Tele-audiology: Implications and Practitioners’ Perceptions
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BACKGROUND

Hearing loss affects over 350 million people in the world.12 Audiologists are the medical professionals who help prevent, diagnose, treat, and rehabilitate hearing loss and balance deficits. Despite being a significant part of world health, audiologists are a small community of healthcare specialists, which can cause some barriers to hearing health access.

Telemedicine has been utilized since the early 1960s, as a way to connect patients with qualified professionals. The service model provides a way for medical professionals to virtually reach patients who do not have those specialists in their area, or struggle to attend appointments due to distance. In the United States, many medical professions are beginning to investigate telemedicine as an option to reach underserved patient populations.

Tele-audiology is an option for audiologists to virtually provide access to diagnostic evaluation and treatment services for families and patients with hearing loss, despite barriers impeding access. As this new service model is assessed, it is important to consider how practitioners view this option for providing care and also to investigate how it is being implemented in different settings, to determine which aspect of audiology telemedicine is most suited for.

PURPOSE

The purpose of this systematic review is to investigate audiologists’ perceptions of tele-audiology and how tele-audiology is being implemented.

METHODS

Studies included in qualitative analysis (n = 14)

- Articles identified through PubMed database (n = 70)
- Articles identified through CINAHL database (n = 38)

Articles after duplicates removed (n = 95)

- Articles excluded due to full-text article assessed for eligibility (n = 64)
- Articles excluded due to study completion outside U.S., inaccessible studies, and study unrelated to PICO question (n = 48)
- Articles excluded due to information unrelated to systematic review question (n = 2)
- Articles excluded due to information unrelated to qualitative analysis (n = 16)

Articles included in data analysis for systematic review (n = 14)

RESULTS

<table>
<thead>
<tr>
<th>Mode of Tele-Audiology</th>
<th>Synchronous</th>
<th>Asynchronous</th>
<th>Remote Monitoring</th>
<th>Mobile Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education/ Training</td>
<td>Counseling</td>
<td>Patient education</td>
<td>Tinnitus education</td>
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<td></td>
<td>on hearing loss</td>
<td>Training other professionals</td>
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<td>Screening</td>
<td>Newborn hearing screening</td>
<td>Adult hearing screening</td>
<td>Ototoxic hearing screening</td>
<td>Hearing screening of school-aged children</td>
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<td>Diagnostic</td>
<td>Pure tone audiometry</td>
<td>Speech Audiology</td>
<td>Video otoscopy</td>
<td>Tympanometry</td>
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<td></td>
<td>Most comfortable level</td>
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<td>ABR</td>
<td>Interpret audiological assessments</td>
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<td>Intervention</td>
<td>Cochlear implant programming</td>
<td>Aural rehabilitation</td>
<td>Tinnitus management</td>
<td>Aural rehabilitation</td>
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<td></td>
<td>Hearing aid programming and fitting</td>
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<td>Datalogging of hearing aid use</td>
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<td>Real-ear measures</td>
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<td>Self-monitoring of hearing status</td>
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</tbody>
</table>

Audiologist’s Perceptions

- Overall experience
- Comfortable using tablet, computer, email, & video conferencing
- Good for answering patient questions & counseling
- Remote hearing aid adjustments & hearing screening
- Able to follow up with patients more often
- Increase access to services
- Decrease patient travel time & cost
- Measurements comparable to traditional modalities
- Quality of audio and visual
- New hearing aid fitting & hearing assessments
- New patients, children, adults over 65 years old
- Connecting equipment/ equipment set-up
- Scheduling
- Patient-clinician relationship
- Time
- Cochlear implant mapping
- Quality of services
- Best for those familiar with technology, living in a remote location, or mobility issues

DISCUSSION

Tele-audiology is becoming a more viable option for audiologists to provide hearing care to underserved populations. There are four models of how tele-audiology connects the clinician to the patient: 1) Synchronous technology allows for the patient and clinician to interact in real-time (video conferencing), 2) Asynchronous technology extracts data from the patient by a technician or self-testing machine and sends it to the clinician to review, 3) Remote technology allows the clinician to monitor the patient’s device from another location, and 4) Mobile health technology involves applications that the patient can utilize for self-monitoring or as assistance to their hearing technology. Using one of these models of tele-audiology, such as tele-audiology assessment, screening, diagnostic or intervention hearing services can be provided. Audiologists tend to have generally positive attitudes towards utilizing tele-audiology, however, there are concerns regarding the patient-clinician relationship and the quality of services that can be delivered remotely. Some of the major challenges of tele-audiology include reliability and accuracy of the remote audio equipment, ensuring proper network connectivity, training of the technicians and audiologists, and maintaining patient privacy. Clinicians can utilize tele-audiology to provide services for patients that live in remote areas, that need more consistent follow-up, and that prefer to utilize these technology options. Some limitations of this systematic review may be the exclusion of articles discussing tele-audiology outside the United States. Of the articles reviewed, 7 were deemed to be good quality articles after appraisal, and the other 7 were lesser quality. There needs to be more quality investigational research on tele-audiology.

FUTURE DIRECTIONS

- Need more research utilizing the technology with real consumers
- Investigate how to best train audiologists and technicians if needed
- Investigate what other services can be offered in this format
- Employ tele-audiology to accomplish EHHD goals

ACKNOWLEDGMENT

This systematic review was completed as a project for SPIIR 701 Introduction to Research Methods, under the guidance of Dr. Linda Wason, Dr. Jessica Steinbrener & Ms. Michaela Dullay.

Disclosures - The authors have no financial or intellectual conflicts of interest.

REFERENCES