

Speech therapy consequences associated with COVID-19: a review

Consequências fonoaudiológicas associadas à COVID-19: uma revisão narrativa

Consecuencias del habla asociadas con COVID: una revisión narrativa

Received: 11/04/2022 | Revised: 11/12/2022 | Accepted: 11/14/2022 | Published: 11/20/2022

Nallanda Victória dos Santos Martins

ORCID: <https://orcid.org/0000-0001-5789-3231>
Universidade Federal de Sergipe, Brasil
E-mail: nallandav0@gmail.com

Solano Sávio Figueiredo Dourado

ORCID: <https://orcid.org/0000-0003-2412-0149>
Universidade Federal de Sergipe, Brasil
E-mail: solanofigueiredo@hotmail.com

Thassya Fernanda Oliveira dos Santos

ORCID: <https://orcid.org/0000-0002-8711-9949>
Universidade Federal de Sergipe, Brasil
E-mail: thassyaf-18@hotmail.com

Gabriel Francisco da Silva

ORCID: <https://orcid.org/0000-0002-9622-2518>
Universidade Federal de Sergipe, Brasil
E-mail: gabriel@ufs.br

Paula dos Passos Menezes

ORCID: <https://orcid.org/0000-0002-4908-540X>
Universidade Federal de Sergipe, Brasil
SejaPhD, Brasil
E-mail: paula.dp.menezes@gmail.com

Abstract

The novel coronavirus (SARS-CoV-2), responsible for the COVID-19 pandemic, causes a respiratory infection disease of rapid transmission through droplets in the air, from person to person, or by contact with contaminated surfaces. Infected people can be asymptomatic or symptomatic, with symptoms like pneumonia, which can lead to hospitalization of these patients. The role of speech therapists in the multiprofessional team has been extremely important in dealing with the pandemic, especially in symptomatic and intubated patients. After extubation, these patients can be affected by serious speech-language pathology consequences, requiring follow-up for rehabilitation with a speech-language therapist. Thus, the aim of this study was to carry out, in an unprecedented way, a review in the literature about the consequences of COVID-19 in the major areas of speech therapy. To meet this objective, a narrative review was carried out, from which it was possible to analyze the major areas of speech therapy in which patients had consequences during or after the COVID-19 infection, such as difficulties in swallowing (dysphagia), tracheostomy, tinnitus, hearing loss, language, and speech delay. It was also possible to present the importance of telephonoaudiology to accompanying patients. Given the above, from the data of this review, it was possible to observe that most of the consequences associated with COVID-19 dealt with the same context: after or during the period of infection, where patients were affected by speech-language pathology consequences which required intervention to assess, rehabilitate and, when necessary, apply appropriate therapy. Furthermore, future investigations, such as randomized clinical trials, are encouraged to better elucidate these consequences, since some information is still found in studies with low scientific evidence such as case reports.

Keywords: Audiology; Buzz; COVID-19; Dysphagia; Speech therapy; Telephonoaudiology.

Resumo

O novo coronavírus (SARS-CoV-2), responsável pela pandemia da COVID-19, causa uma doença infecciosa respiratória de transmissão rápida através de gotículas no ar, de pessoa para pessoa, ou por contato com superfícies contaminadas. As pessoas infectadas podem ser assintomáticas ou sintomáticas, com sintomas como pneumonia, o que pode levar à hospitalização desses pacientes. A atuação do fonoaudiólogo na equipe multiprofissional tem sido de extrema importância no enfrentamento da pandemia, principalmente em pacientes sintomáticos e intubados. Após a extubação, esses pacientes podem ser acometidos por graves consequências fonoaudiológicas, necessitando de acompanhamento para reabilitação com fonoaudiólogo. Assim, o objetivo deste estudo foi realizar, de forma inédita, uma revisão da literatura sobre as consequências da COVID-19 nas principais áreas da Fonoaudiologia. Para atender a esse objetivo, foi realizada uma revisão narrativa, a partir da qual foi possível analisar as principais áreas da

Fonoaudiologia em que os pacientes tiveram consequências durante ou após a infecção por COVID-19, como dificuldades na deglutição (disfagia), traqueostomia, zumbido, perda auditiva, linguagem e atraso na fala. Também foi possível apresentar a importância da telefonoaudiologia para os pacientes acompanhantes. Diante do exposto, a partir dos dados desta revisão, foi possível observar que a maioria das consequências associadas à COVID-19 se deu no mesmo contexto: após ou durante o período de infecção, onde os pacientes foram acometidos por consequências fonoaudiológicas que exigiu intervenção para avaliar, reabilitar e, quando necessário, aplicar a terapia adequada. Além disso, investigações futuras, como ensaios clínicos randomizados, são incentivadas para melhor elucidar essas consequências, uma vez que algumas informações ainda são encontradas em estudos com baixa evidência científica, como relatos de casos.

Palavras-chave: Audiologia; COVID-19; Disfagia; Fonoaudiologia; Telefonoaudiologia; Zumbido.

Resumen

El nuevo coronavirus (SARS-CoV-2), responsable de la pandemia de COVID-19, provoca una enfermedad respiratoria infecciosa que se transmite rápidamente a través de gotitas en el aire, de persona a persona o por contacto con superficies contaminadas. Las personas infectadas pueden ser asintomáticas o sintomáticas, con síntomas como neumonía, lo que puede llevar a la hospitalización de estos pacientes. La actuación del logopeda en el equipo multidisciplinario ha sido sumamente importante en el enfrentamiento a la pandemia, especialmente en pacientes sintomáticos e intubados. Después de la extubación, estos pacientes pueden verse afectados por graves consecuencias de la patología del habla y el lenguaje, lo que requiere un seguimiento para la rehabilitación con un patólogo del habla y el lenguaje. Así, el objetivo de este estudio fue realizar, de forma inédita, una revisión bibliográfica sobre las consecuencias del COVID-19 en las principales áreas de la Logopedia. Para cumplir con este objetivo, se realizó una revisión narrativa, a partir de la cual fue posible analizar las principales áreas de la Logopedia en las que los pacientes tuvieron secuelas durante o después de la infección por COVID-19, como dificultades para tragar (disfagia), traqueostomía, tinnitus, pérdida de audición, retraso en el lenguaje y el habla. También fue posible presentar la importancia de la telefonoaudiología para el acompañamiento de los pacientes. Dado lo anterior, a partir de los datos de esta revisión, fue posible observar que la mayoría de las consecuencias asociadas al COVID-19 ocurrieron en el mismo contexto: después o durante el período de infección, donde los pacientes se vieron afectados por secuelas de patología del habla y lenguaje, que requirió intervención para evaluar, reabilitar y, cuando sea necesario, aplicar la terapia adecuada. Además, se alienta a futuras investigaciones, como ensayos clínicos aleatorizados, a dilucidar mejor estas consecuencias, ya que aún se encuentra alguna información en estudios con baja evidencia científica, como reportes de casos.

Palabras clave: Audiología; COVID-19; Disfagia; Fonoaudiología; Telefonoaudiologia; Zumbido.

1. Introduction

The novel coronavirus (SARS-CoV-2), responsible for the COVID-19 pandemic, is a respiratory infection disease of rapid transmission through droplets in the air, from person to person, or by contact with contaminated surfaces (Wu & McGoogan, 2020), and has flu-like symptoms: fever, dry cough, tiredness, and difficulty breathing. COVID-19 hit the first individual on December 1, 2019, registered by the World Health Organization (WHO), initially being mysterious pneumonia, originating in the City of Wuhan, China. The disease quickly spread through China, and then patients affected by SARS-CoV-2 were identified in other countries, such as Europe, the United States, Canada, and Brazil (Paloski et al., 2020).

Despite all the efforts of the scientific community, ten months after the outbreak of the pandemic in Brazil, to have developed a vaccine to immunize the population, the virus has great potential for mutation and even with the advancement of vaccination, we are experiencing new waves of the pandemic carried out by different variants, sometimes more transmissible, as is the case of the omicron variant, but fortunately with a lower mortality rate (Bedoya-Sommerkamp et al., 2021; Gupta-Smith, 2021). In this context, the World Health Organization (WHO) recognized the role of speech therapists (Gupta-Smith, 2021) in the treatment of patients with COVID-19, especially in symptomatic and intubated patients who, after the post-extubation period, present limitation or restriction of breathing and swallowing. Therefore, the role of speech therapists in the multi-professional team has been extremely important to evaluate, rehabilitate and, when necessary, apply the appropriate therapy (de Melo Cesar & Lima, 2021).

Given the above, this study aims to carry out, in an unprecedented way, a survey in the literature about the consequences of COVID-19 in the major areas of speech therapy. This study is a narrative review based on relevant articles

published in the databases SciELO, Capes Periodicals, Virtual Health Library, Google Scholar, PubMed, and Embase in the period between 2020 and 2021. Most of the articles analyzed reported patient difficulties, post-covid, in the areas of dysphagia (swallowing disorder), tracheostomy, audiology (tinnitus and hearing loss), and speech and language delay. In this article, we also present the importance of telephonoaudiology and what we can expect from this new type of approach.

2. Methodology

This study is a narrative review (Grant & Booth, 2009) based on relevant articles published in the databases SciELO, Capes Periodicals, Biblioteca Virtual em Saúde, Google Scholar, PubMed and Embase in the period between 2020 and 2021. The selected papers were retrieved from crossing search terms (DeCS - Descritores em Ciências da Saúde) COVID-19, speech therapy, audiology, Deglutition. Most of the articles analyzed reported post-covid patient difficulties in the areas of dysphagia (swallowing disorder), tracheostomy, audiology (tinnitus and hearing loss) and speech and language delay. In this article, we also present the importance of telephonoaudiology and what we can expect from this new type of approach.

3. Results and Discussion

3.1 Areas of speech therapy and consequences associated with COVID-19

3.1.1 Telephonoaudiology

The beginning of the COVID-19 pandemic was accompanied by high numbers of infection cases and deaths. Many non-essential activities were stopped to prevent the spread of COVID-19, and so a new style of professional health-patient care was adopted by healthcare workers around the world, the telehealth. In Brazil, the Law No. 13,989, of April 13, 2020, authorized the use of telemedicine during the period of social isolation (Silva et al., O Papel da Telessaúde na Pandemia Covid-19: Uma Experiência Brasileira./2021).

Even with the relaxation of restrictive measures and greater movement of people, two years after the emergence of the COVID-19 pandemic, telehealth still represents an important mechanism for coping with contagion, as it protects health professionals, the community, and the patient from exposure to the virus, avoiding unnecessary displacements, enhancing social distancing, and the practices of telemonitoring, telediagnosis and health education (Paloski et al., 2020).

Despite the advantages and importance of telehealth in this pandemic scenario, this type of approach still divides opinions among professionals. Since not all health professionals can work remotely, the front line of fighting the virus requires direct action by a portion of these professionals working directly in hospitals. On the other hand, many professionals question the humanization and accuracy of the diagnosis and telemonitoring of the telehealth system, due to the lack of direct contact with the patient (Monaghesh & Hajizadeh, 2020).

For speech therapy, non-essential or elective services are all services that do not fit into urgency and emergency, and thus, telephonoaudiology can be performed, including patients in rehabilitation and who are in the follow-up period for phonological disorders, writing difficulties, improves speech intelligibility and children with language delay, as well as adults and elderly people with comorbidities (Dimer et al., Pandemia do COVID-19 e implementação de telefonaudiologia para pacientes em domicílio: relato de experiência./2020).

In this context, telephonoaudiology was essential to guarantee the care of patients with dysphonia and guarantee them voice therapy. Queiroz et al. (2021) conducted a review study that evaluated voice therapy through telephonoaudiology in dysphonic patients. Based on the results found, the authors reported that professionals used different methodologies in therapies with patients with Parkinson's disease, the elderly, and people with muscular tension dysphonia and that they liked telecare in the context of the COVID-19 pandemic. In this way, it was possible to verify that the telephonoaudiology used in

the vocal clinic with different audiences with vocal alterations resulted in patient satisfaction and that there is a promising possibility for this type of care (Queiroz et al., 2021)

Thus, telehealth has been an important resource for the health professional-patient relationship at a distance, however, the advance of vaccination brings us a look to the future concerning this method of care, such as: what can we expect with the continuation of this method? Because, with the online service scenario, it managed to cover a greater number of professionals "going" to patients with difficult access to the professional, as a cost-benefit measure regarding the reduction in travel time of therapists and/or patients and in the displacement of individuals with impaired physical mobility (Queiroz et al., 2021).

3.1.2 Dysphagia

Swallowing consists of the act of moving food, transformed into a "food cake" by mechanical and chemical transformations, from the mouth to the stomach, that is, the act of swallowing. Patients who progressed to severe cases of COVID-19 and who needed to be intubated have presented difficulties in swallowing in the post-hospitalization period (post-extubation), characterizing dysphagia (Rossi-Barbosa et al., 2022).

At the beginning of the pandemic, it was recommended to suspend speech therapy in procedures that generate aerosols, for the safety of the professional, and only those with extreme emergencies should be maintained, according to the Brazilian Federal Council of Speech Therapy (CFFa) (Rossi-Barbosa et al., 2022). However, at the time of extubation of the patient affected by COVID-19, it has speech-language pathology consequences, thus requiring the performance of the speech-language therapist.

Lima et al. (2020) followed 77 patients of both genders (male and female) for 12 months to observe the functional evolution of swallowing in intensive care unit (ICU) patients. In this study, the authors identified that patients with acute respiratory syndrome (COVID-19) required intubation and prolonged mechanical ventilation and, therefore, were at high risk of oropharyngeal dysphagia, changes that can cause severe pulmonary complications, dehydration, and malnutrition. Still based on the data of this research, it was identified that these patients, for the most part, need speech therapy interventions to recover swallowing, such as Coaptation and glottic vibration; orofacial isometric exercises (Lima et al., *Evolução funcional da deglutição em pacientes com COVID-19 internados em UTI./2020*).

This data reinforces that speech therapy monitoring is essential, especially with the multidisciplinary team at the patient's bedside, because without the presence of the speech therapist, complications resulting from COVID-19 can increase the length of stay of these patients by up to four times. In the study by Lima et al., the authors also found that patients affected by the virus or the body's immune response to it could acquire neurological, central, and peripheral sequelae. Thus, the authors observed that there was a significant recovery in the functional patterns of swallowing with the interventions performed by the speech-language pathologists and that 83% of the 77 patients required up to three interventions for the recovery of safe swallowing patterns (Lima et al., *Evolução funcional da deglutição em pacientes com COVID-19 internados em UTI./2020*).

Another study, from the same research group, also evidenced the post-acute consequences, caused by prolonged orotracheal intubation time, which include severe muscle weakness and dysphagia in these patients affected by COVID-19. In this research, the authors surveyed the ICU database of the university hospital, where the study was carried out, and performed a comparison between extubated patients in critical condition with COVID-19 and patients who did not have the respiratory syndrome, so that thus, it was possible to observe and monitor the healing period and return to safe swallowing. To this end, a bedside assessment was carried out, in which a classification of safe levels to rehabilitate swallowing was applied, assigning numbers between 1 and 7; in which "1" the patient is unable to perform safe swallowing and "7" the individual can eat safely

(Lima et al., 2020). This classification is known as FOIS – Functional Oral Intake Scale, and it is important to follow up and monitor the dysphagic patient.

In this way, the researchers observed that in the post-extubation period, ICU patients affected by COVID-19 (or not), mostly had dysphagia consequently. However, an increase in the number of patients with dysphagia was noticeable in participants with COVID-19. However, these patients, compared to those not affected by COVID-19, required fewer sessions to rehabilitate swallowing (Lima et al., 2020).

As much as the indications are that, after extubation, the patient is helped to perform the rehabilitation procedure, with a hospital speech therapist. Studies carried out to suggest some care for this follow-up (Araújo et al., 2020) since the inspection requires proximity to the patient's face, which is performed orally, to check swallowing, mouth, tongue, and oral mucosa. These procedures should be avoided in infected patients for the safety of speech therapists, and in case of extreme need, adequate protection of the entire face of the professional must be ensured, care should be taken with the contact of the mucosa and body fluids, as well as the disposal of utensils or hospital cleaning and disinfection.

In the post-COVID-19 world, it will be necessary to adopt non-invasive swallowing and airway safety tests. Therefore, applications, including electronic medical record systems and video conferencing platforms (as discussed in section 2.1), are being used to contribute to healthcare (Brotsky & Gilbert, 2020).

Still, on dysphagia, we can mention tracheostomy, a surgical procedure that consists of making an opening in the wall of the trachea, when the passage of oxygen is interrupted (Ricz et al., 2011). Tracheostomy was considered one of the procedures that generate the most aerosols, so in tracheostomized patients, it is recommended to avoid procedures such as endotracheal aspiration, which consists of mechanically removing pulmonary secretions, as it generates more fluid droplets (Araújo et al., 2020). And in case of urgency, the COVID-19 test should be carried out before the procedure for the safety of the professional. It has also been shown that the prolonged time of invasive ventilation in the intubation of the patient affected by COVID-19, can lead to tracheostomy which is also a risk factor for dysphagia (de Melo Cesar & Lima, 2021).

3.1.3 Audiology

According to reports from speech therapy professionals, the number of patients in their offices with audiological complaints has increased after being affected by the COVID-19 infection (Jeong et al., 2021). In this review, we analyzed some studies on audiological characteristics in patients with COVID-19 and observed that both hearing loss and tinnitus, which is noise in the ear or in the brain that does not result from an external source, were reported by patients. Until the completion of this article and as has been reported by other works, there is little published evidence connecting the new coronavirus and tinnitus directly (Chirakkal et al., 2021), which represents an important gap in this area of knowledge.

From this perspective, Mustafa conducted a study with patients affected by COVID-19, evaluating the impact of this new viral infection on the auditory system, through two groups: test and control. An audiological assessment was performed in these patients, anamnesis, basic audiological assessment, and acoustic immittance assessment. The study data allowed us to infer that COVID-19 infection can cause physical limitations in the functions of the cochlear hair cells. However, more research is needed in this area to better characterize this phenomenon (Mustafa, 2020).

In addition, reports indicate that Sars-CoV-2 infection can also affect hearing and patients have reported complaints of tinnitus and hearing loss (Almufarrij & Munro, 2021) or a lower response amplitude in otoacoustic emissions of those who tested positive for COVID-19 (Ribeiro & Silva, 2021).

As the report of the first case of SSNHL (Sudden Sensorineural Hearing Loss) in the UK after COVID-19: a 45-year-old patient with asthma presented to the ENT department after a week of hearing loss and tinnitus complaint, while

hospitalized for treatment of COVID-19. After drug-treatment there was a partial subjective improvement in her hearing (Koumpa et al., 2020). We can also observe in the following case: a 35-year-old woman, with persistent symptoms even after recovering from COVID-19, underwent treatment at home because she did not have symptoms of pneumonia, complaining of tinnitus and loss of hearing sensitivity in the left ear. She then received an audiological evaluation, and it was found that the COVID-19 infection had deleterious effects on the outer hair cells of the cochlea. The conclusion of this study corroborates the study by Mustafa (2020) (Mustafa, 2020) who also highlighted the importance of detailed audiological diagnosis in patients with COVID-19 (Chirakkal et al., 2021).

Another recent study showed reports in the literature of hearing disorders, in addition to those already known as olfactory and gustatory consequences. Thus, some primary symptoms were observed, such as sensorineural hearing loss, which affects the inner ear causing damage to the hair cells or the auditory nerve, resulting in a lower perception of sound intensities, which may be permanent or temporary. Possible conditions associated with the use of antiviral drugs such as antimalarials were also reported, and there may be an interrelationship between hearing loss and COVID-19 because they have an affinity with melanin-carrying cells found in the inner ear. Thus, the correlation between changes in hearing function and COVID-19 was noticed (Britto et al., 2021).

Also in this context, in the study by Thrane et al (2020), researchers investigated audiological changes such as tinnitus or concomitant hearing loss and monitored the improvement and recovery of patients affected by the consequences of COVID-19. To this end, data were collected from questionnaires sent every two months to 225 patients with ageusia (loss of taste) or anosmia (loss of smell) related to COVID-19. Individuals over 18 years of age and who had sudden chemosensory hearing loss could participate in the study (Thrane et al., 2022).

In this study, specific questions about hearing loss, tinnitus and headache were asked, very simple and direct, such as: “Which of the following symptoms did you experience during or after your COVID-19 infection?”, after analyzing all the data, it was possible to observe reports of tinnitus, hearing loss, and ear fullness (clogged ear sensation). The median time for tinnitus to appear after the initial symptoms of infection was 30 days. Of the evaluated patients, 21 presented tinnitus, 7 showed recovery, 7 reductions and 7 did not evaluate recovery with a mean time of 258 days. Of these, 17 patients were diagnosed with chemosensory hearing loss, two reported normalities through the questionnaire and 10 total improvements, but not as before the infection, and 5 showed no improvement with a mean time of 266 days (Thrane et al., 2022).

Soon after data collection and analysis, it was possible to infer that COVID-19 has a significant association with audiological consequences as a common symptom. However, we need to carefully analyze these data, because most of them are self-reported by patients, that is, a studies limitation, but not that can be ignored and discarded, because as previously mentioned, viral infections in the upper respiratory tract usually cause intermittent Eustachian tube dysfunction due to mucosal swelling, causing ear symptoms such as conductive hearing loss and tinnitus (Thrane et al., 2022).

3.1.4 Language and speech

The WHO recommended that all health professionals use personal protective equipment (PPE) such as the use of respiratory protection masks, closed shoes, gloves, and face or eye protection to ensure Biosafety, as a way of preventing infection by the coronavirus. However, the use of these PPE makes conversation difficult, which directly impacts language and speech (A. C. L. Porto et al., 2020).

Studies have reported that the use of PPE makes it difficult not only to speak but also to understand what is being said, which is intensified in patients with hearing loss. A device used by many people to understand what is being said is lip reading, a strategy that was made impossible using masks.

This is an important point of debate, as the use of PPE, despite being beneficial and protective, brought this consequence that also needs to be discussed, since it is an additional factor in the difficulty of understanding the act of communicating, as speech can be attenuated or distorted depending on the use of the mask. Although these are important points of discussion, here it is necessary to consider the cost-benefit and in a pandemic scenario, such as the one we refer to in the present work, biosafety standards must be maintained, and with the use of the mask (Goldin et al., 2020; A. C. L. Porto et al., 2020).

Another highlight regarding the impact of speech because of the pandemic is the language delay (speech) in children who were born about a year before the pandemic or during the period of social isolation. However, there are still not enough studies on the problem associated with COVID-19, since the available research is equivalent to the previous period of the pandemic in which children already had this condition due to biological, social, central nervous system pathologies, of origin genetic or psychiatric, these data may help to understand and further studies are needed to investigate the relationship between language delay and social isolation in children.

It is also possible to mention another scenario of isolation and its social effects on the communication of children and adolescents with autism. As previously mentioned, social isolation was extremely harmful to young people, due to the closing of schools and public places where there is a greater number of social interactions. With the return of these activities, many young people have difficulties, since the situation generates insecurity in schools and families. In the study by Givigi et al (2021) the authors mentioned that in situations of social normality, children and adolescents with autism would be in schools and exposed to rehabilitation activities, which are essential for their development, for many hours a day. However, the changes imposed due to the quarantine are reflected in the difficulties in behavior and communication (Givigi et al., 2021).

The child's language development proceeds predictably throughout the various stages of speech and expression development because before starting to speak, the child already communicates with the look, expressions, or body movements (Amorim, 2011). If the child presents any of the following clinical observations, an immediate speech therapy intervention should be used, as it may be a language delay:

- 8 weeks – does not react to nearby sounds
- 10 months – does not vocalize
- 18 months – does not say a word
- 2 years – does not say sentences
- 3 years – incomprehensible speech
- 6 years – the persistence of articulatory changes (Amorim, 2011)

It is already scientifically proven and based on the knowledge that Lev Vygotsky presents us, the idea that the individual develops his cognition through social interactions and that social experience is a key point for adequate development, which can be carried out through contact with other children, from preschool, playgrounds or with the family (Vasconcelos et al., 2018). But, of course, this becomes impossible in a pandemic scenario, in which it is extremely necessary to keep a distance from other people or environments with a possible risk of contamination.

At Federal University of Minas Gerais (UFMG-Brazil), some researchers developed a study to understand these impacts on children and identify ways to minimize them. There was a report of a mother who already observed some signs in her daughter, such as language delay, separation anxiety when the mother needs to perform household chores or telework, changes in sleep rhythm, difficulties with interacting with people who do not part of the child's life, and on the part of the mother, all this ends up becoming stressful (UFMG, 2021).

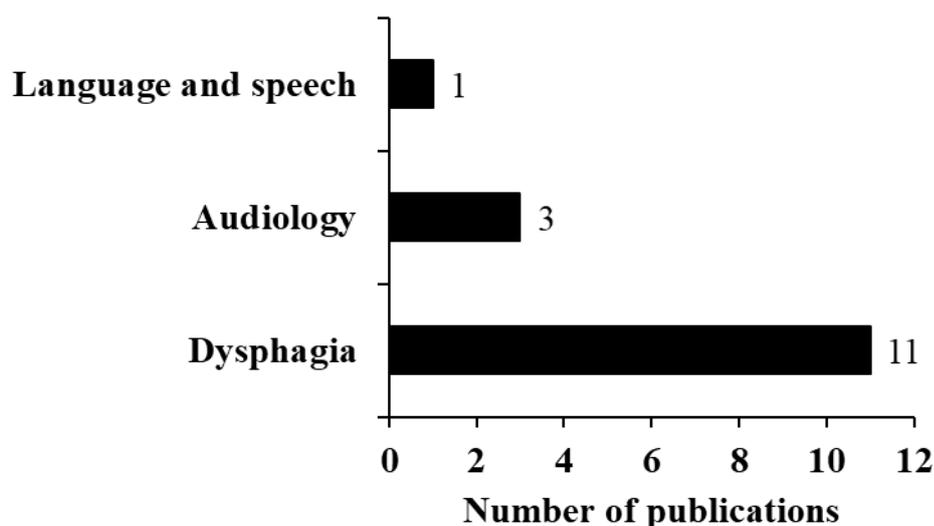
Language development also takes place through stimuli, the Empiricist-Based Learning Theory, which argues that children develop their linguistic knowledge through stimulus-response, imitation, and reinforcement (Nóbrega & Moita Minervino, 2017). That is, at home the child ends up being satisfied with his requests being resolved by the family, and if any of them is denied, the child expresses himself through crying, but the participation of the adult is important in the development of speech and language of child.

It is important to emphasize again that the studies discussed here predate the COVID-19 pandemic, however, the reports of professionals and family members are contemporaneous to the scenario of social isolation. Thus, we suggest that more scientific evidence is needed about language delay in children during the period of social isolation.

3.2 Challenges and Perspectives

Based on the analyzed articles, an informative graph (Graph 1) was constructed with a quantitative view of the works found in the following databases: SciELO, Capes Periodicals, Virtual Health Library, Google Academic, PubMed, and Embase. From the analysis of this graph, it is pertinently observed the need for a greater number of research in several areas of speech therapy in the context of the COVID-19 pandemic, so that a broader and deeper reach of information based on evidence on the speech-language consequences associated with COVID-19.

Graph 1 - Number of publications in the main areas of Speech Therapy in the context of Covid-19 pandemic.



Font: Authors.

Among the areas that need more studies, audiology stands out in this work, more specifically when it comes to studies that address the correlation between tinnitus and COVID-19, emphasizing that so far, most of these studies are published as case reports. In this context, we can also mention the scarcity of research in the field of language and speech, mainly aimed at understanding the impacts caused by the pandemic and its consequences on communication. On the other hand, studies on dysphagia are found in greater numbers, enabling a greater range of information regarding the speech-language pathology consequences and, consequently, on the conduct of speech-language pathologists in these cases.

It is important to emphasize that the speech-language pathologist's work spans multiple environments (ICU, ward, outpatient clinic, home) and aims to meet the most different speech-language pathology demands arising from the disease. Thus, given the need to adapt to the unprecedented situations brought about by COVID-19, the speech therapist must have a

careful and detailed look at the specific needs of each patient, thinking and elaborating on plans, strategies, and personalized therapies, above all, together with all the professionals who are part of the multidisciplinary team and who accompany the patient.

Thus, when considering the challenges imposed by COVID-19 on all fronts of action, the need for trained and specialized professionals to work with patients with COVID-19 is essential (A. C. Porto et al., 2020). Given this, the execution of a greater number of studies and research over time, in the areas that make up speech therapy and that are affected by SARS-CoV-2, will contribute to guiding the performance of these professionals in the most different clinical situations, rethinking, reflecting, and reformulating their actions.

There is no doubt that the speech therapist plays a fundamental and essential role in the intervention of patients with COVID-19 (A. C. Porto et al., 2020) evaluating and enabling an early and safe hospital discharge, investigating the biomechanics of swallowing and guiding the best strategy regarding the rehabilitation and reintroduction of oral feeding in line with the evolution of the condition, respecting the limits imposed by a pathology that still has its facets being unveiled by science and favoring the prompt recovery of the patient (Freitas et al., 2020). In addition to these aspects, the speech therapist is the professional qualified to perform the screening, evaluation, qualification, and rehabilitation of voice, orofacial motricity, and communication (A. C. Porto et al., 2020).

Therefore, given the advancement of scientific discoveries, unraveling the mechanisms of action and the consequences generated by SARS-CoV-2 in the human body, as well as the deepening of professional speech therapists in scientific findings and innovations to provide better technical support in their work in the multidisciplinary team and improving the quality of life of patients, the impacts caused by the consequences of COVID-19 in the major areas of speech therapy will have a broader and more effective resolution, increasingly enhanced by the acquisition of new knowledge.

4. Conclusion

Based on the studies presented, it was possible to infer that the COVID-19 pandemic had an important impact on the most diverse areas of speech therapy (dysphagia, tracheostomy, audiology, speech, and language), demanding a greater need for these professionals in patient care together with the team. multi-professional. In view of this, future clinical trials are necessary to provide scientific evidence of the treatment and rehabilitation of people with COVID-19 sequelae. More studies are also welcome to address the implications of performing basic procedures through telephonoaudiology.

Acknowledgments

We acknowledge CAPES/BRAZIL to fellowship to PPM Bolsista CAPES/BRAZIL (Grant #88887.625437/2021-00 referring to CAPES PREMIO - Programa Prêmio Capes de Teses).

References

- Almufarrij, I., & Munro, K. J. (2021). One year on: an updated systematic review of SARS-CoV-2, COVID-19 and audio-vestibular symptoms. *International Journal of Audiology*, 60(12), 935-945. <https://doi.org/10.1080/14992027.2021.1896793>
- Amorim, R. (2011). Avaliação da criança com alteração da linguagem. *Nascer e Crescer*, 3.
- Araújo, B. C. L., Domenis, D. R., Ferreira, T. H. d. P., Merelles, C. L. d. A., & Lima, T. R. C. d. M. (2020). COVID-19 e disfagia: guia prático para atendimento hospitalar seguro - número 1. *Audiol. Commun. Res*, 25, 5.
- Bedoya-Sommerkamp, M., Medina-Ranilla, J., Chau-Rodríguez, V., Li-Soldevilla, R., Vera-Albújar, Á., & García, P. J. (2021). Variantes del SARS-CoV-2: epidemiología, fisiopatología y la importancia de las vacunas. *Revista Peruana de Medicina Experimental y Salud Pública*, 38(3), 442-451. <https://doi.org/10.17843/rpmesp.2021.383.8734>

- Britto, D., Rocha, M. F. B., Silva, J. D. D., Pinheiro, N. D. S., Silva, L. K. D., & Advíncula, K. P. (2021). Auditive and Vestibular Changes Related to the Use of Hydroxychloroquine and Chloroquine: An Integrative Review. *Int Arch Otorhinolaryngol*, 25(2), e309-e317. <https://doi.org/10.1055/s-0040-1722292>
- Brodsky, M. B., & Gilbert, R. J. (2020). The Long-Term Effects of COVID-19 on Dysphagia Evaluation and Treatment. *Arch Phys Med Rehabil*, 101(9), 1662-1664. <https://doi.org/10.1016/j.apmr.2020.05.006>
- Chirakkal, P., Al Hail, A. N., Zada, N., & Vijayakumar, D. S. (2021). COVID-19 and Tinnitus. *Ear Nose Throat J*, 100(2_suppl), 160s-162s. <https://doi.org/10.1177/0145561320974849>
- de Melo Cesar, A., & Lima, M. D. (2021). *Fonoaudiologia e COVID-19: Guia de Intervenção*. Thieme Revinter.
- Dimer, N. A., Canto-Soares, N. D., Santos-Teixeira, L. D., & Goulart, B. N. G. (2020). The COVID-19 pandemic and the implementation of telehealth in speech-language and hearing therapy for patients at home: an experience report. *Codas*, 32(3), e20200144. <https://doi.org/10.1590/2317-1782/20192020144>
- Freitas, A. S., Zica, G. M., & Albuquerque, C. L. d. (2020). Coronavirus pandemic (COVID-19): what speech therapists should know. *Codas*, 32, 3.
- Givigi, R. C. d. N., Silva, R. S., Menezes, E. d. C., Santana, J. R. S., & Teixeira, C. M. P. (2021). Efeitos do isolamento na pandemia por COVID-19 no comportamento de crianças e adolescentes com autismo. *Rev. latinoam. psicopatol. fundam*, 24, 23.
- Goldin, A., Weinstein, B., & Shiman, N. (2020). Speech blocked by surgical masks becomes a more important issue in the Era of COVID-19. *Hearing Review*, 27, 2.
- Grant, M. J., & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Info Libr J*, 26(2), 91-108. <https://doi.org/10.1111/j.1471-1842.2009.00848.x>
- Gupta-Smith, V. (2021). Science in 5. In *Episode #63 - Omicron variant* <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/media-resources/science-in-5/episode-63---omicron-variant>
- Jeong, M., Ocwieja, K. E., Han, D., Wackym, P. A., Zhang, Y., Brown, A., Moncada, C., Vambutas, A., Kanne, T., Crain, R., Siegel, N., Leger, V., Santos, F., Welling, D. B., Gehrke, L., & Stankovic, K. M. (2021). Direct SARS-CoV-2 infection of the human inner ear may underlie COVID-19-associated audiovestibular dysfunction. *Communications Medicine*, 1(1), 44. <https://doi.org/10.1038/s43856-021-00044-w>
- Koumpa, F. S., Forde, C. T., & Manjaly, J. G. (2020). Sudden irreversible hearing loss post COVID-19. *BMJ Case Rep*, 13(11). <https://doi.org/10.1136/bcr-2020-238419>
- Lima, M. S., Sassi, F. C., Medeiros, G. C., Ritto, A. P., & Andrade, C. R. F. (2020). Functional development of swallowing in ICU patients with COVID-19. *Codas*, 32(4), e20200222. <https://doi.org/10.1590/2317-1782/20192020222>
- Lima, M. S., Sassi, F. C., Medeiros, G. C., Ritto, A. P., & Andrade, C. R. F. (2020). Preliminary results of a clinical study to evaluate the performance and safety of swallowing in critical patients with COVID-19. *Clinics (Sao Paulo)*, 75, e2021. <https://doi.org/10.6061/clinics/2020/e2021>
- Monaghesh, E., & Hajizadeh, A. (2020). The role of telehealth during COVID-19 outbreak: a systematic review based on current evidence. *BMC Public Health*, 20(1), 1193. <https://doi.org/10.1186/s12889-020-09301-4>
- Mustafa, M. W. M. (2020). Audiological profile of asymptomatic Covid-19 PCR-positive cases. *Am J Otolaryngol*, 41(3), 102483. <https://doi.org/10.1016/j.amjoto.2020.102483>
- Nóbrega, J., & Moita Minervino, C. (2017). Análise do nível de desenvolvimento da linguagem em crianças abrigadas. *Psicologia Argumento*, 29. <https://doi.org/10.7213/tpa.v29i65.20361>
- Paloski, G. d. R., Barlem, J. G. T., Brum, A. N., Barlem, E. L. D., Rocha, L. P., & Castanheira, J. S. (2020). Contribuição do telessaúde para o enfrentamento da COVID-19. *Esc. Anna. Nery*, 24, 6.
- Porto, A. C., Luciana Bernadino de, O., Jorgeane de Albuquerque, C., Iana Mara Cândido, A., Moisés Andrade Dos Santos De, Q., & Priscilla Mayara Estrela, B. (2020). Atuação fonoaudiológica em pacientes covid-19: revisão integrativa: phonoaudiological performance in covid-19 patients: integrative review. *Cadernos ESP*, 14(1), 38 - 44. <https://cadernos.esp.ce.gov.br/index.php/cadernos/article/view/305>
- Porto, A. C. L., Gomes, R. J., Silva, T. M. d. C., Barbosa, P. M. E., Sousa, C. S., & Marques, F. J. d. F. (2020). Aspectos de Biossegurança Com Enfoque em Fonoaudiologia: Revisão de Literatura. *Ensaio*, 24, 6.
- Queiroz, M. R. G., Pernambuco, L. A., Leão, R. L. d. S., & Lucena, J. A. (2021). Terapia vocal no contexto da Telefonaudiologia em pacientes disfônicos: revisão integrativa. *Audiol Commun Res.*, 26, 9.
- Ribeiro, G. E., & Silva, D. P. C. d. (2021). Audiological implications of COVID-19: an integrative literature review. *Rev. CEFAC*, 23, 7.
- Ricz, H. M. A., Mello Filho, F. V. d., Freitas, L. C. C. d., & Mamede, R. C. C. M. (2011). Traqueostomia. *Medicina (Ribeirão Preto)*, 44, 7.
- Rossi-Barbosa, L. A. R., Pereira, S. A. A., & Oliveira, G. D. d. (2022). Atuação do fonoaudiólogo frente ao paciente com COVID-19 em relação ao distúrbio da deglutição. *Bionorte*, 9(1), 1-3. <http://revistas.funorte.edu.br/revistas/index.php/bionorte/article/view/130>
- Silva, R. S. D., Schmtiz, C. A. A., Harzheim, E., Molina-Bastos, C. G., Oliveira, E. B., Roman, R., Umpierre, R. N., & Gonçalves, M. R. (2021). The Role of Telehealth in the Covid-19 Pandemic: A Brazilian Experience. *Cien Saude Colet*, 26(6), 2149-2157. <https://doi.org/10.1590/1413-81232021266.39662020>
- Thrane, J. F., Britze, A., & Fjaeldstad, A. W. (2022). Incidence and duration of self-reported hearing loss and tinnitus in a cohort of COVID-19 patients with sudden chemosensory loss: A STROBE observational study. *Eur Ann Otorhinolaryngol Head Neck Dis*, 139(3), 125-128. <https://doi.org/10.1016/j.anorl.2021.07.012>

UFMG, F. d. M. d. (2021). *Atraso de linguagem e dificuldade de interação: os impactos da pandemia na vida das crianças*. Faculdade de Medicina da UFMG. <https://www.medicina.ufmg.br/atraso-de-linguagem-e-dificuldade-de-interacao-os-impactos-da-pandemia-na-vida-das-criancas/>

Vasconcelos, E. V., Braz, S. I. M., & Duarte, C. R. F. (2018). Intervenções com crianças um relato de experiência: uma contribuição da psicologia social comunitária diante das comunidades. . *Editora Realize*, 12.

Wu, Z., & McGoogan, J. M. (2020). Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. *JAMA*, 323(13), 1239-1242. <https://doi.org/10.1001/jama.2020.2648>