Longitudinal Speech and Language Outcomes in Paediatric Cochlear Implant Patients

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We have no relevant conflicts of interests to disclose relative to this presentation
Study context

- London team – heterogeneous population
- Some children are implanted much later than desirable
- We are a National Health Service – where the care and cost of implantation is funded via taxation not insurance
- We want to ensure we are directing public resources towards the most appropriate interventions at the right time
We want to know if implanted children:

- Develop typical spoken language skills (receptive and expressive) by 10 years post implantation
- Develop typical speech intelligibility
Demographic information collected

- Gender
- Type of loss
- Aetiology
- Home language/s - and parental competence
- Communication mode
- Additional difficulties
- Educational placement
- Age at Implantation
- Device configuration
Routine Clinical Data Collection

At specified review intervals we assessed:

- Speech Perception
- Receptive and Expressive language
- Speech Intelligibility Rating Scale
- Mode of Communication
- School placement
- Emerging or confirmed additional speech, language or communication difficulties
Cohort

- Children implanted between 1998 and 2019
  - 171 children with 5 years data
  - 82 with 10 years data

- All children included – no exclusions
### Aetiology - Ten Year Data

<table>
<thead>
<tr>
<th>Aetiology</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>25</td>
</tr>
<tr>
<td>Connexin 26</td>
<td>19</td>
</tr>
<tr>
<td>Meningitis</td>
<td>11</td>
</tr>
<tr>
<td>CMV</td>
<td>10</td>
</tr>
<tr>
<td>Genetic</td>
<td>10</td>
</tr>
<tr>
<td>Syndromic (Wardenburg’s, Ushers)</td>
<td>4</td>
</tr>
<tr>
<td>Rubella</td>
<td>2</td>
</tr>
<tr>
<td>Mitochondrial</td>
<td>2</td>
</tr>
</tbody>
</table>
Implant Configuration by Year

Number of Children

Year of Implantation

- Unilateral
- Bimodal
- Sequential
- Bilateral
- Simultaneous
- Bilateral

NICE Guidance
Age at Implant by Year

Trend for reduction in age at implantation over the years

Only Congenital Severe-Profound

Age at implantation (months)

Medians: 30.50, 34.50, 29.00, 23.00, 19.00, 24.00
Age/ Home Language/ Year 1998 - 2013

Trend for lower age at implant particularly in E1L group
Language outcomes at 10 years – Core score

[Bar chart showing the number of children in each category at different time points: Pre-implant, 2 years post-activation, 5 years post-activation, 7 years post-activation, 10 years post-activation. Categories include Above average, Average - age appropriate, Mild delay, Moderate delay, Severe delay, Unable to test.]
Impact of home language on language levels

- EAL: English Good
- EAL: English Poor
- EAL: English - Age appropriate
- EAL: English - Mild delay
- EAL: English - Moderate delay
- EAL: English - Severe delay
- EAL: Unable to test

Count

Pre-implant, 2 years post activation, 5 years post activation, 7 years post activation, 10 years post activation

Above average

Average - age appropriate

Mild delay

Moderate delay

Severe delay

Unable to test

uclh

University College London Hospitals
NHS Foundation Trust
Unilateral versus bilateral implants

![Bar chart showing implant counts by type and time post-activation](chart.png)

- **Unilateral**
  - Pre-implant
  - 2 years post-activation
  - 5 years post-activation
  - 7 years post-activation
  - 10 years post-activation

- **Bilateral**
  - Pre-implant
  - 2 years post-activation
  - 5 years post-activation
  - 7 years post-activation
  - 10 years post-activation

Legend:
- **Above average**
- **Average - age appropriate**
- **Mild delay**
- **Moderate delay**
- **Severe delay**
- **Unable to test**
Language Results at 5 years post CI

Only Congenital Severe - Profound
Conclusions

Children’s speech perception and speech intelligibility improve over time with greater access to sound and exposure to good models of language.

However, the development of good speech perception skills does not necessarily result in the development of intelligible speech or age-appropriate language skills.

Even if implanted early and English is a child’s first language, at 10 years post implantation only 40% of our total population achieved age appropriate language.
Conclusions (contd)

We need to identify and understand other factors influencing developmental trajectory.

Children need to be implanted at 12 months and younger to maximise performance.

Additional speech and language disorders over and above those normally associated with hearing loss are evident over time.
Conclusions – Clinical Implications

We may consider triage approach for follow up

Children implanted early may need less follow-up

Continue to use red flags for identification of additional needs

Better support required for non English speaking families