Critical Comparative Analysis of International Tele-Audiology Guidelines

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ABSTRACT

Introduction: During the COVID-19 pandemic, we saw a growing need for telehealth services, including tele-audiology. Tele-audiology provides opportunities for patients with geographical or equitable barriers, mobility, or financial issues, to receive care that they would otherwise not be able to. Despite an increase of tele-audiology services, only a few countries offer professional guidance.

Objective: In this article, we provide an analysis of existing tele-audiology guidelines, identifying areas in which they share agreement or disagreement. This analysis will allow for future recommendations to be developed, as well as to identify potential areas of improvement in existing guidelines.

Materials and methods: To provide a comprehensive comparison of available tele-audiology guidelines, a qualitative comparative analysis was conducted. Guidelines were selected to ensure they represent different socio-economic and cultural backgrounds, and fit the inclusion criteria of the study. After analysing 10 guidelines, five were included in the final analysis: Australia, Britain, India, Malaysia and the USA. Points of convergence and disagreement were identified among three themes: practice operation, clinical guidance, and technical operation. Recommendations for future iterations and development of tele-audiology guidelines were offered from this analysis.

Results: Convergent criteria identified in practice operation included: patient and practitioner site candidacy, use of multidisciplinary teams, and data privacy and protection. In clinical guidance: informed consent, patient eligibility, professional and quality standards of care, practice policy, patient and family-centred care, and limitations to tele-audiology. All criteria in technical operations had convergence. Criteria with disagreement in practice operation included administrative aspects and insurance guidance. For clinical guidance, the only disagreement present was for malpractice and misconduct.

Conclusion: Notable consensus among guidelines was observed, however continuous evaluation and reiteration of these documents are recommended. Cultural and diversity influences should also be evaluated by each country. Additionally, guidelines should consider providing protocols on handling emergency medical or non-medical situations during a tele-audiology consultation, and requiring professional training and certification for providing these services. These recommendations will help to strengthen the growing need of tele-audiology guidelines, and therefore also encourage practitioners to adopt these services in their everyday practice to promote equitable access to care.

Keywords: *tele-audiology, guidelines, telecommunication, clinical audiology, technology, remote care.*

1. INTRODUCTION

1.1 Background

Amid the COVID-19 pandemic, significant advancements have been witnessed within healthcare, particularly surrounding corporate telecommunications, and artificial intelligence. The telehealth movement, which aimed to leverage tele-communications technology to overcome barriers in healthcare access and extend healthcare services beyond traditional in-person consultations, emerged as a particularly significant topic.

While the concept of telehealth has been around for decades (Institute of Medicine (IOM), 2012), during COVID-19 there was an increased urgency to find solutions in delivering health care in extreme situations. There are many ancillaries of telehealth services, including tele-audiology, which is the focus of this current article.

Tele-audiology was first coined in 1999 by Dr. Gregg Givens, who went on to provide the first tele-audiology service in 2000 (Kim et al., 2021). While technology has shown to improve workflow and efficiency in healthcare settings, as well as to reduce healthcare costs (Yeow & Goh, 2015), it remains largely under-utilised as a service practice in audiology.

Following the COVID-19 pandemic, audiologists largely shared a positive outlook towards the use of tele-audiology services, however identified barriers of protocol & training to be a current issue (Eikelboom et al., 2022). Therefore, in this article, we analyse existing tele-audiology guidelines to understand the areas of consensus and disagreement in policy guidelines, which could encourage more practitioners around the world to engage in tele-audiology.

1.2 What is tele-audiology?

Tele-audiology can be defined as the practice of providing audiological services remotely, using telecommunications technology (Bennett et al., 2020). This includes the assessment, diagnosis, and management of hearing and balance disorders conducted through telecommunications methods such as video conferencing, telephone consultations, and remote monitoring.

Tele-audiology allows audiologists to reach patients who may have limited access to traditional in-person services due to geographical barriers, equitable access to healthcare services, mobility issues, as well as costs associated with travel (D'Onofrio & Zeng, 2022; Lin & Chen, 2024). It can encompass a range of services including hearing evaluations, hearing aid fittings and adjustments, counselling, and rehabilitation, all conducted remotely using technology (Dillon et al., 2016; Smits et al., 2006).

A limitation to this is tympanometry, as they are not easily connectable for remote computing, or for taking ear impressions. Tele-audiology is not a separate audiology speciality, but rather a tool which can be utilised by practitioners to extend traditional audiological services outside of a typical clinic-based environment.

It enables consumer engagement and empowerment through digital decision-making, and showing different approaches to managing healthcare, therefore encouraging patients to not feel as though having a hearing problem is a limiting disability or impairment with larger effects on their

quality of life (D'Onofrio & Zeng, 2022; Murdin et al., 2022).

1.3 Importance of tele-audiology

Tele-audiology plays a pivotal role in improving access to audiological services for patients, caregivers, and healthcare professionals alike. For patients, especially those in remote or underserved areas, tele-audiology eliminates geographical barriers, allowing them to receive timely assessments, diagnoses, and interventions for hearing and balance disorders without the need for extensive travel (Bush et al., 2016; D'Onofrio & Zeng, 2022). This accessibility not only enhances the overall patient experience, but also facilitates early detection and management of auditory conditions, leading to better health outcomes (Chong-White et al., 2023; Kim et al., 2021; Swanepoel et al., 2010).

Caregivers benefit from the convenience of remote consultations, which enable them to participate in appointments and support their loved ones without logistical challenges (DiFabio et al., 2023; Jorgensen et al., 2019).

Healthcare professionals, on the other hand, gain flexibility in service delivery, as tele-audiology enables them to reach a broader patient population, streamline workflow efficiencies, and collaborate with colleagues across distances (Eikelboom et al., 2022; Kim et al., 2021; Singh et al., 2014).

Additionally, tele-audiology enhances continuity of care, particularly during crises such as the COVID-19 pandemic, by ensuring uninterrupted access to audiological services while minimising the risk of viral transmission (Aggarwal et al., 2022; Chong-White et al., 2023; Eikelboom et al., 2022). Overall, tele-audiology serves as a transformative tool that empowers patients, supports caregivers, and enhances the effectiveness and efficiency of audiological practice.

1.4 Delivery of tele-audiology

There are different modalities in which tele-audiology can be delivered. One common approach involves real-time video conferencing, where patients and audiologists interact virtually, allowing for comprehensive assessments, counselling, and treatment planning.

Another method involves remote monitoring devices that enable patients to perform self-administered (or with the help of a caregiver or family member) hearing tests or adjust hearing aid settings under the guidance of audiologists from a distance.

Additionally, tele-audiology may entail the use of secure messaging platforms or telephone consultations for follow-up appointments, discussion of results, and ongoing support.

Tele-audiology may also take place in real-time (synchronous), with a time delay (asynchronous), or in hybrid formats (Ravi et al., 2018).

In asynchronous models, patients pay be required to fill out online assessments, questionnaires or surveys, with the audiologists reviewing the results and providing feedback asynchronously.

Furthermore, tele-audiology can take place in various settings, for instance at the patient's home or workplace, nursing or residential homes, hospitals, community centres, or educational settings. Tele-audiology enables services to be provided to patients in exceptional environments, such as

remote and rural areas, institutions with limited accessibility, school districts, and simply during extreme weather events where accessibility, in general for patients, might be limited (Cason & Cohn, 2014).

Essentially, services can be provided anywhere the patient is able to obtain stable internet connection and has access to the tele-audiology device or mode, and is able to maintain privacy for the session. Ultimately, the versatility of tele-audiology enables customised care delivery that is tailored to the unique needs and preferences of patients.

1.5 Importance of tele-audiology guidance

In order to regulate tele-audiology and ensure that all stakeholders are able to receive the service in an ethical and efficient manner, there is an urgency of guidelines and protocols. Previous research has shown audiologists supporting legal guidelines for conducting tele-audiology, where these guidelines reflect on privacy and security, and requiring standard protocols for documenting such services (Eikelboom et al., 2022; Mohan et al., 2017).

Tele-audiology guidelines are instrumental in providing standardised protocols and best practices for remote audiological care delivery for different regions around the world. Having such guidelines can ensure consistency, quality, and safety in patient assessment, diagnosis, and treatment across diverse healthcare settings. Moreover, they address regulatory, ethical and training considerations, facilitating interprofessional collaboration and education within the healthcare community.

Given their pivotal role, the current lack of such guidelines are difficult for practitioners to utilise such technological advancements without the proper procedures.

2. OBJECTIVES

Therefore, this study aims to identify and evaluate the most effective tele-audiology guidelines from various international audiology organisations, professional societies and also government health departments.

Through this study, we hope to expand the scope and reach of tele-audiology services, by analysing the key similarities, differences and providing recommendations for countries and their audiology organisations which may not yet have such guidelines.

By conducting a review and comparative analysis of these guidelines, the objective is to elucidate the key similarities and differences in tele-audiology practices worldwide. Through this analysis, we seek to provide valuable insights and recommendations for enhancing the scope, reach, and quality of tele-audiology services on a global scale.

By identifying the areas of consensus and disagreements, as well as potential gaps in guidance that currently may be present in guidelines, we intend to offer an opportunity for guideline reiterations or for countries which currently do not have such guidances in place, on important criteria which must be considered.

Throughout this paper, tele-audiology is used as an umbrella term encompassing various remote or online audiology practices, including telehealth, tele-practice or telemedicine, specifically related to audiological care.

(See Figure 1.)

Guidelines available and selected for analysis may also use these terms interchangeably when referring to remote or online audiology practices, and therefore for the purpose of this research, they have collectively been referred to as tele-audiology in this paper.

3. MATERIALS AND METHODS

In this study, we aim to conduct a comprehensive comparison of tele-audiology guidelines from international countries and their national audiology organisations.

Tele-audiology, as a rapidly evolving field within audiological practice, has seen increasing adoption, particularly in response to challenges posed by factors such as the COVID-19 pandemic and the growing need for remote healthcare delivery.

Understanding the landscape of available tele-audiology guidelines is crucial for elucidating points of consensus, identifying areas of disagreements, and ultimately offering recommendations for countries that may not yet have established guidelines in this domain.

A qualitative comparative analysis was used as the methodology to conduct this analysis (Esser & Vliegenthart, 2017), which is an analytical approach for advancing implementation sciences (Kane et al., 2014). In order to represent different areas of the world, we tried to identify guidelines from different continents, ensuring an equal representation of different regions and healthcare systems. During the selection of guidelines, we also made sure they were (a.) written by governmental health departments, professional audiological organisations, or international healthcare bodies, and recognised at a policy level, (b.) easily accessible, and (c.) written in English.

10 countries and their guidelines were identified, the final selection of guidelines used for analysis is outlined in Table 1. Through meticulous review and analysis, we aim to extract the key elements of these guidelines, identify points of convergence and disagreements, and offer our recommendations for future iterations or development of tele-audiology guidelines.

We seek to discern overarching trends as well as variations across different regions, and healthcare systems. Our guideline recommendations are for policymakers, healthcare practitioners and stakeholders in countries where tele-audiology guidelines may not yet be established, and contribute to the advancement and standardisation of tele-audiology practices globally, thereby enhancing access to quality audiological care across diverse geographical and socio-economical contexts.

4. RESULTS

In this section, we will present the findings of our comparative analysis of tele-audiology guidelines from selected countries (Table 1), through the key guidance themes of: practice operation, clinical and technical operation. Each theme also provides a clarification of its presented criteria.

(See Table 1.)

4.1 Practice operation

The first theme primarily focuses on the services prior to audiology consultation, on

creating an environment and team most suitable for providing the tele-audiology. Particular guidance within this theme can be seen in the environment set-up, administrative aspects and also the inclusion of multidisciplinary teams. Results are presented in Table 2.

(See Table 2.)

Practitioner setting requirement and patient site candidacy can be understood as setting up the environment for the tele-audiology consultation, for both the practitioner and the patient. Multidisciplinary teams refer to using collaborative team settings for the consultation, such as caregivers, family members, translator services, or other allied health professionals. Administrative aspects can be understood as the processes which may occur prior or post tele-audiology consultancy, such as organising or confirming appointments, documenting and reporting the consultation, providing the patient with appropriate reports or invoices, handling payments, etc. Data privacy and protection includes protocols on handling sensitive information and patient confidentiality. Criterion of insurance includes information and guidance regarding reimbursements through insurance or government health systems.

4.2 Clinical guidance

The second theme focuses on more clinical guidance for practitioners providing tele-audiology services. We can see guidance on aspects of patient selection and consent processes, ensuring quality standards and practice policies, as well as on perspectives of delivering care. Countries also provided guidance on addressing the limitations of tele-audiology, misconduct and malpractice. Results are presented in Table 3.

Informed consent and patient selection refers to protocols on obtaining consent from the patient prior to the consultancy and also determining their eligibility for receiving tele-audiology services. Standard of quality, professional standards of care and practice policies refer to guidance on clinical operational regulations as mandated by governing bodies such as professional audiology organisations or government departments, which have been developed based on evidence-based practice and expert consultation. Patient and family-centred care refers to guidance which prioritise the needs, view, values and preferences of patients and their family-members over the needs of audiology. Criterion on tele-audiology limitations includes guidance which identify the audiological services that can and cannot be provided remotely. Guidance on misconduct and malpractice highlights the importance of practitioners to provide services according to the legal and professional standards of their countries.

(See Table 3.)

4.3 Technical operation

The third theme focuses on technology requirements, recommendations and technical audiology test considerations. This includes specific guidance on the recommendations for devices and conferencing platforms, audiological equipment, as well as on the methods of delivery and its accessibility. Results are presented in Table 4.

Device recommendations and audiology test equipment include an outline of devices that may be utilised by practitioners for providing tele-audiology, such as tablets, phones, laptops or desktop monitors, different types of cameras etc., and also specific

audiological devices that may be connected for providing remote care services. Guidance on telecommunication platforms is expected to provide a list of different software that may be used during the consultancy (i.e., video conferencing through Skype, internal software, zoom, hearing aid apps, etc.). Connectivity guidance normally provides best options for ensuring stable internet connections depending on the patient's environment or in relation to connecting devices, it may also include guidance on how to resolve troubleshooting issues that may arise due to internet connectivity or technology. Guidance on accessibility of materials and tools is an important guidance for individuals with an impairment (hearing, or speaking, or visual), and provides protocols for ensuring that materials used in tele-audiology are easily and readily available to patients and their family-members in a format that they can easily access them. This includes any hearing aid apps that may need to be downloaded prior to the consultation to ensure efficiency and identify any technical issues that the patient or their family might already face. Patients may also be required to have certain test equipment for the appointment, and therefore guidance should also provide a protocol on their distribution, connections, and guides for the users. Guidance on the methods of tele-audiology refers to whether it should be conducted in synchronous, asynchronous, or hybrid formats.

(See Table 4.)

5. Discussion

In this section, we will discuss the main findings of the three identified guidance themes: practice operation (Table 2), clinical (Table 3) and technical operation (Table 4). The main results will be reported as areas of convergence and disagreements, where convergence is determined by three (or more) countries sharing guidance on a particular criterion – not including those countries which only recognise a criterion but don't offer guidance on it. After this analysis, we also provide recommendations for future iterations of tele-audiology guidelines, or for those countries and audiology organisations which may currently not have such guidance or protocols available.

5.1 Areas of convergence

In our analysis, we noticed that most of the identified tele-audiology guidelines shared more areas of convergence, or similarities, than disagreements. This section will outline these similarities, and present a discussion on their implications. Having a high rate of convergence among guidelines already displays some level of consistency, clarity and confidence in remote audiological care delivery, thereby promoting effective implementation, seamless collaboration, and improved access to high-quality services for patients globally.

In the theme of practice operation, convergence was identified for criteria on identifying correct consultancy site (for both practitioners and patients), the use of multidisciplinary teams, and also for data privacy and protection. All guidelines provided protocols for identifying and correctly setting up the environments of the practitioner and patient for the tele-audiology consultancy. Having such guidance ensures optimised communication throughout the appointment, as well as privacy, technical stability, patient comfort,

safety and accessibility, which ultimately enhances the quality and effectiveness of remote audiological care delivery. Guidance on using multidisciplinary teams was presented by AUS, IND and USA, and briefly recognised by MYS, and was shown to promote comprehensive care, holistic approaches, coordination of care, resource optimisation, and eventually, better patient outcomes. Similarly, guidance on data protection and privacy was available in all analysed countries, again highlighting the importance of safeguarding the patient's confidentiality when conducted through online platforms, and a compliance to regulatory, risk and ethical considerations.

Within clinical guidance, convergence could be seen for all criteria except misconduct and malpractice. Here, all guidelines presented protocols for informed consent, patient selection, standard of quality/ quality assurance, and professional standards of care. AUS, UK and MYS also provided guidance on practice policies (which was recognised by USA however no concrete guidance provided). AUS, MYS and USA provided guidance for patient and family centred-care, while UK only acknowledged its importance. Limitations of tele-audiology were only detailed in AUS, UK and USA, and briefly mentioned in IND and MYS. Therefore, we can see a high level of coherence for criterion relating to clinical protocols, and a growing consensus for aspects of practice policies and limitations, as well as the promotion of care delivery through targeting the needs of patients and their families. Clinical protocols play a vital role in promoting quality, safety, efficiency, and accountability in tele-audiology and are essential for delivering optimal care to patients. These protocols should also be constantly reviewed to ensure constant quality improvement, thus providing a framework for monitoring, evaluating and optimising tele-audiology services based on feedback, outcomes data, and emerging best practice. Practice policies can also help to ensure standardised delivery of care, making sure all patients receive the same standard of care across different settings and practitioners. These practice policies should be developed based on regulatory requirements and industry standards in order to reduce legal risks or data breaches to safeguard patient safety and confidentiality.

Countries which only mention these criteria without providing concrete guidance on their implementation may risk the potential of having several implications such as a lack of clarity (leading to ambiguity and uncertainty among practitioners), potential variability in practice (leading to inconsistencies in care delivery), compliance challenges (leading to legal and regulatory risks from a lack of industry standards), and also missed opportunities for continuous improvement and innovation in tele-audiology practice.

In technical operation guidance, all guidelines presented protocols for selection of telecommunications platforms and accessibility of materials and tools. Device recommendations were provided by all countries except AUS (which only briefly mentioned it without providing concrete guidance), and also for selecting the method of tele-audiology (i.e., synchronous, asynchronous, or hybrid) except for UK. Guidance on connectivity was explicitly mentioned in UK, IND, MYS and USA, and guidance on audiology test equipment mentioned by AUS, IND and USA, and again only recognised by UK. In summary, convergence on technical operation guidelines in tele-audiology is essential for

promoting consistency, quality, accessibility and compliance in remote audiological care delivery, ultimately enhancing the overall effectiveness of tele-audiology services. Additionally, for practitioners, having such technical guidance also helps to ensure that any technical issues can be solved efficiently and allow for them to focus more on the care which needs to be provided to the patient.

5.2 Areas of disagreement

The analysis revealed fewer areas of disagreement among selected tele-audiology guidelines, suggesting a growing consensus on best practices and standards in remote audiological care delivery, which bodes well for the development of cohesive and effective tele-audiology services worldwide.

Within practice operation guidance, a few disagreements could be seen for criteria on administration and insurance coverage. Administrative guidance can include details on invoicing, sending reports, setting up appointments, etc. and were only offered by IND and recognised by USA but did not offer any guidance. Having clear and simple outlines of correct and ethical administrative processes can streamline tele-audiology services for not only the patient, but also the practitioner and practice. Clear protocols in these areas help streamline workflow, minimise errors, and enhance the overall service delivery. Similarly, guidance on insurance coverage could be an important factor of consideration for patient's when they may decide for in-person consultancy or tele-audiology, however, guidance was only available from AUS and USA. Such guidance can be essential to ensure that patients have access to tele-audiology services without financial barriers, or having better understanding of the reimbursement systems available to them. Having clear guidelines regarding insurance reimbursement, or by a country's healthcare system, can help patients to understand their coverage options and facilitate timely payment to healthcare providers, thereby supporting sustainable tele-audiology practices and equitable access to care.

Under clinical guidance, disagreement could only be seen for misconduct and malpractice – which was only present in IND guidelines, and mentioned but not concretely provided in MYS and USA guidelines. Having such guidance is very crucial for upholding ethical standards, protecting patient's safety, and also for maintaining trust in healthcare delivery. Clear protocols help practitioners understand their ethical responsibilities and the consequences of misconduct, thus minimising the risk of malpractice incidents and elder abuse. In the context of tele-audiology, where interactions occur remotely and may involve technological complexities, guidance on misconduct ensures that practitioners adhere to professional conduct standards. Moreover, clear guidelines on addressing misconduct and malpractice provide patients with recourse in case of unethical behaviour or adverse outcomes, thereby safeguarding their rights and well-being.

5.3 Recommendations for future guidelines

It is recommended for all countries to firstly consider the cultural and diversity factors which may influence behaviours of all stakeholders (i.e., patients, their family members, practitioners). In crafting these professional guidelines, it would prove advantageous to involve advocates and representatives of the individuals whom these guidelines affect. Since every country

has their own rules and regulations for practice, it would not be possible to provide a universal tele-audiology guidance, and therefore such considerations should also be included as part of the guideline formation (Cason & Cohn, 2014). However, this section presents what guidelines could consider implementing, according to their own context and reflective of the standards of individual governing bodies.

The criteria presented in all three themes (Tables 2-4) provide a strong foundation for countries who are looking to develop their own tele-audiology guidelines and currently don't have any such guidance. In formulating these future guidelines, it is imperative to prioritise inclusivity, collaboration, and adaptability. Recommendations include fostering interdisciplinary collaboration among healthcare professionals, policymakers, patients, and advocacy groups to ensure that guidelines reflect diverse perspectives and address the evolving needs of patients. Furthermore, guidelines should prioritise patient-centred care, emphasising the importance of involving patients and their families in decision-making processes and tailoring tele-audiology services to meet individual preferences and needs. Additionally, future guidelines should provide clear guidance on emerging technologies, data protection, and privacy considerations, while also ensuring practitioners are provided with updated technology lists and options for their tele-audiology services. Moreover, guidelines should emphasise the importance of continuous evaluation and refinement to keep pace with advancements in telecommunication technologies and changes in healthcare delivery models. Ensuring there is guidance available for misconduct and malpractice is therefore also essential to promote accountability, maintain integrity of tele-audiology services, and ensure optimal patient care.

There were also a few criteria missing in analysed guidelines, that could further support strengthening tele-audiology guidance further. For instance, guidelines should consider protocols for handling emergency situations that may arise during the tele-audiology service. These protocols should outline clear procedures for assessing the urgency of the situation, providing appropriate immediate care or referrals, and coordinating with emergency medical services if necessary. Additionally, guidelines should also consider requiring practitioners who provide tele-audiology services to undergo proper training (Bennett et al., 2020). For instance, by introducing a tele-audiology certification scheme as part of ongoing professional development, practitioners can ensure they remain updated with new protocols, regulations, methods or technologies that would enhance their remote audiological care delivery. By incorporating these recommendations, future guidelines can facilitate the delivery of high-quality, accessible, and patient-centred tele-audiology services, ultimately improving outcomes and experiences for individuals with hearing disorders.

6. Conclusion

In summary, this article conducted a comparative analysis on international tele-audiology guidelines that were accessible and met the eligibility criteria of this study for analysis. This included guidance from Australia, Britain, India, Malaysia, and the USA, which provided specific protocols for conducting tele-audiology based on their

country's legal regulations and standard of practice.

During analysis, three key themes were identified among guidelines, practice operations, clinical, and technical operations.

Criteria in practice operations included setting up an ideal environment for the tele-audiology (for both the practitioner and patient), ensuring multi-disciplinary teams, administrative procedures, and also data privacy and insurance aspects.

Criteria in the clinical theme included determining eligibility of patients and obtaining consent, ensuring professional and quality standards of care, valuing patient and family-centred care, addressing the limitations which may currently be present with tele-audiology, and detailing issues of malpractice and misconduct.

Criteria in technical operations included device and platform recommendations for providing the service, as well as which audiological equipment could also be utilised and connected, issues of connectivity and troubleshooting, ensuring accessibility of materials and tools, and also on selecting the methods of tele-audiology.

Each analysed guideline was then assessed based on the presence, absence, or recognition of these criteria, and presented in summary tables. From these results, areas of convergence (similarities) and differences were constructed based on how many guidelines presented the criterion (or only recognised them).

In our analysis, we observed a notable convergence among most of the identified tele-audiology guidelines, indicating a higher rate of similarities than disagreements. In practice operations, guidelines emphasised the importance of identifying correct consultancy sites for both practitioners and patients, utilising multidisciplinary teams, and prioritising data privacy and protection. Furthermore, clinical guidance showcased convergence among multiple criteria, such as informed consent, patient selection, quality assurance and professional standards of care. Additionally, technical operation guidelines underscored the necessity of selecting telecommunications platforms, ensuring accessibility of materials and tools, and providing device recommendations and connectivity guidance.

This convergence is pivotal for promoting consistency, quality, accessibility, and compliance in remote audiological care delivery, ultimately enhancing the effectiveness and equity of tele-audiological services worldwide. By adhering to these guidelines, practitioners can ensure optimised communication, technical stability, patient comfort, safety, and accessibility, thus facilitating improved patient outcomes and experiences.

While the analysis revealed a significant consensus among selected tele-audiology guidelines, indicating a positive trend towards unified best practices and standards in remote audiological care delivery, which holds promise for the advancement of cohesive and effective tele-audiology services. However, areas of disagreement were also identified within themes of practice operation and clinical guidance.

In practice operation, discrepancies arose concerning administrative protocols and insurance coverage. Within clinical guidance, disagreement centred on protocols for addressing misconduct and malpractice,

essential for upholding ethical standards and patient safety.

As a recommendation, from our analysis it would be advisable for countries to address each of the identified criteria for all three themes according to the cultural, professional, and legal factors of their countries. Additionally, regular evaluations and re-iterations of tele-audiology guidelines are recommended to ensure they remain up to date with new technological developments, advancements, and standards of care. Additionally, emergency protocols for handling medical or other urgent situations during the tele-audiology service should also be provided by each guideline. It could be beneficial for practitioners to also undergo specific training and certification for providing tele-audiology services.

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APPENDIX

Figure 1.

Different terminology related to the provision of distance services in healthcare.

Table 1.

Selected countries and their tele-audiology guidelines.

Country	Guideline	Issuing bodies
Australia (AUS)	Australian teleaudiology guidelines (2022) (Audiology Australia, 2022)	Audiology Australia
Britain (UK)	Practical guidance for remote hearing care (2020) (Jeffrey et al., 2020)	British Academy of Audiology
India (IND)	Telepractice guidelines (2020) (Indian Speech-Language & Hearing Association (ISHA), 2020)	Indian Speech-Language & Hearing Association (ISHA)
Malaysia (MYS)	Guidelines for teleaudiology services (2021) (Ministry of Health Malaysia, 2021)	Ministry of Health Malaysia
United States of America (USA)	Telepractice (n.d.) (American Speech-Language-Hearing Association (ASHA), n.d.)	American Speech-Language-Hearing Association (ASHA)

Table 2.

Analysis of practice operation guidance among selected countries.

	AUS	UK	IND	MYS	USA
Practitioner setting requirement	+	+	+	+	+
Patient site candidacy	+	+	+	+	+
Multidisciplinary teams	+	-	+	#	+
Administrative aspects (i.e. payment, report)	-	-	+	-	#
Data privacy and protection	+	+	+	+	+
Insurance	+	-	-	-	+

Key Identifier: [+] present, [-] not present.

Table 3.

Analysis of clinical guidance among selected countries.

	AUS	UK	IND	MYS	USA
Informed consent	+	+	+	+	+
Patient selection	+	+	+	+	+
Standard of quality/quality assurance	+	+	+	+	+
Professional standards of care	+	+	+	+	+
Practice policies	+	+	-	+	#
Patient and family centred-care	+	#	-	+	+
Tele-audiology limitations	+	+	#	#	+
Misconduct and malpractice	-	-	+	#	#

Key Identifier: [+] present, [-] not present, [#] recognised but no guidance provided.

Table 4.

Analysis of technical operation guidance among selected countries.

	AUS	UK	IND	MYS	USA
Device recommendations	#	+	+	+	+
Telecommunication platforms	+	+	+	+	+
Connectivity	-	+	+	+	+
Audiology test equipment	+	#	+	-	+
Accessibility of materials and tools	+	+	+	+	+
Methods of tele-audiology	+	-	+	+	+

Key Identifier: [+] present, [-] not present, [#] recognised but no guidance provided.