eHealth Activities and Hearings Aids - A Systematic Review

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eHealth will:

- Fully digitize Health Care delivery in 2020
- Focus on the patient as a consumer
- Promote self-management of chronic diseases using health apps
- Maybe increase auditory training and counselling
  - Over 30% of audiologists provided auditory training in 1980s, but only 16% in 1990s (Schow et al., 1993)
  - This decline not correlated to hearing aids with superior benefits or higher client satisfaction (Sweetow and Sabes, 2006)

Offer quality Health Care
Increase patient involvement
Promote universal access
Mobile phones have the potential to have as big an impact on global healthcare as Sir Alexander Fleming's 1928 discovery of penicillin.

Kathy Calvin, CEO
United Nations Foundation
2010
Apps for Hearing Science and Care

Source: Paglialonga et al. 2015
The eHealth bus

Source: Tognola et al., 2015
### eHealth concerns among medical doctors

**Figure 1: Privacy and payment concerns remain the top two barriers for provider adoption of mobile health**

<table>
<thead>
<tr>
<th>Concern</th>
<th>2010</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>I'm worried about privacy and security of patient info</td>
<td>45%</td>
<td>45%</td>
</tr>
<tr>
<td>I don't get paid to use mobile health tech/deliver digital</td>
<td>36%</td>
<td>39%</td>
</tr>
<tr>
<td>Connectivity issues/coverage gaps in my region</td>
<td>Not asked</td>
<td>29%</td>
</tr>
<tr>
<td>I have to change my workflow too much</td>
<td>18%</td>
<td>24%</td>
</tr>
<tr>
<td>It is too expensive to adopt mobile health technologies</td>
<td>24%</td>
<td>35%</td>
</tr>
<tr>
<td>I don't have enough information on what is available</td>
<td>23%</td>
<td>33%</td>
</tr>
<tr>
<td>My hospital/practice leaders won’t support the use</td>
<td>16%</td>
<td>30%</td>
</tr>
<tr>
<td>Patients don't show any interest in using mobile health</td>
<td>10%</td>
<td>15%</td>
</tr>
<tr>
<td>It seems too complicated to use mobile health tech</td>
<td>14%</td>
<td>17%</td>
</tr>
</tbody>
</table>

Source: 2014 HRI Clinician Workforce Survey and 2010 HRI Physician Survey
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Objective:
• Overview of the newest eHealth and hearing aids
  • Activities
    • Efforts
    • Concerns

Search questions:
1. How is eHealth used in the context of hearing aid rehabilitation in adults?
2. What are the barriers and facilitators to the successful implementation of eHealth in this area?

Articles published in the period 01.01.2005 to 18.09.2015
Criteria

Inclusion criteria

✓ Hearing aid (HA) rehabilitation in adults AND eHealth
✓ Clinical usage or clinical applications in HA rehabilitation
✓ Empirical record must be peer-reviewed
✓ Published literature (not software, webinars, etc.)
✓ English language

Exclusion criteria

✗ Absence of author names, title or traceable abstract for empirical record
✗ Record only consisting of an abstract
✗ Conference paper published in full elsewhere
✗ Text books
Exclusion process and type of included records

**SEARCH**
- PubMed
- WOS
- Scopus
- CINAHL

**Search**
- Identified 385 records

**Screening**
- Identified 287 records after duplicates removed

**Eligibility**
- 42 records eligible according to inclusion criteria
- 4 records from reference lists

**Inclusion**
- 46 records included

- **Empirical**
- **Review including systematic**
- **Editorial**
Focus of records

Six eHealth activities defined:

1. Online rehabilitation
2. Apps and mTech
3. Online information
4. Implications of tele-audiology
5. Remote fitting/verification
6. PC/DVD/telephone rehabilitation

Focus on 4 in this presentation
Records by year of publication and eHealth activity

- 39 records published the last 6 years
- 7 records published the first 5 years

- **Online rehabilitation**
- **Apps and mTech**
- **Online information**
- **Implications of tele-audiology**
- **Remote fitting/verification**
- **PC/DVD/telephone rehabilitation**
Clinical applications by type of eHealth activities

Most frequent across eHealth activities

- Online rehabilitation
- Apps & mTech
- Implications of tele-audiology
- Remote fitting/verification
- Online information
- PC/DVD/telephone rehabilitation

Hearcare activities by type of eHealth

- HA candidacy/follow-up
- Dissemination of information
- Pre-fitting counselling
- HA post-fitting care
- HA performance/satisfaction
- Remote consultation/monitoring
- HA maintenance
- Personal sound amplification
- HA fitting by HCP
- HA fitting by client
- HA and tinnitus
- Other device as HA
Facilitators

Across all eHealth activities:

- Cost and time efficiency

Online rehabilitation:

- Home-based flexible solutions at own pace and time
- Awareness and motivation raising
Facilitators continued

Apps and mTech:

An abundance of low priced apps increasing personalization and client involvement

Online information:

High internet use some countries, significant others facilitating and easy/neat design
Facilitators continued

Implications of tele-audiology:

Innovative technology within many areas of audiology

Reach previous unreachable persons with HL – geographical and client groups

Paradigm shift towards a personalized client centered journey
Barriers

Across all eHealth activities:

- Data security/privacy
- Connectivity issues and Internet access

Online rehabilitation:

- Client adherence
- eHealth literacy and disabilities/skills to understand online info
Barriers continued

Apps and mTech:

Quality, reliability of apps, misuse and privacy of data, readability of information

Online information:

Low readability, update of websites, vision and reading difficulties
Barriers continued

Implications of tele-audiology:

Lack of eHealth policies and legislation, privacy of data, lack of re-imbursement
Methodological quality of the 19 included records with a sample size

High methodological quality is necessary for decision support/policy decisions in the new area of eHealth within audiology

Quality by study design and quality domains*

* According to Downs & Black, 1998
Main conclusions

• eHealth can open for new possibilities in audiology – a paradigm shift

• Give individually tailored cost and time efficient audiologic client journeys

• Open up for holistic interventional audiologic service

• Concerns regarding quality and reliability of apps, legal frameworks, data safety and re-imbursement models

• Underpowered studies with poor external validity cannot support effective evidence-based policy decisions regarding eHealth implementation
## Perspectives

<table>
<thead>
<tr>
<th>eHealth activity</th>
<th>Future research</th>
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</thead>
<tbody>
<tr>
<td>Apps and mTech</td>
<td>HL assessment, clinical potential in apps</td>
</tr>
<tr>
<td></td>
<td>Quality, reliability</td>
</tr>
<tr>
<td></td>
<td>Safety, privacy and legal framework for data</td>
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<tr>
<td></td>
<td>Data driven individualization</td>
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<tr>
<td></td>
<td>Patient centered model</td>
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<tr>
<td>Online rehabilitation</td>
<td>Tailored individualized rehabilitation</td>
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<tr>
<td></td>
<td>Questionnaires on Hearing aid outcomes developed for online use</td>
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<tr>
<td></td>
<td>eHealth literacy</td>
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<tr>
<td></td>
<td>Involve persons with HL and health care professionals in development</td>
</tr>
<tr>
<td>Online information</td>
<td>Increased readability in online information</td>
</tr>
<tr>
<td></td>
<td>Health info in other languages than English</td>
</tr>
<tr>
<td>Implications of tele-audiology</td>
<td>Barriers and facilitators in tele-audiology</td>
</tr>
<tr>
<td></td>
<td>Persons with hearing loss and audiologist perceptions and experiences</td>
</tr>
<tr>
<td></td>
<td>Holistic interventional audiology</td>
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