Vision screening results in Flemish 3-4 year old children since the introduction of the plusoptiX® Eye screener at the age of 12-24 months (2011-2016)

Cécile Guérin

EUSUHM 2017  September 8 - Leuven

Van Hoeck Katelijne - De Keyser Moniek - Hoppenbrouwers Karel

Flemish Scientific Society for Youth Health Care, Leuven, Belgium

With the support of the Flemish Authorities
AIMS
Vision screening in Flanders

- **School Health Care**: Pupil Guidance Centers ‘CLB’
  - Since 2003: **Standard Vision** = guidelines for systematic screening from the age of 3y

  **What?**
  - Screening for early detection of amblyopia and amblyogenic factors

  **How?**
  - Logarithmic crowded picture test for visual acuity (3m)
  - Ocular alignment examination

  **When?**
  - 1st grade Kindergarten (3y)
  - 2nd grade Kindergarten (4y)
  - 1st grade Primary school (6y)
School Health Care: Pupil Guidance Centres

Since 2003: Standardized screening for amblyopia and amblyogenic factors from the age of 3 years

LogMAR Crowded Kay pictures (3m) (matching)

Ocular alignment examination
Vision screening in Flanders

- **Preschool**: Well baby clinics ‘Kind & Gezin’
  - Clinical examination of children from birth to the age of 30m:
    - Not standardized: eye observation (eye & palpebral anomalies, head posture...)
    - Not systematically: symmetry of corneal reflections

  → **Since 2010**: progressive introduction of an automated refractometry
    (plusoptiX® Eye Screener) at the ages of 12 and 24 months

  → **Since March 2013**: in all Flanders, systematic automated refractometry
    offered at the ages of 12 and 24 months
Preschool: Well baby clinics

Since 2012-13: Systematic automated refractometry at the ages of 12 and 24 months (but NOT compulsory !)
Research questions

• Which impact of this screening in toddlers on the timing (age) of detection of visual impairment?
  → No epidemiological data available
  → Indirectly
    1. Which proportion of 3-year olds at school entry:
       • already wearing glasses?
       • with a known eye abnormalities or vision impairment?
    2. Which proportion of newly detected eye abnormalities of vision impairment by SHC at school entry?

→ Evolution of these results since start of plusoptiX® Eye Screener program?
→ Arguments to adapt amblyopia screening program by SHS ??
METHODS
Systematic electronical registration of vision screening

• Uniform electronical registration system for CLB activities (incl. vision screening)
  • Anamnestic information
    • Known ocular abnormalities & vision impairment (parents’ information)
    • Is the pupil wearing glasses / occlusion patch at screening moment?
  • Screening
    • Which vision test + Result visual acuity R & L (of both eyes in case of glasses)
    • Which test(s) for ocular alignment + Result
• Follow-up
  • Referral?
  • Reason for diverging from official guidelines?
  • Feedback of ophthalmologist: no uniform registration!
## Visual acuity: grade specific criteria for referral

<table>
<thead>
<tr>
<th>KINDERGARTEN</th>
<th>1° choice</th>
<th>2° choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1° grade (3y) Test</td>
<td>Kay Crowded</td>
<td>Keeler LogMAR Crowded</td>
</tr>
<tr>
<td></td>
<td>&lt;0.63 or &gt;1 line difference</td>
<td>&lt;0.5 or &gt;1 line difference</td>
</tr>
<tr>
<td></td>
<td>Unreliable result</td>
<td>Unreliable result</td>
</tr>
<tr>
<td>Referral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retest (1-3 m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2° grade (4y) Test</td>
<td>Keeler LogMAR Crowded</td>
<td>Kay Crowded</td>
</tr>
<tr>
<td></td>
<td>&lt;0.63 or &gt;1 line difference</td>
<td>&lt;0.63 or &gt;1 line difference</td>
</tr>
<tr>
<td></td>
<td>Unreliable result or referral without response</td>
<td>Unreliable result or referral without response</td>
</tr>
<tr>
<td>Referral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retest (1-3 m)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Data extraction & analyses

Data extraction:
- From systematically registered computerized school health records
- For both cohorts of pre-schoolers
  - 3y = 1th grade of maternal school (1MS)
  - 4y = 2de grade of maternal school (2MS)
- For registration period 2010-2016 (6 school years)

Data analyzes to determine:
- Prevalence of impaired visual acuity
- Proportion of children wearing glasses
- Proportion of children with known eye abnormality or vision impairment
- Proportion of newly detected eye abnormalities between 1 MS & 2 MS?
RESULTS
### Pupils with known eye abnormality

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% known eye abnormality</td>
<td>2.8%</td>
<td>3.2%</td>
<td>3.1%</td>
<td>3.6%</td>
<td>4.2%</td>
<td>4.4%</td>
</tr>
</tbody>
</table>

**CLB registration BEFORE FIRST screening**
Pupils with glasses vs known eye abnormality

registration BEFORE FIRST screening

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wearing Glasses</td>
<td>1.9%</td>
<td>2.1%</td>
<td>2.2%</td>
<td>2.8%</td>
<td>3.5%</td>
<td>3.7%</td>
</tr>
<tr>
<td>known eye abnormality</td>
<td>2.8%</td>
<td>3.0%</td>
<td>3.1%</td>
<td>3.6%</td>
<td>4.2%</td>
<td>4.4%</td>
</tr>
<tr>
<td>----------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>Birth</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
Pupils with **new** glasses vs **newly** detected eye abnormality between FIRST & SECOND screening

<table>
<thead>
<tr>
<th>Year</th>
<th>New glasses</th>
<th>Newly detected eye abn.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-11</td>
<td>2.8%</td>
<td>3.5%</td>
</tr>
<tr>
<td>2011-12</td>
<td>3.4%</td>
<td>3.9%</td>
</tr>
<tr>
<td>2012-13</td>
<td>3.4%</td>
<td>3.9%</td>
</tr>
<tr>
<td>2013-14</td>
<td>2.8%</td>
<td>3.2%</td>
</tr>
<tr>
<td>2014-15</td>
<td>2.6%</td>
<td>3.0%</td>
</tr>
<tr>
<td>2015-16</td>
<td>2.7%</td>
<td>3.0%</td>
</tr>
</tbody>
</table>
Pupils with glasses vs known eye abnormality

registration BEFORE SECOND screening

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wearing Glasses</td>
<td>4.7%</td>
<td>5.5%</td>
<td>5.6%</td>
<td>5.6%</td>
<td>6.1%</td>
<td>6.4%</td>
</tr>
<tr>
<td>known eye abnormality</td>
<td>6.3%</td>
<td>6.9%</td>
<td>7.0%</td>
<td>6.8%</td>
<td>7.2%</td>
<td>7.4%</td>
</tr>
</tbody>
</table>
CONCLUSIONS
Since the introduction of Plusoptix screening in toddlers:

- **Vision disorders** are detected faster in young children
- Children receive the needed **visual correction at earlier age**

- **Added value of 2 systematic eye screening programs in toddlers & preschoolers**
  - More children are found with an eye disorder and receive earlier treatment
  - As amblyopia is detected at an **earlier stage**:  
    - Can be **successfully treated**
    - Lifelong loss of visual acuity can be avoided
Looking at the future...

- This research = **Indirect evaluation** of 5 years PlusOptix screening in toddlers based on electronic CLB-records
  - Systematic and uniform electronic CLB-registration
  - reveals for the first time the impact at population level of Kind & Gezin eye screening

- Future:
  - **Automatic transfer of individual electronic records** between Kind & Gezin and CLB!
  - Analyses of differences between 2 populations:
    - Children **with** early eye screening
    - Children **without** early eye screening

→ More precise and direct evaluation of this early eye screening program!
Information & online education material: http://vwvj.be

More questions: info@vwvj.be
              cecile.guerin@vwvj.be