Screening for amblyogenic defects
Results and experiences after 5 years
Dr Kristel Boelaert
Screening for amblyogenic risk factors

1. Flemish Pre-school Eye Screening Programme
   • Background
   • Screening device
   • Protocol

2. Results and evaluation

3. Future challenges and opportunities
1. Flemish Pre-school Eye Screening Programme

• Background
  
  – **Aim:** Early detection of amblyogenic risk factors (ARFs) to prevent development of amblyopia
  
  – Since mid 2013 all children in Flanders aged **12/15** months and **24/30** months visiting well-baby clinics
  
  – Tested with automated infrared video-refractometer (Plusoptix®)
  
  – Internationally accepted cut-off criteria for referral
    
    • Myopia
    • Hypermetropia
    • Astigmatism
    • Anisometropia
    • Pupil diameter
1. Flemish Pre-school Eye Screening Programme

• Screening Device
  – Plusoptix®
  – Infrared video-refractometer: eye deviations are detected through reflected infrared light
  – Both eyes tested jointly from distance of 1 meter
  – Cut off parameters can be adjusted for different target groups
  – Easy-to-use, child friendly and instant results
1. Flemish Pre-school Eye Screening Programme
1. Flemish Pre-school Eye Screening Programme

• Protocol
  – Integrated in standard programme of well baby clinics
  – Test age = 12/15m and 24/30m
  – If test result = REFER or FAILED
    Referral to ophtalmologist for further examination, diagnosis and treatment
  – Data of screening and results collected in central database
2. Results and evaluation

- Coverage
  - >500,000 tests performed since implementation (2013-6/2017)
  - 82.3% of children born in Flanders in 2013 received at least 1 screening test by the age of 30 months
2. Results and evaluation

• Coverage

<table>
<thead>
<tr>
<th>Year</th>
<th>No children tested</th>
<th>No tests performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>590</td>
<td>591</td>
</tr>
<tr>
<td>2011</td>
<td>6.044</td>
<td>6.256</td>
</tr>
<tr>
<td>2012</td>
<td>43.139</td>
<td>46.056</td>
</tr>
<tr>
<td>2013</td>
<td>100.760</td>
<td>108.594</td>
</tr>
<tr>
<td>2014</td>
<td>102.679</td>
<td>110.478</td>
</tr>
<tr>
<td>2015</td>
<td>103.820</td>
<td>111.516</td>
</tr>
<tr>
<td>2016</td>
<td>81.474</td>
<td>85.275</td>
</tr>
<tr>
<td>2017</td>
<td>67.695</td>
<td>70.022</td>
</tr>
</tbody>
</table>
2. Results and evaluation

- Referral Rate

Based on all tests up to July 2017
2. Results and evaluation

- Referral thresholds
  - Balance between sensitivity and specificity of the test
  - Avoid over-referral
  - Detect these refraction errors for which early treatment is possible


<table>
<thead>
<tr>
<th>Refraction Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myopie &lt;= -4D</td>
</tr>
<tr>
<td>Hypermetropie &gt;= 4D</td>
</tr>
<tr>
<td>Anisometropie &gt;= 1.5D</td>
</tr>
<tr>
<td>Astigmatisme &gt;= 2D</td>
</tr>
<tr>
<td>Pupil Diameter Afwijking</td>
</tr>
<tr>
<td>Astigmatisme &gt;= 3D / 2.5D</td>
</tr>
</tbody>
</table>
2. Results and evaluation

- Referral Rate

Based on all tests up to July 2017
2. Results and evaluation

- Referral Rate

  Based on all tests up to July 2017

<table>
<thead>
<tr>
<th></th>
<th>Pre nov ‘15</th>
<th>Post nov ‘15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>10.2%</td>
<td>7.2%</td>
</tr>
<tr>
<td>12/15m</td>
<td>10.0%</td>
<td>5.6%</td>
</tr>
<tr>
<td>24/30m</td>
<td>7.8%</td>
<td>6.6%</td>
</tr>
</tbody>
</table>
2. Results and evaluation

- Reason for referral

Based on all tests (all ages) up to July 2017

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astigmatism</td>
<td>47%</td>
<td>24%</td>
</tr>
<tr>
<td>Anisometropia</td>
<td>14%</td>
<td>19%</td>
</tr>
<tr>
<td>Hyperopia/myopia</td>
<td>3%</td>
<td>8%</td>
</tr>
<tr>
<td>Combination</td>
<td>36%</td>
<td>49%</td>
</tr>
</tbody>
</table>
2. Results and evaluation

• Follow-up diagnostic tests after refer
  – Examination by ophtalmologist
  – Standard referral letter and report to be filled in by ophtalmologist
  – Data collected in central database
2. Results and evaluation

Reports received as a % of total referrals

*incomplete data
2. Results and evaluation

Reports received as a % of total referrals

Reports for 1/4 to 1/3 referrals

*incomplete data
2. Results and evaluation

• Confirmation of screening results

  – Based on analysis of 8419 reports collected over period 2011-2016

<table>
<thead>
<tr>
<th></th>
<th>Screening confirmed</th>
<th>Amblyogenic risk factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>57.9%</td>
<td>29.2%</td>
</tr>
<tr>
<td>No</td>
<td>20.7%</td>
<td>17.6%</td>
</tr>
<tr>
<td>No data</td>
<td>15.9%</td>
<td>52.3%</td>
</tr>
<tr>
<td>Not conclusive</td>
<td>5.3%</td>
<td>0.7%</td>
</tr>
</tbody>
</table>
2. Results and evaluation

Average confirmation rate after referral 60%

Main reason for ‘not conclusive’ results
  Lack of cooperation for diagnostic tests

Reports often incomplete
2. Results and evaluation

- Based on analysis of 8419 reports collected over period 2011-2016

<table>
<thead>
<tr>
<th>Total treatment started*</th>
<th>Treatment started as % of confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>19,9%</td>
</tr>
<tr>
<td></td>
<td>34,4%</td>
</tr>
<tr>
<td>No</td>
<td>80,1%</td>
</tr>
<tr>
<td></td>
<td>65,6%</td>
</tr>
</tbody>
</table>

*Glasses, eye patch, both
2. Results and evaluation

20% of all children referred started corrective treatment

For 65% of children with confirmed refraction error no treatment was started

Main reasons not to start treatment when refraction error is confirmed

Young age

Small astigmatism
2. Results and evaluation

• Evaluation
  – Photoscreening for amblyogenic risk factors in Flanders
    • Easy test to perform on young children
    • Accepted by parents
    • Achieves a high coverage
  – Part of ongoing screening programme for amblyopia continuing at school age
    • Referral criteria need to be set for high specificity in order to detect these children for whom treatment will be started at young age
  – Collecting results from follow-up tests and diagnosis remains difficult
3. Future challenges

- Improving data collection on follow-up tests, diagnosis and treatment by developing electronic referral and reporting system
- Further adjusting cut-off criteria for referral?
  - Astigmatism?
  - Pupil diameter?
- Transfer of screening results from pre-school screening at Kind en Gezin to school services (CLB)
- More research onto the outcome of early screening on the incidence of amblyopia.
  - Incidence of amblyopia in 8 year olds in Flanders
  - Data from school vision screening