Data Logging in Pediatric Cochlear Implant Recipients

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Data Logging

• Objective data regarding CI recipient’s auditory experience
• Available for N24, N24 RE, CI512, CI422 CI recipients fitted with CP910 or CP920 (Nucleus 6) processors
• Information regarding CI system use:
  – Hours system is active
  – Frequency of coil offs (loss of link between transmitter & implant)
  – Hours of accessory use
    • FM system
    • Personal audio cable (for MP3)
    • Telecoil
    • Lapel microphone
Data Logging

• Listening environment experience
  – Hours exposed to speech in:
    • Quiet
    • Noise
  – Hours listening environment characterized by:
    • Quiet
    • Noise
    • Wind
    • Music
Methods

- Minimum 3 month experience with N6 processor
- Data was obtained for the following:
  - Number of “coil offs” per subject
  - Average daily use per ear
  - Average daily exposure to speech
    - In quiet
    - In noise
- Relationship between these measures and age, presence of disabilities, and auditory skills were examined
- Software does not currently permit extraction of historical data
  - Data extracted from de-identified patient files by manufacturer
  - Data analysis independent of manufacturer
Demographics (N=52)

- 28 male, 24 female
- 30 unilateral CI
- 22 bilateral CI
  - Time between 1st and 2nd CI: 2 years (range 0 - 8.6 years)
- 48 recipients upgraded to N6
  - Mean age first CI surgery: 4.2 years (range 0.6 – 18.9)
- 4 recipients fitted with N6 without prior CI experience
- Initial CI to N6 fitting interval: 5 years (range 0 – 14.4 years)
- Mean length of N6 use: 7.8 months (range 4.1 – 12.5 months)
Demographics

• 14/52 (27%) had additional disabilities
  – Developmental Delay: 4
  – Cerebral palsy: 3
  – CHARGE Syndrome: 3
  – Autism spectrum disorder: 2
  – Other disabilities: 3
Results
Coil Offs Per Day

Mean = 25  (SD 24.1)
Median = 17
Coil Offs Per Day By Age Fitted With Nucleus 6

Mean Coil Offs

Age at Onset of N6 Use

*\(p < .005\)
Daily Use (N=47)

Mean = 10.2 (SD 3.6)

Number of Subjects

Avg. Daily Hours of CI Use
Daily Use by Age Group (N=47)

Mean Hours of N6 Use by Age Group:
- 0-3 years: 7 hours
- 3-6 years: 10 hours
- 6-11 years: 10 hours
- ≥ 11 years: 10 hours

Age at Onset of N6 Use:
- 0-3 years
- 3-6 years
- 6-11 years
- ≥ 11 years
Daily Exposure To Speech In Quiet & Noise

Mean Hours

Daily use

Speech exposure

- Speech in noise
- Speech in quiet
- Overall hours of use
Daily Total Use, Speech In Quiet and Noise By Age Group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Total Use</th>
<th>Speech in Quiet</th>
<th>Speech in Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-6 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-11 years</td>
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<td></td>
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<tr>
<td>≥ 11 years</td>
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</tbody>
</table>

Age at Onset of N6 Use

*p ≤ .027

**p ≤ .004
Auditory Performance Groups (N=52)

<table>
<thead>
<tr>
<th>Auditory Ability</th>
<th># Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>No detection</td>
<td>0</td>
</tr>
<tr>
<td>Detection only</td>
<td>9</td>
</tr>
<tr>
<td>Closed-set</td>
<td>4</td>
</tr>
<tr>
<td>Open-set</td>
<td>39</td>
</tr>
</tbody>
</table>

No significant difference in average daily device use
Ear 1 & Ear 2 In Bilaterally Implanted (N=22)

- Daily Use
- Speech in quiet
- Speech Exposure in noise

Mean Hours

1st CI
2nd CI
Auditory Skills and number of "coil offs"

Mean # of coil offs

- Detection only
- Closed Set
- Open Set

*p < .002"
Summary

• Average device use was less than expected
  – Use may have been underestimated if back up processor was used and not reported
• Use patterns may differ by age and considerable variation among subjects on all measures was present
• Access to data logging can help to identify transmitter retention problems that may go unreported