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REVIEW

Telehealth in speech and language therapy during the COVID-19 pandemic: a systematic review

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ABSTRACT

Purpose: The need for social distancing in order to reduce the prevalence of COVID-19 concomitant with the needs of patients as well as the protection of the patients and service providers which has led to the use of tele health in speech and language therapy. For this reason, we decided to review the studies that focus on tele health in speech and language therapy during the COVID-19 pandemic and the purpose of this study is to investigate the use and satisfaction of tele health in speech and language therapy.

Materials and methods: We conducted a systematic review of the literature in accordance with the PRISMA statement on google scholar, PubMed, Scopus, Science direct, ProQuest, Web of science, Springer and Cochrane databases between 2020 – 2021. An additional manual search was performed, taking into consideration references of the included papers, through the same eligibility criteria. Two researchers screened the titles and abstracts of articles that met inclusion criteria. The methodological quality of the included papers was evaluated using the Critical Appraisals Skills Program (CASP) checklists.

Results: The collection of reviewed articles included 83 articles from different countries, subsequently 8 articles (3 clinical trials and 5 experimental) were selected. The data extracted were: participations, objects, methods, tools and results.

Conclusions: According to present study, tele health can be used in diagnosis and treatment of speech-language conditions as well as educating speech and language pathology students. Moreover, these findings showed patients and therapists were more inclined to utilise tele health.

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Telehealth; telemedicine; telerehabilitation; speech and language therapy; COVID-19; coronavirus; systematic review

➤ IMPLICATIONS FOR REHABILITATION

- Reduced access to in-person rehabilitation care in covid-19 pandemic, along with changes in health care finance and delivery, contributed to an exponential increase in telehealth.
- Measures of quality and patient satisfaction are unknown in the model of tele rehabilitation.
- To date, the literature on tele rehabilitation is limited and most commonly describes treatment for an impairment within a specific disease.
- Beyond infection control, eliminating travel time, incorporating other health care advocates, and convenience delivering care in familiar environments to pediatric patients are all benefits that will be durable outside times of pandemic.
- For families who live in rural or medically underserved areas and have access to internet and technology, telemedicine is a tool to provide access to medical care. Telemedicine can also increase patient and caregiver satisfaction through reduced travel and clinic wait time and increased potential for appointment time flexibility.
- Tele rehabilitation medicine provides an opportunity to deliver timely, patient and family-centric rehabilitation care while maintaining physical distancing and reducing potential COVID-19 exposure for our patients, their caregivers and medical providers.
- Since SLP mostly relies on communication through visual-auditory and perceptual aspects, tele practice could be a proper opportunity to provide care in this field.
- Given the need for continuous therapy sessions in order to treat speech-language disorders, the application of tele practice may eliminate problems in this area to some extent while preventing the transmission of COVID-19.

Introduction

On 31 December 2019, the Municipal Health Commission in Wuhan, China reported the first case of COVID-19 disease [1]. As the prevalence of COVID-19 spread around the world, the World Health Organisation (WHO) declared it a pandemic [2], which resulted in implementing restrictions and quarantine protocols by governments all around the world. Under such circumstances, all daily activities such as attending schools or attending medical and health appointments were affected [1,3–5]. This posed several challenges and a need for adaptation in several areas to update working methods and improve education and services in the health science [2,3,6,7]. Tele rehabilitation is the provision of

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Table 1. Search strategies in different databases.

Data base	Keywords and filters	Search query
PubMed	*Tele practice*, *telemedicine*, *Tele health*, *speech* and *language pathology, speech and language therapy, covid* 19, *coronavirus 2019–2020*	(((((((Tele speech and language therapy) OR (Tele practice)) OR (Telemedicine)) OR (Tele health)) AND (Covid 19)) OR (Coronavirus)) AND (Speech and language therapy)
ProQuest	*Tele practice*, *telemedicine*, *Tele health*, *speech* and *language pathology, speech and language therapy, covid* 19, *coronavirus*	Tele health OR Tele practice OR Telemedicine AND Covid19 OR (corona virus) AND (speech and language therapy)
Cochrane	*Tele practice*, *telemedicine*, *Tele health*, *speech* and *language pathology, speech and language therapy, covid* 19, *coronavirus* Publication Year from 2019 to 2021, in Trials (Word variations have been searched)	"Tele health" in Title Abstract Keyword OR "telemedicine" in Title Abstract Keyword AND "speech and language therapy" in Title Abstract Keyword - with Publication Year from 2019 to 2021, in Trials (Word variations have been searched)
SCOPUS	*Tele practice*, *telemedicine*, *Tele health*, *speech* and *language pathology, speech and language therapy, covid* 19, *coronavirus.* PUBYEAR > 2019 AND (LIMITTO (LANGUAGE," English"	(ALL (Tele practice) OR TITLE-ABS-KEY (telemedicine) OR TITLE-ABS-KEY (Tele health) AND TITLE-ABS-KEY (speech AND therapy) AND TITLE-ABS-KEY (covid 19) OR TITLE-ABS-KEY (coronavirus)) AND PUBYEAR > 2019 AND (LIMIT-TO (LANGUAGE," English"))

health care by any means of telecommunication that is currently available, such as telephone, videoconferencing, e-mail, messaging, mobile applications with or without video communication [1,8–12].

At this time, many non-emergency and elective treatments, including speech and language therapy, were regarded as not urgent and incomplete [12]. To promote physical distancing during the COVID-19 pandemic, many health care services have expanded use of tele health for outpatients, emergency departments, and intensive care units [13,14]. The need for social distancing and intensive care in order to reduce the prevalence of COVID-19 [3,4,15] and the need to protect the health of patients and service providers [8] necessitated the use of tele health in speech and language therapy.

In December 2019, the American Speech and Hearing Association (ASHA) published a full issue of ASHA[1] Leader magazine on the need to improve digital resource skills in vocational education [3]. Following the changes imposed by the pandemic, several international associations, such as CAPCSD[2], ASHA, IALP[3], and CPLOL[4], provided guidelines and materials for the development of tele health activities, including basic tele practice training for speech and language pathologists [3].

The main purpose of using these technologies is to expand access to health care. This type of providing services solves the transportation problem for patients who live far from rehabilitation centres and those who have difficulty accessing services; at the same time, it is suitable in situations such as the COVID-19 pandemic. This method can be used for all three levels of prevention, diagnosis and treatment [12].

Prior to the epidemic, tele health insurance reimbursement was not ubiquitous, and telemedicine medical visits were not usually covered. The changes, which took effect in Massachusetts on 10 March 2020, required insurers to pay for tele health at an in-person visit rate for the duration of the emergency. At the end of March, the Medicare and Medicaid service centres added more services to the list of eligible, which extends the terminology codes of current healthcare practices [16].

The last two decades have seen a growing trend towards using tele health in speech pathology [9]. Analysis of PubMed database data in 2020 showed that less than 1% of all tele health articles were published during the 1990s and approximately 82% were published between 2010 and 2020 [9]. In 2005, ASHA reported that speech therapists had vacancies in all health care settings. This figure was 25% in 2002 and 40% in 2005. These results indicate a growing gap between supply and demand and an important problem is the lack of speech and language pathologists in many geographical locations, so ASHA offers tele health to provide speech-language pathology services in these areas [17].

Whilst some research has been carried out on the use of tele health in speech and language pathology during the COVID-19 pandemic, no systematic studies have been made. The purpose of this paper is to review recent research into the investigation of effectiveness, benefits and limitations of using tele health in speech and language pathology during the outbreak of COVID-19.

Materials and methods

In presenting the review, the guidelines of the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statements were followed [18]. Details of the protocol for this systematic review were registered on PROSPERO (registration number CRD42021262119) and can be accessed athttps://www.crd.york.ac.uk/PROSPERO/#searchadvanced.

Data sources and search strategy

The initial systematic search of resources was conducted in December 2020 across various databases including Pub Med, Science Direct, Scopus, Springer, ProQuest and Google Scholar. The keywords used for this search include: Tele health; Telemedicine; Speech and language therapy; COVID-19; Coronavirus; Systematic review. It should be noted that in order to access a more comprehensive number of related articles, the mentioned words were used individually as well as in combination; a manual search was also performed in the list of sources of searched articles and related books. Table 1 shows the search strategies used for a comprehensive search on different databases.

Study selection process

We exported all identified articles of databases to EndNote (a reference manager software). Next, authors reviewed the references of the papers to identify any eligible papers that we did not identify in our initial search of the databases (Figure 1). At this stage, we also consulted with experts in this field to find out more studies. Next, two authors independently screened the titles and

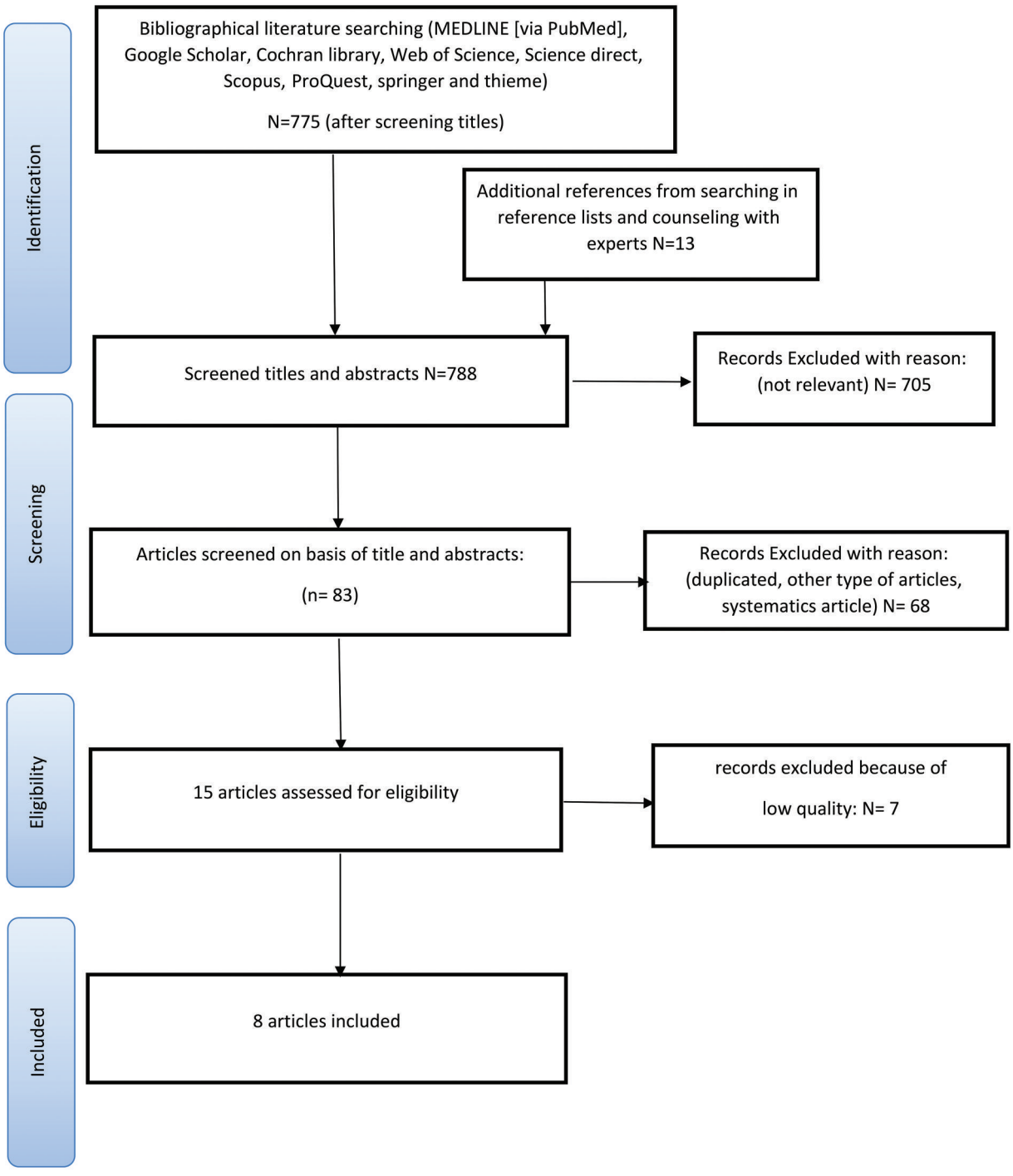

Figure 1. Flow chart of the review process.

abstracts to select potential papers for full-text review based on selection criteria and at this stage all irrelevant articles were removed. Next, both reviewers read the full-texts of selected papers and identified the ones that reported using tele health in speech and language therapy. We included these papers for data abstraction. At the end of each step, the authors compared their results and resolved disagreements through discussion until they reach a consensus. For articles that we included, we first reviewed if the study was eligible for review and if we identified a study as ineligible for review, we reported the reasons for exclusion.

Data extraction was also done through a data extraction form and was reviewed by the authors. This information included: names of authors, year of publication, study groups, objectives, methods and tools studied and results of studies (Table 2).

Inclusion criteria

We included studies that:

1. Were published between 1 January 2020 and 31 June 2021.
2. Were published in any language and were available in full text in peer-reviewed journals.
3. Used any design (descriptive, experimental) or methodology (qualitative, quantitative, or mixed).

Table 2. Data extraction.

Study	Participations	Objects	Methods & tools	Results
KRALJEVIĆ et al. (2020) Croatia	255 Speech and language pathologists	Examine SLP professionals' perceptions and application of tele practice in SLP settings in Croatia during the COVID-19 pandemic	Complete an online survey	Most SLPs had provided direct online therapy, mainly those employed in health care and private practice.
Fong et al. (2020) Hong Kong	135 Speech and language pathologists	Investigate the accelerated emergence of tele practice in speech language pathology during the coronavirus disease 2019 (COVID-19) pandemic in Hong Kong	Online survey of speech and language pathologists in Hong Kong was conducted between February and March in 2020 Survey consisting of up to 15 questions that was distributed through e-mail and instant messaging	The survey findings suggested that tele practice provision in Hong Kong was different from that of other countries where tele practice has been well established, due to the accelerated emergence by the COVID-19 pandemic.
Aggarwal et al. (2020) India	500 speech and language pathologists Of the 500 people to whom the survey was sent, 97 responded, of whom 84 met the inclusion criteria.	Explore the sudden uptake of tele practice in India among speech and language pathologists	Online survey consisting of 20 questions	Findings highlight an acceptance and uptake towards tele practice. This might pave the path for serious consideration for tele practice in the field of speech-language therapy in India in the future
Castillo-Allendes et al. (2020) Michigan	11 experts in voice and swallowing disorders from five different countries	To promote safety, and effective clinical practice to voice assessment and rehabilitation in the pandemic COVID-19 context for speech-language pathologists.	A group of 11 experts in voice and swallowing disorders from five different countries conducted a consensus recommendation following the American Academy of Otolaryngology-Head and Neck Surgery rules building a clinical guide for speech-language pathologists during this pandemic context	Each clinician must attempt to mitigate the risk of infection and achieve the best therapeutic results taking into account the patient's particular reality
Pamplona et al. (2020) Mexico	43 Children with cleft palate	To study whether providing Speech and Language Pathology (SLP) interventions by tele practice (TP) could effectively improve speech performance in children with cleft palate	Forty-three children with cleft palate were treated with TP intervention in 45 min sessions, 2 times per week for a period of one month	Tele practice can be a safe and reliable tool for improving compensatory articulation
Cangi et al. (2020) Turkey	20 adults who stutter	1. Compare the outcomes of tele practice and in-person therapy delivery on traditional 2. Stuttering treatment explore tele practice stuttering therapy experience in Turkey	1. Pre-test, post-test, and follow-up quasi-experimental designs were used to compare tele practice and in-person therapy effectiveness 2. Examine the perspectives of the 10 participants in the tele practice group *via* qualitative procedures and data collection	1. The effectiveness of tele practice and in person in the post-test and follow up is not significantly different 2. 7 themes emerged out of the qualitative data analysis in Study 2: (1) expectation, (2) tele practice -participant suitability and advantages of tele practice , (3) technology, (4) therapy techniques and clinician skills, (5) therapeutic components, (6) satisfaction and (7) preference.
Adam S. Tenforde et al. (2020) Boston	205 Participants	Describe the feasibility of and satisfaction with Tele rehabilitation	Complete the questionnaire after Tele rehabilitation visit	High patient satisfaction measures across age, condition, therapist, and visit characteristics for both adults and paediatric populations
Michelle Braley et al. (2021) UA	Of the 58 participants that were screened against eligibility criteria, 36 were enrolled and 32 completed the study	Assess the feasibility and clinical efficacy of a virtual speech, language, and cognitive digital therapeutic for individuals with post-stroke aphasia relative to standard of care	Experimental group: Received digital therapy, Constant Therapy. Control group: Received a regime of standard, paper workbooks used for homework practice	1. Participants in the CT-R group had WAB-AQ scores 6.43 higher than the workbook group at the end of treatment 2. The WAB-Language Quotient, WAB-Cognitive Quotient, Brief Test of Adult Cognition by Telephone (BTACT), and Stroke and Aphasia Quality of Life Scale 39 (SAQOL-39), with significant changes in BTACT verbal fluency subtest and the SAQOL-39 communication and energy scores for both groups.

Table 3. Items of Critical Appraisals Skills Programme (CASP) checklist for randomised controlled trial (RCT) studies.

1. Did the study address a clearly focussed research question?
2. Was the assignment of participants to interventions randomised?
3. Were all participants who entered the study accounted for at its conclusion?
4. Were the participants 'blind' to intervention they were given? Were the investigators 'blind' to the intervention they were giving to participants? Were the people assessing/analyzing outcome/s 'blinded'?
5. Were the study groups similar at the start of the randomised controlled trial?
6. Apart from the experimental intervention, did each study group receive the same level of care (that is, were they treated equally)?
7. Were the effects of intervention reported comprehensively?
8. Was the precision of the estimate of the intervention or treatment effect reported?
9. Do the benefits of the experimental intervention outweigh the harms and costs?
10. Can the results be applied to your local population/in your context?
11. Would the experimental intervention provide greater value to the people in your care than any of the existing interventions?

Exclusion criteria

We did not include the studies that met the following criteria:

1. Their full-text was not available.
2. Studies that were about other fields of medical sciences and rehabilitation except speech and language pathology.

Quality assessment of studies

The Critical Appraisals Skills Program (CASP) checklists (Appendix 1) was employed as a standard tool to evaluate the quality of the selected studies. In this study we used two CASP checklists, one checklist for the randomised controlled trial (RCT) studies and the other checklist for qualitative studies [19].

CASP checklist for RCT studies has four sections: the first section screens questions about the validity of the basic study design, the second section concerns study methodology and statistical methods, the third and fourth sections evaluate the comparability of the results obtained from the participants. Each question is scored with three responses, yes, no and I can't tell.

Questions have been raised for quality assessment in the first ($n = 3$), the second ($n = 3$), the third ($n = 3$) and fourth ($n = 2$) sections of the study (see Table 3 for the questions in this checklist).

CASP checklist for qualitative studies has three sections: the first section screens questions about the validity of the basic study design, the second and third sections evaluate the comparability of the results obtained from the participants. Scoring for this checklist is the same as CASP checklist for RCT studies that we explained earlier.

Questions have been raised for quality assessment in the first ($n = 6$), the second ($n = 3$) and the third section ($n = 1$) of the study (see Table 4 for the questions in this checklist).

The two authors of this article (N-SH and M-GH) completed the quality assessment checklists for each study independently in order to confirm the quality of included studies. According to the agreement of the authors, studies of which two thirds of the questions received a yes answer by both evaluators included in the review.

Results

See Figure 1 for the results of the review process. 788 papers were selected for initial screening based on the compatibility of their title and abstract. Of these, studies based on the inclusion, exclusion and eligibility criteria were evaluated, 83 met the eligibility criteria for full text review. After reviewing the full-text of the selected articles, 68 studies excluded (68/83) because they did not report using tele health in speech and language therapy.

This selection was further analysed according to the inclusion and exclusion criteria and the application of filters related to this review article; 15 articles were selected for quality assessment, and finally, after the quality assessment, 8 articles were included in this study.

Characteristics of the research conducted in the use of tele health in speech and language therapy (study type and design)

The earliest study that was eligible for the review was dated 7 August 2020. Studies included in the review were of two designs: three studies were intervention and five studies were cross-sectional that examined the use of tele rehabilitation by SLPs and their patients. Included studies were from six different countries: Most of the studies were from the United States with two studies (one in Michigan, USA, one in Boston, USA) and in each of other countries (Croatia, Hong Kong, India, Mexico and Turkey) one study was conducted.

Table 2 represents the characteristics of these studies. The sample size varied in the studies ranging from 11 to 500. Participants in four of the studies were SLPs and in the other four studies were patients. Patients group included: children with cleft palate, adults who stutter and people with speech and language problems. The SLPs group included SLPs that use tele health in speech and language therapy. Six studies used online surveys to examine the perceptions of SLP professionals and patients regarding the use of tele health. Two studies focussed on the result of intervention to examine the efficacy of tele health as an intervention method (Table 2).

The most common platform used to provide tele health was WhatsApp video calling, followed by Zoom and Skype [20]. The 68% of SLPs also are willing to provide treatment *via* tele health, but mostly through a synchronous communication (e.g., file sharing) and approximately 80% of SLPs use computers in their daily work activities, while tablets, smartphones, and web and digital cameras are used to a lesser extent [10].

Children of school age (6–17 years) were the most common age group receiving tele health services, followed by pre-school children (3–5 years) [11]. The most common clinical domain was language disorders followed by articulation/phonological disorders. In-person speech and language therapy sessions usually take at least 30 min on average, but seasons *via* tele health take between 20 and 60 min, depending on the disorder [13]. The duration of the sessions varies with age groups and disorders.

Discussion

The purpose of this study was to conduct a systematic review of research in the use of tele health in speech and language therapy during the COVID-19 pandemic.

Benefits of using of tele health in speech and language therapy

According to the results of the studies reviewed in the current study, tele health can be used in diagnosis and treatment of speech and language conditions, assessment, speech and language pathology students educating and exchange of information between health professionals and students.

Some of the benefits of using of tele health that we have found include:

Table 4. Items of Critical Appraisals Skills Programme (CASP) checklist for qualitative studies.

1. Was there a clear statement of the aims of the research?
2. Is a qualitative methodology appropriate?
3. Was the research design appropriate to address the aims of the research?
4. Was the recruitment strategy appropriate to the aims of the research?
5. Was the data collected in a way that addressed the research issue?
6. Has the relationship between researcher and participants been adequately considered?
7. Have ethical issues been taken into consideration?
8. Was the data analysis sufficiently rigorous?
9. Is there a clear statement of findings?
10. How valuable is the research?

- Facilitation of access to speech and language pathology services, overcoming logistical barriers, and help with early diagnosis of speech and language disorders [13].
- Facilitating close follow-up with patients who can be monitored from their home.
- Helping to increase people's awareness and information about speech and language disorders.
- Saving on disposable materials such as gloves and disinfectants [21].

This method is also very effective for developing countries where relevant specialist services are limited and scattered [13].

A study conducted by Wosik et al. in the United States found that the use of technology tools to provide health care services at all stages of COVID-19 pandemic disease is very useful [20]. Studies have demonstrated the effectiveness of tele health in providing speech and language pathology services to patients with a variety of disorders, including neurogenic voice disorders, muscle tension dysphonia, vocal fold nodules, dysarthria, swallowing disorders, and post-laryngeal care. In addition, it has been shown that the quality of auditory-perceptual assessment of sound through tele health is comparable to face-to-face auditory assessment, which indicates the feasibility, effectiveness and diagnostic accuracy of tele treatment compared to traditional face-to-face appointments [22].

The results of a study examining the effectiveness of tele health in speech and language therapy in correcting compensatory errors in children with cleft palate also experienced a significant improvement; at the end of the virtual treatment period there was a significant improvement in the severity of errors [4].

Using of tele health method also leads to reducing problems such as transportation and time [13].

Most evidence of the effectiveness of tele rehabilitation has been obtained from implementation of tele health on stroke patients. Factors that significantly affect rehabilitation outcomes including the timeliness of the intervention, the severity and the frequency of the intervention. Clinical evidence suggests that treatment improves functional outcomes in patients with neurological conditions, particularly stroke [23]. A study reported the implementation of tele health in speech and language therapy during the COVID-19 pandemic for patients previously treated in an outpatient clinic at a primary care facility. The goal of this project is to ensure the continuity of services for patients who have worsened by incomplete treatment or enduring concomitant illnesses during the quarantine period. Treatment was performed in the form of video calls for patients and trainees under the supervision of SLP specialists. The results of this study showed that tele health is effective in caring for patients who need speech and language therapy and makes tele health care possible with the same quality of face-to-face care [3,13]. Rapid use of tele rehabilitation during COVID-19 epidemic; highlights the benefits of a virtual visit in patient care. If the barriers to tele rehabilitation are completely removed, this type of service delivery may become part of the treatment and affect the number of in-person visits [9]. Participating in a tele rehabilitation program helps avoid disruption in the provision of services after discharging from the hospital [23].

Limitations of using of tele health in speech and language therapy

Use of tele health in speech and language therapy has limitations such as poor audio and video quality during sessions and patient and therapist compliance. To address these challenges, high-speed internet connections and the use of platforms that are preferred and more accessible to the patient should be implemented [13].

One study in Hong Kong examined parents and students' perceptions of tele health in speech and language therapy during the COVID-19. The aim of this study was to evaluate the level of effectiveness and preference between face-to-face and tele health treatment methods. The results showed that despite the fact that the effectiveness of telecommunication was highly rated by parents and students, both groups believed that telecommunication was less effective than face-to-face methods. Parents also prefer face-to-face methods to tele health method, while for students, there was no difference between two mentioned methods [24]. Face-to-face communication has been preferred in various studies because this communication allows better observation of visual cues, such as facial expressions and body language [24].

Another factor that makes patients less receptive to this technology is the assumption that this type of service will not have the same effect as face-to-face counselling [13], even though face-to-face interactions play an important role in examinations [5]. This negative perception creates a distance or even a bad experience from the situation, so that it challenges the real benefits of tele health counselling [13]. One way to gain patients' trust is to continue the tele health consultations with the same therapist who provided the in-person treatment [13].

Concerns about the use of tele health in speech and language therapy

Age and work experience of the therapist does not seem to be significantly related to the efficiency of the results of using tele health [10], but Approximately 70% of therapists (including those who work directly online and those who provide counselling to family members) feel that using tele health in therapy requires additional training [1]. The professionals believe that in tele health sessions communication should be clear, dynamic and understandable as it can create a gap between the therapist and the patient, thus it leads to a lack of adherence to telephone counselling due to feelings of insecurity, ambiguity and conflict and therapists need to learn effective communication skills to achieve the expected result [13].

Prior to the COVID-19 pandemic, global use of tele health was hampered by insurance restrictions, low reimbursement, and equipment and software restrictions. It is not clear whether barriers to virtual medical visits will be reversed or corrected by reducing or eliminating COVID 19 [9].

One of the points that must be considered during a pandemic is the type of disorder and the patient's condition; whether in-person care is necessary, for example, in-person voice

rehabilitation should not be considered in the current pandemic situation. If the patient has already begun rehabilitation, therapy can be continued as tele health method. Face-to-face therapy should only be maintained for swallowing or dysphonia disorders that are impossible to delay. The decision to maintain these disorders should be confirmed by group discussions or should be based on formal recommendations from health officials [25].

Another point about using tele health in speech and language therapy sessions is observance of patient rights. In both tele health sessions as well as during in-person sessions, it is ethically necessary to consider all patient rights. The speech and language pathologist must keep the patients' information confidential at all times [13].

Conclusion

According to the studies reviewed in this systematic review, the results of applying tele health approach are promising provided that the following principles are included: the facilitation of access to intervention services, overcoming geographical barriers, and helping in early diagnosis of speech and language disorders. Lead to; as a result of which, patients and therapists had satisfactory results from this approach. Importantly, in cases where treatment cannot be postponed, and in-person treatment is required; use of low-tech communication methods, such as disposable communication boards and writing methods, and/or using advanced options, such as text-to-speech programs on portable devices is advantageous [26]. Tele health saves time and costs, and is beneficial for patients [27]. Satisfaction findings of SLPs show that the level of satisfaction was relatively varied. This seemed to depend on the system in which a person works and whether or not a specialist provides direct treatment to patients.

Future studies

Reaffirming the novelty of this way of providing services in many countries, we suggest that researchers examine the advantages and disadvantages of this type of speech and language therapy service in a wider range of disorders as well as in more participants from around the world.

Notes

1. American Speech-Language and Hearing Association.
2. Council of Academic Programs on Communication Sciences and Disorders.
3. International Association of Logopaedics and Phoniatrics.
4. Comitée Permanent de Liaison des Orthophonistes et Logopédes.

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