Evaluation and outcome measures for cochlear implantation for children with unilateral hearing loss

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Thursday, May 12, 2016
NO FINANCIAL DISCLOSURES
Diagnosis of UHL

If we diagnose UHL then we consider it significant

WHO guidelines for screening (Wilson’s Criteria 1968)

1. The condition should be an important health problem.
2. There should be a treatment for the condition.
3. Facilities for diagnosis and treatment should be available.

- Incidence 0.6:1,000 (WHO)
- 37-58% will have deterioration of hearing
- 10-22% will have a progressive bilateral loss
- Parental stress at time of diagnosis is not related to level of hearing loss
- Risk of delay for speech, language and listening

Screening guidelines for principles and practice (Force & Force, 2008; Joint Committee on Infant Hearing of the American Academy of et al., 2013; Ross et al., 2008; WHO, 2009; Yoshinaga-Itano, 2004), (WHO, 2009), Fitzpatrick, Whittingham, & Durieux-Smith, 2014; Lieu, Tye-Murray, & Fu, 2012, (Bess, Klee, & Culbertson, 1986; Culbertson & Gilbert, 1986; Lieu et al., 2012; McKay, Gravel, & Tharpe, 2008), (Martinez-Cruz, Poblano, & Conde-Reyes, 2009), (Bess et al., 1986; Culbertson & Gilbert, 1986; Fischer & Lieu, 2014; Fitzpatrick et al., 2014; Holstrum, Gaffney, Gravel, Oyler, & Ross, 2008; Lieu et al., 2012; Tharpe, 2008), (Ead, Hale, DeAlwis, & Lieu, 2013), (Abel & Lam, 2008; Johnstone, Nabelek, & Robertson, 2010; Tavora-Vieira & Rajan, 2015), (Goberis et al., 2012), (Firszt, Reeder, Dwyer, Burton, & Holden, 2015; Johnstone et al., 2010; Van Deun et al., 2010).
What do we know about children in with UHL in EI?

- 20% of children start early intervention with UHL
- Median age of starting EI higher than for bilateral HL
- Bilateral HL: n=120
  - 58% stable hearing
  - 17% deteriorating UHL
  - 17% ongoing OME
  - 8% deteriorate to bilateral hearing loss

Speech and language measures similar to hearing peers, theory of mind significantly poorer as a group.
UHL Outcomes on Functional Listening Index

Functional listening outcomes for children with typical hearing
### Cochlear Implant and UHL

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age at CI</th>
<th>Age at diagnosis (months)</th>
<th>CI type</th>
<th>Duration of CI (yrs)</th>
<th>Data logging</th>
<th>MRI</th>
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**Children Currently Under Evaluation**

- **Gender:**
  - M: 55%
  - F: 45%

- **Age:**
  - Median: 6 years (2.5-11.2 years)

- **Hearing Aids/Baha:**
  - Yes: 32%
  - No: 68%

- **Medians:**
  - 4 FA non-CI: 15 dBHL (5-34 dBHL)
  - 4 FA CI: 99 dBHL (69-120 dBHL)

- **MRI:**
  - L: 55%
  - R: 45%

- **Congenital/Acquired:**
  - Congenital: 73%
  - Acquired: 27%

- **Age at Diagnosis:**
  - Median: 1.6 years (0-5 years)

- **Duration of CI:**
  - Median: 7 hrs (2.7-12.4 hrs)

- **HL CND:**
  - 55-60% with SNHL > 80 dB
CI for UHL: candidacy n=22

- **Audiometric evaluation**: may be difficult with younger children, parent choice with profound HL to try hearing device
- **Listening, speech & language**: looking for more subtle difficulties with real world listening environments, particularly in background noise. SSQ, formal speech and language assessment, speech perception in noise (age appropriate)
- **Counselling & expectations**: what are the family’s goals for their child?, meet independently with a Child and Family Counsellor
- **Medical**: MRI results much more likely to show problems with the auditory nerve
CI for UHL: device programming $n=17$

- Greater reliance on objective measures (NRT-based programming) than for same aged children with bilateral hearing loss
- Greater ability to include children in the programming—typically have better speech and language than their bilateral hearing impaired peers
- Fast access to sound, but slower to progress to rely on the signal than bilateral hearing loss/bilateral CI

CI for UHL: therapy considerations

- Therapy via streaming AND targeting individual goals
- Working on complex listening skills early
- Ongoing considerations: FM to the better ear? Or the CI ear?
CI for UHL: Measuring Outcomes

- **Typical approaches** to outcomes measures for speech and language
- **Focus** on the areas of general concern with UHL: social/pragmatic skills, complex listening environments, any gaps in speech and language
- Targeting and measuring **goals the family/child have set**
- **Tools** to measure what families report:
  - *Improved attention*
  - *Speech awareness, speech at word level better than pre CI*
  - *Awareness of sound*
  - *Ability to focus and listen to softer sounds has improved*
  - *Listening in background noise (less repetitions, can retain more)*
CI for UHL: Listening to parents

“To us it’s simple. If our baby only had one arm, we’d do anything to make sure she had another one. It’s the same with her ears”

“I’ve been told my child has enough hearing to develop typical speech and language”

“I can’t get Better Start funding as the level of my child’s hearing loss isn’t significant enough”

“Should we do anything? I just don’t know and everyone tells us different things”

“The level of distress from a diagnosis does not equate to the level of hearing loss”

“We feel judged about our choice for our child to have a CI because it’s different to what some clinicians think we should do”
The Shepherd Centre team

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Cheryl Parsons

Research
Tracy Hopkins

Information & Analysis
Alyshia Hansen
Yeeka Yau
Heidi Shaw
Samantha Lynch
Thank you to all the children and families that share their journey with us.

We gratefully acknowledge the contributions of past TSC staff members to the design and implementation of our clinical research.

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The Shepherd Centre
Giving deaf children a voice