Outcomes of a fully-remote clinical pathway adapted for NHS

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Introduction

Provision of audiological care using teleaudiology is becoming more available. In most instances, this takes place via a combination of in-person and remote care.

Lively Hearing Corporation, USA, has developed an audiologist-supported hearing care pathway in which every step, from ear disease assessment to hearing aid (HA) support, is conducted remotely.

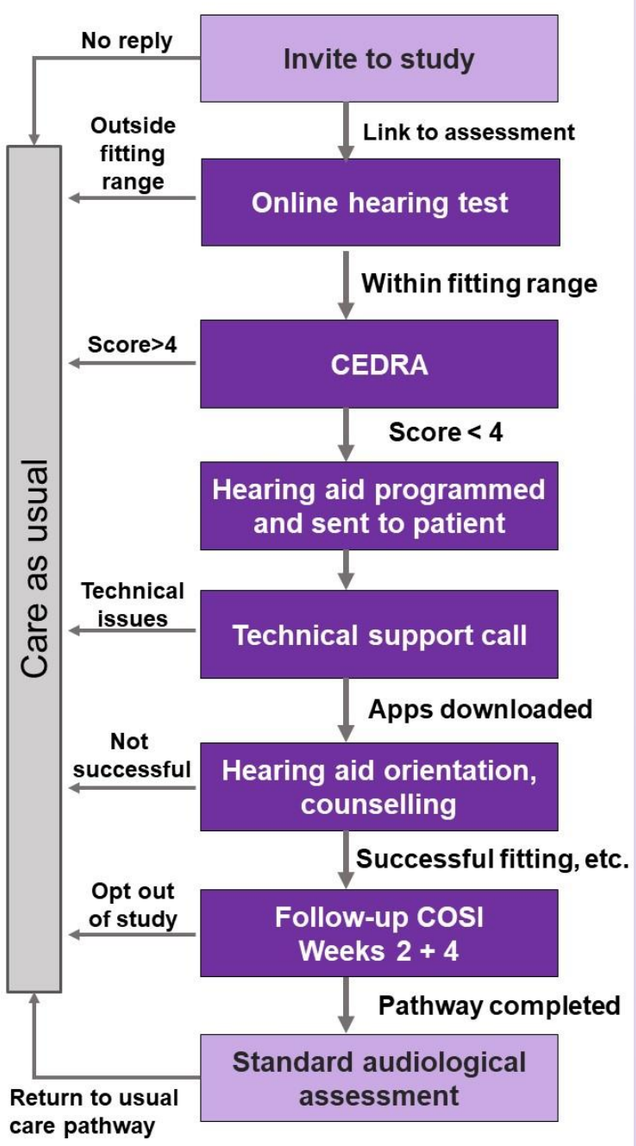
However, there are questions regarding how such a pathway affects identification of ear disease, measured hearing thresholds and hearing aid output.

This study addressed these questions by implementing an adapted version of the fully-remote pathway in an NHS audiology department.

Methods

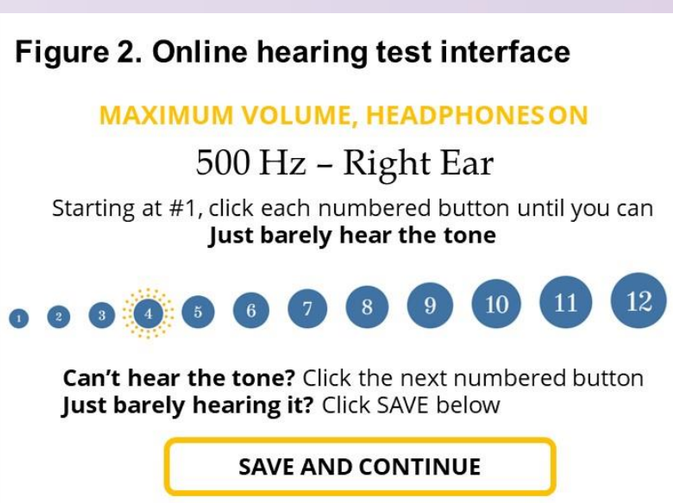
Patients referred to the Withington Community Hospital Audiology Department between 15th Jun and 10th Nov 2021 were offered the option of care via the adapted fully-remote pathway (Figures 1 and 2). These patients also attended an extra in-person audiological assessment 3-4 months after their remote HA fitting. All other patients received care as usual.

Figure 1. Fully-remote care pathway



- THE CEDRA (Consumer Ear Disease Risk Assessment) is a 15-item questionnaire used to identify ear disease of 90% sensitivity and 72% specificity (Kleindienst et al., 2017). See https://sites.northwestern.edu/cedra/.
- The study HA was the Resound LiNX Quattro programmed using QuickFit to NAL-NL2 using online thresholds. The HA can be programmed remotely both synchronously and asynchronously and can be fine tuned by the user.
- A technician conducted the technical support call.
- An audiologist conducted the hearing aid orientation and counselling.
- Light purple boxes indicate a diversion from the Lively model. Further, Lively provides 3 & 6 mth. follow-ups; and CEDRA failures can re-enter the pathway following further audiological consultation.

Figure 2. Online hearing test interface

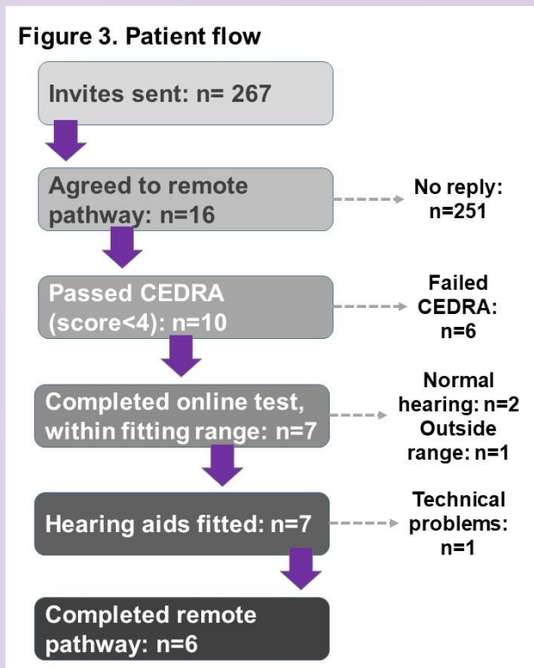


Online testing is via headphones with computer volume set to maximum for pure tones of 0.5, 1, 2 & 4 kHz for each ear separately.

Participants

Figure 3 shows the patient flow through the study.

Figure 3. Patient flow

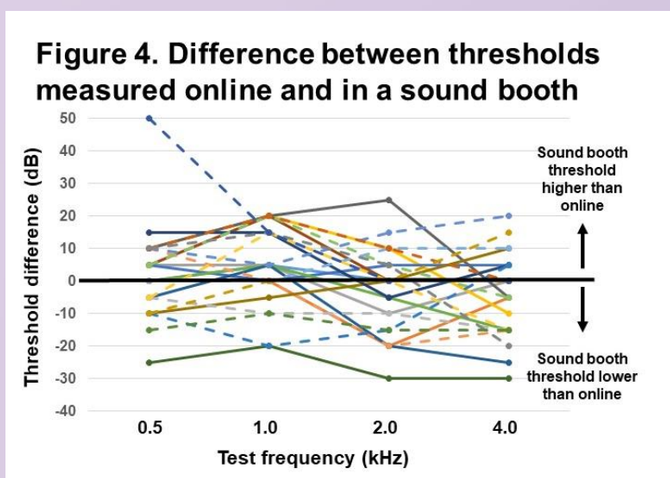


- Only 6.3% of patients opted for the fully remote pathway.
- Patients who joined study were younger than those who did not (mean: 55.6 yr. vs. 66.3 yr.).
- 1 of the 6 who failed the CEDRA required onward referral, the other 5 were false positives.
- There were no CEDRA false negatives i.e. none who passed the CEDRA required referral.
- The technical problem was inability to pair the phone to hearing aids.

Results

Comparison of online and standard audiometric thresholds

Figure 4. Difference between thresholds measured online and in a sound booth



Right ears: dashed lines
Left ears: Solid lines

65% of thresholds within 10dB of each other
Mean absolute diffs between thresholds are:

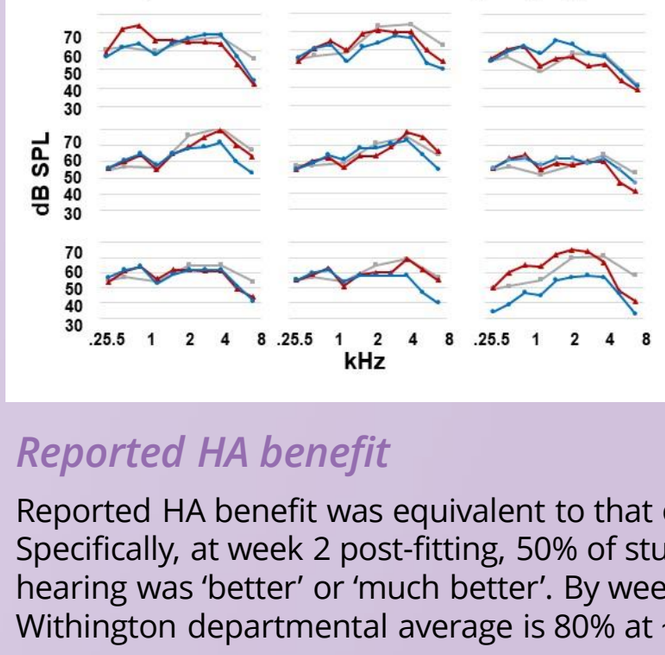
- 0.5kH: 6.3 dB
- 1.0 kHz: 5.8 dB
- 2.0kHz: 8.7 dB
- 4.0kHz: 7.1 dB

Wilcoxon signed rank test showed no sig. diffs at any frequency ($p>0.05$)

Comparison of Quickfit HA coupler output at 65dB SPL

Figure 5 shows quickfit HA outputs relative to NAL-NL2 target (computed from booth-based thresholds) for 9 participants who had a HA fitting.

Figure 5. Quickfit HA coupler output for the 9 participants with HA fittings using online (blue) and booth-based (red) thresholds, shown relative to NL-NL2 targets (grey)



HA coupler outputs programmed with the two sets of thresholds on average deviate to a similar extent from the NAL-NL2 target. Statistically, the deviations do not differ for any frequency below 8kHz. At 8kHz outputs were closer to NAL-NL2 for booth-based testing than online testing.

Reported HA benefit

Reported HA benefit was equivalent to that of the audiology department. Specifically, at week 2 post-fitting, 50% of study patients reported their hearing was 'better' or 'much better'. By week 4 this had increased to 86%. Withington departmental average is 80% at ~8 weeks.

Discussion and Conclusions

This fully-remote pathway yielded hearing thresholds, HA output and reported benefit that were almost equivalent to those obtained in a clinical test booth. However, few patients opted for the remote pathway (possibly due to no waiting times for in-person appointments), some encountered technical issues, and the CEDRA led to false positive failures. Nonetheless, this small study suggests such a pathway could be implemented into NHS care for younger patients who are open to receiving care remotely.

Acknowledgments

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References

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