Mobile System for Rehabilitative Vocal Assistance of laryngectomees. A Pilot Study of Romanian patients with total laryngectomy.

Cristina Țiple, F Dinescu, S Matu, R Mureșan, R Șoflău, M Giurgiu, A Stan, D David, M Cosgarea, Magdalena Chirilă

Department of Otorhinolaryngology, Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania
SWARA
Total laryngectomy - surgical aphonia

The psychological consequences:
Anxiety
Depression
Hopelessness and passivity

Compromise their quality of life
SWARA

Devices that allow them to speak again

Voice restoration may be obtained with any of three methods:
esophageal speech (ES)
voice prosthesis (TEP)
electrolarynx (EL)
SWARA

SWARA - "voice" in Javanese

A new system for assisting these patients

Patients refuse, avoid or fail to use today’s vocal assistive methods to communicate with family and other members of society.

October 9, 2017
SWARA

A new interface involving smartphone technology which synthesize an improved artificial voice

Technical team generated four synthetic voices
  two female voices
  two male voices
SWARA

Assessed the satisfaction of patients with a new vocal assistive technology (speech synthesis systems)

Twenty laryngectomees with smart phones and internet network access were included in this study

Patients were trained to use the assistive communication system, web-based text-to-speech synthesis service accessible from any device

Feedback on the voice synthesis system after 1 month  

October 9, 2017
SWARA Voice Synthesis Assessment Questionnaire

The questions were short, simple and easy to answer

The questions investigated the ability to communicate in different situations:
- known and unknown people
- noise
- personal satisfaction
### Demographic and clinical characteristics of the sample

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>M</td>
<td>95%</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>5%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>25 – 74 (mean age 59)</td>
</tr>
<tr>
<td>Vocal rehabilitation</td>
<td>Yes</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>40%</td>
</tr>
<tr>
<td>Level of education</td>
<td>high school graduates</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>higher education</td>
<td>20%</td>
</tr>
<tr>
<td>Engagement</td>
<td>employed</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>retired</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>retired due to disability</td>
<td>15%</td>
</tr>
</tbody>
</table>
SWARA

Comparison between the voice of the vocal prosthesis with the synthetic voices on three key dimensions - the clarity of the voice, its naturalness, and the attitude towards future interactions.
SWARA

The quality of synthetic voices:

80% of the patients reported being satisfied
20% were somewhat satisfied

The use of the application:

10% patients used the voice synthesis system
90% dropped the use of this speech assistant for various reasons
SWARA

The difficulty recorded in the routine use of the speech synthesis system

- The functionality of mobile and internet networks
- The inconsistent internet speed
- The site is not mobile-friendly

Difficult to transform the written information into the spoken message
Regard to text input:

80% of correspondents prefer lip reading
20% by typing.

Most of the patients considered the idea of using synthetic voices for patients with laryngectomy as useful, if it works in an application that can provide continuity in expression and not make users dependent on internet access.
SWARA

Synthetic voices are clearer but less natural

There is no difference in attitude towards possible future interactions with any type of voice

Difficulties in using the voice synthesis system would disappear if it were a synthesis system that could be used as an independent mobile application and be mobile-friendly
Help people who have lost their ability to speak, especially those with surgical aphonia, to integrate and take part in everyday life.
ACKNOWLEDGMENT

This research leading to these results has received funding from Romanian Ministry of Education under the grant agreement SWARA Project, PN-II-PT-PCCA-2013-4-1660, Contract no. 6/2014
Thank you!