



Patient perceptions of a remote assessment pathway in otology: a qualitative descriptive analysis

Christopher Metcalfe¹ · Colin Leonard¹ · Jameel Muzaffar¹ · Christopher Coulson¹

Received: 14 February 2022 / Accepted: 28 September 2022

© The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2022

Abstract

Purpose This study aims to gain in-depth feedback on patient perceptions of remote assessment in otology, to better inform the development of a telemedicine pathway for new otology referrals.

Methods A qualitative descriptive approach was employed to analyse semi-structured interviews from 14 patients seen in a routine otology clinic.

Results Patients were generally accepting of the proposed telemedicine pathway. Key themes included maintaining quality of care, adequate training for facilitators, reducing waiting times, appropriate actioning of clinic outcomes and anxiety surrounding the use of technology.

Conclusions Our proposed telemedicine pathway for new otology referrals is acceptable to patients, provided there is no compromise in the standard of their care versus a traditional pathway. These results further our understanding of remote assessment in otology from the patient perspective and may help to inform the development of such pathways outside of our centre.

Keywords Telemedicine · Remote assessment · Technology · Otology · Service design

Introduction

The novel coronavirus 19 disease (COVID19) pandemic has had a profound impact on the way we practice otolaryngology in the United Kingdom (UK); however, the pressure on our health system has acted as a catalyst for exploring novel ways to assess and manage our patients. A need to reduce footfall within the hospital environment, optimise clinic capacity through triaging and manage ever-increasing waiting times [1] has led to an increase in the use of telemedicine for the assessment and management of outpatients. Commonly, this has involved the use of telephone consultations as the most simple form of remote-assessment [2]; however, the skills required for a telephone consultation may differ slightly from those used during face-to-face interactions with patients; therefore, refinement of teleconsultation skills may be key for increasing patient satisfaction with this form of consultation [3]. Likewise, telephone triaging alongside a

validated risk stratification calculator has been used to good effect in the initial assessment of suspected head and neck cancer patients, demonstrating a low risk of harm and the potential to optimise the patient experience by preventing unnecessary hospital attendances [4]. Whilst telephone consultations are effective in many circumstances, the ability to add a visual examination, for a clinician to assess remotely, is likely to enhance the diagnostic sensitivity of a remote assessment pathway. Otolaryngology is well placed to utilise this concept as a visual inspection of the ear, nose or throat, via either an otoscope, rigid endoscope or flexible nasendoscope, is central to a routine outpatient examination for the majority of patients. Indeed, there is already evidence to suggest that asynchronous remote assessment using video-otoscopy may facilitate an adequate otological examination [5] and flexible nasendoscopy performed by a trained practitioner, with remote consultant review of acquired videos, can be used as part of a telescopic head and neck cancer pathway [6]. Remote otological assessment may even be further enhanced by the introduction of boothless audiometry [7, 8]. Technological advancements in the form of increasingly high-quality image acquisition and the availability of secure store and forward technology will likely make remote

✉ Christopher Metcalfe
christophermetcalfe@nhs.net

¹ Department of Otolaryngology, Queen Elizabeth Hospital Birmingham, Edgbaston, Birmingham B15 2TH, UK

assessment an increasingly viable option in otolaryngology moving forward, with various potential benefits to patients, clinicians, and the wider healthcare system.

Development of a remote assessment pathway for new otology referrals from primary care is underway at our centre, which aims to optimise the patient experience by providing timely access to consultant-delivered care. To direct the development of such a pathway, it is vital to gain both patient and clinician feedback to better inform the decision-making process and understand what is important to key stakeholders. A qualitative methodology provides an optimal platform to obtain such feedback, through its ability to describe complex phenomena[9] and record rich and insightful perceptions from patients and clinicians alike. This qualitative study presents patient perceptions of a proposed remote assessment pathway at our centre, for new otology referrals.

Materials and methods

Setting

UK secondary/tertiary referral unit.

Governance

The study was prospectively registered as a service evaluation/development and approved by our institutional review board.

Proposed remote assessment model

A proposed model for the remote assessment of new otology referrals was described to participants as part of the interview process. In this model, a patient visits their General Practitioner (GP) with an ear problem and a referral is made from primary care to secondary care. Referrals are reviewed by a consultant otologist and, where appropriate, directed into a remote assessment clinic. The patient is seen in a community satellite clinic by a trained technician (a nurse practitioner, physician associate or similar healthcare professional). During this visit, a proforma-based history is inputted onto a tablet device and a self-administered automated hearing test is completed using boothless audiometry. Video-endoscopic images are acquired from both ears and stored securely alongside the history and hearing test results. This information is reviewed remotely (and asynchronously) by a consultant otologist and an outcome communicated with the patient. Outcomes may include treatment, discharge, referral for further investigations or follow-up in a conventional face-to-face clinic. Where possible, outcomes will be communicated with both patient and GP entirely digitally (either email or text message).

Sampling

Participants for patient feedback were identified from routine adult otology clinic referrals at a large teaching hospital in the United Kingdom. Only new referrals were considered as the current proposed remote assessment pathway involves the management of new referrals. Purposeful sampling was used to sample a range of ages and genders. A minimum sample size of 12 participants was identified as adequate for this study in keeping with previously reported studies of similar methodology[10–12]; however, attention was paid to the quality of interviews and the emergence of new themes during the analysis phase, to determine whether further interviews were required. Data was collected on patient age, gender, reason for referral and time from GP referral to clinic appointment.

Interview procedure

Interviews were all conducted in a quiet clinic room within the outpatient department at our unit. All participants explicitly consented to proceed with the interview process, and it was made clear at the start of the interview that they were permitted to terminate the interview at any point, with or without giving a reason. An information sheet was provided for all participants. Interviews followed a semi-structured format consisting of a dialogue between the interviewer and the participant, guided by a flexible interview protocol and supplemented by follow-up questions and probes. The method allowed the interviewer to collect open-ended data and explore participant thoughts and feelings about the remote assessment pathway. A continuous audio recording was used for the duration of each interview.

Data analysis

A qualitative descriptive approach was the most appropriate for this study, as the aim was to obtain a straight, low-inference and minimally theorised description of the patients' perception of our proposed remote otology referral pathway [13–15]. By staying close to the data, we aimed to present our findings in a way that is patient-focused and easily interpreted by the wider healthcare team, to better inform the ongoing development of our pathway. Recorded interviews were transcribed verbatim by the primary interviewer (CM) and a qualitative content analysis approach was employed to analyse the data [16]. A single author (CM) read the transcripts and freely coded all text to describe the content. Transcripts were then re-read and annotated with reflections and insights before codes were grouped into descriptive sub-categories, with further exploration of themes within these

sub-categories. This became a two-way process as important areas of enquiry required to answer the research question influenced the formation of these categories. Categories were then reviewed and analysed to give a broad description of the data. A second researcher (JM) coded randomly selected transcripts and reviewed the completed analysis as a means of augmenting rigor, improving transparency in the coding process and to promote dialogue within the research team. NVivo 12 software (QSR International, Burlington, MA, USA) was used as a data management tool.

Results

A total of 14 participants were interviewed during the study period in November 2021. There were seven females and seven males, with ages ranging from 17 to 87 years. Mean time from GP referral to review was 12 months (range 2–18 months). Participant characteristics are summarised in Table 1. Results have been categorised below, with further analysis of themes arising within these categories.

Overall acceptability of the proposed remote assessment pathway

There was a general trend towards patients being accepting of and open to the proposed otology referral pathway; however, there was variation in the way that this was expressed. Many participants responded to the interviewer's description of the new pathway using short phrases of approval with little elaboration. For example, *'Fine, that would be fine'* (participant 3); *'Yeah, I think it would be fine'* (participant 5); *'That sounds all right, yeah'* (participant 6); *'That would be*

good enough' (participant 9); *'Um seems good to me. Yeah'* (participant 14). Whilst not wholly quantifiable in text, there was a general impression from the interviewer that many patients are indifferent to the pathway they are referred on, provided their problem gets adequately addressed. This was notable in both the tone of the above quoted answers, but also non-verbal cues whilst discussing the pathway. A clear condition for the acceptance of such a pathway, compared to the traditional face-to-face system, was the assurance that care would not be compromised (*'As long as I got the treatment and proper, proper care and treatment'* (participant 11); *'if they (patients) keep coming back and back and back, those people are just going to clog it (the system) up again, so you need to make sure that what you're doing is still properly managed in that way'* (participant 2)) and to ensure that outcomes are actioned, for example imaging requests (*'as long as they say, if you do need a scan, you get on with it, you know, get me one!'* (participant 9)). The concept of time from referral to review was also notable when discussing the proposed pathway, with a clear preference towards reducing the amount of time taken for a specialist opinion: *'You know, you'd rather see somebody who knows what they're talking about fairly quickly'* (participant 2); *'Yeah, like actually getting the answers sooner is an important thing. The waiting lists are insane'* (participant 3); *'I mean, if it speeds up the waiting times, which I think it will do, then I'm happy with it'* (participant 7); *'I'm quite anxious in general... I'm the sort of person that likes answers, the sooner the better really, you know'* (participant 14). This extended beyond time from referral to review, with patients also noting the importance of speeding up investigations and results once the remote assessment had taken place: *'I don't mind that as long as they don't take two years to pass it on- it's got to be quicker*

Table 1 Participant characteristics

Participant number	Age	Gender	Reason for referral	Time from GP referral to review
1	39	Female	Right ear heaviness	11 m
2	57	Male	Bilateral tinnitus and ear fullness	13 m
3	21	Female	Bilateral hearing loss	13 m
4	61	Female	Right conductive hearing loss	13 m
5	25	Female	Hyperacusis	13 m
6	87	Male	Chronic right otitis externa	14 m
7	49	Male	Bilateral tinnitus	13 m
8	44	Male	Left ear infections and hearing loss	7 m
9	85	Female	Left ear infections	13 m
10	17	Female	Right hearing loss	2 m
11	63	Male	Bilateral hearing loss	10 m
12	59	Female	Bilateral tinnitus	18 m
13	49	Male	Bilateral tinnitus	18 m
14	36	Male	Left hyperacusis and tinnitus	9 m

in the results! That's very important' (participant 9). In other patients, the importance of reducing waiting times was still a factor; however, it required more direct questioning from the interviewer:

Interviewer: *If that (the proposed pathway) could cut down the waiting time significantly, would that be a worthwhile trade off for not coming up and seeing someone face-to-face to start with?*

Participant 8: *It would, yeah*

Interviewer: *So you think that if you could be assessed and reassured more quickly, that would be a positive thing for you?*

Participant 9: *Yes, definitely. Just told what it (the diagnosis) is.*

When discussing participant experience of their waiting time for a face-to-face appointment, the impact of COVID was a common theme; however, patients were very understanding of the fact that this may have prolonged their waiting time: 'Well, there was nothing you could do about it' (participant 11); 'There's nothing anybody can do about it. It's circumstances with COVID unfortunately' (participant 12); 'I'm not too bothered, because of the pandemic' (participant 13). There was also a suggestion that GPs were priming patients due to the long ENT waiting times resulting from the pandemic: 'You're going to have to wait a long time. So that was the comment I had at the time- they're very, very busy at the Ear, Nose and Throat' (participant 2); 'I was told it could take up to a year' (participant 10). That said, there was still frustration at how long patients had waited for a review: 'Truth be told, you know, two years is a long time for me to wait for someone to go and check to see if anything's wrong' (participant 2); 'If you can't hear properly for two years, it's going to make an effect on your life' (participant 11). There was also an awareness of the teething issues often associated with the rollout of a new pathway or system: 'Yeah that sort of could surely be a possibility, I mean, I wouldn't say, it would work a hundred percent because obviously there'll be hiccups on the way' (participant 8). Whilst the concept of trust did not emerge as a common theme, it was noted by one participant and it was felt to be an important concept to report when drastically altering a long-accepted patient pathway: 'My view is when it starts it might be totally different, but it's something new and for people to trust something new...I think it's going to be really hard to take in' (participant 1). The same participant also noted a potential drawback in removing the face-to-face aspect of a consultation, with the inability for a patient to ask questions:

Interviewer: *So the opportunity to ask questions is important?*

Participant 1: *Yeah I think it is because it kinda like puts my mind at rest, because you know nowadays you've got internet, if you hear a word or you're looking up a condition you can sit there and type it and get a whole load of information, and it just questions you again and again.*

Training

Appropriate training for the facilitator running the remote assessment clinic and acquiring otoendoscopic videos of patients' ears was an issue highlighted by several participants. Assurance that the facilitator was competent in their role appeared to be a condition for the acceptance of the proposed pathway. Examples of participant comments on training are summarised in Fig. 1. An overall summary of conditions for patient acceptance of the proposed remote assessment pathway is summarised in Fig. 2.

Anxiety surrounding use of technology

Discussion about the use of technology on the proposed pathway, in particular the use of a tablet device to record a history, saw the emergence of some potential patient anxiety surrounding these technological aspects. During the interviews, we stated that a proforma-based history would be recorded on a tablet device by the trained facilitator; however, there are plans for patients to complete this themselves to maximise pathway efficiency, with assistance available if required. We did note some concerns from participants that they would be required to do this autonomously. A dialogue with participant 6, an 87-year-old male, went as follows:

Participant 6: *Do I understand it rightly, would I have to do, you know, laptops and things like that?*

Interviewer: *No, someone would take the history on the tablet device, rather than you having to do it yourself.*

Participant 6: *Oh I see.*

Interviewer: *I'm going to make the assumption that you wouldn't feel necessarily comfortable trying to do that on your own?*

Participant 6: *No, I couldn't do it.*

This issue was also picked up by younger patients who would perhaps feel comfortable with the technology themselves, but were astute to other patient groups, namely, older patients, who may find this aspect of the pathway challenging: 'If you're giving it to someone who's, I'm not giving an age thing, but someone who hasn't got the nouse for it, they're going to start panicking and doing it wrong. And before you know it, all the stress, they might as well just go and see someone (face to face) (participant 2).

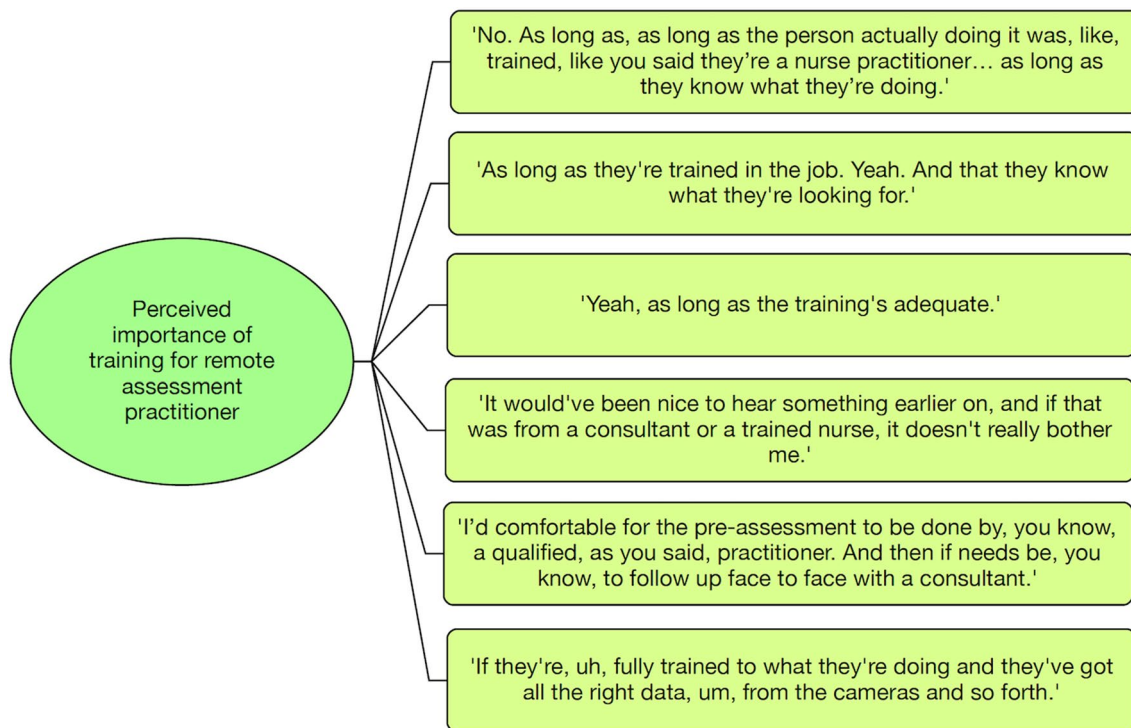
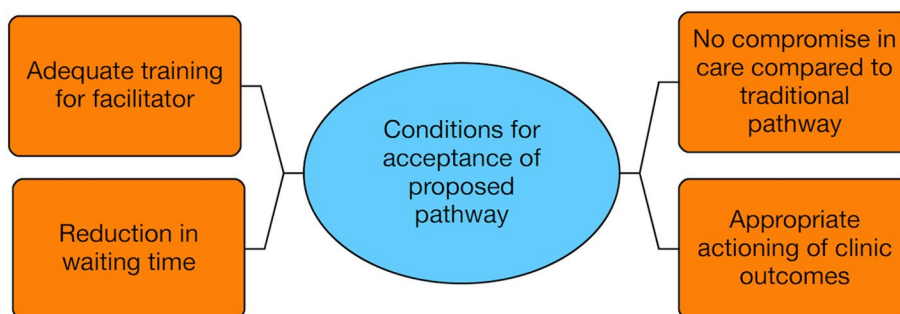


Fig. 1 Examples of how appropriate training of the remote assessment practitioner is important to patients

Fig. 2 Summary of conditions which should be met to ensure that the proposed remote assessment pathway is acceptable to patients



Outcome communication

Participants were generally very positive about a shift towards digital communication of clinic outcomes, usually in the form of email: ‘At the moment...I’m getting my letters online which is easier for me because I don’t have to run around a look for my letters’ (participant 1); ‘sending me emails is probably better, because then I could go on my phone and see my email’ (participant 11) ‘I received the appointment letter has an attachment and it was all just very intuitive, made sense’ (participant 13); ‘Yeah, I’m amenable to email’ (participant 14). There was also an understanding of a general shift towards paperless working: ‘We want to become a paperless society anyway’ (participant 12); ‘I think paperless is good in general’ (participant 14). A caveat to this was the understanding that some patient groups, such

as older patients, would prefer a posted letter as the primary form of communication and this needs to be built into the pathway where necessary: ‘It’s no good going on computers because I don’t do computers’ (participant 9); ‘But then you’ve also got to look at the other side of things with a lot of elderly people that don’t possess, like, a mobile phone’ (participant 12). The importance of face-to-face communication in certain circumstances, such as to discuss a serious diagnosis, was noted by one participant:

Interviewer: *So for serious diagnoses... you need that human interaction?*

Participant 2: *Correct, because I think a piece of paper is a bit insensitive sometimes*

Concerns about digital security were also noted by participant 7, who worked in information technology (IT),

although he still had a clear preference for digital communication: *'I think the only danger with a PDF, you know, we'd have to have some kind of secure mail. Because obviously, if it's coming into a Google type environment, Google can scan all the email and they don't take the sensitive data out'*.

Access to the hospital

Access to the hospital for face-to-face appointments was not a significant issue for most participants, with the majority living close by. However, participants living further afield did express a preference to be seen closer to home, when discussing the prospect of being seen in a community satellite clinic as part of the proposed remote assessment pathway: *'I think being seen closer to home would be a good thing. I'm not a very confident driver so driving across Birmingham to here can be a problem. It's big and parking can be difficult'* (participant 10); *'Oh yes (it would be preferable to be seen closer to home), if you don't come up to this place, I haven't been up here for four or five years, and it's a completely different place and I could get lost just coming around the corner. It's a bit big, very big you know'* (participant 6).

Discussion

This paper utilises a qualitative approach to gain patient-focussed feedback on a proposed remote assessment otology pathway at our centre. Technological advances in both remote image acquisition and store-and-forward technology are making remote assessment an increasingly feasible option in otology, and a combination of ever-increasing waiting lists and COVID19 pandemic recovery have provided impetus to search for novel ways of streamlining the patient journey and optimising care. As with any change in practice, patient feedback is vital, and this study was undertaken to further understanding around what is acceptable to patients and to better inform the ongoing development of our pathway. It is also hoped that these results will provide a foundation for other centres who may be considering developing their own remote assessment pathway in otology.

Overall, patients seemed open to the prospect of our described remote assessment pathway. It must be acknowledged that it was challenging to describe a hypothetical pathway to participants, and it is likely that we may see some different themes emerge if we were interviewing patients following the introduction of the pathway and who would, therefore, be describing their lived experience in that respect. This issue notwithstanding, the authors still felt it was important to gain patient feedback prior to the formal rollout of the pathway, as this would help to shape its development. This may explain the fairly short, albeit positive, answers of agreement from many patients, when asked about

their opinions on the described pathway; however, it was clear that, on the whole, patients accepted this pathway as a reasonable format for the assessment and management of their ear problem. What did emerge from the data is that this acceptance is likely to be conditional, provided certain criteria are fulfilled. For example, we need to ensure that the novel pathway provides a standard of care comparable to that seen on a traditional face-to-face referral pathway. To safeguard this, prospective auditing of the pathway following rollout and comparison with face-to-face clinic data will be essential. The aim to reduce waiting times for patients is an obvious catalyst for the new pathway; however, these data confirm that it is also a priority for patients. Many see a reduction in waiting times as a reasonable trade-off for not having a face-to-face review. Deeper interpretation of patient responses suggested that the concept of 'waiting time' was less about seeing a clinician and more to do with getting answers or reassurance, both of which should be adequately provided by this remote assessment pathway. The concept of waiting time also extended to expediting outcomes and investigations and this needs to be considered as part of the pathway setup. For example, the time between remote assessment and asynchronous consultant review should be minimised to ensure that patients are not waiting too long for the clinic outcome or subsequent investigation and management. Patients appear keen for reassurance that the facilitator who is performing the remote assessment is adequately trained to complete an examination and obtain recorded otoendoscopic videos. In practice, this is a difficult aspect to evidence as there is no recognised training pathway or credentialing. Our proposed training pathway includes plenary delivery of key concepts followed by practical training on anatomical models prior to supervised contact with patients. Only once facilitators have been assessed as competent would they perform examinations on patients without direct supervision. This is important both to maintain patient safety and to provide images of sufficient quality to allow an accurate diagnosis. There is a learning curve associated with the acquisition of optimal video-otoscopic images [17], and therefore, it can be inferred that this will also be the case with otoendoscopic image acquisition. Likewise, it has been shown that focussed training allowed parents to perform smartphone otoscopy for the diagnosis of otitis media in children [18]; we envisage that this process will be even more straightforward when training a facilitator from a clinical background. In a routine clinical delivery setting, it is likely that patient trust in the trained facilitator will be determined by the facilitator themselves, their confidence in the process and the rapport they develop with the patient. This is something that should be emphasised during the training phase.

One potential drawback for patients on the remote assessment pathway is the inability to ask questions during their

review. One participant noted the anxiety associated with using the internet to research symptoms and felt that directly questioning the reviewing clinician was one way of exploring these anxieties and seeking reassurance. We should be mindful of this and acknowledge that patients may have questions that are not adequately addressed by the remote assessment pathway. In such cases, it may be prudent to offer further follow, potentially in the form of a telephone consultation if appropriate, so that patients can be given the opportunity to ask questions. It is also clear that in cases where a potentially serious diagnosis is picked up during the asynchronous assessment, patients should be brought back for a face-to-face discussion rather than including this information in writing. Obviously, this is less common in an otology clinic compared to a head and neck clinic; for example, however, this principle would also hold true in cases, where a surgical procedure is going to be offered as part the clinic outcome, as this is a discussion that should ideally be done in person.

A key aspect of the proposed pathway is a shift towards a primarily digital method of communication with patients, whether by email or text message. The potential benefits of this include reducing the time spent awaiting transcription of dictated letters in addition to the time it takes for posted letters to reach the patient. The environmental impact should also be considered, as evidenced by the introduction of a Greener NHS Programme [19] which aims to reach net zero for all carbon emissions, controlled directly by the NHS, by the year 2040. A transition towards digital communication with both patient and GP and a move away from traditional postage of letters is likely to reduce the carbon footprint at this stage of the patient journey and the use of digital messaging is specifically cited in the NHS report. The majority of patients interviewed were very positive about a shift towards digital communication, citing benefits such as having correspondence automatically backed up, increased speed of correspondence and easy access via a smartphone. However, care must be taken to involve patients in this decision as our results suggest that some patients, particularly those in an older age group, may not have access to email or a smartphone, or feel comfortable with this method of communication. This anxiety surrounding the use of technology was also seen in one older participant who expressed concern that he would have to use a laptop or similar as part of the proposed pathway, as this was something outside of his comfort zone. To optimise pathway efficiency, it is envisaged that patients will complete a self-directed proforma-based history and hearing test on the tablet device whilst waiting to go through for an examination. What is clear from the data, is that support should be available for troubleshooting, particularly for those less comfortable with using a tablet device independently, to ensure the capture of accurate clinical information and prevent undue stress to the patient.

Results from this study have highlighted a number of areas that require further work as we move towards the roll-out of a pilot remote assessment pathway for new otology referrals at our centre. It is clear that for the new pathway to be acceptable to patients, the standard of care must be comparable to the current model of outpatient review, and therefore, prospective data collection is required to compare a number of key areas including waiting times, clinical outcomes and the proportion of patients who cannot be managed on a remote pathway alone and, therefore, require face-to-face review. For patients passing through the pilot pathway, it is vital that we seek further in-depth feedback to explore their experience and whether our setup needs further modification moving forward.

Conclusions

Our proposed remote assessment pathway for new otology referrals appears to be acceptable to patients, provided there is no compromise in the standard of their care when compared with a traditional clinic review. Key areas that appear important to patients include reducing waiting times and ensuring adequate training of the remote assessment facilitator, and this needs to be considered during the ongoing development of the pathway. Further work is required to seek in-depth patient feedback once the pathway is established to ensure that the patient experience is optimised. These results further our understanding of remote assessment in otology from the patient perspective and may help to inform the development of such pathways outside of our centre.

Author contributions CM, JM and CC envisaged the study. CM devised the original study design with feedback from all authors. CM performed and transcribed the interviews with a sample transcribed by JM without reference to CM's transcription. CM wrote the first draft of the manuscript with critical edits from all authors. All authors take responsibility for the content and validity of the manuscript.

Funding No funding was received for this work.

Declarations

Conflict of interest Mr Chris Coulson is the CEO of endoscope-I Ltd, a developer of physical adaptors and smartphone applications for mobile endoscopic imaging.

References

1. NHS England (2021) Consultant-led Referral to Treatment Waiting Times Data 2021–22. <https://www.england.nhs.uk/statistics/statistical-work-areas/rtt-waiting-times/rtt-data-2021-22/>. Accessed 8 Nov 2021

2. Sargsyan N, Karunaratne D, Masani A et al (2021) ENT telephone clinics during the coronavirus pandemic: an analysis of 400 Telephone Consultations at a District General Hospital. *Ear Nose Throat J*. <https://doi.org/10.1177/01455613211028091>
3. Zammit M, Siau R, Williams C, Hussein A (2020) Patient satisfaction from ENT telephone consultations during the coronavirus disease 2019 pandemic. *J Laryngol Otol* 134:992–997. <https://doi.org/10.1017/S0022215120002480>
4. Hardman JC, Tikka T, Paleri V (2021) ENT UK, BAHNO and INTEGRATE (The UK ENT Trainee Research Network) Remote triage incorporating symptom-based risk stratification for suspected head and neck cancer referrals: a prospective population-based study. *Cancer*. <https://doi.org/10.1002/cncr.33800>
5. Metcalfe C, Muzaffar J, Orr L, Coulson C (2021) A systematic review of remote otological assessment using video-otoscopy over the past 10 years: reliability and applications. *Eur Arch Oto-Rhino-Laryngol Off J Eur Fed Oto-Rhino-Laryngol Soc EUFOS Affil Ger Soc Oto-Rhino-Laryngol Head Neck Surg*. <https://doi.org/10.1007/s00405-020-06596-2>
6. Metcalfe C, Dogan M, Glazzard N, Ross L, George A (2021) Introduction of a novel telescopic pathway to streamline two-week-wait suspected head and neck cancer referrals and improve efficiency. A prospective service evaluation. *Laryngoscope Investig Otolaryngol* 7(1):117–124. <https://doi.org/10.1002/lio2.721>
7. Seluakumaran K, Shaharudin MN (2021) Calibration and initial validation of a low-cost computer-based screening audiometer coupled to consumer insert phone-earmuff combination for boothless audiometry. *Int J Audiol*. <https://doi.org/10.1080/14992027.2021.1969455>
8. Swanepoel DW, Matthysen C, Eikelboom RH et al (2015) Pure-tone audiometry outside a sound booth using earphone attenuation, integrated noise monitoring, and automation. *Int J Audiol* 54:777–785. <https://doi.org/10.3109/14992027.2015.1072647>
9. Erlingsson C, Brysiewicz P (2017) A hands-on guide to doing content analysis. *Afr J Emerg Med* 7:93–99. <https://doi.org/10.1016/j.afjem.2017.08.001>
10. Clarke V, Braun V (2013) *Successful Qualitative Research: A Practical Guide for Beginners*
11. Fugard A, Potts H (2015) Supporting thinking on sample sizes for thematic analyses: a quantitative tool. *Int J Soc Res Methodol*. <https://doi.org/10.1080/13645579.2015.1005453>
12. Guest G, Bunce A, Johnson L (2006) How many interviews are enough?: an experiment with data saturation and variability. *Field Methods* 18:59–82. <https://doi.org/10.1177/1525822X05279903>
13. Neergaard MA, Olesen F, Andersen RS, Sondergaard J (2009) Qualitative description—the poor cousin of health research? *BMC Med Res Methodol* 9:52. <https://doi.org/10.1186/1471-2288-9-52>
14. Sandelowski M (2000) Whatever happened to qualitative description? *Res Nurs Health* 23:334–340. [https://doi.org/10.1002/1098-240x\(200008\)23:4%3c334::aid-nur9%3e3.0.co;2-g](https://doi.org/10.1002/1098-240x(200008)23:4%3c334::aid-nur9%3e3.0.co;2-g)
15. Bradshaw C, Atkinson S, Doody O (2017) Employing a qualitative description approach in health care research. *Glob Qual Nurs Res* 4:2333393617742282. <https://doi.org/10.1177/2333393617742282>
16. Hsieh H-F, Shannon SE (2005) Three approaches to qualitative content analysis. *Qual Health Res* 15:1277–1288. <https://doi.org/10.1177/1049732305276687>
17. Jones WS, Kaleida PH, Lopreiato JO (2004) Assessment of pediatric residents' otoscopic interpretive skills by videotaped examinations. *Ambul Pediatr Off J Ambul Pediatr Assoc* 4:162–165. <https://doi.org/10.1367/A03-017R1.1>
18. Erkkola-Anttinen N, Irjala H, Laine MK et al (2019) Smartphone otoscopy performed by parents. *Telemed J E-Health Off J Am Telemed Assoc* 25:477–484. <https://doi.org/10.1089/tmj.2018.0062>
19. NHS England Greener NHS » Delivering a net zero NHS. <https://www.england.nhs.uk/greenernhs/a-net-zero-nhs/>. Accessed 18 Oct 2021

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.