New and emerging technologies for hearing loss

More than 11 million, (approximately one in six) people in the UK are affected by hearing loss, the majority (92%) experiencing mild to moderate hearing loss. The likelihood of hearing loss increases with age, with more than 70% of 70 year-olds experiencing some form of hearing loss. Hearing loss is however, not uncommon in children; there are over 45,000 children in the UK who have a profound hearing loss. As a consequence of the aging population profile, it is estimated that there will be over 14.5 million people in the UK with some degree of hearing loss by 2031, and over 2 million with severe hearing loss.

In 2010/11 the cost of managing hearing loss to the NHS was estimated to be £450 million. However, the financial burden of hearing loss falls not only upon society and the NHS, but upon individuals, who often experience difficulties with interpersonal communications and challenges in day-to-day living and employment. Hearing loss can impact negatively on economic activity, psychological wellbeing and quality of life.

Current management options include education programmes, auditory and cognitive training to help people make the most of their hearing aids and manage their hearing loss effectively; assistive listening devices to support people in every day situations such as using telephones; hearing aids and alternative listening devices to amplify and enhance sound and hearing; cochlea implants for those with severe hearing loss; drug therapy and surgery for specific disorders and malformations.

Methods

In 2015, the Mild to Moderate Hearing Loss Priority Setting Partnership (PSP), comprising patients, carers and health care professionals, under the direction of The James Lind Alliance (JLA) identified and prioritised unanswered questions about the treatment of mild to moderate hearing loss. Two of the top ten questions and priorities for future research that arose were:

- Can new technologies replace hearing aids?
- Can stem cell therapy offer a cure for mild to moderate hearing loss in adults?

This NIHR Horizon Scanning Research and Intelligence Centre horizon scanning review was undertaken in response to these questions, and aimed to identify new and emerging technologies in development for the management and reduction of the negative consequences of hearing loss, of any degree of severity.
Between April and December 2016, we searched a wide range of sources of intelligence including horizon scanning databases, MedTech industry news, clinical trial registries, bibliographical databases and the Internet. We excluded identified technologies in development for prevention, screening, diagnosis or assessment of hearing loss, those in very early clinical evaluation and those that were already widely available. We invited clinical and research experts and patients to comment on the level of innovation, user acceptability and likely benefits and barriers to use by patients, carers and the NHS of the identified technologies.

**Results**

We identified 55 technologies that fitted the identification criteria: five educational programmes, six auditory and cognitive training programmes, five assistive listening devices, eleven hearing aids (HAs) and alternative listening devices, eight implants and devices, twelve drugs, one regenerative medicine approach, and seven surgical procedures. Most of the developments were in early or uncertain clinical research and would require additional evaluation before widespread adoption by patients and the NHS.

We acknowledge that the methods we used will not identify all products in development and may miss in particular, those that have not been associated with formal clinical trials. Using our methods, we did not identify any technologies that would replace HAs. We do, however, understand from our expert advisers that some alternative listening devices may in practice, substantially replace HAs for some people.

We did identify one stem cell regenerative medicine approach in early phase I/II clinical trials for bilateral severe to profound hearing loss that, if it progresses successfully through the trial stages (and the phase I/II study is due to complete in summer 2017), has the potential to offer a novel treatment for this patient group. However, we did not identify anything in trials for mild to moderate hearing loss.

Experts and patients picked out technologies of interest including: apps for converting speech to text and sign language to speech, hearing aids and alternative listening devices to support listening in different environments, a fully implantable cochlear implant (CI) system, a closed-loop CI system, and three developments to support the tuning and optimisation of HAs. If these were successful they have the potential to change the CI landscape for patients, improve patient experience and use of HAs, and to affect service delivery and provision.

However, as the experts and patients say in their general comments, the greatest benefit to the greatest number of patients will come from identifying and supporting those patients with age-related hearing loss to access and use HAs to their best advantage, overcoming reluctance, poor training, stigma and sometimes poor access to interventions and services.

For further details of the technologies we identified and references, please read the full NIHR HSRIC report which is free to download.