Maciej Ludwikowski, Piotr H. Skarżyński, Adam Piłka, Roman Barylyak, Irina Pierzyńska, Kinga Wołujewicz, Henryk Skarżyński,

TELEMEDICINE IN HEARING SCREENING IN SCHOOL-AGE CHILDREN

MedTeL
LUXEMBOURG, 22-24 APRIL 2015
Recent epidemiological studies: significant increase of hearing impairments in school-age children

- Hearing impairments in newborns
  ~ 3 in 1000

- Hearing problems in school-age children
  ~ 14 in 100

Growing need for introducing universal hearing screening programs in school-age children

Need for development and evaluation of new organizational models and low-cost devices
IT system supporting the diagnostics of a patient from a distance and assuring the transfer of tests’ results to healthcare sector

- Large-scale audiological screening programs
- Integration with clinical and scientific centers
- Integration with medical registers

PROJECT POIG.02.03.00-00-009/09
PLATFORM FOR SENSE ORGANS SCREENING

- Audiologic Questionnaire
- Pure Tone Audiometry
- Adaptive Auditory Speech Test (AAST)
- Tests of Central Processing Disorders (GIN, DDT)
- Tinnitus Questionnaire
REALIZATION

DIAGNOSTIC DEVICE → INTERNET → CENTRAL SYSTEM

- MEASUREMENT CATALOG
- STATISTICAL MODULE
- QUESTIONNAIRE MODULE
- REPORTING MODULE

WORLD HEARING CENTER
Comparison of the results of hearing screening in school age children
### MATERIAL

<table>
<thead>
<tr>
<th>EUR</th>
<th>CENTRAL ASIA</th>
<th>AFRICA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EUROPE</strong></td>
<td><strong>CENTRAL ASIA</strong></td>
<td><strong>AFRICA</strong></td>
</tr>
<tr>
<td>n = 464</td>
<td>n = 1011</td>
<td>n = 321</td>
</tr>
<tr>
<td>Romania - 120</td>
<td>Tajikistan - 143</td>
<td>Senegal - 191</td>
</tr>
<tr>
<td>Moldova - 178</td>
<td>Kyrgyzstan - 408</td>
<td>Ivory Coast - 130</td>
</tr>
<tr>
<td>Russia - 166</td>
<td>Azerbaijan - 170</td>
<td>Armenia - 290</td>
</tr>
</tbody>
</table>
Positive was defined as any hearing impairment greater than 20 dB HL in any ear, at any frequency from 500 to 8000 Hz

Qualification ANSI (1965), ISO
Methods

Automatic Qualification

Positive result was defined as any hearing impairment greater than 20 dB HL in any ear, at any frequency from 500 to 8000 Hz

Qualification ANSI (1965), ISO

Revision by Propheessionals
<table>
<thead>
<tr>
<th></th>
<th>EUROPE</th>
<th>CENTRAL ASIA</th>
<th>AFRICA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROMANIA</td>
<td>12.5%</td>
<td>23.8%</td>
<td>29.8%</td>
</tr>
<tr>
<td>MOLDOVA</td>
<td>13.5%</td>
<td>18.1%</td>
<td>33.8%</td>
</tr>
<tr>
<td>RUSSIA</td>
<td>13.9%</td>
<td>22.9%</td>
<td></td>
</tr>
<tr>
<td>ARMENIA</td>
<td></td>
<td>23.8%</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>13.4%</strong></td>
<td><strong>21.4%</strong></td>
<td><strong>31.5%</strong></td>
</tr>
</tbody>
</table>

**World Hearing Center**

Institute of Physiology and Pathology of Hearing

Kajetany/Warsaw, Poland
## RESULTS

### AGE 7-8

<table>
<thead>
<tr>
<th>Region</th>
<th>N</th>
<th>Positive [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUROPE</td>
<td>380</td>
<td>13,7%</td>
</tr>
<tr>
<td>CENTRAL ASIA</td>
<td>773</td>
<td>22,0%</td>
</tr>
<tr>
<td>AFRICA</td>
<td>246</td>
<td>30,1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1399</td>
<td><strong>21,2%</strong></td>
</tr>
</tbody>
</table>

### AGE 12-15

<table>
<thead>
<tr>
<th>Region</th>
<th>N</th>
<th>Positive [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUROPE</td>
<td>82</td>
<td>15,9%</td>
</tr>
<tr>
<td>CENTRAL ASIA</td>
<td>238</td>
<td>19,3%</td>
</tr>
<tr>
<td>AFRICA</td>
<td>75</td>
<td>36,0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>397</td>
<td><strong>20,9%</strong></td>
</tr>
</tbody>
</table>
PILOT SCREENING – DAKAR (SENEGAL)

191 children; 29.8% positive results
PILOT SCREENING – ABIDJAN (IVORY COAST)

130 children
33,8% positive results
RESULTS FROM TAJIKISTAN

First school (tajik)
110 children tested (mean age 7 years old), 22.7% - positive result

Second school (russian language classess)
33 children were examined, 27.3% positive results

Total – 143 children tested obtained 23.8% of positive results
LESSONS LEARNED

• Prove of concept

• **SZOK and Platform for Sense Organs Screening** worked well

• Platform can be operated by trained teachers, school nurses etc. without need to interpret the results – the interpretation is on central side by the system, verified by audiologists

• Low knowledge about hearing loss and it’s influence on school and social achievements

• In some regions, is hearing loss really the biggest concern?
There are important / significant differences between regions in positive rates results.

There are no significant differences between the age groups in hearing screening results.
THANK YOU ; )

WORLD HEARING CENTER
INSTITUTE OF PHYSIOLOGY AND PATHOLOGY OF HEARING
KAJETANY, WARSAW, POLAND