Psychosocial Determinants of Quality of Life and CI Outcome in Older Adults

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Presented by: Howard Francis
Disclosure

- Member, Surgical Advisory Boards:
  - Advanced Bionics Corporation
  - Med-El Corporation
  - Cochlear Corporation
Speech Perception Gain with Age

1 yr change in HINT Speech Scores by Age at CI

Lin et al, Medicine, 2012
Residual Hearing Helps

Lin et al, Medicine, 2012
Health Utility Index (HUI) Gain by Age

Francis et al, Laryngoscope, 2002
Association between HUI and Speech Perception Gains

Francis et al, Laryngoscope, 2002

Monosyllabic Words

△Speech Discrimination at 6 mos (%)

Change in HUI

-6 -4 -2 0 2 4 6

<65 y.o. at CI

>=65 y.o. at CI

r=0.55; p< .005
Hearing Loss and Aging Outcomes

*Independent risk factor for:*

- Hospitalization
- Physical disability
- Cognitive decline
- Increased mortality

Lin et al, JAMA Int Med, 2013;
Hearing Loss and Aging Outcomes

Potential Mediators

- Attention burden
- Depression
- Isolation
Loneliness score

- Higher baseline in CI recipients
- Improves at 6-12m after CI

Contrera et al., Laryngoscope, 2017
The Older CI Candidate

Hearing deprivation and aging effects

AGING ↔ Hearing Deprivation Effects

Cochlear Implant Intervention → Quality of Engagement → Outcome

SEVERITY → TIME
Conceptual Model for CI Outcomes in Older Adults

Clark et al, JAGS, 2012

Adopted from Wilson and Cleary, JAMA, 1995
Study of Psychosocial Determinants I
Francis et al, (Triological Thesis) Laryngoscope, 2014

JHH Retrospective, 2000-2008
N= 219
56% female

Dependent Variables:
Surgical results
full insertion
complications

Open-set SP
CNC words, CNC phonemes, HINT sentences in quiet baseline, 3, 6 & 12m
Study of Psychosocial Determinants I
Francis et al, (Triological Thesis) Laryngoscope, 2014

Independent variables

- Age at CI
- Proportion of life using HA
- Education
- Living Arrangements
- Depression
- Co-morbidities (Charlson Index)
- Missing SP data
Time Course of Speech Perception Gains
Francis et al. (Triological Thesis) Laryngoscope, 2014

![Graph showing mean CNCP(%) over time with data points at Pre-CI, 3 m, 6 m, and 12 m.](image)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>(Std. Err.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equation 1 : cnpc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visit</td>
<td>31.933**</td>
<td>(2.356)</td>
</tr>
<tr>
<td>Visit²</td>
<td>-6.668**</td>
<td>(0.739)</td>
</tr>
<tr>
<td>Missing I CNCP</td>
<td>0.983</td>
<td>(3.050)</td>
</tr>
<tr>
<td>Missing &gt;1 CNCP</td>
<td>-6.348*</td>
<td>(3.151)</td>
</tr>
<tr>
<td>Intercept</td>
<td>29.794**</td>
<td>(2.803)</td>
</tr>
</tbody>
</table>

N = 534
Log-likelihood = -2351.041
χ²(4) = 320.24

Significance levels: †: 10%  *: 5%  **: 1%

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Duke Surgery
Correlates of SP Gain

Francis et al, (Triological Thesis) Laryngoscope, 2014

Speech Perception (%)

Early Gains (3m):
PropLifeHA (Baseline SP)
Correlates of Early vs Late SP Gain (6-12 m)

Francis et al, (Triological Thesis) Laryngoscope, 2014

Late Gains:
Education status, Residential status, Depression status, Co-morbidities

Early Gains (3m):
PropLifeHA (Baseline SP)
Correlates of 12 m SP Gain

Francis et al, (Triological Thesis) Laryngoscope, 2014

12m Gains:
- Education status
- Residential status
- Co-morbidities (Baseline SP)
  (Missing data)
Correlates of Speech Perception Gain
(with addition of data missingness*)

Francis et al, (Triological Thesis) Laryngoscope, 2014

Late Gains:
- Education status
- Residential status
- Depression status
- Co-morbidities

Early Gains (3m):
- PropLifeHA*
- (Baseline SP)
- Duration HL

12m Gains:
- Education status
- Residential status*
- Co-morbidities*
- (Baseline SP)
- (Missing data)
- Female gender
- Family involvement

Francis et al, (Triological Thesis) Laryngoscope, 2014
Conceptual Model for CI Outcomes in Older Adults

Clark et al, JAGS, 2012

1. Biological, Physiological: Sound deprivation
2. Symptom Status: Speech perception
3. Functional Status: Physical, Psychological, Role, Social
4. General Health Perception
5. HRQL
6. Characteristics of the Individual: Education Status, Co-morbidities, History of depression, Gender
7. Characteristics of the Environment: Residential Status, Family Involvement

Adopted from Wilson and Cleary, JAMA, 1995
Study of Psychosocial Determinants II
Tang et al., Ear and Hearing, 2017

- Evaluate: Individual and environmental determinants of CI outcome
  - Emotional intelligence
  - Comfort with technology
  - Engagement with aural rehabilitation
  - Resident and co-domicile status
Prospective study - Recent JHH CI cohort
- >65y at CI in previous 18m
- N=55

Dependent variables (at 1y; avg 13.9m)
- Speech perception (AzBio)
- Quality of Life (Glasgow Benefit Inventory)

Independent variables (surveys and EMR)
- age, health status, exposure to aural rehabilitation, trait emotional intelligence (EI), comfort with technology, and living arrangements
Higher education
- 27% higher SP scores (p<.05)

Cohabitation
- 22% higher SP scores (p<.05)
- Less significant with education

Engagement with aural rehabilitation
- Higher GBI score (+15.8, p<.05)

Comfort with technology (tablet users)
- 18% higher SP performance (p<.05)
- Borderline significant with education status
- Relevance to appropriate device use
Study of Psychosocial Determinants II

RESULTS

- **No effect of Age**
- **Emotional Intelligence**
  - Higher than average
  - *Not predictive* of SP or QoL at 1 year
- **Missing Data**
  - Associated with mild cognitive impairment (*N=5*)
  - Associated with lower social engagement scores on GBI
Conceptual Model for CI Outcomes in Older Adults

Tang et al., Ear and Hearing, in press
Conclusions

- Older adults of all ages can benefit from CI
- Variable outcomes influenced by delayed intervention, psychosocial factors and general health
- Limitations to access and ability to engage in practice and rehabilitation services need to be addressed
Communication and QoL outcomes:

\[ f(x) \]

Atrophic effects of sensory deprivation

+ 

Downstream health and psychosocial effects of hearing loss

+ 

Other aging effects
Proposed Policy and Practice

- Early intervention
- Tailored Rehabilitation
  - Patient
  - Family and caregivers
- New Strategic Alliances
  - Local Care and Companion Networks
    - Enhanced social engagement
    - Family support
  - CI Manufacturers and Community Audiologists
    - Technological support
Thank you