Newborn Hearing Screening at Chris Hani Baragwanath Academic Hospital (CHBara): Current Practice & Challenges

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AIM for paediatric Audiology CHBara:

To early-identify & provide intervention for children with a hearing loss.
Hearing screening—WHY?


- EDHI promotes linguistic, cognitive, social-emotional & literary development (JCIH, 2007).
Context
Chris Hani Baragwanath Academic Hospital
- Services Soweto Population of Gauteng

- Population=1,3 million (some believe higher).

- 43% of Johannesburg's population. (Loots, 2008 -Joburg archive)

- 23 175 babies born at CHBara: 2010

- Estimated S.A. births: 2011= 1 059 417 (Stats SA, 2011)

- +-2.2% of babies born in S.A/year born at CHBara
Staffing at CHBara Speech Therapy & Audiology:

- Currently 28 clinicians in total:
  - 1 X HOD
  - 3 X Chief clinicians (1 audio; 2 STA)
  - 9 X Senior clinicians (2 audio; 7 STA)
  - 5 X Junior clinicians (1 audio; 2 speech; 1 STA)
  - 7 Comm. serve. clinicians (1 audio; 1 speech; 5 STA)
  - 3 STA assistants
Services at CHBara

Speech Therapy & Audiology

- Adult Speech Therapy
- Paediatric Speech Therapy
- Adult Audiology
- Paediatric Audiology
- BAHA & CIP services
Paediatric Audiology Clinics

Total % Attendances per clinic: Paediatric Audiology Jan-Oct 2011 (n=2473)

- Screening (n=1269): 51.30%
- Diagnostic Audiology (n=604): 24.40%
- Aural rehabilitation (n=419): 17%
- Sign Language Groups (n=86): 3.50%
- ABR (n=60): 2.40%
- Aural Rehabilitation support group (n=35): 1.40%
Estimated 6/1000 babies born with PCHI or acquire a PCHI in the first few weeks of life (Subsaharan Africa) (Olusanya, 2008)

Therefore estimated 6357 born in SA/year (Using Stats SA 2011 birth estimates)

139 born at CHBara each year (based on 2010 birth stats)
PRIVATE vs. PUBLIC: South Africa

16%: private healthcare via medical aids

Another 16%: pay for private health care themselves (mainly for G.P’s or pharmacy). (Lloyd, Sanders & Lehmann, 2010)

Due to costs: assume patients access Audiological services via medical aid or public health.

Therefore 84% of the population use public health care for Audiology services.
Therefore of the 6357 children born with a permanent or early-acquiring a permanent hearing loss, 5340 will be born in the public sector/year.
South African & International Policy

South African guidelines
HPCSA, (2007) recommends that PCHI is:
- confirmed by 3 months
  - intervention provided by 6 months of age - Hospital
- identified by 4 months
  - intervention provided by 8 months of age - Clinic

International
American JCIH (2007) recommends that:
- hearing screened by 1 month of age,
- full audiological evaluation by 3 months of age,
- appropriate intervention by 6 months of age.
South African screening services

PUBLIC:
  o Survey of 77% public hospitals-51% return rate (n=44)
  
  o 27 % S.A. Hospitals completing newborn hearing screening.
  
  o 2% (i.e. one hospital): Universal Screening, rest: screening for high risk babies & NICU graduates.
South African screening services

PRIVATE:
Meyer & Swanepoel (2011)
- 166 Private Obstetric units surveyed.
- 53% (n=87) providing hearing screening.
- Universal hearing screening: 14%.
- Challenges:
  - newborn hearing screening not included in birthing packages
  - not supported by other health care staff or medical aid schemes.
### Ages of identification of childhood hearing loss, initial hearing aid fitting and enrollment in an early intervention (EI) programme

<table>
<thead>
<tr>
<th>Study</th>
<th>n</th>
<th>Age at Identification</th>
<th>Age of enrollment in an EI programme</th>
<th>Age at initial hearing aid fitting</th>
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</thead>
<tbody>
<tr>
<td>van der Spuy &amp; Pottas (2008)</td>
<td>54</td>
<td>23 months; (SD = 17 months; range = 2-27 months)</td>
<td>31 months (+19SD)</td>
<td>28 months (SD = 19 months)</td>
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<td>Strauss (2006)</td>
<td>35</td>
<td>27% younger than 6 months.</td>
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<td>Less than 50% in first year of life</td>
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<td>16% between 6-12 months.</td>
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<td>24% between 12-24 months.</td>
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<td>30% over 30 months.</td>
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<td>Venter &amp; Viljoen (2008)</td>
<td>20</td>
<td>31 months</td>
<td>43 months</td>
<td>39 months</td>
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<td>In Swanepoel, Störbeck &amp; Friedland (2009)</td>
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<tr>
<td>Theunissen and Swanepoel (2008)</td>
<td>76</td>
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<td>Less than 7% (5/76) by 6 months of age.</td>
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<td>70% (53/76) older than 12 months</td>
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*Includes all initial fittings for permanent hearing losses fitted in 2011 (various aetiologies)*
Hearing Screening options

1. **Otoacoustic Emissions:** Test of cochlear outer hair cell function
   Recommended for most screening. i.e. ‘well babies’
   - Cost efficient & quick screening method


   - Present OAE’s and/or CM & absent ABR: Auditory Neuropathy Spectrum disorder may be present (Berlin, 1999; Simmons, 2008; Mason, 2004).
High-risk register- Current screening at CHBara

- Infants (birth – 28 days):
  - Family History of hereditary childhood sensori-neural hearing loss (SNHL)
  - In utero Infections (CMV, Rhubella, syphilis, herpes, toxoplasmosis)
  - Cranio-facial Abnormalities
  - Birthweight less than 1500g
  - Hyperbilirubinaemia at a serum level requiring exchange transfusion
  - Ototoxic medication
  - Bacterial meningitis
  - Apgar score of 0-4 at one minute and 0-6 at five minutes
  - Mechanical ventilation for 5 days or more
  - Syndromes known to include SNHL & conductive hearing loss
Hearing Screening-Bara

- **Automated Auditory Brainstem response (AABR)**
VIDEO-2 days old
Neonatal Hearing Screening

Audit January to October 2011:

- Overall increase in attendances of 122% in screening services for young babies and new-borns: compared to 2010

- Despite this: only 4.46% of children born at CHBara had their hearing screened.
  - 2.48% in 2010
Acceptable referral rates

Two-step hearing screening process (i.e. 2nd screening for those referring initial screening)

Acceptable referral rates for **well-babies:**

- AABR: 2-3%
- OAE: 6-10%

Sound Beginnings (2001)

- Korres et al (2008) study:
  76,560 neonates screened (TEOAE’s): 1,564 (2%) failed the initial screening.
Audit-Screening

% referred after initial screening (n=856) - AABR

- Ward 40 (n=49/223)
- Ward 66 (n=62/195)
- Baby screening (n=31/83)
- NNFUC (n=107/332)
- Cleft (n=22/23)
Possible reasons for high referral rates

- Only includes initial screening
  - Incomplete data to analyse after 2\textsuperscript{nd} screen

- Some ‘older’ children, therefore CNT: movement & 2\textsuperscript{nd} appointment booked

- Equipment malfunction for a short period-1 week

- High-risk children screened
Time Taken for screening

Time allocated/taken-for screening per child (minutes)

- Wards & Cleft (walk-in): 45.75 minutes
- Baby screening (booked): 26.05 minutes
- NNFUC (Booked & walk-in): 27.12 minutes
Testing only-AABR

- Current equipment (estimated times):
  - Pass: Minimum: 10-20 seconds
  - Refer: Minimum- 3 minutes
  - Maximum time: variable depending on movement of child
Time taken for screening..cont
(Lin, Shu, Chang & Bruna, 2002)

- **Method:** Wellborn infants using TEOAE screening. Ave. age at initial screening = 52 hours.

- **Results:** Average TEOAE screening time/ear = 41.43 seconds.
Infants should have their hearing screened by 1 month of age (JCIH, 2007)
Assessment of Hearing

• Infants < 6 months:
  - Electrophysiological measures. E.g. ABR (Hall, 2004)
  - Or children unable to complete behavioural testing e.g. visual or developmental delay (Rance & Briggs, 2002).

• From five to six months of age:
  - Behavioural testing in the form of VRA can be included as part of the test battery (Madell, 2008).
Referral to diagnostic services

Referrals to CHBara diagnostic clinics: after referring on screening

- Dx ABR (n=40)
- Paed audio (n=44)
AUDIT: Average age of initial fitting

Audit: initial fittings for PCHI (acquired or congenital)

- 2010: 16 initial hearing aid (H.A) fittings

- 2011: 26 initial H.A. fittings
  - i.e. 62.5% increase in the number of initial H.A fittings from 2010 to 2011.

- No affect on average age of fitting:
  - 2010: 4.84 years
  - 2011: 4.31 years
Age at initial hearing aid fitting

% of children seen for initial fitting per age category (excludes fluctuating CNHL & BC fittings)

- 0-6m: 4% (2010), 0% (2011)
- 6-12m: 4% (2010), 0% (2011)
- 12-18m: 8% (2010), 0% (2011)
- 18-24m: 0% (2010), 0% (2011)
- 2-3 yrs: 25% (2010), 19% (2011)
- 3-4 yrs: 8% (2010), 15% (2011)
- 4-5 yrs: 19% (2010), 19% (2011)
- 5-6 yrs: 19% (2010), 19% (2011)
- 6-7 yrs: 35% (2010), 15% (2011)
- 7-8 yrs: 0% (2010), 6% (2011)
- 8-9 yrs: 0% (2010), 6% (2011)
- 9-10 yrs: 0% (2010), 6% (2011)
- 10-11 yrs: 6% (2010), 0% (2011)
Age at initial hearing aid fitting

No. of initial fittings per age group: 2010 vs 2011 (excludes fluctuating CNHL)
Initial Fittings - 2011

- Only 4/26 children <18 months
  - 2 had acquired hearing loss (meningitis)
  - 1 detected through screening services
  - 1 has atresia & absent/malformed pinnae - Doctor referred
Affects on age of initial fittings

- Challenges in 2011:
  - ABR not available and then functioning for large part of year. Delayed Ax & diagnosis
  - ? See impact of increase in hearing screening on age of initial hearing aid fittings in 2012
Suggestions

- Proposal developed for Universal neonatal hearing screening at CHBara to hospital management
- Will need full screening service & more diagnostic services for those referring
- As children seen younger in wards, focus on ward screening
- Wards also ‘walk-in’ situation. Able to optimise use of clinical time
Hearing Screening: Implications on services


- U.S.A.-Kansas: Newborn hearing screening = paediatric population undergoing audiological evaluation at younger ages

- Found clinical caseload of newborns increased from 25% to 80%, after UNHS introduced.
REFERENCES


REFERENCES...cont...


- Images from the world wide web: Google Images