

Telephonoaudiology: an integrative review

Telefonoaudiologia: uma revisão integrativa

Telefonoaudiologia: una revisión integradora

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Abstract

Introduction: The Coronavirus pandemic brought about the need for social distancing. Based on this new reality, the Brazilian Federal Council of Speech, Language and Hearing Sciences (CFFa) recommended the use of telephonoaudiology to enable the continuity of speech therapy assistance. Although this is not an unprecedented practice, doubts about telephonoaudiology use and its effectiveness, when compared to face-to-face care, still permeate the clinical practice. **Objective:** to perform an integrative review of the literature on the effectiveness of telephonoaudiology technologies when compared to face to face care. **Methods:** an integrative review of the scientific literature was carried out, without the restriction of language and time, in the databases: Pubmed, Web of Science, Science Direct, Cochrane, and Google Scholar. **Results:** twenty-one articles were selected. The unanimity of the papers demonstrated that there was no statistically significant difference between the configurations. In studies focused on evaluation, the test methods (face to face vs. telephonoaudiology) were highly correlated and presented high inter-examiner reliability. In papers focusing on therapy, in both treatment configurations, there was a significant improvement in the parameters evaluated. In almost all the papers that conducted telephonoaudiology satisfaction surveys, patients and/or guardians reported moderate to high satisfaction and indicated a willingness to participate again in assessment and/or therapy in the configuration of remote care. **Conclusion:** the current literature on telephonoaudiology suggests the use of remote care and demonstrates its non-inferiority when compared to face to face care. However, most of these studies have low scientific evidence.

Keywords: Telemedicine; Telemonitoring; Speech, Language and Hearing Sciences; Revision

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TCC: writing of the article, participation in the design of the study, and the collection, analysis, and interpretation of data;

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Resumo

Introdução: A pandemia do Coronavírus trouxe a necessidade do distanciamento social. A partir dessa nova realidade, o Conselho Federal de Fonoaudiologia (CFFa) recomendou o uso da telefonaudiologia para permitir a continuidade do atendimento fonoaudiológico. Embora a telefonaudiologia não seja uma prática inédita, dúvidas quanto à sua utilização e eficácia, quando comparada ao atendimento presencial, ainda permeia a prática clínica. **Objetivo:** realizar uma revisão integrativa da literatura sobre a eficácia da telefonaudiologia comparada ao atendimento presencial. **Métodos:** foi realizada uma revisão integrativa da literatura científica, sem restrição de idioma e tempo, nas bases de dados: Pubmed, Web of Science, Science Direct, Cochrane e Google Scholar. **Resultados:** vinte e um artigos foram selecionados. A unanimidade dos artigos demonstrou que não houve diferença estatística significativa entre as configurações. Nos estudos com foco na avaliação, os métodos de teste (presencial X teleavaliação) foram altamente correlacionados e com alta confiabilidade inter examinador. Nos artigos com foco na terapia, em ambas as configurações de tratamento, houve melhora significativa dos parâmetros avaliados. Os artigos que realizaram pesquisa de satisfação na modalidade de telefonaudiologia, em quase a totalidade dos estudos, os pacientes e/ou responsáveis relataram moderada a alta satisfação e indicaram disposição de participar novamente de avaliação e/ou terapia na configuração de atendimento remoto. **Conclusão:** a literatura atual em telefonaudiologia sugere o uso do atendimento remoto e demonstra a não inferioridade deste quando comparado ao atendimento presencial. Porém, a maioria desses estudos apresenta baixa evidência científica.

Palavras-chave: Telemedicina; Telemonitoramento; Fonoaudiologia; Revisão.

Resumen

Introducción: La pandemia del coronavirus provocó la necesidad de desapego social. Con base en esta nueva realidad, el Consejo Federal de Terapia del Habla (CFFa) recomendó el uso de telefonaudiología para permitir la continuidad de la asistencia de la terapia del habla. Si bien el telefonaudiología una práctica inédita, las dudas sobre su uso y efectividad, en comparación con la atención presencial, aún impregna la práctica clínica. **Objetivo:** realizar una revisión integradora de la literatura sobre la efectividad de telefonaudiología frente a la atención asistente personal. **Métodos:** se realizó una revisión integradora de la literatura científica, sin restricciones de idioma y tiempo, en las bases de datos: Pubmed, Web of Science, Science Direct, Cochrane y Google Scholar. **Resultados:** se seleccionaron veintinueve artículos. La unanimidad de los artículos demostró que no hubo diferencia estadísticamente significativa entre las configuraciones. En los estudios centrados en la evaluación, los métodos de prueba (asistente personal versus telefonaudiología) estaban altamente correlacionados y tenían una alta confiabilidad entre examinadores. En los artículos centrados en la terapia, en ambas configuraciones de tratamiento, hubo una mejora significativa en los parámetros evaluados. Los artículos que realizaron encuesta de satisfacción en forma de telefonaudiología, en casi todos los estudios, los pacientes y / o tutores reportaron satisfacción moderada a alta e indicaron disposición a participar nuevamente en la evaluación y / o terapia en la configuración de la atención remota. **Conclusión:** la literatura actual sobre telefonaudiología sugiere el uso de la atención remota y demuestra su no inferioridad en comparación con la atención personal. Sin embargo, la mayoría de estos estudios tienen poca evidencia científica.

Palabras clave: Telemedicina, Telemonitorización; Terapia del lenguaje; Revisión

Introduction

Telepractice consists of the exercise of the profession of audiologists and speech-language pathologists mediated by information and communication technologies (ICT) to promote health, improve speech and voice, as well as prevent, identify, evaluate, diagnose, and intervene in disorders of human communication, balance, and orofacial functions¹.

There are different service models in telepractice, varying according to the synchronicity of interactions, such as synchronous, asynchronous, hybrid, and automatic. The synchronous model consists of the interaction between the participants and occurs in real time. Interaction between participants does not occur in real time, in the asynchronous model. In the hybrid, however, there is a combination of synchronous and asynchronous models. Finally, the automatic model automatically records and transmits a client's health data¹.

Based on this new reality, the need to adapt care practices and continuity of service provision to patients, the Brazilian Federal Council of Speech, Language and Hearing Sciences (CFFa), in March 2020, issued a manual guideline for good practices in Telepractice¹ and considers its use as an alternative to not harming patients and treatments in progress. Until then, telepractice in Brazil was regulated by resolution No. 427 of March 1, 2013².

Regarding the persistence of the pandemic situation, in August 2020, the CFFa issued a new resolution No. 580, of August 20, 2020, revoking the previous one and regulating telepractice³. In its first article, it is regulated as the exercise of Speech, Language Pathology and Audiology Therapy mediated by information and communication technologies (ICTs) for health promotion, speech and voice improvement, as well as for prevention, identification, evaluation, diagnosis, and intervention of human communication disorders, balance, and orofacial functions.

The American Speech-Language-Hearing Association (ASHA) defines telepractice as the application of telecommunications technology for the provision of remote professional speech therapy services, connecting professional to client or professional to professional for evaluation, intervention, and/or consultation⁴. And this type of service can be provided in three ways: asynchronous (store-and-forward), synchronous (use

of real-time technology), and hybrid (combination of the first two)⁵.

The World Health Organization, on the other hand, defines telemedicine as the provision of health services by professionals in the field, in which distance is a critical factor, using ICTs to exchange valid information for the diagnosis, treatment, and prevention of diseases and injuries, research and evaluation, and for the continuing education of health professionals; all in the interest of promoting the health of individuals and their communities⁶.

Before the pandemic, the use of telepractice was already seen as promising, as the scarcity of specialized speech therapy services in the public and private health systems has been a persistent reality. Besides, patients face several barriers to carrying out rehabilitation, such as physical incapacity to travel to the treatment site, long distances from services, absence/unavailability of guardians, and difficulty with transportation and travel⁷.

This method of service provision can be used in several areas of Speech, Language and Audiology Therapy. In a systematic review⁸ to investigate the applications of telepractice, the authors selected 103 papers, mainly from the area of audiology, followed by speech, language, voice, swallowing, and multidisciplinary, respectively. Regarding diseases/conditions, most studies focused on individuals without known disorders, followed by those with hearing loss, aphasia, and stuttering.

Another review⁹ sought to present an overview of the infrastructure and current technological procedures for telepractice applications, besides the challenges and opportunities of the tool. The results showed that hybrid methods were used in most studies. The general technological components for telepractice activities were computers, web cameras, headphones with integrated microphones, and internet connectivity. The main challenge found by the authors refers to the limitations in the technological components, highlighting the importance of selecting means of connectivity, bandwidth, and equipment based on the desired clinical results. The disadvantages described were: audio feedback (static and echo), equipment malfunction, reliance on participant technology, and participants' limited experience in technology⁹⁻¹⁰.

Although clinical care by telepractice is not an unprecedented exercise arising from the pandemic, doubts about its use and effectiveness when

compared to face-to-face care still permeate clinical speech therapy practice. Also, Audiology and Speech-Language Pathology must conduct their practices ensuring the effectiveness of care with ethics and safe practices².

Therefore, this study aims to carry out an integrative review of the literature on the effectiveness of speech therapy by telepractice compared to face-to-face care.

Methods

The methodology of this study was characterized by an integrative review of the scientific literature. This method allows, based on previous studies, to determine the current knowledge on a specific topic, since it is aimed at identifying, analyzing, and synthesizing results of independent studies on the same topic. Therefore, we sought to understand the effectiveness of telepractice and the scientific evidence in this method of assistance.

Initially, the guiding question of this study was: “What is the scientific evidence available on the

use of telepractice and its effectiveness compared to face-to-face assistance?”

The research was carried out from September to November 2020 and was limited to studies fully-published, without language and year of publication restrictions. The databases consulted were: Pubmed, Web of Science, Science Direct, Cochrane, and Google Scholar.

The structured search strategy followed the database used, intending to cover the largest possible number of studies, using the following descriptors: *Telemedicine, Mobile Health, Health Mobile, mHealth, Telehealth telerehabilitation, eHealth, Telepractice, and Remote care* combined with *Speech Therapy Therapy Speech, Speech Therapies, Therapies Speech and speech-language pathology*. All of the above are considered descriptors registered in the Health Sciences Descriptors (DECs) and Medical Subject Headings (MeSH). For articles not available in the electronic databases or for data not available in the articles included in this review, the authors were contacted to obtain the necessary information. Table 1 contains all the terms used in the different databases.

Table 1. Search strategy in electronic databases.

Databases	Search strategies	No.
Pubmed	((“Telemedicine” [Mesh] OR “Mobile Health” OR “Health, Mobile” OR “mHealth” OR “Telehealth” OR “telerehabilitation” OR “eHealth” OR “Telepractice” OR “Remote care” AND (“Speech Therapy”[Mesh] OR “Therapy, Speech” OR “Speech Therapies” OR “Therapies, Speech” OR “speech language pathology”))	215
Web of Science	(“Telemedicine” OR “Mobile Health” OR “Health, Mobile” OR “mHealth” OR “Telehealth” OR “telerehabilitation” OR “eHealth” OR “Telepractice” OR “Remote care”) AND (“Speech Therapy” OR “Therapy, Speech” OR “Speech Therapies” OR “Therapies, Speech” OR “speech language pathology”)	113
Science Direct	(“Telemedicine” OR “Telehealth” OR “telerehabilitation” OR “Telepractice” OR “Remote care” AND “Speech Therapy” OR “speech language pathology”)	439
Cochrane	(“Telemedicine” OR “Mobile Health” OR “Health, Mobile” OR “mHealth” OR “Telehealth” OR “telerehabilitation” OR “eHealth” OR “Telepractice” OR “Remote care”) AND (“Speech Therapy” OR “Therapy, Speech” OR “Speech Therapies” OR “Therapies, Speech” OR “speech language pathology”)	32
Google Scholar	(“Telemedicine” OR “Telehealth” OR “telerehabilitation” OR “Telepractice” OR “Remote care” AND “Speech Therapy” OR “speech language pathology”)	7550
TOTAL		8349

In this review, editorials, comments and opinions, reflection articles, projects and technical reports, reviews, and articles dealing with other changes that were not related to telepractice were excluded. To expand the number of eligible articles retrieved, no filters were used in the search. Clinical studies that compared the two care methodologies (telepractice and face-to-face care) were included.

A total of 8344 studies were found, 215 in PubMed, 32 in Cochrane, 439 in Science Direct, 113 in Web of Science, and 7550 in Google Scholar. During the searches, most of the articles found were not related to the researched topic.

The screening of studies went through three stages. Initially, the titles and abstracts were analyzed by an evaluator, and studies that did not meet the eligibility criteria were excluded. In this first stage, 120 articles addressed issues related to the topic, including 28 repeated works. Subsequently, the abstracts of 92 articles were read. After this step, 28 papers were selected for a full reading.

Of the articles selected for full reading, 7 were excluded (2 studies sought to test the feasibility of a pilot study to prove the effectiveness of telepractice. However, their results did not compare the methodologies and 5 articles were not available in full. Thus, after all the screening steps, 21 articles were included in this review.

After the final selection of the researched studies included in the analysis, the main conclusions were compiled. Subsequently, a descriptive analysis was performed and a standard form containing information on authors/year/country, type of study, objective, and conclusion was used.

Results

Of the twenty-one studies selected in this integrative review according to the previously established criteria, the United States of America was the country with the highest number of publications with 11 studies, followed by Australia with 7, and Italy, Canada, and South Africa together with 3 publications. In Table 1, these articles are summarized with the description of the authors, year of publication, country, type of study, objectives, and conclusions.

The areas of speech therapy with greater focus were language and speech (n=14), dysphagia (n=4), voice (n=2), and audiology (n=1).

Most articles researched speech therapy assessments (n=11), followed by the therapy itself (n=10). The articles were published between 2003 and 2020. Of these studies, 6 were clinical trials, 3 were randomized^{11, 21, 26}; 2 non-inferiority randomized^{23, 24}, 1 clinical trial²⁵, 5 intervention studies^{14, 19, 28, 29, 31}, 4 validation studies^{12, 15, 20, 21}, 3 pilot studies^{16, 27, 30}, 2 cohort studies^{17, 18}, and 1 comparative study¹³. The types of studies were classified according to the description of the respective authors.

Most of the articles had in their study population patients with different pathologies (dysphonia, brain injury, aphasia, cleft palate, stuttering, phonological disorder, cognitive-communicative disorder, dysarthria, dysphagia, apraxia, and hearing loss) that had speech-language repercussions. Only one study¹⁶ used a sample of normal individuals who simulated dysphagia at different levels of severity. The authors justified the choice of standardized patients, that is, healthy individuals who realistically represent a real patient, to eliminate the risk of undetected aspiration occurring during the evaluation. The objective of this pilot study was to test the feasibility of clinical evaluation of dysphagia in the telepractice modality.

In the articles in which the purpose was the speech therapy assessment,^{11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21} the test methods (face-to-face vs. telepractice) were highly correlated, with high inter-examiner liability and there was no statistically significant difference between the settings. That is, in both settings, therapists were able to satisfactorily assess patients.

In studies focusing on therapy^{22, 23, 24, 25, 27, 28, 29, 30, 31}, in both treatment settings, there was a significant improvement in the parameters evaluated, regardless of the treatment modality, with no statistically significant difference. In both, patients presented gains.

Eleven articles conducted satisfaction surveys^{11, 12, 13, 15, 19, 20, 21, 24, 27, 31} and in almost all of these studies, patients and/or guardians reported moderate to high satisfaction with this type of intervention and indicated a willingness to participate once more in assessment and/or therapy in the telepractice setting. In only one article³¹, parents reported preference and better satisfaction with face-to-face speech therapy. The authors justified that the patients had previously received a face-to-face intervention and that this may have caused some bias due to previous exposure. The authors also reported that although the preference for face-

to-face care was unanimous, parents recognized the ability of telepractice to allow and facilitate meaningful interactions between them and their children similarly to face-to-face interventions.

The studies by Hill et al.²⁰ and Ward et al.²⁴ had in their sample patients diagnosed with apraxia and dysphagia, respectively, at different levels of severity. Although the use of the evaluation performed by telepractice has shown to be viable and reliable, the evaluative speech therapists, in both studies, reported that the severity of the pathology made the evaluation and decision-making difficult.

In the first study²⁰, the authors indicate that due to the severity of the participants' speech apraxia, the speech therapist needs to rely more on non-verbal communication signals, such as facial

expression, to successfully manage the assessment, which was difficult in the remote environment, where audio and video cannot accurately provide this necessary information.

In the second study²¹, in patients with severe dysphagia, the evaluators reported that an ideal evaluation was not so easily achieved due to the increase in the complexity of the patient who presented concomitant dysphagia and cognitive and/or language difficulties, hindering the ability to follow the instructions and further limit the information that the speech pathologist in the remote environment could independently collect. In these cases, there was greater dependence on the assistant, who helped transmit the information to the speech therapist to assist in their decision-making.

Chart 1. Evidence found on the effectiveness of speech therapy by telepractice compared to face-to-face care.

AUTHOR/YEAR/COUNTRY	STUDY DESIGN	OBJECTIVE	CONCLUSION
Georgeadis et al., 2004, US	Randomized clinical trial	Investigate the usefulness of teleservice to perform flow phonation exercises for people with primary muscle tension dysphonia (MTD)	Flow phonation exercises can be used successfully for MTD patients in tele-practice and can improve patient care by providing treatment to underserved individuals in rural or other populations without the ability to go to medical centers where such treatment is available
Dekhtyar et al., 2020, US	Validation study	Discuss the feasibility of WAB-R (West Aphasia Battery) tele-assessment and determine whether administration by videoconference was comparable to administration in person	These findings suggest that the administration of the WAB-R in person and via videoconference can be used interchangeably in this patient population. Additional work should expand to larger sample sizes, a more diverse patient population, and a variety of assessments for individuals with aphasia
Whitehead et al., 2012, US	Comparative study	To determine whether a speech-language assessment performed by a speech-language pathologist using telemedicine would be equivalent to a discursive assessment performed in person	Telemedicine represents an effective means of performing speech assessment in cleft lip and palate patients, enabling greater access to care for underserved populations
Brennan et al., 2004, US	Intervention study	To compare SRP-measured communication across experimental settings, and determine whether subject variables (such as age, education, technology experience, or gender) affected performance differences between settings	The results found in the study illustrate the continued potential for speech therapy using videoconferencing and suggest the need for continued research and development in the field
Hill et al., 2009, Australia	Validation study	To explore the validity and reliability of dysarthria assessment using standardized formal and informal assessments through a purpose-built telerehabilitation system	Valid and reliable assessment of dysarthria using telehealth methods is possible. The robust intra- and inter-examiner reliability found in the face-to-face and remote methods provided strong support for the strength of agreement found between both assessment environments
Sharma et al., 2011, Australia	Pilot study	To provide pilot information on the basic feasibility and validity of performing dysphagia assessments through telerehabilitation	The data were positive, with high levels of agreement observed between the remote evaluator and the face-to-face evaluator in all parameters of interest. This pilot study provides preliminary evidence for the feasibility of assessing remote dysphagia

AUTHOR/YEAR/COUNTRY	STUDY DESIGN	OBJECTIVE	CONCLUSION
Morrell et al., 2017, US	Prospective cohort study	To discuss the development, implementation, and reliability of testing an in-hospital dysphagia assessment for acute stroke patients	This study allowed speech therapists to conduct the assessment according to their standards of practice and did not require the adoption of a specific assessment protocol. Besides, room assistants were not trained in our study. These 2 points should make the implementation more generalizable to urban and rural hospital settings
Ward et al. 2014, Australia	Cohort study	Examine whether the severity of dysphagia affects clinical decisions regarding safety for oral intake and/or clinic perceptions of relationship development and conducting clinical swallowing assessments through telehealth	The data revealed acceptable levels of agreement for the parameters evaluated in all severity groups. Online physicians' insights, however, indicated that a greater proportion of patients in the severely dysphagic group had complex conditions and were more difficult to assess when compared to other groups
Sutherland et al., 2017, Australia	Intervention study	Examine the reliability and feasibility of performing a standardized language assessment with school-age children with known or suspected language impairments via a telehealth application using a computer in a public school setting	The results support the use of telehealth in the assessment of language in school-age children. This innovative and reliable service delivery model has the potential to be used by speech therapists to provide assessments to children in remote communities
Hill et al., 2009, Australia	Validation study	To determine whether the valid and reliable assessment of apraxia of speech using a standardized assessment tool was feasible in telehealth	The results of the present study indicate that the assessment of speech apraxia by ABA-2 (Adult Apraxia Battery) over the internet seems valid and reliable. However, the speech pathologist's comments suggested that participants who have severe speech apraxia may be better suited for an in-person assessment
Ward et al., 2012, Australia	Validation study	To determine the level of agreement between evaluators (in person and online) regarding the safety of oral feeding (complete oral, modified oral, or non-oral) and, regarding the modified oral diet, the recommendations for safe foods/liquids intake	The data show that a clinical swallowing assessment conducted in a remote setting can provide valid and reliable results comparable to clinical decisions made in the face-to-face setting in patients with normal cognition or mild cognitive impairment
Rangarathnam et al., 2015, US	Randomized clinical trial	To investigate the usefulness of telepractice to perform flow phonation exercises for people with primary muscle tension dysphonia (MTD)	Flow phonation exercises can be used successfully for MTD patients in tele-practice and can improve patient care by providing treatment to underserved individuals in rural areas or populations without the ability to go to medical centers where such treatment is available
Meltzer et al., 2018, Canada	Non-inferiority randomized clinical trial	To compare non-inferiority between face-to-face and remote treatment for patients with an objective diagnosis of language disorders (aphasia or cognitive-linguistic communication disorder) quantified by the Western Aphasia Battery - aphasia quotient (WAB-AQ)	Speech-language pathologist-guided computer-based treatment is effective in producing generalized gains in language and communication skills in chronic stroke. Language gains are equivalent whether services are provided via videoconferencing equipment or in person
Carey et al., 2010, Australia	Non-inferiority randomized clinical trial	To investigate whether Camperdown Program telehealth delivery offers a non-inferior alternative to face-to-face treatment for adults who stutter	The results provide evidence to support the use of the Camperdown Program delivered by telehealth as an alternative to face-to-face treatment of this program for adults who stutter
Agostini et al., 2014, Italy	Clinical trial	To explore the feasibility of teleservice compared to face-to-face appointment treatment	The remote treatment of nomenclature deficits is not inferior to face-to-face treatment
Agostini et al., 2014, Italy	Clinical trial	To explore the feasibility of teleservice compared to face-to-face appointment treatment	The remote treatment of nomenclature deficits is not inferior to face-to-face treatment

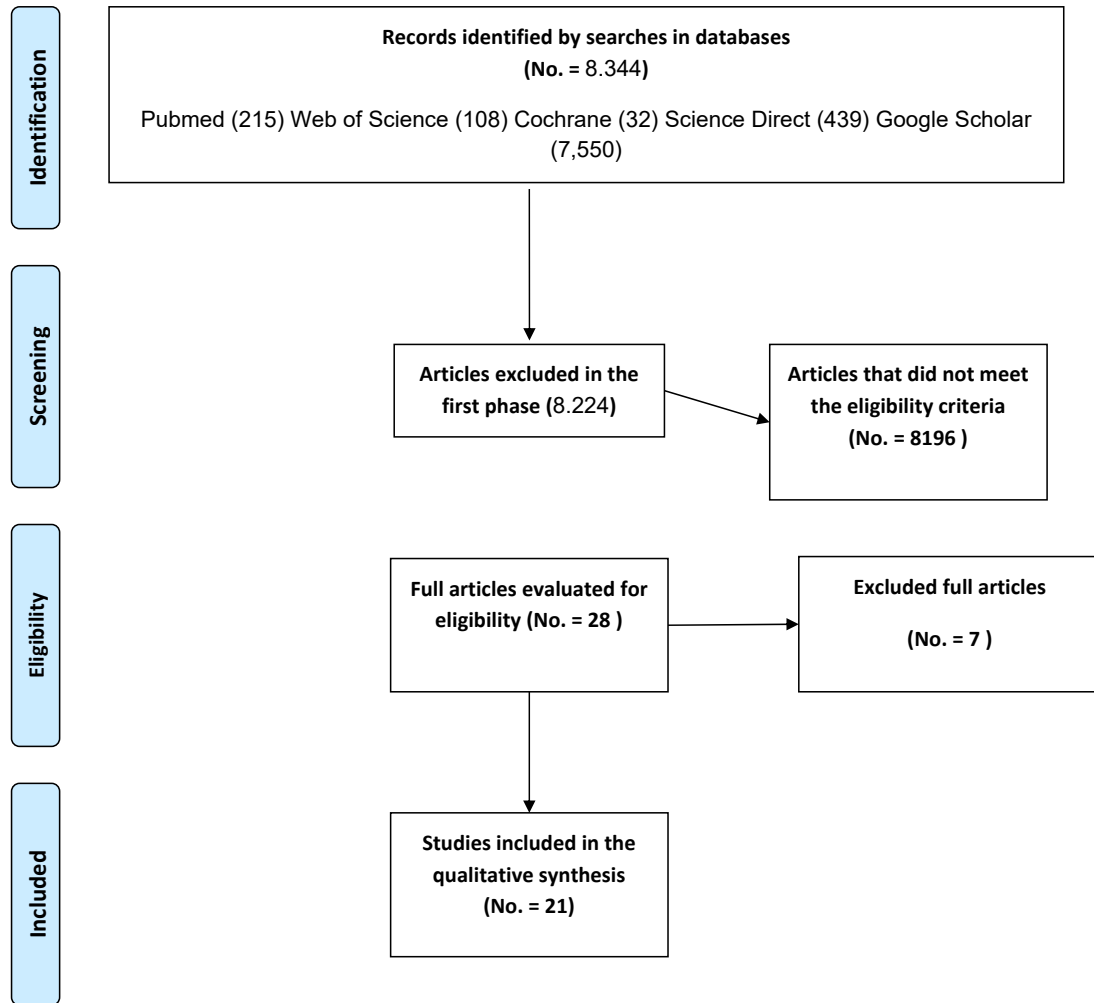


Figure 1. Flowchart of the article search process.

Discussion

This literature review sought to identify the effectiveness of telepractice when compared with face-to-face speech therapy.

The country with the highest number of studies was the USA followed by Australia. The first research on the subject of telepractice was carried out in the USA and later extended to Australia and Canada. These countries have some features in common, such as widely dispersed populations, for which the use of telehealth service delivery is important. Besides, the rising cost of health care and difficulties in recruiting and retaining speech therapists in rural and remote areas have led to

an increase in the development of telepractice services³².

Speech therapy remains a scarce resource in many health services and its availability is especially limited in remote areas⁷. With the use of telepractice, this problem can be mitigated. Among the benefits of its use are: improved access to health and professional qualification; efficiency, with cost reduction in care, with the displacement of patients and professionals; improved quality and solvability of health services; reduced waiting time for necessary services; satisfaction of patients, families, and the community in using telepractice; improved access and approximation of the services they need, among others⁶.

The results of this research showed that the speech-language pathology area with the largest number of studies was language and speech, followed by dysphagia, voice, and audiology respectively, as a result of the variability of the studied areas. Several pathologies which had speech and language repercussions were objects of study.

Although all included studies have established the effectiveness of telepractice in assessment and therapy in their results, the scientific evidence of these studies was limited. Of the twenty-one studies, only five were randomized clinical trials^{11,22,23,24,26}. Well-conducted clinical trials are considered the gold standard studies for determining the effect of a therapy³³.

The low evidence of the studies corroborates a systematic review carried out in 2019³⁴. The authors identified only two randomized clinical trials and one non-inferiority randomized clinical trial among the 31 articles study sample. Besides, only 34% of the intervention studies reviewed included a control group. The authors justify that the inclusion of control variables is fundamental to establishing the effectiveness of the treatment, as it helps to eliminate the possibility of other factors causing the effects of the treatment. Choosing the appropriate methodology is important for the growth and development of research in the field of telepractice.

The satisfaction survey was also used in most studies to investigate whether the teleservice modality was beneficial and satisfactory for users. Almost all articles indicated high satisfaction with the use of this tool by their participants. Satisfaction assessment is important to contribute to the production of useful measures that assist in decision-making and subsidize improvements in the scope of services³⁵.

In a study, Burns et al.³⁶ aimed to examine the results of the service, costs, and consumer satisfaction of a validated model for performing clinical assessments of swallowing in adults through telepractice. In their results, they observed that service efficiency and cost savings were achieved with an average of 2 days of waiting time and an average cost benefit of \$218 per session when using the telepractice service instead of face-to-face care. Also, high physician-to-patient satisfaction has been reported using remote assessments.

In two studies^{20,21} of this review, the severity of the speech-language pathologies presented by

the patients made it difficult for the evaluators to assess and take conduct in the remote environment. It should be considered that the telepractice configuration, for the most part, will be carried out at the patient's residence and with the technological resources available to him, and these instruments will not always have the necessary audio and video quality for clinical impressions to be reliable.

Cherney and Van Vuuren³⁷, in their study, aimed to identify pieces of evidence regarding the assessment and treatment of acquired neurological disorders of speech and language in adults. The researchers noted that technical issues such as camera positioning, lack of zoom focus, inadequate lighting, and background contrast can influence the results of evaluating these patients with communication disorders. The internet quality is another factor that needs to be considered, a small bandwidth (128 Kbit) can make it difficult to detect fine motor movements and precision in the oromotor evaluation due to the low frame rate and pixelated images. In cases of severe dysarthria, these difficulties were more apparent. One solution found to minimize the audiovisual difficulties associated with real-time videoconferencing was the resource for storing and sending high-quality audio and video recordings, which allowed the evaluator to clear up possible doubts during the service. In addition, most speech therapists in the studies analyzed by the authors³⁷ suggested that patients with very severe communication disorders should be evaluated in a face-to-face setting.

Telepractice is a promising modality and has the potential to expand the timely, convenient, and accessible supply of quality services, improving the equity and efficiency of speech therapy care¹. However, even with all the articles in this review ensuring the effectiveness and non-inferiority of the remote care modality when compared to face-to-face care, some gaps remain open and need to be clarified.

Professional qualification for the safe use of these tools is still lacking worldwide. Especially when considering initial training. An online survey with 135 speech therapists carried out in Hong Kong³⁸ revealed that 60% of this sample had never had training in telepractice and that of the 23.7% who reported having undergone training, only 6.7% (9/135) were trained in telehealth during their degree. In another recent survey³⁹ carried out in Brazil, of the 32 speech therapists interviewed,

only 4 reported having contact with the topic of telepractice during their bachelor's, and only 5 performed remote care before the pandemic.

This deficiency in speech-language pathology training needs to be considered since work processes are constantly changing and curricular guidelines and speech-language pathologists need to adapt to the new reality and changes in health problems and the population's needs³⁹. With the advent of the COVID-19 pandemic, telepractice gained visibility and in many situations was the main service tool. Therefore, it is necessary to encourage the continued training of professionals who use technological tools in their work routine, in addition to studies with greater methodological rigor to enable more effective and safer practices.

Another issue still in evidence is the standardization of the tools used for videoconferencing and security regarding internet data. The Federal Council of Speech-Language and Hearing Sciences (CFFa) recommends that the platforms used must comply with the Health Insurance Portability and Accountability Act (HIPAA). It should also be noted that free platforms such as Facebook Messenger, WhatsApp, and Zoom do not comply with the HIPAA protocol². The CFFa recommends the use of the HiTalk platform, which is the first Brazilian Telehealth platform specifically designed for speech therapists. Among the advantages of this platform, we can highlight the maintenance of the privacy of patients and speech therapists, including data encryption.

It is important to highlight that telepractice has advanced a lot in recent years, in terms of directing activities, guidance, regulations, and, especially, good practice in teleconsultation, tele-appointment, telemonitoring, and tele-interappointment. Differences between the different areas of Audiology and Speech-Language Pathology should also be considered, as each area has a specific characteristic in its care. Thus, we suggest larger studies on Telehealth and Telepractice, with current and complete regulations, as well as in-depth knowledge of its regulations.

Future directions

In summary, studies demonstrate that telecare in speech therapy can be a valid and reliable vehicle for evaluation and therapy in the various speech-language pathology areas. However, some factors

can affect the validity of the assessment and the fidelity of the treatment. We suggest studies that seek to elucidate such gaps:

- Well-established criteria of patient characteristics and pathology types most eligible for the use of remote configuration;
- Need to standardize videoconferencing tools and create specific protocols for remote service;
- Professional qualification in the use of telehealth;
- Patient and professional safety to use this tool;
- Need for more studies on the benefits, costs, accessibility, and feasibility of using teleservice, especially in Brazil;
- Development of mobile applications for speech therapy;
- More reliability and accuracy studies with larger and more homogeneous samples, in the most diverse speech-language pathologies.

Conclusion

It is concluded that the current literature on telepractice suggests the use of remote care and demonstrates its non-inferiority when compared to face-to-face care. However, most of these studies have low scientific evidence.

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