

Delivery of Hearing Healthcare and Education Using the Internet



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Over the last decade there has been a substantial increase in the delivery of healthcare and healthcare-related information via PCs and the Internet to patients and the public.^{1,2} The same is true of hearing healthcare. A systematic review of peer-reviewed articles on tele-health applications in audiology, or 'tele-audiology', in 2010³ showed these were effective across a range of audiological services including screening,^{4,5} diagnosis,⁶ and interventions such as auditory training,^{7,8} counselling⁹ and patient education.¹⁰ Examples of applications currently in use in large numbers are the Action on Hearing Loss (AoHL, formerly RNID) Hear Check,³ which has had over a million hits, and auditory training using the LACE (Listening and Communication Enhancement) tool,⁴ primarily used in the US.

The advantages of tele-audiology include improved time-, clinic- and cost-effectiveness, and increased accessibility to health care.¹¹ Typically, discussions on accessibility of hearing healthcare and the benefits of tele-audiology focus on remote and rural communities in both third world and developing countries, such as Australia and North America. However, closer to home in the UK, there are also issues about accessibility to hearing services. The largest group with hearing loss are those with mild-moderate age-related losses who are over the age of 50. Two-thirds of the 10 million people with hearing loss (PHL) in the UK are over the age of 65 and the average age of first-time hearing aid users is around 74 years.¹² Many hearing aid users have had difficulties in hearing for at least 10 years before they get a hearing aid citing many reasons for not seeking advice. These include perceiving their hearing to be "not that bad", acceptance of hearing loss as a normal consequence of ageing, lack of awareness that they may have a hearing loss ("everyone mumbles these days"), lack of understanding of hearing loss and what to do about it, and simply avoiding addressing the issue.¹³

An additional and not insubstantial reason for sub-optimal access to audiology services is the failure of GPs to refer onwards those in the pre-typical hearing aid age group. Just under half (47%) of those with a significant hearing loss in the 55-74 year age group who went to their GP with complaints of hearing loss failed to get an onward referral to audiology services.¹³

In addition to the accessibility limitations to current conventional hearing services, we also need to be mindful of the skill set

required to access information technology, which can limit access to tele-health solutions in the older, typical hearing aid population. Whilst use of PCs and the Internet is increasing in the over-sixties (the 'silver surfers'),¹⁴ there are significant effects of age on information technology use. A recent study that we carried out with 50-74 year olds (n=1,298), showed PC and Internet use in the younger (50-62 years old) group was 81% and 60.9% respectively, whereas in the older (63-74 years old) group this was 54% and 29.8%.¹⁵ These age effects were highly significant (p<.001) and consistent with other reports in Europe¹⁶ and the US.¹⁷ The age differential between the age group of typical first-time hearing aid users (70-74 years old) and those in the youngest group (50-54 years old) highlighted even greater differences in PC and internet use. For the older group this was 36.4% and 17.5% respectively, around a third of that for the younger group, which was 84.6% and 65.6%.

Other significant demographic effects are sex, whereby women were 25% less likely to use a PC and 38% less likely to use the Internet than men (p<.005). This difference was more marked in the older group compared to the younger group for PC use (32% vs 17%). Not surprisingly, there was also a significant effect of socioeconomic status (SES) where those with a higher SES were more likely to use PCs and the Internet than those with a lower SES. Similar effects of sex and SES have been reported elsewhere.^{16,17} These factors alongside those of age need to be taken into account when planning tele-audiology services.

However, what has not been reported before is the effect of hearing loss on PC and

Internet use in older adults. Two studies on an adolescent and a severe-profound hearing loss group showed a preference for text-based communication (that is, email and SMS text) and suggest this overcomes the auditory barrier.^{18,19} Although our study did not look at preference of communication methods *per se*, our results are broadly consistent with these two studies. PC and Internet use for the older group was more than half as much in those with slight hearing difficulties compared to those with no difficulties ($p < .05$). However, in the younger group where PC and Internet use was already high, the converse was seen whereby for those with moderate losses, PC and Internet use was significantly less.

So what does this mean for the delivery of audiological services to PHL via the Internet? For those over 62 years with mild hearing difficulties and no hearing aids, the relatively higher use of the Internet suggests two potential approaches – education and early hearing screening, both of which may lead to further interventions, such as hearing aids and auditory training.

The educational approach provides information and advice about hearing loss, what to do about it, and what to expect from any intervention with interactive elements to enhance learning.²⁰ There is some, though limited, research on educational approaches for PHL via the Internet but only with hearing aid users, although the general principles can also be applied to non-hearing aid users. One recently published article shows better outcomes in terms of reduced activity (disability) and participation (handicap) restrictions in those that undertook an educational programme compared to a control group.¹⁰ A small qualitative study of three hearing aid users who received advice and support from an audiologist via emails, showed this programme reinforced positive behaviours.⁹

At NBRUH, we have taken a slightly different approach. We have developed a series of seven interactive video tutorials (or reusable learning

objects, RLOs) that address both practical (for example insertion of earmould and hearing aid maintenance) and psychosocial issues (for example acclimatisation and expectations) relevant to hearing aid users. These are currently being evaluated in a randomised controlled trial of 170 first-time hearing aid users. Patient benefit will be identified in terms of hearing aid satisfaction, use and benefit, as well as how any learning translates to improvements in lifestyle activity and participation, and self-efficacy related to hearing aids and communication.²¹ RLO accessibility has been maximised in this group of first-time hearing aid users who have already overcome a number of barriers, and are likely to be predominantly older with all the attendant limitations for Internet and PC use and access. Therefore, RLOs are being delivered using three methods – DVD for TV and PC, and the Internet. Whilst the current RLOs are highly informative, they are generic (that is, everyone gets what they are given). Patient-centred care has been shown to improve patient outcomes.²² To address this and the generic nature of the RLOs, we plan to develop RLO packages using a platform suitable for high levels of interactivity. These will then be delivered via PC and Internet and can be tailored to the needs of each individual.

Whilst these current educational approaches have been used with hearing aid users the general principles can also be applied to non-hearing aid users. There is a huge potential to use these methods in people with hearing loss but who have not or cannot access advice from audiology services. Of the 10 million PHL in the UK, only three million have hearing aids. It is estimated that a further four million would benefit from having a hearing aid.¹² It is anticipated that making educational materials available to non-hearing aid users could increase awareness of hearing related issues and therefore trigger proactive help-seeking behaviours.

The second approach is early hearing screening. Davis *et al.*¹³ have shown that hearing screening in the 55-74 years old age

group is acceptable. This is supported by more than one million people who have taken the AoHL Hearing Check. A benefit of early screening is that it can encourage those with hearing difficulties to seek interventions such as hearing aids and auditory training. 'Early' hearing aid intervention has been shown to be beneficial in those with mild losses, and both beneficial and cost-effective in those with hearing losses greater than 35dB HL.¹³

Hearing aids for those with mild losses are not the only option, and may not be the preferred option. Auditory training has been shown to be beneficial in both hearing aid users and those without hearing aids. A systematic review of individual auditory training in adults with hearing loss showed that training improves the trained task in almost all studies.²³ The question is, does this learning on the trained task transfer to everyday functional hearing? The answer is generally 'yes', although effects are small and not always robust. The LACE programme is the most widely used commercially available product, which can be delivered through PC and the Internet, but there are many other programmes available on the Internet and through apps for smartphones.

Of course, Internet delivered early screening, patient education and auditory training are not just for those over 62 years with mild hearing losses. They are relevant to anyone, at any age, who has hearing difficulties and the required skill set and access to the Internet. There are inherent barriers to many people who currently have hearing loss, however the numbers overcoming these barriers, in terms of access to IT at least, will increase over the coming years. If the Internet is able to address the current unmet need in even just a small proportion of the millions of people who could benefit from some form of intervention, that will still lead to benefit for many thousands of people with hearing loss. The future of internet delivered audiology applications is bright – the future is better hearing for more people.

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