ShoeBOX Audiometer in Canada’s North: a portable and cost-effective method for hearing screening

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Background

- Development of speech and communication skills in children is largely dependent on having adequate hearing. Hearing loss (HL) can impede normal social, emotional and cognitive development and is often undetected. [1]
- The WHO estimates that 32 million children live with disabling HL and 50% of these cases can be prevented. Early detection and intervention would have provided profound benefits to many of these children. [2]
- The majority of undiagnosed and untreated HL occurs in countries with low to middle income economies. HL has also been reported to be highly prevalent among Canadian Aboriginal children. [2]
- It is estimated that the total economic burden of HL in Canada is $18 billion per year. [3]

Table 1. Previous studies - HL prevalence in children

<table>
<thead>
<tr>
<th>Criteria for HL</th>
<th>Location of Study</th>
<th>% HL in Children</th>
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<tbody>
<tr>
<td>≥25 dB</td>
<td>Kuujjuaarapik, Quebec</td>
<td>23%</td>
</tr>
<tr>
<td>&gt;20 dB</td>
<td>Inukjuak, Quebec</td>
<td>20%</td>
</tr>
<tr>
<td>Baxter (1999)</td>
<td>Baffin Island, Nunavut</td>
<td>30%</td>
</tr>
<tr>
<td>Mehra et al. (2009)</td>
<td>USA</td>
<td>3.1%</td>
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</tbody>
</table>

- Traditional hearing tests in children is often challenging, labour intensive, time consuming and require trained personnel. Many regions in rural and Northern Canada have limited access to such resources [8].
- An new interactive audiometer entitled “ShoeBOX Audiometry” (Clearwater Clinical Limited) uses a tablet (ie. Apple iPad®) to present a user-friendly, inexpensive and portable medium to perform interactive hearing testing in children.

Preliminary Results

- Preliminary analysis reveals a hearing prevalence of 15.3%
- These children then received standard testing by an audiologist using standard sound booth audiometry and the results will be analyzed.
- A cost-benefit analysis will assess the use of the tablet audiometry in this remote location, as well as similar settings across Canada.

Conclusion

This is the first study in over 30 years assessing the hearing of children in this region and the first interactive audiometer screening test in Canada. This novel testing proves to be valuable as it provides an easily accessible method to test hearing in high-risk populations in rural and remote areas at an affordable cost.

Objectives

2. Demonstrate the use of asynchronous tele-audiometry.
3. Conduct a cost-benefit analysis of the tablet audiometry in the Canadian Arctic.

Future Directions

2. Demonstrate the use of asynchronous tele-audiometry.
3. Conduct a cost-benefit analysis of iPad® audiometry in the Canadian Arctic.

References