITE, 2-TC, 3-RITA

Unaided WIN = +15.2 dB
Patient 4
42 year old New Hearing Aid User

Unaided WIN = +14.8 dB
Final ranking: 1-TC, 2-RITE, 3-RITA

Unaided WIN = +14.8 dB
Why did Patient 4 Choose a TC?

- Work situation
  - Electrician who could use TC better with safety glasses
  - TC felt more secure in his ears – had to remove OE devices in certain work situations (e.g., duct work, maneuvering in tight spaces)
Final Take Home Message
Final Take Home Message

- Open Ear is likely the best way to go for the majority of your patients
Final Take Home Message

- The audiogram alone is not enough for optimal patient management
Final Take Home Message

- It is critical to measure speech-in-noise performance
Final Take Home Message

- Measuring up-front can save you and your patients time!
Final Take Home Message

- Practice Patient-Centered Care!
Final Take Home Message

- Practice Patient-Centered Care!
- Ask your patients about their communication goals and needs
1. Understanding while I work as an electrician
2. Hearing Sherri Smith during dinner
3. Talking with Harvey Dillon in the pub
Increasing Hearing Aid Adoption & Use
Increasing Hearing Aid Adoption & Use

In all of those individuals with hearing loss who seek your help