EUSUHM 2017

Mind the gap! Building bridges to better health for all young people

Session: Early detection of hearing impairment

Neonatal Hearing Screening Program in Wallonia and Brussels

Bénédicte VOS
Alain LEVEQUE
Background

Implementation process

Outcomes: screening, diagnosis, age at diagnosis

Take home message

*Images: Created by Yu Luck, Creative Stall, Lee, Barracuda from Noun Project*
Background
Neonatal hearing loss

Public health concern

• Prevalence [significant bilateral hearing loss*]:
  – 1-3‰: well-baby nursery population
  – 2-4%: risk factor(s), NICU stay

• Consequences
  – Language, speech
  – Cognition, social-emotional development

• International recommendations:
  – Universal newborn hearing screening program

Hearing screening programs

- **Objective of screening programs:**
  - Early identification
  - Milestones [neonatal hearing loss]:
    - Screening <1 month*
    - Diagnosis <3 months*
    - Early enrolment in intervention services: as soon as possible after diagnosis, but at no later than 6 months of age*

- **Since newborn hearing screening program implementation:**
  - Decrease in children’s age at diagnosis
  - Improved outcomes in case of early intervention:
    - language, speech, cognition, social-emotional development...

Newborn hearing screening protocol in the Wallonia-Brussels Federation

Participating hospitals (n=41/43$)

- **No risk factors**
  - Test 1
    - AOAE* Day 2
      - Pass
      - Refer Uni- or bilat.
  - Test 2
    - AOAE* Day +1
      - Pass
      - Refer Uni- or bilat.

- **Risk factor(s)**
  - Audiological assessment
    - Normal hearing
    - Hearing impairment Uni- or bilat.

Centralized data collection:
« paper » or computer data transmission (progressively since 2011)

$ in 2017
* AOAE: automated otoacoustic emissions
Participating hospitals (n=41/43$)

Centralized data collection: «paper» or computer data transmission (progressively since 2011)

Non-participating hospitals (n=2$)

Non-screened newborns

Program in the Wallonia-Brussels Federation

$ in 2017

* AOAE: automated otoacoustic emissions
Implementation process

*Image: Created by Creative Stall from Noun Project*
## Implementation of the program

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<tbody>
<tr>
<td><strong>Internal</strong></td>
<td>- Experience</td>
<td>- Work organization &amp; workload</td>
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<td>- Collaboration (professionals)</td>
<td>- Protocol application</td>
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<td>- Organizational</td>
<td>- Parents</td>
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<td>- Lack of collaboration (services/professionals)</td>
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<td><strong>External</strong></td>
<td>- Training (professionals)</td>
<td>- Financial</td>
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<td>- Awareness (parents)</td>
<td>- Data collection</td>
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<td>- External coordination unit</td>
<td>- External collaboration (GP/pediatricians; ONE)</td>
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</table>
Participation in the program

Participating hospitals
Non participating hospitals

Number of newborns

Number of hospitals

January 2007: 23/50 hospitals

January 2017: 41/43 hospitals

>500,000 newborns

2007-2010: +36%
≥2010: stable
«Outside» = test will be performed in another institution/by another otorhinolaryngologist

BUT: ‘Kind & Gezin’

2007-2011: ≈58% among the group «outside»
2012-2016: >85%
Outcomes

Screening

Diagnosis

Age at diagnosis

*Image: Created by Lee from Noun Project
OUTCOMES

Screening process – Newborns without risk factors
**Screening process**

Newborns without risk factors (2007-2016)  
$n=448,880$

- **Tested**  
  93.79% (n=421,046)

- **Not tested**  
  6.21% (n=27,837)

**Not OK**

- **Pass**  
  86.67% (n=364,901)

- **Refer**  
  13.33% (n=56,145)

JCIH coverage rate: ≥95%

Outcomes: variations according to the year

Screening process

Newborns without risk factors (2007-2016) 
n=448,880

1st test

Tested 93.79% (n=421,046)

Not tested 6.21% (n=27,837)

Tested 83.93% (n=47,123)

Not tested 16.07% (n=9,022)

Pass 86.67% (n=364,901)

Refer 13.33% (n=56,145)

Pass 75.20% (n=35,436)

Refer 24.80% (n=11,687)

Screening

High refer rate: → method (OAE)

Not OK

OK

JCIH referral rate: <4%

Referral rate (audiological assessment) 2.78% (n=11,687)

Screening process

Newborns without risk factors (2007-2016)  
n=448,880

1st test
- Tested 93.79% (n=421,046)
  - Pass 86.67% (n=364,901)
  - Refer 13.33% (n=56,145)

2nd test
- Tested 83.93% (n=47,123)
  - Pass 75.20% (n=35,436)
  - Refer 24.80% (n=11,687)

Follow up coverage 66.50% (between 45-76% according to year)

Hearing loss: see next slide

Referral rate (audiological assessment) 2.78% (n=11,687)

Diagnosis

Not OK

JCIH Follow-up rate: ≥95%
OUTCOMES

Newborns with ≥1 risk factor(s) for hearing loss
Reported risk factors for hearing loss

Most frequently reported (year 2013-2016)

1. Prematurity*: ≈40% (out of “RF” newborns)
2. Ototoxic drugs: ≈32%
3. NICU >5 days: ≈10%
4. Family history: ≈10%
5. In utero infection(s): ≈7%

Among this group:
≈80-85%: only 1 reported risk factor

*GA <36 weeks and/or birth weight <1500 g
Coverage (at least 1 hearing test) (year 2016):

91.3% of tests performed (out of 4,892 neonates)

≈86.7% “bilateral normal hearing”
≈3.2% “lost to follow-up”

No information on the number of performed tests
OUTCOMES

Diagnosis
Final hearing status
Reported prevalence of hearing loss
Reported prevalence of hearing impairment, by year of birth (2007-2016) and absence or presence of risk factor(s)

Data collection?
- No systematic transmission
- Information related to diagnosis not sufficiently accurate

Literature & other programs: ≥1‰
Outcomes

Impact of the screening program on timing at intervention
Has the age at enrollment in hearing services been reduced after screening program implementation???

No data collection on hearing intervention in the WBF program

– Impossible to assess the final objective of the program
– Public health problem

– Assessment based on billing data (no medical data available in database) \(\rightarrow\) population-based (federal)
Results for initial assessment

• Outcomes: 3 key-moments
  – Initial assessment
  – Hearing-aid fitting
  – Cochlear implantation
    \( \rightarrow \) age in months (difference between date of billing/birth)

• Birth cohorts: 2006-2011

• Results by birth cohort and residence at birth: Flanders vs Wallonia and Brussels
Timing of enrollment in hearing services

Median ages

Flanders: stable  
WBF: decrease over time  

Overlapping P25-75
A major question:
Impossible to identify
neonatal hearing loss
from
progressive or delayed onset hearing loss

...goal of neonatal screening: identification of neonatal hearing loss...

But, final outcome of the program was assessed for the first time!!
Take home messages

**Newborn hearing program in the WBF:**

- results lower than some JCIH recommendations (coverage rates; follow-up)
- results comparable to those from other programs

**Challenges:**

- Early discharge from hospital, reduction of hospital stay duration
- Data collection: efficient system (computer), including data on intervention
Contact

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Scientific promoter: Pr. Alain Levêque

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## Risk factors for hearing loss in the WBF program

<table>
<thead>
<tr>
<th>Risk factors related to</th>
<th>the prenatal period</th>
<th>the peri- and postnatal period</th>
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<tbody>
<tr>
<td>the prenatal period</td>
<td>- Family history of hereditary hearing loss</td>
<td>- Apgar score of 0-6 at 5 minutes</td>
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<td>- Consanguinity (1&lt;sup&gt;st&lt;/sup&gt; degree)</td>
<td>- Gestational age &lt;36 weeks and/or low birth weight (&lt;1500g)</td>
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<tr>
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<td>- In-utero infection:</td>
<td>- NICU stay ≥5 days</td>
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<tr>
<td></td>
<td>• cytomegalovirus</td>
<td>- Newborn ototoxic medication</td>
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<td></td>
<td>• toxoplasmosis</td>
<td>- Exchange transfusion</td>
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<td></td>
<td>• herpes</td>
<td>- Assisted ventilation ≥24 hours</td>
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<td></td>
<td>• rubella</td>
<td>- Head or neck anomalies,</td>
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<td></td>
<td>• syphilis</td>
<td>syndrome including hearing loss</td>
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<td></td>
<td>- Poisoning (alcohol, drugs) by the mother during pregnancy</td>
<td>- Neurological diseases</td>
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<tr>
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<td>- Endocrine diseases</td>
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</table>

**Special Note:**
- Poisoning (alcohol, drugs) by the mother during pregnancy may also be a risk factor for hearing loss.