Redefining the borders:
The benefits of stretching the criteria for paediatric CI

Yetta ABRAHAMS; Aleisha DAVIS; Katie NEAL

14th Symposium on Cochlear Implants in Children
December 11-13, 2014 at the Omni Nashville Hotel – Nashville, TN
Is there anyone not suitable for a CI?

- Vast improvements in outcomes for all children with hearing loss given early diagnosis, free access to better technology, better early intervention techniques and multidisciplinary service for families
- Significant changes in the landscape of Early Intervention
- Since the introduction of UNHS the typical age of commencing with early intervention is 8-12 weeks
- Increase in mild and unilateral hearing losses in EI
- In recent years, clinical trend for children with moderate hearing loss (with HAs) to be struggling with progress more than children with more significant hearing loss (with CIs)
Our Early Intervention outcomes

Language and vocabulary results 2007 - 2013

* 'Standard' graduates are those children who join the EI program within 6 months of diagnosis and do not have additional needs nor are from a background with less than 50% English exposure

** 'All' graduates includes the outcomes from children who joined the program late - normally already with delayed language development; with additional needs; or are from a non-English speaking environment
The clinical challenge

Leigh et al (2011) PTA 75dBHL or poorer 75% chance of improved hearing with CI
Ching et al (2010) immediate referral for infants with 3FA >80dBHL, or if 3FA=60-80dBHL and listening performance is poor
Insufficient functional access for listening in real world environments
Newish indications for CI

- Significant advances in implant technology, sound coding strategies and surgical techniques since the use of the multi-channel cochlear implant commenced 1978
- Subsequent expansion of the indicators for cochlear implantation over the years
- Candidacy criteria has changed over time - audiological

- Hearing aid users who still fall outside the candidacy criteria continue to present to the cochlear implant clinic report and demonstrate significant hearing and communication difficulties in real-world situations (Alkaf & First, 2007; Gifford et al., 2007; Novak et al., 2007)
- Adult studies provide the basis and criteria for expanding into the paediatric population
What about children?

• Significant changes in the landscape of Early Intervention

• Since the introduction of UNHS the typical age of commencing with early intervention is 8-12 weeks

• Increase in mild and unilateral hearing losses in EI

• Vast improvements in outcomes for all children with hearing loss given early diagnosis, free access to better technology, better early intervention techniques and multidisciplinary service for families

• In recent years, clinical trend for children with moderate hearing loss (with HAs) to be struggling with progress more than children with more significant hearing loss (with CIs)
## CI for children with more residual hearing n=68 (106 implants)

<table>
<thead>
<tr>
<th></th>
<th>GROUP 1: n=41</th>
<th>GROUP 2: n=23</th>
<th>GROUP 3: n=4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>&gt;Severe-profound HL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean HTL better ear</td>
<td>100dBHL (min 80, max NR. SD:3)</td>
<td>68dBHL (min 48, max 79. SD:8)</td>
<td>13dBHL (min 100, max NR. SD:8)</td>
</tr>
<tr>
<td>Mean HTL poorer ear</td>
<td>100dBHL (min 81, max &gt;100. SD: 3)</td>
<td>82dBHL (min 58, max 120. SD:16)</td>
<td>100dBHL (min 100, max NR)</td>
</tr>
<tr>
<td>Mean Age at CI1 (months)</td>
<td>16 (min 5- max 53. SD: 12)</td>
<td>29</td>
<td>min 58 (min 47- max 74. SD: 12)</td>
</tr>
<tr>
<td>UNHS diagnosis</td>
<td>80%</td>
<td>100%</td>
<td>25%</td>
</tr>
<tr>
<td>gender</td>
<td>19 female, 22 male</td>
<td>4 female, 6 male</td>
<td>1 female, 3 male</td>
</tr>
<tr>
<td>CI configuration</td>
<td>1 CI+HA, 8 SQBiCI, 32 SimBiCl</td>
<td>7 SQBiCI, 3 SimBiCl</td>
<td>4 CI1</td>
</tr>
</tbody>
</table>

- **SSD**: +7 older children with CI for SSD
- **5** congenital, **2** fracture, **2** LVAS, **1** ANSD
Outcomes with more residual hearing:

Median total language score in typical range 6 months post implant for children with more residual hearing

- Working with trained LSLSs to build a picture of usable residual hearing through ongoing functional diagnostic assessment

- Important to monitor rate of progress very carefully in first 12-18 months: detailed vocal assessments, auditory hierarchy, expressive and receptive development compared to hearing
Listening skills

Children with matched hearing levels

With Cochlear Implants
With Hearing Aids

The Shepherd Centre Auditory Hierarchy
Case study 1

Tracking auditory development for individual children: supporting CI candidacy

- **Point of implantation**
  - 34 months
  - Moderate-severe HL

The Shepherd Centre Auditory Hierarchy
Case study 2

Tracking auditory development for individual children: supporting CI candidacy

- Point of implantation
  - 12 months
  - Moderate-severe HL

The Shepherd Centre Auditory Hierarchy
Case study 3

Regularly recorded access to sound vs. total language score (PLS).

Candidacy is not waiting for scores to drop out of the normal range, but also considers access to sound.
Implications for clinical practice

• More hearing means harder decision for families

• More hearing usually goes with more confidence from the child at initial activation- prior experience with sound

• Often faster to get to a stable MAP & to demonstrate good access

• Overall progress is quicker

• Best outcome is with earliest CI

• Important to consider fitting the acoustic hearing children have
What needs to change for best outcomes?

- Greater awareness for paediatric referral sources
- Raising expectations of what children with hearing impairment can achieve
- Move focus beyond audiology and speech perception to the real impact of listening & missing high frequency information
- Referral to talk about CI is about information not about implanting everyone
Acknowledgments

CEO: Jim Hungerford

Director of Clinical Programs: Aleisha Davis, LSLS Cert AVT

Listening & Spoken Language Therapists
- Sharon Lowe, LSL Manager
- Dr Anne Fulcher, LSLS Cert AVT
- Rashmi Hiriyur, LSLS Cert AVT
- Joanna McAdam, LSLS Cert AVT
- Lisa Niall, LSLS Cert AVT
- Danielle Slack, LSLS Cert AVT
- Ha Thanh Lam, LSLS Cert AVT
- Janna Weller, LSLS Cert AVT
- Jen Whiteway, LSLS Cert AVT
- Samantha Arnison, LSLS Cert AVT
- Ali Corlette, LSL Therapist
- Tiffany Bennett, LSL Therapist
- Fiona Deeney, LSL Therapist
- Jessica Evers, LSL Therapist
- Jenna Golab, LSL Therapist
- Amber Monk, LSL Therapist
- Natasha Shallita, LSL Therapist
- Victoria McKinnon, LSL Therapist

Child & Family Counsellors
- Renee Bennett
- Michelle Southgate
- Alison Hersee
- Sara Luscombe
- Danielle Bollard
- Elizabeth McCartin

Research & Assessments
- Erin Lymbers
- Jessica Evers

Audiology Team
- Yetta Abrahams
- Katie Neal
- Shellie Lavery
- Megan Gradden
- Emma Coote
- Brooke Rose
- Heather Lassenev

Group Programs/Early Education
- Niamh O’Reilly

Cochlear Implant Surgeons
- Dr Phillip Chang
- Dr Thomas Kertesz

ENT Specialists
- Dr Nigel Biggs
- Dr Simon Greenberg

Clinical Programs Admin
- Sharon Hill
- Ann Wright
- Katherine Saunders
- Mariene Aoun
- Georgina McPherson

Information & Analysis
- Alyshia Hansen
- Yeeeka Yau
- Heidi Shaw
“Thank you this much!”