Decibels
Research Project

Lone Percy-Smith, Jane Lignel Jøsvassen, Tanja Pihl Sandager, Lena Nissen, Jeanette Hølledig Mikkelsen, Matilde Grønborg Sandvej, Dorte Clausen Holst, Per Cayé-Thomassen, Jørgen Hedegaard, Georg Busch
Background

- Only representative studies from Danish children with CI
- No representatives studies from pediatric HA CI users
- First pediatric implantations in 1993
- Neonatal hearing screening, UNHS, introduced in 2005
- Bilateral CI offered to all relevant candidates in 2006
- One year of specific habilitation post implantation from the two pediatric CI centers started in 2011
- No guidelines for children with HA/BAHs
Number of pediatric cochlear implantations in DK 1993-2014
Background – First generation of children with CI in Denmark 1993-2010

<table>
<thead>
<tr>
<th></th>
<th>Prior UNHS (n=155)</th>
<th>Post UNHS (n=83)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean hearing age with CI</td>
<td>28 months</td>
<td>26 months</td>
</tr>
<tr>
<td>Mean age at day of testing</td>
<td>84 months</td>
<td>47 months</td>
</tr>
<tr>
<td>Mean age at implantation</td>
<td>36 months</td>
<td>20 months</td>
</tr>
<tr>
<td>Mode of implantation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bilateral</strong></td>
<td>2% (n=3)</td>
<td>82% (n=68)</td>
</tr>
<tr>
<td><strong>Unilateral</strong></td>
<td>98% (n=152)</td>
<td>18% (n=15)</td>
</tr>
<tr>
<td>Educational Placement</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mainstream</strong></td>
<td>38% (n=59)</td>
<td>86% (n=71)</td>
</tr>
<tr>
<td><strong>Special</strong></td>
<td>62% (n=96)</td>
<td>14% (n=12)</td>
</tr>
<tr>
<td>Communication Mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spoken Language</strong></td>
<td>26% (n=40)</td>
<td>84% (n=70)</td>
</tr>
<tr>
<td><strong>Spoken + Sign</strong></td>
<td>54% (n=85)</td>
<td>14% (n=12)</td>
</tr>
<tr>
<td><strong>Sign Language</strong></td>
<td>20% (n=30)</td>
<td>0% (n=0)</td>
</tr>
</tbody>
</table>
# Outcomes – audition, speech and language

- First generation of children with CI in Denmark

<table>
<thead>
<tr>
<th>Tests</th>
<th>Prior UNHS</th>
<th>Post UNHS</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt;age/low score</td>
<td>&lt;age/high score</td>
<td>&gt;age/low score</td>
</tr>
<tr>
<td>Receptive language</td>
<td>45,5% (n=40)</td>
<td>54,5% (n=48)</td>
<td>30% (n=11)</td>
</tr>
<tr>
<td>Active Vocabulary</td>
<td>37,7% (n=23)</td>
<td>62,3% (n=38)</td>
<td>24% (n=6)</td>
</tr>
<tr>
<td>Phonology</td>
<td>29,5% (n=18)</td>
<td>70,5% (n=43)</td>
<td>18,4% (n=9)</td>
</tr>
<tr>
<td>Capacity of Auditory Performance, CAP</td>
<td>20% (n=31)</td>
<td>80% (n=124)</td>
<td>7,3% (n=6)</td>
</tr>
<tr>
<td>Speech Intelligibility Rating, SIR</td>
<td>33,5% (n=52)</td>
<td>66,5% (n=103)</td>
<td>28% (n=23)</td>
</tr>
</tbody>
</table>
Research project

Parents and professionals working together in establishing qualitative habilitation for children with hearing impairment and their families

*Multidisciplinary approach: parents, surgeons, audiologists, speech and language pathologists*

Lone Percy-Smith, Tanja Pihl Sandager, Dorte Holst, Jane Lignel Josvassen, Lena Nissen, Jeannette Hølledig Mikkelsen, Matilde Grønborg Sandvej, Per Cayé-Thomassen, Jørgen Hedegaard, Georg Busch
Overall aim

• Try out the specific intervention method Auditory-Verbal Therapy, AVT, in a Danish context

• Document whether Danish children with HI, when offered 3 years of AVT, become age equivalent in speech and language prior to school start at the age of 6

• Assess how to implement AVT in Denmark, when the method requires intense involvement of parents, who in the majority of cases both work
Overall aim

• Monitor how a randomised group of children with HI spread across the continuum of communication options

• Describe a Nordic approach to AVT and discuss the need of a European alternative to the American certification
Communication options (Ganek et al., 2012)
Auditory-Verbal Therapy

Overall aim:

• Develop the auditory brain, which is done by use of listening and spoken language
• Brain plasticity is the foundation for cochlear implant
• Hearing is a brain issue (Flexer, 2011)

AVT is an early intervention programme and an applied science with its objective goals

(Estabrooks, 2012)
Auditory-Verbal Therapy

• AVT is based on ten principles

• Guide and coach parents in developing listening and spoken language for their child with HI.

• Based on normal speech and language development
Material and method

• 60 children with HI and families from all over the country

• Participants from Sweden, Norway and the Faroe Islands

• 20% of children have a diagnosis other than HI, i.e. cerebral palsy, mental retardation, autism spectrum, visual problems

• BAHS = 3%, Bilat HA = 37%, Bilat CI = 57%, Bimodal (HA/CI) = 2%
Material and method

• Children tested annually with standardised speech and language tests (Little Ears, PPVT-4, Reynell receptive, Active Vocabulary, Phonological test, MLU)

• Parental questionnaires distributed yearly: stress, understanding of short and long term goals, carry-over of activities, social well-being of child
Results

HA/BAHA
Age at diagnosis (n=20):
• Mean: 9 months
• Median: 5 months
• Range: 0 – 34 months

Age start HA/BAHS (n=20):
• Mean: 14 months
• Median: 13 months
• Range: 1 - 40 months

CI
Age at diagnosis (n=28):
• Mean: 9 months
• Median: 5 months
• Range: 0 - 30 months

Age Start CI (n=28):
• Mean: 16 months
• Median: 13 months
• Range: 9 - 37 months
Years of education - mother

- 9 YEARS OR LESS: 5%
- 10-11 YEARS: 3%
- 12-13 YEARS: 8%
- >13 ÅR: 92% (CI = 89%, HA/BAHA = 92%)
- DON'T KNOW

Decibel
Børn og Unge med Høretab
Years of education - father

- 9 YRS OR LESS: 22% CI, 17% HA/BAHA
- 10-11 YEARS: 76% CI, 75% HA/BAHA
- 12-13 YEARS: 3% CI, 8% HA/BAHA
- >13 ÅR: 0% CI, 0% HA/BAHA
- DON'T KNOW: 0% CI, 0% HA/BAHA

Decibel
BORN OG UNGE MED HÆRETAB
Language(s) at home

- Danish: 76%
- Danish + SL: 85%
- Danish + Sign Support: 14%
- Sl: 5%
- Danish + Support + Sl: 11%
- Danish + Other Spoken Language: 10%

CI and HA/BAHA are represented by different colors in the chart.
What do you wish to achieve by participating in the AVT-project?

- **To become able to provide core support to our child’s hearing development:**
  - Year two: 76%
  - Year three (only CI): 75%

- **To achieve a thorough understanding of our child’s hearing loss:**
  - Year two: 51%
  - Year three (only CI): 50%

- **Having qualified professionals helping our child:**
  - Year two: 87%
  - Year three (only CI): 96%

- **Getting the right tools in order to support our child’s speech and hearing development:**
  - Year two: 96%
  - Year three (only CI): 96%
We use AV techniques at home

![Bar chart showing the percentage of agreement with AV techniques at home, with data points for Year two and Year three (only CI).]
We understand the long term goals
We think it is fine to spend time in AV therapy

![Bar chart showing support for AV therapy]
We believe that AVT makes everyday life easier
We believe that AVT takes too much time in everyday life and becomes a stressful factor.
We believe that AVT requires one parent working reduced hours

<table>
<thead>
<tr>
<th>Year two</th>
<th>Year three (only CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPLETELY DISAGREE</td>
<td>17%</td>
</tr>
<tr>
<td>PARTLY DISAGREE</td>
<td>11%</td>
</tr>
<tr>
<td>NEITHER DISAGREE NOR AGREE</td>
<td>7%</td>
</tr>
<tr>
<td>PARTLY AGREE</td>
<td>35%</td>
</tr>
<tr>
<td>COMPLETELY AGREE</td>
<td>30%</td>
</tr>
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</table>