

The Application and Benefits of Teledentistry Nowadays: A Narrative Study

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Abstract

The COVID-19 pandemic was one of the worst health crises in history, due to the high incidence and lethality rate and the lack of knowledge about this new virus. With the lack of effective treatments, non-pharmacological measures were adopted, such as social distancing, use of masks, and prohibition of events with agglomerations to contain the pandemic. Health services also suffered restrictions, and in dentistry, elective treatments were canceled, attending only urgencies. In this pandemic scenario and the need for continuity of care to the population, telehealth services were strengthened. Based on this, this work aimed to verify the benefits of teledentistry nowadays and during the pandemic, in addition to present the difficulties for its implementation. The present work was made based on a literature review of articles related to teledentistry, telehealth, and COVID-19 pandemic using the following platforms: Pubmed, Medline, Scielo, Lilacs, Cochrane and Google scholar. It can be concluded that teledentistry, as well as telehealth services, is a promising tool within society since its implementation implies benefits such as cost reduction and improved access to health services. Its use proved to be effective during the pandemic because it provided a reduction of the spread of the virus while preserving the provision of care. To carry out its implementation, it is necessary to get over some barriers such as the lack of knowledge of professionals and precariousness of resources, in view of this, there is the need to create concise policies and training courses about the subject.

Keywords: Telehealth; Teledentistry; COVID-19 Pandemic; Public Health Dentistry; eHealth Policies

Abbreviations

COVID-19: Corona Virus Disease-19; WHO: World Health Organization; PHEIC: Public Health Emergency of International Concern; ANVISA: Brazilian Health Regulatory Agency; H1N1: Influenzavirus A; CFO: Brazilian Federal Council of Dentistry; PAHO: Pan American Health Organization; UFRGS: Federal University of Rio Grande do Sul; ICTs: Information and Communication Technologies; ADA: American Dental Association; TDA: Total Dental Access; US: United States; SUS: Brazilian Health Unic System; ITI: Brazilian National Institute of Information Technology; ICP:

BRASIL - Brazilian Public Key Infrastructure; NHS: National Health Service; RNDS: Brazilian National Health Data Network; DCN: Brazilian National Curriculum Guidelines; HEI: Higher Education Institutions; PHC: Primary Health Care

Introduction

At the beginning of 2020, one of the biggest health crises that devastated humanity began, the Coronavirus (COVID-19) pandemic. On December 31, 2019, the World Health Organization (WHO) received the first alert about cases of pneumonia that were

occurring in the city of Wuhan, China, but without an apparent cause [1]. A week later, these patients were diagnosed with a new type of coronavirus, Sars-CoV-2. On January 30, 2020, with the increase in the number of cases reaching other countries, the WHO declared state of Public Health Emergency of International Concern (PHEIC) which, according to Brazilian Health Regulatory Agency (ANVISA), meant an extraordinary event constituting a public health risk due to the international spread of the disease, requiring a coordinated international response [2].

Historically, a Public Health Emergency of International Concern has only been declared six times: H1N1 pandemic in 2009; spread of poliovirus in 2014; Ebola outbreak in West Africa in 2014; Zika virus and cases of congenital malformations and microcephaly in 2016; Ebola outbreak in the Democratic Republic of Congo in 2016 [3].

In Brazil, the first recorded case of COVID-19 was in São Paulo, notified on February 26, 2020, and the first death from the disease was confirmed by the Brazilian Ministry of Health on March 17, when the outbreak of the new virus was already classified as a pandemic by the WHO. From the first death, the country took 17 days to reach the 100th case, but only seven more to reach the thousandth and, in another 14 days, the 10,000 cases mark [1].

In view of this, a rapid deployment of health departments was necessary to combat the COVID-19 pandemic that has spread rapidly across several countries, with a considerable lethality rate. In April, 2020 more than 2 million cases had been recorded with 120,000 deaths related to the new coronavirus [4].

With the exponential increase in cases, some health systems were close to collapse due to the lack of knowledge about the new virus, combined with its high dissemination and mortality, especially in vulnerable populations, which made it difficult to find a strategy for the pandemic control [4]. Adjunct to this, Aquino, *et al.* report the lack of vaccine and therapeutic measures that, together with the high rate of transmissibility and the high number of asymptomatic cases, corroborated to reach in this scenario of global crisis [5].

In this context, the biggest challenge for the health departments and governments was the search for non-pharmacological actions

and strategies that help the combat the pandemic, reducing the rate of new cases and deaths, in addition to preserving the functioning of health systems [6]. For that, several countries have implemented containment measures, such as the isolation of confirmed cases, use of face masks, and social distancing plans - since the closing of schools and events with agglomeration, until the prohibition of circulation in the streets. These measures were implemented gradually and based on the scenario of each country, according to the need seen by governments [5,6].

In this pandemic scenario, the WHO prepared a document with orientations for health services to face the pandemic with measures to slow the spread of the virus, ensure the health care of the population and reduce the damage. Among the measures mentioned, it is worth highlighting the adoption of telehealth services [7]. In this perspective, Brazil enacted Law No. 13,989, of April 15, 2020, which authorized the use of telemedicine during the pandemic "for the purposes of assistance, research, disease and injury and health promotion." [8]. In addition, other health services, such as nursing through Brazilian Federal Board of Nursing Resolution 634/2020, were structured to validate the use of health technologies. In the context of dentistry, the Brazilian Federal Council of Dentistry (CFO) ratified the exercise of distance dentistry - teledentistry, through Resolution CFO-226, of June 4, 2020 [9].

The need to adopt non-pharmacological measures and social distancing to combat the COVID-19 pandemic contributed to highlighting the operation of telehealth services within global health systems. In view of this, together with the dissemination of technologies throughout society today, it creates a questioning about the importance of including technologies in health services.

Based on this, this paper aims to research the relevance of teledentistry adherence nowadays, as well as to verify the benefits brought by this service, and the importance of using this tool during the pandemic. In addition, it is essential to understand the current regulation for the use of teledentistry services in Brazil and identify the barriers and difficulties faced for its implementation.

Materials and Methods

The present study refers to a narrative review about the application and benefits of teledentistry, which, despite having

been developed before the COVID-19 pandemic, proved to be even more essential during and after it. By definition, narrative review is a very appropriate methodology to describe, discuss and understand the current concepts on a given subject through theories and discussions present in the literature [10].

For the bibliographic research, the following databases were used: Pubmed, Medline, Scielo, Lilacs, Cochrane, and Google scholar. In addition, consultations were made in government websites and institutions that guide health practices, such as the World Health Organization (WHO) and the Pan American Health Organization (PAHO). The period selected for the study of the materials that composed this review work was from 2012 to 2022. However, it is worth mentioning that the publications of 2021 and 2022 were the most explored in view of the need to focus on the objective of this study. The English and Portuguese languages were part of the selected studies.

Results and Discussion

The legitimization of the use of health technologies, coupled with the need for non-pharmacological measures to provide continuity of care and reduce the spread of the pandemic, promoted the strengthening of telehealth. Silva, *et al.* showed an increase of 76.8% in the amount of teleconsultations in the Telehealth Service of the Federal University of Rio Grande do Sul (UFRGS) compared to the same period in 2019, while there was still no pandemic. In this perspective, the same authors pointed out that weekly accesses to the Telehealth Service of the UFRGS website doubled, from 60,000 access to 120,000 during the pandemic [11].

Telehealth is composed by health professionals and is defined as the “use of information and communication technologies to transfer information from clinical, administrative and educational data and services in health” [12,13]. Moreover, Pereira and Machado explained the difference between the term telehealth and telemedicine, according to them telehealth is based on the use of information and communication technologies (ICTs) in health services in general, which include telemedicine, as well as teleeducation in health, telepidemiology networks, health management networks, among others [14].

According to the American Dental Association - ADA, teledentistry emerges from the use of systems and features of

telehealth, but focused on the field of dentistry, used both for patient care and health education [15]. Based on this, it is understood that teledentistry is also an element that makes up telehealth services, as well as the others mentioned above [16].

One of the pioneers teledentistry programs was the Total Dental Access (TDA), which began in 1994 and was developed by the US Army, together with a telemedicine program. This project sought to use communication technologies to provide patients care, continued education in dentistry with the transmission of lectures and exchange of information between the dentist and the laboratory for the adequate confection of braces [17].

Nowadays, with the advancement of ICTs, most teledentistry systems are performed using the internet as a means of communication, and work in two main ways: (1) the consultation in real time or synchronous format, and (2) the analysis of stored data, also called “store and forward” or asynchronous format. In synchronous service, the interaction between users is done in live, in other words, the exchange of information occurs simultaneously and bidirectionally, and can be carried out with apps that allow audio or video calls, such as WhatsApp, Skype and Zoom. In the asynchronous format, the user accesses a digital database and electronic health records, such as patient radiographs and previously saved messages, and it is made from e-mails or apps such as WhatsApp, without real time contact between the users [15,18,19].

Configuration of teledentistry in Brazil

The regulation of teledentistry in Brazil was made through Resolution CFO-226, of June 4, 2020, which authorized the performance of telemonitoring and teleorientation services, while the use of remote technologies to carry out consultations, diagnosis, prescription and elaboration of treatment plan was forbidden. Teleconsulting between professionals was also allowed [9].

The teleorientation is related to patient triage and initial listening and a way of clarify the patient's doubts, in addition, serving as a care tool in the form of educational projects, which can reach many people. This resource allows guiding the patient about the best time to realize a procedure or can be used to refer the patient, for example [20,21]. Concomitantly with this, the Resolution CFO-226 determines that teleorientation is destined

only in the form of a pre-clinical questionnaire so the dentist can define the ideal moment to perform a presential service [9]. It is important to emphasize that the first contact with the patient must be done in presential format, teledentistry services do not replace this.

Telemonitoring is precisely defined as the remote monitoring of the patient health/disease factors, based on the collect and interpretation of clinical data examined in a previous presential visit. Its use is focused on patient-centered care, combined with shared decision making. Through the data obtained, the health professional provides instructions and monitors to the patient's care [22]. According to Resolution CFO-226/2020, telemonitoring can only be performed in patients who have already been attended and were in treatment, thus being carried out within a period between consultations [9]. During the pandemic, telemonitoring could be used to identify suspected cases of COVID-19, from questions to patients about respiratory symptoms and contact with infected people [23].

Teleconsulting, refers to the exchange of information between health professionals to discuss some treatment or health action to be done and issues involving the health service. This interaction can be performed to discuss a clinical case, for example, making the patient's treatment faster and more effective. It is also important to mention the Second Formative Opinion, which is built from questions raised in teleconsulting and answered based on scientific literature [21,24].

Figure 1: Flowchart on teledentistry and its tools according to Resolution CFO-226/2020.

Elaborated by the author

Within the scope of Brazilian Health Unic System (SUS), teledentistry should be carried out based on the mediation platform used in each specific region [25]. In this context, the professional will be able to issue prescriptions and certificates in places where there is a virtual office and the dentist is qualified to generate these documents. Its use within the SUS during the COVID-19 pandemic had as main objectives: the reduction of the number of people inside the health units and the maintenance of care for cases that are not serious [23].

In addition, the CFO implemented, together with the Brazilian National Institute of Information Technology (ITI) the digital signature, and on November 12, 2020 more than 344 thousand dentists had already acquired this new tool. From it, dental surgeons are able to generate digital documents in the form of certificates, exam requests, clinical reports and prescription of medicines, through the certification of the Brazilian Public Key Infrastructure (ICP-BRASIL) [26,27].

Benefits of teledentistry

Among the benefits of teledentistry is the capacity to make treatment more agile and economical [28,29]. Moreover, the cost reduction of the remote service occurs through the virtualization of distances, avoiding transport expenses, in this logic, the greater the distance, the greater the economy related to locomotion [30,31]. Given this, the importance of information and communication technologies (ICTs) in health is highlighted to serve geographically isolated populations, where there are no specialists [30,32-34]. Ignatius, *et al.* (2006, p. 48) affirmed that "the telemedicine tools have the potential to increase the total number of dental specialist trainees and specialists in sparsely populated areas." [35]. Based on this, the reduction of health care inequities can be reached, making the population's access more effective and fairer [30].

Bradley, *et al.* showed in their study a 65% reduction in the number of elderly patients going to hospitals with the use of teledentistry, reducing transport costs, making the service time effective and reducing patient anxiety [36]. In the same way, Ignatius, *et al.* pointed out the ability to increase the number of assistances to rural populations, at the same time that there is a decrease in the referral patients to hospitals by the remote health service, which eventually generates future cost savings [35].

The evolution of telehealth leads to an increase in the availability of services, that can be performed in a simpler, more agile and economical way [28,29]. In this perspective, Daniel, Wu and Kumar said that teledentistry qualifies and speeds up the triage of patients, due to the easy access to consultation between professionals and specialists [32]. Furthermore, Bradley, *et al.* detail that the effectiveness of patient triage results by the practicality in prioritizing urgent cases and identifying inappropriate referrals, in this way, teledentistry can validate and reduce the waiting list [36].

Scuffham and Steed stated that the adoption of teledentistry can generate savings cost for the entire healthcare system in the long term. In their research, the authors demonstrated the capacity of cost reduction that the adoption of this tool could generate for the NHS (National Health Service), enabling the reuse of this savings to subsidize the cost of other procedures [30].

Harzheim, *et al.* emphasize that in addition to this care function, telehealth services can also act in an organizational function within the health service, because through a remote system it is possible to have access to the flow of information, resources and people. With that, telehealth would act in two ways, according to them, (1) assistential role; (2) metaservice in health, as a service regulator, integrating the decision-making - in this role, the authors say that telehealth becomes a service of health services [37].

Based on this, Brazil, through the Ministry of Health, created a plan that aims to renovate the entire Brazilian health system until the year 2028, combining the functioning and stimulating interaction between the country's public and private health services on a digital platform, the National Health Data Network (RNDS). This national plan entitled Digital Health Strategy for Brazil 2020-2028, aims, from the RNDS, to provide the sharing of information and digital data between the various health services in the country, organizing and qualifying the provision of health care to the population and unifying patient data in electronic medical records to improve accessibility, referrals and integrality of care [38].

From the point of view of academic formation, Caldarelli and Haddad reported that adopting teledentistry within the teaching-learning process is in accordance with what the National Curriculum Guidelines (DCN) of the Dentistry Course in Brazil says,

that the health professional should have domain of communication and information technologies [39,40]. Moreover, Teixeira, *et al.* highlight the importance of this tool in the continuing education of professionals and to illustrate this, Caldarelli and Haddad (2016, p. 30) say that teledentistry can "expand the insertion of Higher Education Institutions (HEIs) in training and continuing education actions of professionals in the SUS service network, strengthening the teaching-service integration and expanding the opportunities to apply active methodologies in the teaching-learning process" [34,39].

Still in relation to the use of remote technologies in the teaching-learning process, Lima, *et al.* in a study conducted with students who participated in a telehealth service, noted the facility of actuation with the ICTs due to easy access to information and contact with professionals, which qualified the service, providing security and tranquility to the care provided by the students [41].

Advantages of using teledentistry during the pandemic

According to Smith, *et al.* telehealth resources have several benefits in emergency situations, being able to establish multiple providers quickly; speed up the patient's triage in response to the high demand for care; enable remote consultations while hospitals and clinics are overloaded; and reduce the rate of disease transmission [42].

Based on the restrictions adopted during the pandemic, Caceres-Matta and Carmona-Arango affirm that teledentistry is a method of social distancing that offers some specific benefits, such as: remote triage of cases with suspected COVID-19 for dental care and the reduction of exposure to the virus [43]. Silva, *et al.* reiterate this idea by highlighting that the adoption of this tool during the pandemic made it possible to reduce the circulation of people, a decrease in the inappropriate use of technological resources and unnecessary referrals [11].

In this way, teledentistry becomes an important tool to fight the pandemic, especially to reduce the waiting list for diagnoses and the search for care, considering its characteristic of crossing geographical distances and strengthening the service of Primary Health Care (PHC) [20].

Difficulties in implementing of teledentistry

Among the difficulties faced by teledentistry, Skelton-Macedo, *et al.* affirm that ICTs were incorporated into health services without a certain structured planning and discussion about their risks in relation to the code of ethics [31]. Besides that for its implementation, the multidisciplinary participation of professionals is necessary [28-29].

In addition, there is still some resistance from teachers, because, according to them, it is not possible to carry out practical skills via distance education. The same authors also emphasize that it is wrong to refer to teleducation as distance education, but rather as a tool to help and complement teaching, which must be used within a structured and planned pedagogical approach [16,44].

From a professional point of view, dentists may be fear for the use of ICTs and worry about the possible cost generated by them, in addition to the lack of technical support, training and the precariousness of the health system in relation to telehealth services [45].

Smith, *et al.* also cite the need to perform physical exams and diagnostics, which cannot be done by teledentistry [42].

Thus, it is essential for the complete and effective implementation of teledentistry that professionals must be trained to use the tools of telehealth [28,29,43,46]. Moreover, a structured strategic system is necessary to organize the operation of the telehealth service, built with operational networks, concise policies and technological structure that can respond to emergency situations [42].

Conclusion

In view of the arguments presented in this work, it can be concluded that teledentistry is an innovative tool within health services, presenting several benefits, such as cost reduction and effective accessibility of the population to health care. During the COVID-19 pandemic, the use of this service was essential to give continuity of care to the population, while helping to reduce the transmission of the new virus, strengthening measures of social distance and isolation of cases.

Moreover, teledentistry is a promising service within the Brazilian health system, in view of the Ministry of Health's planning for 2028, for the institution of the digital platform of the National

Health Data Network responsible for regulation and coordination of health care across the country through the use of the telehealth features mentioned.

At this juncture, it is noted that is extremely important that telehealth services, such as teledentistry, be widely discussed and studied since the graduation process of professionals, in addition to the need to create training and continuing education courses in dentistry about the subject, to inform and prepare dentists to adopt this tool and break some paradigms in relation to it.

Finally, it is essential to create new public policies and guidelines on the implementation of services such as teledentistry, to organize and promote its strengthening and use in society.

Given the above, it is understood the need for a mobilization of various sectors of society in order to promote the expansion of teledentistry within the health system and its use as a whole, covering all the features of this tool and enjoying all its benefits.

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Conflicts of Interest

None to declare.

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