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Impact of COVID-19 pandemic on audiology practice: A scoping review

Komal Aggarwal\textsuperscript{a,b}, Dhanshree R. Gunjawate\textsuperscript{b}, Krishna Yerraguntla\textsuperscript{a}, Rohit Ravi\textsuperscript{b,*}

\textsuperscript{a} Department of Speech and Hearing, Manipal College of Health Professionals, Manipal Academy of Higher Education, Manipal, Karnataka, India
\textsuperscript{b} Department of Audiology and Speech Language Pathology, Kasturba Medical College, Mangalore Manipal Academy of Higher Education, Manipal, Karnataka, India

1. Introduction

Pandemics are simultaneous global transmission of infectious diseases affecting significantly large numbers of people leading to high morbidity and mortality, social, political, and economic disruption.\textsuperscript{1} These pandemics have several short-term as well as long-term implications on the health care systems, especially on the healthcare professionals.\textsuperscript{2,3} The coronavirus disease-19 (also called as COVID-19) emerged in Wuhan, China, and eventually rapidly spread across the globe.\textsuperscript{4} The subsequent lockdowns and stay-at-home orders have led to several disruptions in availability and access to healthcare services. A recent systematic review reported a drastic reduction to almost one-third in the utilization of healthcare services, especially among persons with less severe illnesses.\textsuperscript{5}

As restrictions were imposed as well as while they were being relaxed, healthcare services were either halted or reduced or shifted to online modality. These changes in service delivery were carried out to avoid the spread of infection and ensure patients are cared about. The healthcare professionals also had to adapt to what was termed as the “new normal” for infection control measures, hand hygiene, social distancing, and changes in routine clinical procedures to reduce or prevent risk of transmission.\textsuperscript{6,7}

Audiological consultation usually take place in closed sound-treated rooms. Further, multiple face-to-face appointments are required for assessment, hearing aid trial, fitting, counselling, and troubleshooting.\textsuperscript{8,9} In audiology, the catastrophe of COVID-19 had a profound impact requiring modifications to existing practices as well as adaptations to the rapidly evolving situation. Professional bodies responded rapidly and provided guidelines and positional statements to help the audiologists adapt to the changing clinical scenario.\textsuperscript{10–12} Tele-practice had always been an integral part of clinical practice in audiology, even before the pandemic.\textsuperscript{14,15} However, the use of tele-practice got an added impetus during the pandemic.

Although the COVID-19 pandemic has limited the access and provision of healthcare services, it is equally important to continue delivering audiological services. Reasonable published work has been seen...
since the onset of the pandemic, to study the impact on the audiology practice across the globe. It would be interesting to note the procedures adopted by audiologists to reduce risk of COVID-19 infection, and the impact and changes in professional practices due to the pandemic. Thus, the present scoping review was carried out to explore the impact of COVID-19 pandemic on audiology practice and the challenges faced.

2. Material & Methods

The scoping review was carried out using the Preferred Reporting for Systematic Review and Meta-analysis statement-extension for scoping review (PRISMA-ScR statement). The secondary data study related to COVID-19 were permitted by Ethical committee.

2.1. Literature search, inclusion/exclusion criteria

The population, intervention/impact, and outcome (PIO) was framed. Studies carried out among audiologists (P), exploring the impact and challenges of COVID-19 pandemic (I) on their audiology practice (O) were included. Studies exploring the impact of COVID-19 on individuals with hearing loss, tinnitus, vestibular or other audiological issues were excluded. Only studies published in English language and published from January 2020 to June 2021 were included for this review.

2.2. Search methods used for identification of the studies

The search was conducted by two independent reviewers (KA, RR). The electronic databases Scopus, PubMed/Medline, and Cochrane Library were included for the review. The keywords ‘audiology’, ‘audiologist’, ‘teleaudiology’, ‘COVID-19’, ‘coronavirus-19’, were used in different combination using Boolean operators ‘AND’ and ‘OR’.

![PRISMA flowchart explaining the steps followed in the review](chart1)

**Figure 1.** PRISMA flowchart explaining the steps followed in the review

**Figure 2.** Challenges faced professional practice due to pandemic.

- Related to patient or family:
  - Poor family involvement [17]
  - Poor follow-up [17]
  - Not suited for all cases (e.g. multiple disabilities, children) [18,19]

- Related to remote services:
  - Lack of access to devices/internet [17-19]
  - Lack of access to internet [17]
  - High costs [26]
  - Lack of experience or confidence using technology [18,19]
  - Data protection and privacy [18,19]
  - Payment issues [19]
  - Time constraints/ more time commitment [18,19]
  - Remote fitting HA/CI challenging [17,18]
  - Multiple technologies as per device [18]

- Related to specific practice aspects:
  - Issues with use of mask (lack of access to cues from lip-reading & facial expression; attenuation of high frequencies) [21]
### Table 1
Characteristics of included studies.

| Author ID     | Country                              | Study Design/sampling                          | Participants details                                                                                                                                                    | Questionnaire details                                                                                                                                                                                                                                                                                                                                                     |
|---------------|--------------------------------------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gunjawate et al. | India                               | Cross sectional study, using convenient sampling | Age: 29.8 ± 9.32 years, 21–69 years  
Experience: 6.99 ± 8.3 years, 1–40 years  
70% females, 28.6% males, 0.5% not revealed  
34.1% Bachelors, 57.8% Masters, 8.1% Doctorate  
32.7% private practice, 31.3% hospital, 36% teaching and clinical services | 23 items demographic details, knowledge and attitudes towards COVID-19, and practices related to infection control. Response - true/false statements, yes/no, multiple-choice questions, checkboxes, and short answer open-ended questions.                                                                                                                                                                                                 |
| Manchaiah et al. | South Africa (International survey from 44 countries, majority participants from five countries Australia- 81, United States- 60, South Africa- 57, United Kingdom- 14, and Canada-13) | Cross sectional study                           | Age 44.5 years (22–81 years)  
Experience 18.5 years (0–53 years).  
Education level:  
• On job training, no professional degree-0.3%; Certificate course-3.9%,  
• Bachelor’s degree-19.6%,  
• Master’s- 38.3%,  
• Doctoral-38%  
Employment:  
• Private practice-42.2%,  
• Private hospital or clinic-6.5%,  
• Government hospital or clinic-23.1%  
• Others 28.2% | 50 items demographic details, effects on the workplace, use of and attitude towards telehealth, mental health status. Response - Open ended questions & structured closed set responses.                                                                                                                                                                                                                                                   |
| Parmar et al. | UK                                   | Mixed-methods cross-sectional survey, snowball sampling | 323 hearing care professionals (57% public sector; 28% private sector) | 62 items Demographic information: Age, gender, regional location, educational qualifications, work setting, work role pre- and post- onset of COVID-19, duration of work, type of patients seen, time to commute to work Understanding about the term “Telehealth” Barriers to the delivery of telehealth Response - 58 closed-ended questions to be rated on 4-point Likert scale and 4 open-ended questions.                                                                                                                                                                                                                          |
| Saunders et al. | UK                                   | Survey conducted using social media & personal emails, snowball sampling | 120 audiologists  
Work settings - 75% paediatric care,  
57% conduct primary evaluations with adults, 58% hearing aids fitting,  
52.5% tinnitus care, 38.3% vestibular care. | 28 items  
• Practice patterns such as type of services provided (paediatric, adult evaluation, adult hearing-aid, tinnitus vestibular), location of practice, the number of daily appointments prior to COVID-19 restrictions.  
• how each type of service provided has been managed during COVID-19 restrictions.  
• decision-making & triaging for remote care  
• prior experience with remote care  
• views about remote care & its impacts on patient and service provision Response - five-point rating scale or open-ended questions.                                                                                                                                                                                                                                                                 |
| Zaitoun et al. | Jordan & Arab countries              | Cross sectional Study                          | 65% female, 34% male  
43.9% bachelor’s degree, master’s degree 39.6%, 16.5% doctoral degree 16.5%.  
Experience: range 1–30 years.  
Areas of practice - diagnostic audiology, rehabilitation sector, few in teaching | 40 items across four sections  
• demographic details, work, years of experience, gender, age, level of education, and population group they work with, children or adults.  
• knowledge of the COVID-19 characteristics such (signs and symptoms, modes of transmission, incubation period, prevention methods).  
• audiology practice during the COVID-19 pandemic, and precautions followed while providing services to patients  
• audiologists’ knowledge, attitude, and practice towards telehealth. Response - yes/no or multiple-choices.                                                                                                                                                                                                                                                                                                 |
| Nalley et al. | USA                                  | Cover Story                                    | NA | NA                                                                                                                                                                                                                                                   |

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The full-length of the shortlisted abstracts were then retrieved. Any discrepancies were resolved through discussion to arrive at a consensus. Data extraction was conducted from the full text of the hence shortlisted articles.

### 2.4. Data extraction and management

A data extraction sheet was prepared based on the discussion among all the authors. The extraction sheet included author id, country, study design, participant details, objective of the study, questionnaire/tool used, changes in professional practice due to COVID-19 pandemic and challenges/limitations faced.

### 3. Results

The total hits across all the databases were 172 and 30 duplicates were removed. 142 titles were screened to shortlist 64 abstracts for screening. Upon screening, 64 abstracts, 9 studies were included in the final review. Fig. 1 illustrates the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) chart of the procedure followed to screen and shortlist the articles (Fig. 2).

#### 3.1. Summary of included studies

The nine included studies in the review were from different countries, two from United Kingdom, one each from Jordan and Arab countries, India, France, South Africa, United States of America and Iran. One study was an international survey carried out by a group of authors from South Africa including participants from 44 countries, with most participants from five countries namely, Australia, United States, South Africa, United Kingdom and Canada. All the studies were conducted between March 2020 to August 2021. The studies included were cross-sectional surveys, best practice recommendations, cover story and commentary. Table 1 presents the characteristics of included studies in the present review.

Table 1 presents the changes in professional practice in terms of infection control measures, shift towards remote services, workplace related changes and prioritizing services.

### 4. Discussion

The present scoping review highlights the changes in audiology practice during COVID-19. Nine studies were included in the review, these included 5 cross-sectional surveys 2 cover stories, 1 recommendation and 1 commentary. The present review helps to understand the different changes in practice in audiology as a result of the COVID-19 pandemic and the restrictions. It also helps to identify the different challenges faced by audiologists in adapting to this change.

The different changes in audiology practice reported across the included studies in the could be categorized based on broad headings such as changes in infection control measures, shift to remote services, changes at workplace and prioritizing services. Infection control was always an important component in routine audiology practice due to direct and indirect contact with patients for prolonged duration and often for multiple visits It involves the use of probes, specula, headphones, and other instruments that are inserted in the ear. Further, most often the testing and management procedures take place in sound-treated closed setups. The onset of COVID-19 and the subsequent pandemic further highlighted and calibrated the need for more stringent infection control measures. Among the studies included, 5 studies recommended the implementation of strict infection control measures. These included use of face masks, face shields, gloves, social distancing, frequent cleaning of touch surface areas, reducing patient wait time and orienting and screening the patients before the actual appointment. As the pandemic continues to spread globally, it has become imperative that these infection control measures become a part of routine clinical practice.

Further, the COVID-19 pandemic hindered the standard routine audiology practice and led to exploration of the use of alternative options for service delivery. Tele practice acted as a quick alternative mode. Tele practices were identified to have the potential and longer-term opportunities since several years. However, in a study by Elkilbeon and Swanepoel among audiologists from over 28 countries, reported that only 15.5% has experienced with tele-audiology. The reasons included were lack of infrastructure, cost, high case load at work limiting provision for tele practice. However, the 2019 COVID-19 pandemic brought a sudden shift to use of tele-audiology due to the unavailability of regular services. A shift of about 49–77% to remote services was reported in the included studies. This shift was a quick shift and led to a sudden uptake of remote services in audiology practice.

Various modalities such as telephonic consultations, remote-services, video consultations, drop-off services, no-touch and low-touch options were used for providing services. This enabled in reducing the patient contact time to reduce the risk of infection as well as provision of services to remote areas.

The COVID-19 pandemic also brough about changes at the workplace for several audiologists. 92% of the audiologists stopped working during pandemic in one study while in another only 5% audiologists provided regular care. In yet another study, 97% reported changes within their workplace with 76.4% reporting a drop in case load. In order to overcome with these changes, the audiologists adopted strategies such as shorter appointment timings involving parents or teachers, using communication strategies. The pandemic also made audiologists prioritize patients based on diagnosis. Patients with complaints of sudden hearing loss, monitoring of ototoxicity, vestibular management got more priority.

The findings of the review helped in identifying several challenges faced by audiologists while adapting to the changed audiological practice. These were categorized based on related to patients, related to remote services or specific practice related aspects. Majority of the challenges were related to adapting to remote services. As although tele audiology was available as a alternative means of service delivery, the pandemic and the unavailability of routine services forced many audiologists to shift quickly. These studies were conducted during the lockdown and at the start of the pandemic and as time passes, the audiologists might become more well-versed with using the remote practice.
Changes in professional practice due to pandemic.

| Author ID | Infection control measures | Shift towards remote-services | Changes at workplace | Prioritizing services |
|-----------|-----------------------------|-------------------------------|----------------------|----------------------|
| Gunjawate et al. 17 | More than 80% used sanitizer, handwash, masks, social distancing, 39.3% with standard procedures for handwash. Need for more standard operating procedures for infection control. | 77.3% expressed interest to shift to tele-practice | – | -Higher priority to audiological support for device maintenance (53.4%), device adjustment (53.3%), cleaning and maintenance (48.4%) -Least priority to tinnitus management (72.1%), implant support services (71.4%) -Medium priority to emotional support (55.9%) and psychosocial support (62.2%) |
| Manchaiah et al. 18 | More importance to infection control measures | Higher usage of remote services and upgrading remote services | 97% changes at workplace, 76.4% reduction in caseload, 38.7% reduced work hours, 25% staff cuts or closure of clinics, - differences in counselling, service delivery, triage, troubleshooting, rehabilitation - reduced appointment timings | -Higher priority to audiological support for device maintenance (53.4%), device adjustment (53.3%), cleaning and maintenance (48.4%) -Least priority to tinnitus management (72.1%), implant support services (71.4%) -Medium priority to emotional support (55.9%) and psychosocial support (62.2%) |
| Parmar et al. 19 | – | No change in services (27%), redirected to other work (9%) | Majority appointments shifted to waitlist, varied alternatives used such as taking assistance from teachers of deaf, parents being asked to monitor children, doorstep drop of hearing aids, drop-off services, hybrid appointments | Most priority given to vestibular care |
| Saunders et al. 20 | – | Majority expressed interest to continue using tele-mode after lifting of restrictions (83.7%). | 82.9% minimized the waiting room time 90.9% stopped working, 92.7% established new policies for dealing with pandemic, 63.4% received new training for managing cases, | Priority areas -Assessment of sudden hearing loss (92.7%) and post meningitis patients (85.4%), follow-up of bilateral fail results in new-born hearing screening (76.2%) and vestibular disorders with risk of fall (Meiners disease & vestibular neuritis). Other areas such as hearing aids repair, earmold impression, replacement of lost aids, monitoring of ototoxicity. |
| Zaitoun et al. 21 | 94.5% avoided crowded places, 93.9% used sanitizer or washed hands regularly, 88.4% disinfected surfaces, 85.4% wore face masks, gloves. | Use of tele-mode for imparting services to rural areas, 56.1% could reach to patients outside the conventional work practice | 82.9% minimized the waiting room time 90.9% stopped working, 92.7% established new policies for dealing with pandemic, 63.4% received new training for managing cases, | Priority areas -Assessment of sudden hearing loss (92.7%) and post meningitis patients (85.4%), follow-up of bilateral fail results in new-born hearing screening (76.2%) and vestibular disorders with risk of fall (Meiners disease & vestibular neuritis). Other areas such as hearing aids repair, earmold impression, replacement of lost aids, monitoring of ototoxicity. |
| Nalley et al. 22 | Recommended use of face masks, eye protection (goggles, face shield), hand hygiene measures (use of sanitizer- 60% ethanol or 70% isopropanol), disinfect surfaces regularly, social distancing | Encourage telehealth services | Inform patients about new guidelines in advance, pre-screen all patients. Mail-in or drop-off services for devices. Use of communication strategies – speak slowly, reduce ambient noise levels, rephrase and repeat, use of speech to text conversions/communicator (transparent) facemask | Give priority to those with urgent needs. |
| Saki et al. 23 | Use of facemask and gloves, washing hands at least for 20 s, using hand-held ethanol alcohol solution at least for 30 s, cleaning and sterilizing the equipment after attending to each patient, disinfecting surfaces. Be updated with latest guidelines. | Promote remote care. | Limit personal interaction, especially with paediatric and geriatric population, ‘drop off’ service for hearing aid | High priority - Assessment of sudden sensorineural hearing loss, ototoxicity, idiopathic facial palsy, post meningitis followed by disorders like acute otitis media, acute mastoiditis, follow-up of new-born hearing screening, troubleshooting of hearing aid, and cochlear implant programming. |
| Swanepoel & Hall 8 | – | Encourage use of Web and mobile-based applications for hearing care services like hearing assessment, hearing aid troubleshooting, fine-tuning, and counselling | Audiology services based on no-touch (teleconsultation for digital proficiency assessment, hearing aid drop-off services, hearing aid troubleshooting, fine-tuning, counselling); low-touch service (screening, counter side service, self-testing kit for pure tone audiometry, speech-in-noise testing, digital otoscopy, hearing aids troubleshooting, counselling) | |
| Thai-Van et al. 24 | Video-otoscopy, pure-tone audiometry, speech-in-quiet or a speech-in-noise audiology test, objective measures of hearing, self-administered screening or monitoring patients using smartphone or a tablet with an iOS or Android operating system. Caregivers’ role as facilitators in both | – | – | |

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service.

5. Conclusion

The present review explored the changes in audiology practice during COVID-19 and the challenges encountered by audiologists. This study will also help the audiologists and policymakers adjust to the audiology practice to cope with the ongoing pandemic. This study extends the directions for tele practice to become an integral part of routine practice.

Declaration of competing interest

There is no conflict of interest to disclose.

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