Cochlear Implants for Adults with Age-Related Hearing Loss

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MED-EL Corporation

Disclosures

Jane M. Opie, Ph.D., CCC/A is a Senior Research Audiologist employed at MED-EL Headquarters (Innsbruck, Austria), manufacturer of cochlear and other hearing implants.
Course Outline

I. Adult Cochlear Implant Candidacy (0-5 minutes)
II. Decision Making Beyond the Audiogram (5-20 minutes)
III. Outcomes: Speech Understanding, Subjective Benefit, and Quality of Life (20-40 minutes)
IV. Patient Management and Rehabilitation (40-50 minutes)
V. Summary and Q&A (50-60 minutes)

Course Learning Outcomes

• discuss CI candidacy criteria and considerations for adults with age-related hearing loss

• discuss expected hearing performance outcome measures and subjective benefits of CIs for adults with age-related hearing loss

• discuss patient management and rehabilitation considerations for adult CI recipients with age-related hearing loss
Adult Cochlear Implant Candidacy

FDA Adult Cochlear Implant Candidacy Criteria

- Age 18 years and older
- Bilateral SNHL, severe-to-profound: $\geq 70\text{dB PTA at } 500\text{Hz, 1000Hz, and 2000Hz}$
- Limited benefit from appropriate amplification
- $\leq 40\%$ on HINT sentences in best-aided condition

+ Medically fit to undergo general anesthesia with realistic expectations and motivated to participate in follow-up device fitting and aural rehabilitation
What if you don’t use sentence tests in your clinic?
Suggestions for referring to a CI center

- Bilateral SNHL, severe-to-profound:
  $\geq 70\text{dB PTA}$ at 500Hz, 1000Hz, and 2000Hz

- Recorded, word (full) lists and use your best clinical judgement that the candidate receives limited benefit from appropriate amplification

- Refer to CI center for full work up
What is *not* specified in FDA candidacy criteria?

- Upper age limit
- Cognitive status

However, when evaluating CI candidates with ARHL, there might be other considerations to drive decisions and proactively manage CI recipients to best success.

Hearing loss can have serious consequences for older adults

- Cognition*, depression, social isolation, reduced brain volume, fall risk, partners
  [www.linresearch.org](http://www.linresearch.org)
- Institute of Medicine Workshop on Hearing Loss and Healthy Aging (2014)
- Davis et al. (2016) Aging and Hearing Health, Gerontologist
- AudiologyOnline: Hearing, Cognition, and Healthy Aging Kathy Pichora-Fuller, 24 February 2016

*Achieve-P pilot study results will be reported in the next months
Mosnier et al. (2015). JAMA Otolaryngol*
How might hearing loss be associated with other health outcomes?

Decision Making Beyond the Audiogram: Considerations for Adults with ARHL
### Team Approach

<table>
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<tr>
<th>Profession</th>
<th>Goal</th>
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<tr>
<td>Medical (might be geriatrician), surgical, anesthesiology</td>
<td>Medical stability and comorbidities, anesthesia risk</td>
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<tr>
<td>Neuropsychologist</td>
<td>Cognitive and psychologic testing</td>
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<td>CI Audiologist</td>
<td>Candidacy evaluation, counsel for realistic expectations</td>
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<tr>
<td>HA Audiologist</td>
<td>Manage HA, contralateral HA</td>
</tr>
<tr>
<td>Aural Rehabilitation Therapist</td>
<td>Identify needs to plan post-op care, HA</td>
</tr>
<tr>
<td>Family members and friends</td>
<td>Support for appointments, troubleshooting</td>
</tr>
<tr>
<td>Social Worker</td>
<td>Support nursing homes, assisted living, home</td>
</tr>
<tr>
<td>Physical Therapist</td>
<td>Manual dexterity, physical needs</td>
</tr>
</tbody>
</table>

### Adult Implant Profile (AIP)

- **Factors important to use of Cochlear Implant**
  - Audiological
  - Functional Hearing
  - Duration of Profound Deafness
  - Additional Special Needs
  - Communication Skills
  - Support
    - a) Home
    - b) Work
  - Environment
    - a) Home
    - b) Work
  - Expectations
    - a) Patient
    - b) Family & Friends
  - Motivation & Commitment
  - Medical
  - Other (please specify):

- **Comments**

- **Developed by the Yorkshire CI Program (1997), definitions out of date**
- **Used to summarize information across professionals**
- **Help identify areas of concern/referral**
- **CI center specific profile and definitions can be developed**
- **Attune Brisbane Hearing Profile for Older Adults, Karen Pedley**
Jonathan, retired, 76 years old

- Progressive, bilateral SNHL since mid-50s; HINT, BA: 38%,
- Consistent HA use: left not helpful, right for telephone
- Eager to hear better
- Battery change difficult – limited dexterity??
- Family reports forgetfulness; participates happily in family events
- Wife died four years ago
- Gym four days per week, plays chess at the community center

Jonathan is an appropriate candidate for CI

- Recommend identifying someone to help manage appointments, support external equipment
- Speak with family re: future plan for residence
- Monitor cognition
- Refer to PT
Outcomes: Speech Understanding, Subjective Benefit and Quality of Life

Pre-vs Post-op Outcome

Speech understanding better post-op

- 113 adults: (67) ≥65y, (46) <65y
- Individual differences within all age groups
- Significant differences post-op between youngest and oldest age groups and between younger older adults and oldest older adults

Roberts et al. (2013). Laryngoscope, Fig 2
Better Pre - Better Post

Better pre HINT-Q predicted better post-op performance

(78) 65y+

3 groups based on pre-implant HINT-Q score

- Better pre-op HINT-Q predicted better post-op outcomes
- Effect held regardless of age

Friedland et al. (2010). Arch Otolaryngol- HNS, Fig 1D

Bilateral CI

Benefit of bilateral CI

(67) who received a 2nd CI 50y+

- CNC phoneme recognition decreased with age at 2nd CI
- Bilateral CI was better than either the first or second CI alone; 1st and 2nd CI were similar
- 1st CI score predicted 2nd CI score

Study did not assess bilateral benefits (noise, localization)

Boisvert et al. (2016). LIA, Fig 1
Performance Plateau

Performance increases up to 5y post-op, plateaus thereafter

(14) CI with 10y experience
Mean age = 70y

- Significant effect of interval, consistent with improvement over time.

- Plateaus:
  - Stable 6m to 1y
  - Improved 1y to 5y
  - Stable 5y to 10y

Dillon et al. (2013). JAMA Otolaryngol, Fig 1

Long-Term Performance

No performance decline over time

OA: (20) 70y+ @ CI
YA: (37) 40-60y @CI
Dutch phonemes

- Group means significant differences YA performance better than OA
- Individual differences, variability
- No significant differences in interval, indicating stable performance

Jolink et al. (2016). CI International, Fig 1
Subjective Benefit
Disease-Specific QoL

Good disease-specific QoL

Nijmegen Cochlear Implant Questionnaire
(20) 60y+; (20) <60y

Similar results across groups
- Advanced Sound
- Self-Esteem
- Activity Limitations

Significant differences
- Basic Sound
- Speech Production
- Social Interaction

Sladen et al. (2014). AJA, Fig 4

Subjective Benefit
General QoL

Good General QoL

- Glasgow Benefit Inventory (GBI): similar scores across three age groups (Vemiere)

- HUI-3 (Health Utilities Index 3): pre-to post-op improvements (Francis)

Vermeire et al. (2005). Otol Neurotol, Fig 5
Francis et al. (2002). Laryngoscope.
Patient Management and Rehabilitation

Patient-Centered Care and Patient Decision Aids

- Clear and informed choices
- Optimize shared decision making
- Patient participation and activation
- Needs and expectations
- Collaborative goal setting
- Compliance with plan
- Include family

GOAL: align with patient values

Developing Support Materials
PDAs, Flyers, Caretaker Communication, etc.

CI manufacturer supplied user manuals are labeling approved by the FDA and go through extensive review. Always provide user manuals to the CI recipient and do not substitute with other documents.

Content and Language
- Common and simple vocabulary
- Simple, direct sentences
- Reading level
- Active (not passive) voice
- Positive (not negative) statements
- Focus on a few concepts

Graphics and Layout
- Large font size (12-pt or larger)
- Serif font
- Contrast: dark text on light background (50:1 or higher)
- Number steps in instructions
- Uncluttered page: Blank areas
- Matt paper (not very light reflective)
- Icons only if clear and obvious
- Line drawings

Copepecco et al. (2011). Trends in Amplification; Designing for Older Adults ISBN 978-1-4200-8055-1

Cochlear Implant Management Skills (CIMS)
Practical Hearing Aid Skills Test (PHAST-R)

Skills: Maintenance & Usage
- Speech processor
- Battery compartment
- Headpiece
- Cable and magnet
- Accessories

CIMS
10 question survey
3-pt Likert scale: Performs task
- Accurately with no difficulty
- Some difficulty, would benefit from retraining
- Inaccurately, unable, does not perform (NA)

Flash cards, large font

Traditional Rehabilitation for ARHL

Relearning skills for simple to complex materials

- Analytika
- Auditrain
- Hear at Home
- Hear Today
- Listening Up
- Music Notes
- Speech Trax
- Syntrain
- Telephone Tips
- Localisation

Current Trend: Integrate Cognitive Training

- Brain Training from Posit Science [www.BrainHQ.com](http://www.BrainHQ.com)
  - Attention
  - Brain Speed
  - Memory
  - People Skills
  - Intelligence
  - Navigation

- Reminiscence Therapy
  - Dementia/Alzheimer’s
  - Discuss past activities, events, and experiences
  - Memory aids: photos, videos, and life story books
  - Communication and social interaction

Caveat: Generally must continue regular training to maintain benefit

Summary and Q&A

Summary

- Proactive candidate selection uses a team approach
  - Address concerns up front and plan for future needs

- Adults with ARHL benefit from CI
  - Better post-op, better pre-op yields better post-op, bilateral speech recognition benefit, 5y performance plateau, long-term benefit maintained, good disease-specific and general QoL

- Patient mangement
  - Involve patient in decision making, use supporting materials appropriate for age group, assess ability to use and maintain externals
  - Rehabilitation: Use traditional methods and consider integrating cognitive training
Cochlear Implants are suitable for adults with severe-profound age-related hearing loss. Proactive candidate selection, under a team approach, is useful in decision making and to plan for success. Benefits are observed in speech understanding and disease-specific and general quality of life. Postoperative patient management and rehabilitation are important to ensure consistent device use and benefit.

Conclusion

Q & A
Thank you for your attention.

If you have any questions or would like further assistance, please do not hesitate to contact us at 888-633-3524.
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<thead>
<tr>
<th>Factors</th>
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<th>Mid-Moderate Concern</th>
<th>Great Concern</th>
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<td><strong>Audiological</strong></td>
<td>Recent or improving hearing loss</td>
<td>Patient had been fitted with hearing aids, but improvement not seen in long-term</td>
<td>Patient failure to improve hearing remains consistent, even with hearing aids</td>
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<td>Hearing aid usage</td>
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<td>Hearing aid usage remains consistent, but improvement not seen in long-term</td>
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<td>No significant loss from auditory function tests</td>
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<td></td>
<td>and work colleagues, peers, and staff in the education setting</td>
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