Med & Health Jan 2026; 21(1): 145-152 https://doi.org/10.17576/MH.2026.2101.07

ORIGINAL ARTICLE

A Preliminary Study to Investigate Students' and Staff Members' Satisfactions in Using Remote Hearing Aid Fine-tuning Service

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Received: 24 October 2024 / Accepted: 17 February 2025

ABSTRAK

Kajian ini bertujuan untuk meninjau tahap kepuasan pelajar dan pekerja dalam Program Audiologi, Universiti Kebangsaan Malaysia serta mendapatkan maklum balas mereka mengenai penggunaan perkhidmatan alat bantu pendengaran melalui kaedah jarak jauh. Enam orang pelajar audiologi (pengamal perkhidmatan) menerima latihan tentang cara menggunakan sistem jarak jauh tersebut. Setiap pelajar atau pengamal yang telah dilatih ditugaskan kepada seorang atau lebih pekerja (penerima perkhidmatan) yang direkrut untuk menerima perkhidmatan jarak jauh. Seramai sembilan orang pekerja bersetuju untuk menyertai kajian dan mereka diberi panduan untuk memainkan peranan sebagai 'pesakit' yang menerima perkhidmatan jarak jauh. Pengalaman dan kepuasan peserta menggunakan perkhidmaan jarak jauh diperolehi melalui soal-selidik. Hasil kajian menunjukkan penerima perkhidmatan mempunyai tahap kepuasan yang tinggi, dengan 77.8% melaporkan perkhidmatan sebagai sangat baik, manakala tahap kepuasan pengamal perkhidmatan adalah lebih rendah, dengan hanya 33.3% melaporkan perkhidmatan sebagai sangat baik. Secara keseluruhannya, pengguna berpuas hati dengan perkhidmatan jarak jauh yang digunakan untuk menyelaras tetapan alat bantu pendengaran dan berpendapat bahawa ia merupakan satu alternatif yang berpotensi untuk membawa kebaikan. Kajian ini telah membantu menyediakan panduan yang berguna untuk pengguna perkhidmatan tersebut.

Kata kunci: *Alat bantu pendengaran; audiologis; penyelarasan jarak jauh; teleaudiologi*

ABSTRACT

This study aimed to explore students' and staff's satisfaction levels in the Audiology Program of Universiti Kebangsaan Malaysia and to obtain their feedback on using remote hearing aid service. Six audiology students (service providers) were recruited to receive training on how to use the remote system. Each student was then assigned to one or more staff members (service recipients) recruited as recipients of the remote service. Nine staff members agreed to participate and were given instructions on playing the' patient' role. All the participants completed a survey measuring their satisfaction using the remote

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service. The results showed the recipients reported high satisfaction ratings, with 77.8% rating the service as excellent, while the providers provided lower satisfaction levels, with 33.3% rating it as excellent. In general, the participants were satisfied with the remote hearing aid fine-tuning service and regarded it as an alternative service that offered potential benefits. This study has provided valuable insight and helped develop useful guides for using the service.
Keywords: Audiologist; hearing aid; remote fine-tuning; teleaudiology

INTRODUCTION

Hearing loss is a significant global health concern, affecting communication, social interactions, and quality of life. According to the World Health Organisation (WHO 2024), over 1.5 billion people globally live with some degree of hearing loss, and this number is expected to rise as the population ages. Hearing aids are a primary intervention for individuals with hearing impairment, but their optimal performance often requires fine-tuning and adjustments tailored to their needs.

Traditionally, these adjustments have been made during in-person appointments. However, the COVID-19 pandemic disrupted face-to-face healthcare services, accelerating the adoption of telehealth, including teleaudiology (Quar et al. 2023). Teleaudiology encompasses a range of remote services, including hearing aid fine-tuning, which allows audiologists to adjust devices in real time without the need for the patient to be physically present (Campos et al. 2012; Novak et al. 2016; Rashid et al. 2019). Remote fine-tuning hearing aid offers several benefits for clinicians and patients. For clinicians, it allows for more flexible scheduling, increases patient follow-up rates, and improves patient outcomes (Zitelli 2022). For patients, the benefits include the convenience of adjustments from the comfort of their homes, potentially reducing travel time and expenses associated with in-person appointments.

Despite the increasing relevance of teleaudiology, its integration into audiology practice remains limited. Audiologists in Malaysia suggested incorporating remote hearing-aid programming into the audiology syllabus in universities. This approach will educate audiology students about remote service and enhance the practice in the future (Quar et al. 2024). The present study aimed to explore the satisfaction levels of audiology students and staff members in using the service and gather information and suggestions from the users regarding the remote service so that the results can be used to improve the service implementation.

MATERIALS AND METHODS

This study was conducted at the Audiology and Speech Sciences Clinic of Universiti Kebangsaan Malaysia (UKM). Ethical approval was obtained from the UKM Research Ethics Committee (UKM PPI/111/8/JEP-2024-336).

Participants

Six final-year audiology students (hereafter referred to as providers) with prior knowledge of hearing aid fine-tuning participated in the study alongside nine staff members (hereafter referred to as recipients) from Audiology Departments who acted as patients to simulate clinical practice. None of the participants had experience with remote hearing aid fine-tuning services. The recipients, aged 26 to 54 years with a mean of 38, included five individuals without audiology backgrounds, while the providers had a mean age of 24. Table 1 showed the demographic data of the providers and recipients.

Procedures

This study involved two main steps, which were training and implementation. Firstly, the providers underwent comprehensive training

TABLE 1: Demographic data of the participants

	Provider (n= 6)	Recipient (n=9)
Mean ± SD	23.8 years	38.1 years
Gender		
Male	-	2
Female	6	7
Race		
Malay	3	7
Chinese	3	2
Profession		
Audiologist	-	4
Non-Audiologist	-	5

sessions conducted by local product trainers for two hearing aid brands, Oticon and Phonak. The training covered the technical aspects of remote hearing aid fine-tuning, including software navigation, device pairing and troubleshooting common issues. This training aimed to equip providers with the necessary skills to deliver remote services effectively.

Secondly, the remote fine-tuning sessions were conducted using Oticon and Phonak hearing aids. The service providers were paired with recipients who acted as simulated patients. The sessions were held in separate rooms to simulate a real-world remote care environment, ensuring that providers experienced the full range of challenges associated with teleaudiology, such as maintaining a stable connection and communicating effectively with patients who were not physically present.

After each session, providers and recipients completed a structured questionnaire developed by Thrum et al. (2018). Their study used the questionnaire to investigate the satisfaction of clinicians and clients in a teleaudiology trial. For this study, the questionnaire was adapted, so the questions were specifically related to remote hearing aid fine-tuning and not teleaudiology as in its original version. The present questionnaire consisted of four parts i.e. (i) demographic information; (ii) satisfaction level with the remote service; (iii) comparison between face-to-face; and (iv) remote service, and participants' comments/suggestions. For the comparison question, the respondents were asked to compare their satisfaction with the hearing-aid service they have experienced in the typical face-to-face clinic to the remote hearing-aid service they had experienced in the present study. Four Likert-based questions were used to measure the participants' satisfaction level in experiencing the remote fine-tuning service or session. Responses were rated on a scale from 1 to 4, where 1 represented 'Poor', 2 'Fair', 3 'Good', and 4 'Excellent'. In another section, four Likert scale questions were utilised for the participants to provide their views on comparing remote and face-to-face clinical services. The scale ranged from +3 ('Greatly increased') to -3 ('Greatly decreased'), indicating the extent of change in their perceived experiences. The last section of the questionnaire consisted of two open-ended questions to address the sustainability of the remote fine-tuning service.

Data Analysis

Descriptive analysis was used to examine participants' satisfaction with the remote hearing-aid service based on the ratings provided by the subjects. Satisfaction levels across various components of the remote service were compared between providers and recipients. In addition, an independent t-test was conducted to investigate differences in satisfaction between providers and recipients.

RESULTS

As previously mentioned, the structured questionnaire was analysed using descriptive statistics to assess participants' responses. The analysis focused on two main areas: satisfaction levels among providers and recipients of the remote fine-tuning service. Additionally, the questionnaire compared the remote fine-tuning sessions and traditional face-to-face service experiences to gauge any differences in perception between the two methods.

Providers and Recipients Satisfaction

Figure 1 compared satisfaction levels between providers and recipients following remote fine-tuning service sessions, highlighting seven key areas i.e. communication (Question 1), voice quality (Question 2), visual quality (Question 3), remote fine-tuning services (Question 4), comfort and confidence (Question 5), session duration (Question 6) and overall satisfaction (Question 7). Overall, recipients' ratings for the remote session were very positive, with 77.8% indicating 'Excellent' satisfaction levels, while 33.3% of providers indicated 'Excellent' satisfaction on the remote session. More recipients consistently rated their experiences as 'Excellent' across most categories than providers. For example, in communication, eight recipients rated the service as 'Excellent' compared to only one provider. Similarly, seven recipients rated the experience highly in the remote fine-tuning services category, whereas only three providers gave the same rating. Finally, for voice and visual, more providers had an 'Excellent' experience than recipients.

The discrepancy of ratings explained above could imply that providers encountered more technical challenges or had a more critical perspective on service delivery. In contrast, recipients seemed to have a smoother experience in these areas, focusing more on the service results. Additionally, when it came to comfort and confidence during the sessions, six recipients expressed a high level of comfort, while only two providers felt the same. This disparity could be attributed to recipients being more focused on the benefits they received from the session, while providers were more attuned to the operational aspects. This suggested that recipients were more satisfied with the remote service's overall effectiveness and ease than those delivering it.

Despite the differences in satisfaction levels, the providers and recipients overall showed good satisfaction levels, with most of them rating the service as 'Excellent' or 'Good' and none rating the service as 'Poor'. The independent t-test revealed no significant differences in satisfaction between the providers and recipients in all the investigated areas ($p > 0.05$). The participants commented positively about time effectiveness, convenience and valuable skills to develop when considering future trends. On the other hand, providers identified some areas for improvement, particularly in technical aspects such as voice and visual quality. These findings suggest that while the remote fine-tuning service was adequate

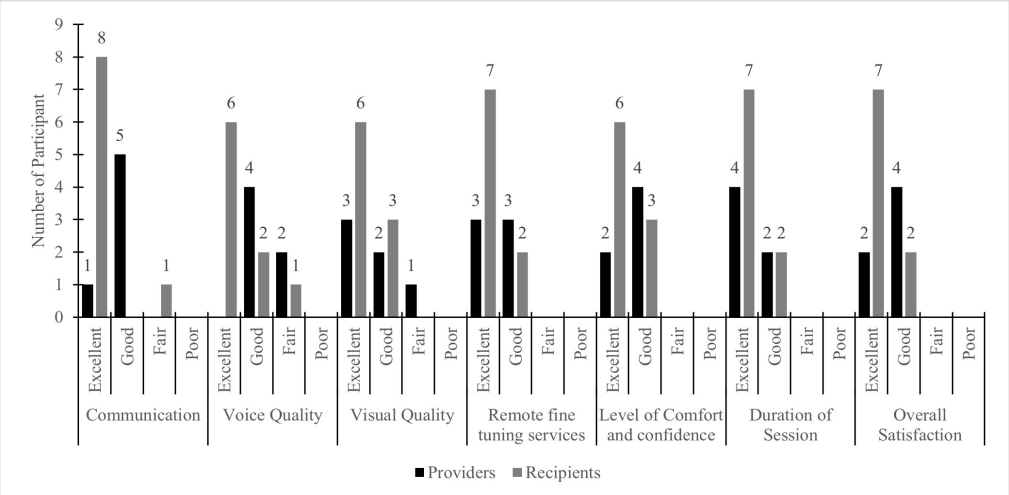

FIGURE 1: Satisfaction scores among providers and recipients

and well-received, further enhancements to the technical delivery aspects could improve the provider experience, aligning both groups' satisfaction levels more closely.

Comparison with Face-to-Face Approach

Figure 2 showed how the providers and recipients would compare the remote hearing aid fine-tuning service to the face-to-face clinical sessions they had experienced before. It covered four critical areas: the overall quality of care in audiology, the quality of interaction between the recipient and the provider, the ability to arrange urgent appointments promptly and the necessity for technological troubleshooting. These categories highlighted the differences in satisfaction between providers and recipients, showcasing how each group experiences and evaluation of the remote service.

Regarding the quality of care provided, most providers (n=5) viewed the remote service as an enhancement, reporting noticeable improvements it can offer compared to face-to-face clinics. Recipients, on the other hand, showed a more mixed reaction, with some noting improvements while others felt there was little change that the remote service could offer compared to the face-to-face clinic. The difference in perceptions might stem from the providers focusing on the technical execution of care while recipients emphasise the outcomes and personal experience more.

For quality of interaction, all the providers (n=6) generally reported that remote service could further improve this aspect. On the other hand, recipients displayed a more varied perspective, with some feeling the interaction could be better with remote service while others felt the quality of interaction can decrease with remote service compared to face-to-face service. This disparity could be due to the different expectations between providers focused on delivering services and recipients who might value personal connection and comfort in their interactions. Additionally, in terms of scheduling urgent appointments, providers were more optimistic about the increased flexibility of the remote service. The same results applied to the recipient except for one recipient perceiving no substantial benefit from the remote service. Finally, regarding the need for technological troubleshooting, both groups agreed that the technical challenges would be higher for remote service than face-to-face service.

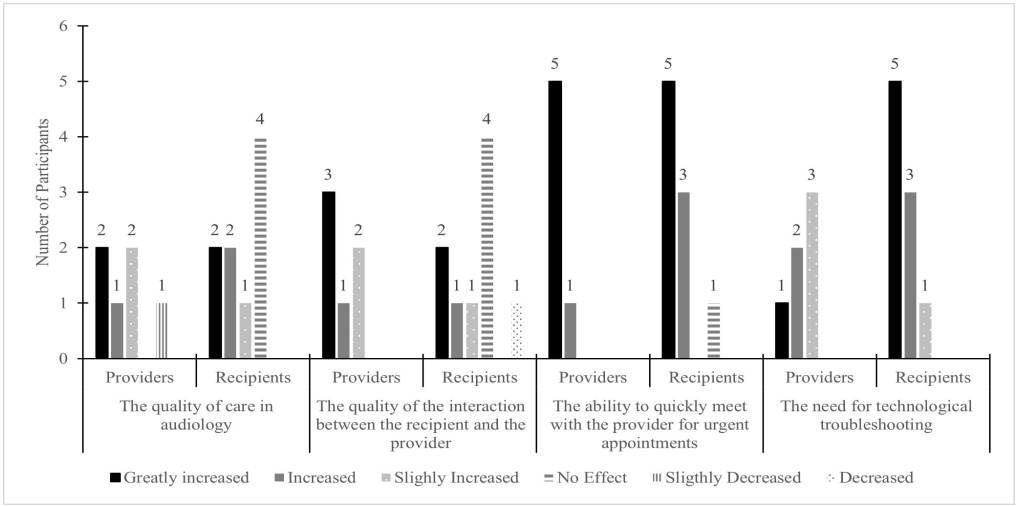

FIGURE 2: Comparison scores of remote fine-tuning and face-to-face approach

DISCUSSION

The findings demonstrate high satisfaction levels among providers and recipients. However, it also reveals that providers consistently reported lower satisfaction than recipients from their experiences with the remote hearing aid service. This aligns with the findings from Thrum et al. (2018), which documented a similar pattern of mixed responses from clinicians (providers) and high satisfaction from patients (recipients) in the teleaudiology service. Both sets of research underscore a prevailing issue: while patients often appreciate the convenience of remote services, clinicians express concerns over the ability to maintain quality care from a distance. This hesitancy is echoed in findings showing providers often doubt their capability to deliver high-quality care remotely, a sentiment Thrum et al. (2018) corroborated. The reluctance largely stems from an unfamiliarity with telehealth technologies and a perceived lack of preparedness, which are substantial barriers to satisfaction. Additionally, technical issues such as connectivity problems and the complexities of navigating remote fine-tuning platforms exacerbate clinicians' frustrations and impact their overall job satisfaction. Nonetheless, other studies, like those by Saunders et al. (2012), suggest clinicians' confidence and satisfaction with teleaudiology can improve significantly with proper training and experience. These initiatives should cover technical skills and clinical practices to optimise the efficacy of remote care. Moreover, investing in a robust infrastructure to minimise technical disruptions and formulating clear, standardised policies for remote services can further solidify the framework of teleaudiology, enhancing service quality and consistency for providers and recipients.

Several challenges emerged during this study, most related to technological barriers. This includes issues with the requirement to have good and stable internet connectivity during remote sessions, which is crucial for providers and recipients, the audio and video quality were perceived as moderately good by some participants and the initial challenges faced by some participants in navigating the manufacturer fitting software and the remote applications. These issues were consistent with Kochkin (2005) and Zitelli (2022) findings. Furthermore, the diversity in hearing aid fitting software and the specific procedures required for remote hearing aid fine-tuning added complexity. Audiologists needed to become proficient with multiple systems, increasing their workload and reducing their confidence. Programming features such as feedback tests and detailed audiological assessments were also limited in the remote environment, preventing comprehensive care delivery.

This study faced several limitations. One fundamental limitation was the small sample size, which affected the study's generalisability and reliability. A larger sample size would reduce the margin of error, increase statistical power, and allow for more robust interpretations. Additionally, the recipients in this study were not actual patients with hearing loss, which raises questions about whether the same results would apply to actual patients. Therefore, a more extensive trial involving actual patients should be conducted over an extended period. Another limitation is that the study was conducted in a controlled environment, which does not fully reflect the variability or challenges encountered in real-world settings. Future studies should explore how remote services perform over longer distances and in more diverse environments for a broader understanding. Moreover, the study only used two hearing aid brands (Oticon and Phonak). For remote fine-tuning services to be widely applicable, systems for other hearing aid brands should be integrated before offering the service to the public. Lastly, provider-related factors such as their experience and attitudes toward remote technology likely influenced the outcomes. Providers with more proficiency may have faced fewer technical challenges and reported higher satisfaction. Hence, future research should also focus on training and supporting providers to improve their confidence and competence in delivering remote services.

Lesson Learned: General Guidelines for Remote Hearing Aid Adjustments

Implementing remote hearing aid adjustments has given audiology students valuable insights and lessons. One of the most critical aspects of this process is patient education. Many individuals, particularly older adults, may encounter difficulties navigating new technology. Consequently, comprehensive preparation and clear guidance can help prevent technical challenges during remote sessions, ensuring that patients feel more at ease and capable of engaging with their hearing aids.

Furthermore, maintaining clear and consistent communication throughout the entire process is essential. Remote care necessitates an elevated level of interaction to ensure that patients understand not only the adjustments being made but also the operational aspects of their hearing aids. This communication can include step-by-step explanations and visual aids, fostering a supportive environment where patients feel encouraged to ask questions and seek clarification.

Moreover, while remote care offers a powerful solution for many patients, it is essential to recognise that it should not entirely replace in-person consultations. In certain situations, patients still need the personal touch of face-to-face appointments. Audiologists or audiology students must carefully assess each case to determine when remote care is appropriate and when an in-person visit is warranted. This discerning approach helps to ensure that patients receive the most effective and suitable care.

To support audiologists and audiology students in this endeavour, the following general guidelines have been created based on this study:

(i) Ensure compatibility

Before initiating remote adjustments, always verify that the patient's hearing aids and mobile devices are compatible with the manufacturer's remote adjustment platform. Proactively addressing compatibility issues can prevent frustration and ensure a smoother, more effective session. This includes guiding patients on how to check compatibility and troubleshoot any initial concerns.

(ii) Conduct an initial assessment

Evaluating whether the patient is a good candidate for remote care is crucial. Factors such as the severity of hearing loss, the complexity of adjustments needed and the patient's comfort level with technology should all be considered. Patients with severe hearing impairments or those requiring intricate modifications may still benefit from in-person.

(iii) Prepare the patient

Provide clear and detailed instructions for setting up their devices and using the associated app before the scheduled session. This preparation can involve sending instructional videos, written guides or even conducting a preliminary practice session. Patients who feel confident and well-prepared are significantly more likely to experience successful outcomes during remote adjustments.

(iv) Customise settings based on patient needs

Tailoring the remote adjustment process to address individual patient needs is fundamental. This can include adjustments to sound quality, specific tinnitus management techniques and environmental noise reduction strategies. By personalising the adjustments, audiologists can ensure that patients receive the most relevant and practical support for their unique hearing situations.

(v) Follow-up

Regular follow-up ensures that remote adjustments are effective and satisfactory. Schedule periodic check-ins to monitor the patient's progress, address any concerns and make further adjustments as needed. These

follow-ups reinforce the support available to patients and demonstrate a commitment to their ongoing hearing health, fostering a positive and trusting relationship.

By following these guidelines, audiologists or audiology students can enhance the effectiveness of remote hearing aid adjustments and provide high-quality care that meets the needs of their patients, ultimately improving their overall hearing experiences.

CONCLUSION

This study offers valuable insights into the satisfaction levels of audiology students as providers and staff members as recipients using remote hearing aid fine-tuning systems. Both groups rated their experiences from good to excellent, indicating a positive reception of the service. Audiology students also recognised the importance of integrating remote hearing aid fine-tuning into their curriculum to better prepare for the future of audiological care. Further research involving practising audiologists and actual patients is essential to assess their experiences and satisfaction with remote services. Such studies would help to equip the profession for broader adoption of this technology in the coming years.

Author contributions: All authors contributed to the conception, design, material preparation, data collection and analysis of the study. Writing-original draft, review and editing: TKQ, JYS, MFNR. All authors have approved the final manuscript.

Conflict of interest: The authors declare no conflicts of interest.

Funding: Not applicable.

Ethical statement: This study was conducted in accordance with the ethical standards of the institutional research committee (JEP-2024-336).

Acknowledgement: The authors would like to express their sincere gratitude to all participants who generously took part in the remote session, as their valuable insights were instrumental in shaping this research. The authors would also like to extend their thanks to Mr. Patrick Tan and Miss. Tan Kia Ying for providing training and guidance to the author.

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