mhealth technologies empower hearing aid users to self-manage their hearing loss

Presented by:
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Benefits of mhealth

- Increase access
- Empowerment
- Greater knowledge
- Engagement
- Self-management
- Awareness of hearing loss
- Big data
- New service models

NAL
Mobile tech for connected hearing healthcare and self-management

Smartphone-connected hearing aids

Auditory-cognitive training

Alternatives: Hearables PSAPs

Pre-assessment/ pre-fitting preparation

Remote device adjustment

Hearing health education

(Ferguson et al, Sem Hear, 2019; Maidment et al, IJA, 2019)
Smartphone-connected hearing aids
Hearing aids are effective

Hearing-related QoL
Large beneficial effect
Moderate quality evidence

Listening ability
Large beneficial effect
Moderate quality evidence

Health-related QoL
Small beneficial effect
Moderate quality evidence

Adverse effects
None reported
Very low quality evidence

“The evidence is compatible with the widespread provision of hearing aids as the first-line clinical management in those seeking help for hearing difficulties”

(Ferguson et al, Cochrane Database, 2017)
Hearing aids get bad press. Why?

Can new technologies help?
Smartphone connectivity

Self-fitting

User-adjustment

Remote delivery

(Convery et al, 2018; Maidment et al, Int J Aud, 2018; Maidment et al, JAAA, 2019; Convery et al, 2019)
RQ: Does the functionality of a smartphone app provide benefits in everyday life?

• Aims
  1. To assess benefits of the smartphone app
  2. To explore and identify usability and user’s preferences of the app

• Methods
  – n=44 hearing aid users
    - New n = 14; existing n = 30
    - Age: new = 66.7 yrs; existing = 69.8 yrs
    - PTA_{0.5-4kHz}: new = 36 dB HL; existing = 43 dB HL
  – Owned Apple iPhone ≥ 5.0 (iOS 10+)
  – Single centre, prospective, observational design
    – 7 weeks, 3 visits
  – Mixed methodology
    • Quants and quals, including 2 focus groups

(Habib et al, BAA, 2019)
Hearing aid outcomes improved: large clinical effect sizes

**Benefit and satisfaction**

- GHADtMP Outcome (%)
  - Benefit: 80-100%
  - Satisfaction: 80-100%

**Participation restrictions**

- HHIE Global (%)
  - New: d=2.8
  - Existing: d=0.8

**Listening effort**

- DOSO
  - Previous HA: 3-5
  - Study HA: 5-7

**Fatigue**

- VFS Global (%)
  - New: d=1.9
  - Existing: d=0.9

E.S. Cohen’s d

- ≥ 0.8 large
- ≥ 0.5 moderate
- ≥ 0.2 small
Patient feedback of the app

Star rating was high

App met their needs
• Extremely well = 68%
• Somewhat well = 26%

Best feature
• Ability to adjust, improved listening = 42%
• Use in different environment = 26%

Situations app most useful
• Conversation in noise = 50%
• Watching TV = 32%

Did you experience tiredness?
• No= 87%
• Yes, only once = 8%
What the patients say

“It’s great. It gives you control….it’s not other people running my life, it’s me”

“In a restaurant, it meant I didn’t have to sit with my back to the wall anymore – I could sit where I wanted”
Conclusion: Smartphone-connected hearing aids get good press

- Improved listening and participation
- Less fatigue and effort

EMPOWERMENT

STIGMA!
Hearing health education
Why is hearing health education important?

- **Hearing aids are difficult to use**
  - 51% found difficulties using aid at first
  
  “You get a lot of information …by the time you get home, you’ve forgotten most of it.”

- **Retention of information is poor**
  - Overall = 49.6%: practical = 62.9%, psychosocial = 34.3%

- **Hearing aid users have a desire for additional information**
  - both before and after the fitting appointments

- **Health context**
  - better knowledge increases patient satisfaction and treatment compliance

- **Self-management**
  - better self-management → adoption of better health behaviours → better outcomes
  - hearing: knowledge, self-efficacy and psychosocial

References:

(AoHL, 2011)

(El-Molla et al, 2013)

(Laplante-Levesque et al, 2013; Kelly et al, 2013)

(Murray et al, 2005)

(Mosen et al, 2007)

(Convery et al, 2018)
C2Hear: reusable learning objects (RLOs) → multimedia-based programme for hearing aid users

(Ferguson et al, Int J Audiol, 2018)
C2Hear was clinically effective

- Evidence-based, randomised controlled trial (n=203)

- Freely available multimedia RLOs on YouTube (>225k views) and standalone C2HearOnline.com

- Lots of positives but….
  - RLOs 5-8 minutes, too long
  - One size fits all
  - Limited interactivity

- To future-proof
  - Shorter
  - Individualise
  - Interactive

(Ferguson et al, Ear Hear, 2016; Gomez & Ferguson, Int J Audiol, 2019)

(Ferguson et al, Sem Hear 2019)
Individualised: tailored to meet user’s specific needs (m2Hear)

- 42 mRLOs
- Greater interactivity
- More activities

https://www.nottingham.ac.uk/helm/dev-test/m2hear

(Ferguson et al, Sem Hear 2019)
Access to individualised information to meet user’s needs

How do I know which hearing aid is for my left/right ears?
Additional interactivity

How do I work with other to help me take part in conversations?

Hearing problems and solutions activity

Here are some situations you might recognise with suggested solutions.

Activity: Drag which solution you think would be best to each problem.

- Helps communication
- Doesn't help communication

Situations:
- Face the person
- Attract attention
- Speak clearly
- Be patient
- Answering for others
- Covering your face
- Shouting
- Talking from a different room
Self-efficacy for hearing aids and participation restrictions significantly improved

Self-efficacy for hearing aids (MARS-HA)

Participation restriction (HHIE)

$p<.001; d=2.01$

$p<.001; d=2.9$

n=59 first-time hearing aid users

(Maidment et al, Int & Aud, 2019)
What the patients say

“I haven’t got to rely on anyone else…I’d rather be able to just do it myself”

“It’s [m2Hear] just really given me confidence – I feel I can cope with any situation now”

**Capability**
- Comprehensive, facilitating knowledge
- Concise, easy to retain
- Interactive, improved memory

**Opportunity**
- Better self-management
- Inclusive, shared with others
- Personalised, tailored to needs

**Motivation**
- Empowerment
- Greater self-efficacy
- Better coping
- Set expectations
Conclusion: hearing health education can benefit patients

- **Hearing aids became less difficult to use**
  - Practical hearing aid handling skills and self-efficacy for hearing aids significantly improved

- **Retention of information**
  - Knowledge of hearing aids and communication is significantly improved

- **Delivery through mhealth technologies is feasible**
  - m2Hear was used on mobile devices in around half of users
  - Adherence and ratings were high (92% and 84%)
  - Provided individualised, interactive learning that was beneficial
  - m2Hear was preferred to the original C2Hear

- **Self-management was improved**
  - Improved knowledge and self-efficacy → better self-management
  - Better self-management → improved social participation and reports of feeling empowered
Benefits of mhealth: summary

- Increase access
- Empowerment
- Person-centred
- Greater knowledge
- User control
- Self-efficacy
- Self-management
- New service models
Benefits of mhealth: empowerment

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Empowerment: conceptualising empowerment

Indicators of patient empowerment
- Self-efficacy
- Knowledge, skills,
- Perceived personal control over health
- Health literacy

Behaviours: what people do
- Self-management
- Empower themselves
- Participate in shared decision-making

Patient outcomes
- Adapt chronic illness
- Quality of life
- Wellbeing/satisfaction
- Independence

(Bravo et al, BMC Health Services Research, 2015)
Harnessing the power of mhealth technologies: clinical implications

• Smartphone-connected hearing aids
  • enable greater user-control
  • encourage audiologists and their patients to use smartphone connectivity
    ➢ Empowerment, less fatigue and stigma

• Hearing health knowledge
  • cornerstone of self-management and empowerment
  • importance can often be overlooked
  • delivered along the pathway
    ➢ Improved hearing aid handling skills, self-efficacy, use, participation

➢ mhealth technologies can empower patients and lead to better patient outcomes

What will hearing healthcare look like in 5 years?

New service models
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