

Challenges and opportunities for telehealth during the COVID-19 pandemic: ideas on spaces and initiatives in the Brazilian context

Desafios e oportunidades para telessaúde em tempos da pandemia pela COVID-19: uma reflexão sobre os espaços e iniciativas no contexto brasileiro

Desafíos y oportunidades para la telesalud en tiempos de la pandemia por la COVID-19: una reflexión sobre los espacios e iniciativas en el contexto brasileño

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Abstract

COVID-19 has created enormous challenges for health systems worldwide, with the rapidly growing number of deaths and critical patients with pneumonia requiring ventilatory support. Alternative methods to control the spread of the disease such as social isolation, extreme quarantine measures, and contact tracing have been used around the world. However, these measures may not be totally effective to fight COVID-19, in step with the necessary national preparations to meet the new patient care demands. A wide range of digital technologies can be used to enhance these public health strategies, and the pandemic has sparked increasing use of telehealth. This field has grown considerably in Brazil in recent years. Still, despite the intense proliferation of recommendations and rules, until the current pandemic the country still lacked a fully consolidated regulatory framework. The emergence of COVID-19 marks a key moment in the expansion of applications and use of telehealth for improving the health system's response to the current crisis. The article discusses telehealth's contribution to the fight against COVID-19 and the recent initiatives triggered in Brazil as opportunities for the consolidation of telemedicine and improvement of the Brazilian Unified National Health System. The authors conclude that telehealth offers capabilities for remote screening, care and treatment, and assists monitoring, surveillance, detection, prevention, and mitigation of the impacts on healthcare indirectly related to COVID-19. The initiatives triggered in this process can reshape the future space of telemedicine in health services in the territory.

COVID-19; Coronavirus; Telemedicine; Pandemics; Emergencies

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Introduction

Since early 2020, due to the novel coronavirus pandemic, Brazil and the world are facing an unprecedented emergency with extremely grave consequences for human life, public health, and economic activity.

The emergence of several severe cases of pneumonia of unknown etiology in Hubei Province, China, triggered an alert to the World Health Organization (WHO) on December 31, 2019. A new type of coronavirus not previously present in humans was identified (2019-nCoV). The exponential growth of cases and deaths, initially limited to China, and the subsequent spread to other countries led the WHO to declare on January 30, 2020, that the outbreak of the novel virus constituted a Public Health Emergency of International Concern (PHEIC), the highest health warning level under the International Health Regulations ¹. On March 11, COVID-19 was declared a pandemic, a term that refers to the geographic distribution of a disease (in various countries and regions of the world) rather than to its severity.

Soon after declaration of the PHEIC by the WHO, Brazil launched its own national preparations for the situation. In early February, the Brazilian Ministry of Health declared a Public Health Emergency of National Concern based on *Ruling n. 188* ² and began to draft a National Contingency Plan for COVID-19, published on February 13 ³. The first case of COVID-19 was reported in São Paulo on February 26, 2020. The country took 17 days to reach its 100th case, but only seven days to reach the thousandth case, and within 14 more days it reached 10,000 cases. Figure 1 summarizes the main events related to the COVID-19 epidemic in Brazil and the world.

As of April 28, Brazil already had 71,886 confirmed cases of COVID-19 infection and 5,017 deaths, having exceeded the deaths recorded in China (4,643), with case-fatality reaching 7% (Ministério da Saúde. Painel coronavírus. <https://covid.saude.gov.br/>, accessed on 28/Apr/2020). However, due to the shortage of tests to confirm cases, not all patients are being tested, prioritizing risk groups and more severe cases and suggesting relevant underreporting of infected patients and deaths from the disease.

Although the great majority of infected individuals are asymptomatic or mild cases, 15% experience more severe clinical symptoms, and 5% require intensive care and mechanical ventilation ⁴. The disease displays high transmissibility; a large contingent of infected and sick individuals at the same time poses a risk of overload on care for symptomatic and severe cases, potentially strangling the health system and significantly increasing case-fatality from the disease.

The establishment of broad social distancing measures (closing establishments and canceling events with large public attendance), isolation, and quarantine are essential to slow the epidemic's spread (flattening the transmission curve), protecting from infection those at greatest risk of severe cases and reducing the peak demand for medical care in hospitals and intensive care units (ICUs).

While infected patients need to be diagnosed, monitored, and placed in quarantine, sending febrile or coughing individuals to a hospital can overload the health system and place uninfected individuals at risk, especially in situations with shortages of masks and other personal protective equipment (PPE). It is also reasonable to expect an important increase in the number of confirmed cases as test kits become more readily available, triggering waves of worried patients to health services that are already short of resources.

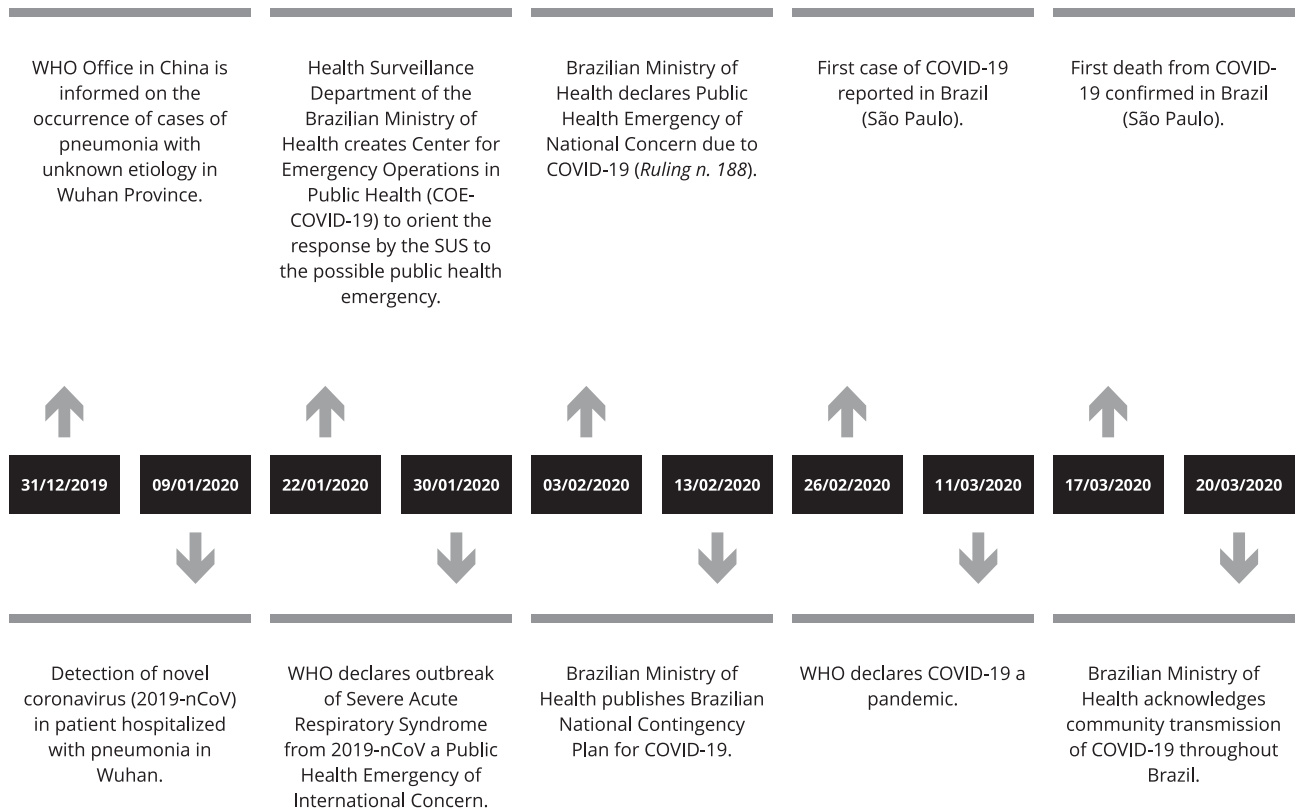
Historically, telemedicine was concentrated on the application of traditional physician-patient (and physician-physician) interactions, enhanced by two-way video and audio communications. Later, the use of information and communications technologies (ICTs) was extended to support services, training, and health information activities for multidisciplinary healthcare providers and patients, shaping an expanded field called "telehealth" ⁵. In this article, considering the multiple opportunities for use in the current epidemic, we opted to analyze (and employ the term) telehealth, which includes but is not limited to the field of medicine.

Box 1 summarizes the broad scope and various possible applications of telehealth ⁶.

Evidence has shown that the use of telehealth can produce benefits such as reducing the time in care, transportation costs for patients and health professionals, and improvements in quality of care by allowing access to specialists by non-specialist health professionals working in remote areas ^{7,8,9}.

Figure 1

Timeline of the COVID-19 epidemic: principal events in the world and in Brazil.



SUS: Brazilian Unified National Health System; WHO: World Health Organization.

Source: prepared by the authors based on documents from the World Health Organization ¹ and Brazilian Ministry of Health ^{2,3}.

The broad scope and flexibility of digital technologies, adjusting them to the health needs in each social context, create innovative solutions in health services provision, creating major opportunities for their use in the case of epidemics, specifically in the current COVID-19 pandemic.

The article proposes to discuss the spaces for telehealth's contribution to dealing with the COVID-19 epidemic and the recent initiatives in Brazil, especially by the Federal Government, suspending restrictions on its use and opening new opportunities for greater consolidation of telehealth in the country as a tool for improving the Brazilian Unified National Health System (SUS).

Methods

The discussion is based on three complementary methodological approaches. A comprehensive literature review was conducted with a focus on the possibilities for use of telehealth in dealing with epidemics and specifically the COVID-19 pandemic. A search was conducted on April 1st (and updated on April 13) in MEDLINE, Scopus, Embase, Oasis, LILACS, and Web of Science, using the descriptors and keywords "Telemedicine", OR "Telenursing" OR "Education", "Distance" OR "Remote Consultation" AND "New Coronavirus" OR "Coronavirus Disease" OR "2019-nCoV" OR "COVID19" OR "COVID-19" OR "COVID2019" OR "COVID-2019" OR "COVID 2019" OR "SRAG-CoV-2" OR

Box 1

Scope of telehealth services with description of corresponding activities.

Telehealth applications	Activities
Teleconsultation liaison	Consultation recorded and performed between health workers, professionals, and administrators, aimed at resolving doubts on clinical procedures, health measures, and issues pertaining to the work process.
Telediagnosis	Use of ICTs in diagnostic support services across geographic distances or time differences, including teleradiology, teleECG, tele-spirometry, telepathology, etc.
Telemonitoring	Distance monitoring of patients' health and/or disease parameters, including clinical data collection, transmission, processing, and management by a health professional.
Teleregulation	Action in systems for regulations, evaluation, and planning of activities, providing management with operational regulatory intelligence. Allows reduction in waiting lines for specialized care.
Tele-education	Classes, courses, or supply of interactive learning tools on health-related topics.
Formative second opinion	Systematic response based on literature review of the best scientific evidence on questions originating from the teleconsultancies.
Teleconsultation	Medical or other professional health consultation performed remotely via ICTs, which until the current epidemic was only authorized in Brazil by the Federal Board of Medicine in emergency situations.

ECG: electrocardiogram; ICTs: information and communications technologies.

Source: prepared by the authors based on data from Brazil Telehealth Networks (<https://www.saude.gov.br/telessaude>).

“SARS2” OR “SARS-CoV-2” OR “Coronavirus”, according to the technical note by the U.S. National Library of Medicine ^{10,11}.

We also examined the thematic platform created at the Oswaldo Cruz Foundation (Fiocruz) to support research and the adoption of measures related to the novel coronavirus, organized with the free software for managing references called Zotero, which collects diverse manuscripts published as preprints (Zotero. Novo coronavírus Covid-19. https://www.zotero.org/groups/2442236/novo_coronavirus_covid-19__fiocruz, accessed on 10/Apr/2020). In order to identify and discuss the strategies related to telehealth that were triggered in Brazil, we examined the national and state contingency plans for the epidemic and the rulings published by the Federal Government since the Public Health Emergency of National Concern was declared on February 4, 2020, both made available by the Brazilian Ministry of Health in a specific file on the coronavirus (Ministério da Saúde. Coronavírus COVID-19. <https://coronavirus.saude.gov.br/>, accessed on 05/Apr/2020). We also examined the webpages of the Federal and State Boards of Medicine, considering that some of these rulings directly impact medical practice, which is regulated specifically by these boards. Finally, we consulted the webpages of the Brazilian Ministry of Health Department of Digital Health (DESD-MS; <https://saudedigital.saude.gov.br/>), the Brazil Telehealth Networks Program (<https://www.saude.gov.br/telessaude>), and the University Telemedicine Network (RUTE; <https://rute.rnp.br/>), aimed at identifying current strategies adopted by these actors.

Possibilities for the use of telehealth in the fight against COVID-19

Telehealth is a fundamental resource due to its capacity to decrease individuals' circulation in health-care establishments, reduce the risk of infection and spread of the disease, reach hard-to-reach places or those with deficient infrastructure, and free up hospital beds and other hospital resources for infected patients. It further allows ensuring care for patients with preexisting diseases and comorbidities who may not be infected, but who cannot appear in person for medical appointments given the recommendations to reduce social contact. Finally, telehealth can help improve the coordination of

existing resources in separate places, facilitating access to necessary treatment protocols for severe cases of COVID-19^{12,13,14}.

Thus, with its multiple and diverse applications in the field of health promotion, care, and education, telehealth has great potential for confronting the novel coronavirus pandemic.

Some spaces for telehealth have emerged or been intensified during the pandemic and are discussed below as examples of this strategy's potential use, identified in the literature or in different national contingency plans.

Teletriage and on-line consultations

New models of care that avoid personal contact between physicians and patients can be useful in the current epidemic situation, and one such strategy involves ICT-operated consultations¹⁵. Video consultations are already implemented in some countries as part of national digital health strategies^{16,17}. There are two possibilities for use of telehealth in this case: (i) teleconsultation to screen for severe cases and (ii) teleconsultation for monitoring clinically stable patients.

A central strategy for controlling disease outbreaks is "direct triage", classifying patients before they reach the health services in person. Telemedicine can be used to maintain patients out of hospital, keeping asymptomatic individuals or mild cases at home and referring the more serious cases to hospitals, allowing to gain time and avoid overload on health services. Meanwhile, the use of on-line contacts or telephone-based software programs that detect and record patients' data such as symptoms or temperature can prevent unnecessary hospital consultations for patients with mild symptoms. Depending on the symptoms' severity, users can be referred to contact a physician, who can instruct them either to go directly to the hospital, remain at home and monitor their symptoms, or take other appropriate steps for the situation.

Although fighting the direct impact of COVID-19 is important, it is equally essential and critical to keep clinical services operational. In many countries, health services have reduced or even suspended many clinical services, including cancelling or postponing medical appointments and elective surgeries. However, such strategies cannot be sustained indefinitely. Many patients have comorbidities like hypertension, cardiopathies, chronic respiratory diseases, and diabetes, which are proven risk factors for severe forms of COVID-19 and need to be controlled.

"Virtual clinics" can be assembled through the use of telemedicine consultations, including imaging tests (e.g., chest x-ray and/or chest computerized tomography – CT, relevant for assessing pulmonary involvement from the coronavirus), uploaded from peripheral sites and interpreted remotely. This guarantees that patients continue to receive clinical care, reducing physical crowding of patients in hospital facilities. Recording and transmitting patients' data (e.g., daily temperature and symptoms) can also prevent unnecessary hospital consultations for patients with mild symptoms¹⁸.

Other types of consultations that can avoid in-person visits include follow-up of chronic diseases, counseling, or other therapies (e.g., telerehabilitation using on-line educational platforms or game-based psychotherapy for elderly, children, and adolescents as a way of establishing cognitive relations and problem-solving), and mental health care, allowing patients to be reviewed in the comfort of their homes, without submitting them to visits to health services.

Specifically in relation to mental health, in addition to patients who already present previously identified disorders and who need specific support to continue their follow-up, the rise in the number of confirmed cases and deaths from COVID-19 has produced psychological problems including anxiety, depression, and stress in the general population as well as in the medical teams and other health professionals^{19,20}. In addition, social isolation and forced quarantine measures have reduced access to support from family and friends, undermining normal social support networks, producing loneliness, and aggravating anxiety and depressive symptoms. Thus, the supply of mental health services using telehealth was adopted in countries like China and Australia for dealing with the COVID-19 epidemic. This supply included counseling, supervision, training, and psychoeducation via on-line platforms, prioritizing physicians and health workers on the frontline in the fight against the epidemic, COVID-19 patients and their families, law enforcement officers, and security guards²¹.

Telehealth to obtain support from specialists

Even before the arrival of COVID-19, telehealth had been adopted increasingly for specialized home care of ill patients and their families. It can provide quick access to specialists who are not immediately available, potentially even more valuable in countries where certain specialties are particularly scarce, especially outside large urban areas.

In the case of COVID-19, health professionals directly involved in care are at greater risk of infection and illness. In various countries, the large number of health professionals on quarantine to avoid exposure to the virus has raised concerns about the workforce capacity, especially the workforce involved in intensive care. Quarantined medical specialists can assist services by conducting emergency teleconsultations or direct distance consultations with patients, thus freeing up other physicians to conduct face-to-face care^{13,22}.

Local intensive care capacities can be expected to be overloaded with the epidemic, both because of the imbalance between critical patients' needs and the supply of services, and because patients with severe COVID-19 require long periods on ventilatory support, placing further strain on scarce resources. Telehealth allows improving clinical decisions, including on ICU support, based on the development of digital monitoring programs (e-ICU) that allow nurses and physicians to remotely monitor patients in ICUs located in distant hospitals²³. Teams of IT specialists can be assembled with some specialists working inside the ICUs while other more experienced colleagues are deployed for difficult cases, discussing the strengths and weaknesses of the clinical management strategy for patients and issuing suggestions to national and local health authorities.

Another important aspect involves the care for rural populations, who often live with shortages and difficulties in access to health services and specialists. These difficulties have been one of the drivers in the expansion of telemedicine in various countries, especially in the field of teleradiology and teleconsultation, and it is reasonable to expect that they will increase even further during the current pandemic²⁴.

Telehealth to support imaging tests and other specialized tests

The use of teleradiology can help overcome the limited number of radiologists in geographically remote areas, allowing to expand the coverage of local systems where these human resources do not exist or are insufficient or overloaded by the peak in cases of the disease²⁵. Diagnostic imaging support can be particularly important because radiological alterations are frequent in severe cases, with most of these patients presenting bilateral opacities on chest CT, allowing streamlined adoption of interventions by the frontline professionals, and in the absence of virus test kits, contributing evidence to suspected cases of COVID-19²⁶. Chest x-ray and CT imaging banks from remotely accessed COVID-19 patients have been used to assist care for cases, a strategy also adopted by the Brazilian Ministry of Health.

Imaging-based triage can also be used to reduce face-to-face referrals in the fields of dermatology, ophthalmology, and otorhinolaryngology.

One of the oldest and most frequent uses of telehealth is in cardiological diagnosis based on ECG and echocardiography, valuable because some drug treatments employed experimentally in the COVID-19 epidemic – chloroquine and hydroxychloroquine – affect cardiac rhythm and function, increasing the risk of arrhythmias and sudden death.

Telehealth in the improvement of health communications and education

In the field of health communications and education, a potential application for telehealth is the use of screening and orientation systems based on artificial intelligence, potentially capable of relieving physicians' clinical load. An on-line medical "chat bot", the use of a software (virtual assistant) that attempts to simulate a human being in conversation with people (via telephone or chat apps), can help detect early symptoms in patients, referring them for medical treatment if their clinical condition worsens²⁷. Based on the identification of certain conditions, a professional personally enters the conversation and interacts with the individual, explaining the questions and allowing better orientation.

Digital technology can also enhance education and communications in public health. Some key examples have multiplied in this epidemic, such as health authorities' use of social medias (Twitter, WhatsApp, Facebook) to provide health information of public interest, update cases in real time, announce government initiatives, and answers users' questions.

In some countries, facial recognition companies have adopted thermal facial recognition to identify persons with high temperature at screening checkpoints ²⁸. In Recife (Pernambuco State), drones equipped with infrared cameras have been proposed to identify similar situations, sending information in real time to an Integrated Command Center to orient teams doing prevention work in order to convince the population to stay off the streets and to trigger interventions ²⁹.

Telehealth and its potential use in the fight against the epidemic in Brazil

Telemedicine first found a place in Brazil in teaching and research institutions in health in the 1990s. *Disque Saúde*, a health hotline, was a pioneering initiative launched in São Paulo in 1989, initially as merely an information service. From information, the service was expanded to include referrals and scheduling appointments, starting in August 1991, implemented in the city of Contagem in the State of Minas Gerais, and was extended two months later to the cities of Vitória (Espírito Santo State), Curitiba (Paraná State), and Florianópolis (Santa Catarina State). The RUTE network and the Brazil Telehealth Networks Program are two initiatives launched a decade later by the public administration aimed at linking specific telehealth activities in the SUS, using the computer network. Telehealth has also expanded to the private health sector, which organized in the first decade of the 21st century and prepared technically for regulation of teleconsultations, glimpsing a new healthcare market in Brazil ³⁰.

Various initiatives involving telehealth have emerged in Brazil since the beginning of COVID-19, as part of state contingency plans for the epidemic, in patient care, communications, and training of health professionals, several of which are described below ^{31,32,33,34,35}.

In parallel, telehealth activities have also been developed in the private healthcare sector. ANS, the National Regulatory Agency for Private Health Insurance and Plans, which regulates private health plans, in keeping with the declaration of a Public Health Emergency of National Concern, issued *Technical Note n. 3* ³⁶ in March 2020, regulating the use of telehealth by health insurance companies and health service providers. The technical note was based on decisions by various professional bodies and societies in health that authorized physicians, psychologists, physical therapists, speech therapists, and nutritionists to conduct remote professional practice using ICTs. The technical note further emphasizes that procedures coded in the Unified Supplementary Health Terminology (TUSS in Portuguese) already provide for patient care, consultations, and sessions performed by health professionals, without restrictions on the format of care to be performed during the procedure or event ³⁶. However, in *Technical Note n. 4* ³⁷ of March 31, the ANS states that in operational terms, operators and providers will have to adjust their routines to allow for telehealth and/or teleconsultations, and that “it does not suffice to merely record the procedure’s TUSS code; it is necessary to specify that it was performed on an urgent basis, and to record the markup or markdown factor when applicable”. Finally, on April 2, seeking to frame the debate on the need for inclusion of procedures in the private insurance healthcare list, the ANS explicitly states in *Technical Note n. 6* ³⁸ that medical treatments provided via telemedicine are also subject to mandatory coverage by health plans, as authorized by the Federal Board of Medicine (CFM).

Telehealth to support healthcare in Brazil

An innovation in the use of telehealth that was not previously present in Brazil was launched with COVID-19: authorization and encouragement for the use of teleconsultations during the epidemic.

Some brief background will be useful for understanding the scope of this recommendation and the rules related to this new use. Until 2019, telemedicine practice was regulated by the Federal Board of Medicine (CFM, in Portuguese) based on *Resolution n. 1,643/2002* ³⁹, which defines as “an exercise of medicine, the use of interactive audiovisual and data communication methodologies with the objective of health-

care, health education, and health research” (Article 1). The Resolution does not provide any description of modalities. On February 6, 2019, the CFM issued *Resolution n. 2,227/2018*⁴⁰, which allowed physicians to conduct on-line consultations as well as telesurgeries and telediagnosis, among other forms of distance medical care. The CFM repealed the Resolution on February 22 that same year⁴¹, claiming the high number of proposals submitted by physicians to amend the wording of *Resolution n. 2,227/2018* and the need for more time for a proper review⁴². The regulation of telemedicine practice in Brazil thus reverted to the terms of *Resolution n. 1,643/2002*³⁹.

With the COVID-19 epidemic, the Federal Board of Medicine published a memorandum on March 19, 2020, acknowledging the possibility and ethical grounds for the use of telemedicine “on an exceptional basis and as long as the fight against COVID-19 contagion lasts”, under the following terms: “(i) teleorientation, for medical professionals to conduct distance orientation and referral of patients in isolation; (ii) telemonitoring, an act under medical orientation and supervision for distance monitoring or surveillance of health and/or disease parameters; and (iii) teleconsultation liaison, exclusively for exchange of information and opinions between physicians for diagnostic or therapeutic purposes”⁴³. Patients’ telecare, the most controversial issue in the adoption of telemedicine in Brazil, in which the medical consultation is conducted in the same way as a face-to-face consultation, was not included in the above-mentioned memorandum.

Importantly, one day before, on March 18, then-Minister of Health Luiz Henrique Mandetta had announced in a press briefing that the Brazilian Ministry of Health would be providing a telehealth system open to the population for questions and orientation on COVID-19. This measure had been demanded by the medical profession, even on a temporary basis. A survey by the São Paulo Medical Association entitled *Connectivity and Digital Health in the Brazilian Physician’s Life*, conducted in February 2020 with 2,258 physicians, assessed their receptiveness to digital health technologies, especially concerning the adoption of telemedicine⁴⁴. The results signaled that the lack of regulation on the use of telemedicine was an important barrier to the use of on-line communications tools to assist patients (43.76% of the sample), and that 64.39% of the physicians wanted regulation that would allow the expansion of medical services and care for the population, including teleconsultation (directly between the physician and patient)⁴⁵.

Brazil’s Federal and State Boards of Medicine had been pressured by medical societies, but the boards were still reluctant to use telemedicine, on grounds that it would infringe Article 37 of the Code of Medical Ethics by “prescribing treatment and other procedures without directly examining the patient”.

Shortly afterwards, and based on Article 3 of *Law n. 13,979/2020*⁴⁶, the Brazilian Ministry of Health issued *Ruling n. 467/2020*⁴⁷ on March 23, 2020, on activities in telemedicine for operationalizing measures to deal with the pandemic, authorizing its use in public and private settings. According to the ruling, telemedicine can be employed on an exceptional basis (our emphasis) in activities that include preclinical care, patient care support, consultation, monitoring, and diagnosis in the SUS, supplementary healthcare (private health insurance), and private care (Article 2)⁴⁷.

Various State Boards of Medicine, including those of the Federal District, Goiás, Rio de Janeiro, Rondônia, Paraná, and Tocantins, oriented physicians via their own regulatory provisions (resolutions, recommendations, and guidelines) on the procedures for application of telemedicine. For example, the Rio de Janeiro State Board of Medicine (CREMERJ) authorized medical consultation, orientation, and follow-up in the state of Rio de Janeiro using telemedicine through any digital communication or telephone medium (Article 1)⁴⁸. The board argued on the need to reduce patients’ movement to and from (and presence at) healthcare services and the greater flexibility for maintaining medical care for the population, aimed at reviewing current treatments and maintaining outpatient care to avoid overloading the urgent and emergency services. However, the authorization only covers the teleconsultation modality for patients already attended by the physician, prohibiting first consultations with patients on a remote basis (Article 5)⁴⁸.

On March 25, the Chamber of Deputies (the lower house of the Brazilian Congress) passed *Bill of Law n. 696/2020*, authorizing the use of telemedicine in any activities in the health field in Brazil, including teleconsultation, as long as the COVID-19 crisis lasts. The Senate seconded the bill six days later, and it was signed by the President Jair Bolsonaro as *Law n. 13,989/2020*⁴⁹ of April 15, 2020, with two vetoes: Article 6, which transferred the regulation of telemedicine to the CFM after the

pandemic, and Article 2, which validated digital medical prescriptions, as long as they included a signature with digital certification (electronic signature) or merely digitized.

The Brazilian Ministry of Health published its guidelines for diagnosis and treatment of COVID-19 ⁵⁰ on April 6, including a series of initiatives for the use of telehealth in the epidemic. The first refers to the use of TeleSUS, an on-line channel of the SUS with two tools for orienting the population and monitoring cases, decreasing the risk of local transmission between patients and professionals in healthcare units: (i) the coronavirus SUS app, which provides information on the disease and allows answering a health evaluation questionnaire on measures to be followed (Ministério da Saúde. Coronavírus – SUS. <https://www.gov.br/pt-br/apps/coronavirus-sus>, accessed on 12/Apr/2020), and (ii) an on-line chat, a tool for patients to report their symptoms and receive orientation on remaining at home or seeking a healthcare service (Ministério da Saúde. Coronavírus: chat on-line. <https://w.tnh.health/c/5521>, accessed on 12/Apr/2020). The guidelines also mention that in addition to this orientation, TeleSUS will monitor patients in stay-at-home isolation, monitoring the development of symptoms without the person having to leave home. Finally, concerning the management and control of tuberculosis during the epidemic, the guidelines recommend conducting visits to patients with active or latent TB, using strategies such as teleconsultation whenever possible.

The 7th version of the protocol for clinical management of COVID-19 in primary healthcare (PHC) ⁵¹, of April 2020, states that teams can use telecare strategies in the identification, management, and follow-up of patients with suspected symptoms of influenza syndrome (item 3.1), at different intervals for high-risk and low-risk groups, up to 14 days from the onset of symptoms, following a protocol (annex 2 – Fast-Track Telecare in PHC) and with a specific form for identification and follow-up ⁵².

Telehealth for health information and education in Brazil

Various state and municipal health departments in different regions of Brazil have created official channels using ICTs to increase the transparency and allow access to reliable and up-to-date information on the disease for the general population and health professionals. These channels include websites featuring technical documents, educational videos, and informative materials for health professionals and awareness-raising campaigns, which can be downloaded and shared, social networks, telephone contacts, on-line panels, and virtual attendants ^{33,34,35,53} (Secretaria de Estado de Saúde do Rio de Janeiro. Covid-19: webinar para orientação técnica de profissionais de saúde – acolhimento e manejo seguro no cuidado a pacientes. https://zoom.us/webinar/register/WN_rI1hfxOjSvKWr3MnQl6Fng, accessed on 09/Apr/2020) (Secretaria de Estado de Saúde do Rio de Janeiro. Assistente virtual “Sesin Responde”. <https://chat.brazilsouth.cloudapp.azure.com/>, accessed on 09/Apr/2020) (Governo do Estado do Rio de Janeiro. Painel coronavírus Covid-19: monitoramento Estado do Rio de Janeiro. <http://painel.saude.rj.gov.br/MicroStrategyLibrary/app/D7D7C6EE494B6C054B21A08F44420305/B14AF1A34D1043BA22DAFFA0993C7CF5/WDD98796A24CC4FA5BBA1980848D325A7—K46>, accessed on 07/Apr/2020). The activation of a “Talk to Us” channel can also be used by the population to answer questions on the disease and combat fake news, as another feature of ICTs use in the fight against COVID-19 (Governo do Estado do Rio de Janeiro. Painel coronavírus Covid-19: monitoramento Estado do Rio de Janeiro. <http://painel.saude.rj.gov.br/MicroStrategyLibrary/app/D7D7C6EE494B6C054B21A08F44420305/B14AF1A34D1043BA22DAFFA0993C7CF5/WDD98796A24CC4FA5BBA1980848D325A7—K46>, accessed on 07/Apr/2020).

The dissemination of up-to-date information via ICTs has also spawned the organization and proliferation of electronic data panels on the Internet, posted by various government agencies and single institutions, with daily (and sometimes real-time) data on confirmed and suspected COVID-19 cases, deaths, ICU admissions, patients on mechanical ventilation, and the availability of critical inputs, among others. Examples include the Brazilian Ministry of Health data panel (Painel coronavírus. <https://covid.saude.gov.br/>, accessed on 05/Apr/2020), the Rio de Janeiro State Coronavirus/COVID-19 monitoring panel (Governo do Estado do Rio de Janeiro. Painel coronavírus Covid-19: monitoramento Estado do Rio de Janeiro. <http://painel.saude.rj.gov.br/MicroStrategyLibrary/app/D7D7C6EE494B6C054B21A08F44420305/B14AF1A34D1043BA22DAFFA0993C>

7CF5/WDD98796A24CC4FA5BBA1980848D325A7—K46, accessed on 07/Apr/2020), and the Rio COVID-19 Panel of the Rio de Janeiro Municipal Health Department (Painel Rio Covid-19. <https://experience.arcgis.com/experience/38efc69787a346959c931568bd9e2cc4>, accessed on 07/Apr/2020), as well as Coronavirus BR, a CoVida Network panel, a joint initiative by the Center for Integration of Health Data and Knowledge (Cidacs/Fiocruz Bahia) and the Federal University of Bahia (Rede CoVida. Painel Coronavirus BR. <http://covid19br.org/#>, accessed on 07/Apr/2020).

On March 21, the RUTE network launched an emergency measure for dealing with the pandemic, creating a special interest group called RUTE SIG COVID19 BR. Special interest groups are organized groups coordinated by the member institutions of RUTE in which health professionals debate specific topics based on video or web conferences, focused on teaching, research, or distance care⁵⁴. The objective of SIG COVID19 BR is communication among public and private tertiary and university hospitals that treat more severe cases, exchanging experiences not only among professionals in Brazil, but also with other countries including China, Italy, and USA. Web conferences lasting one hour each are held three times a week, addressing topics ranging from the reach of telemedicine during the COVID-19 pandemic to other more specific subjects such as the importance of adequate and conscientious use of PPE by health professionals and other workers in health units⁵⁵.

In the current context, activities by the different state telehealth hubs affiliated with the Brazil Telehealth Networks Program are focused on structuring and organizing knowledge and information related to COVID-19, seeking to build qualified support for dealing with the pandemic. The DESD/MS is responsible for setting the guidelines for telehealth in Brazil within the SUS, to which the Brazil Networks Program belongs, and has oriented the organization of educational initiatives related to the epidemic, as provided in some state contingency plans, in addition to extensive production of clinical protocols, videos, infographics, podcasts, and webinars, among other materials, as summarized in Box 2.

Finally, the Open University of the SUS (UNASUS; <https://www.unasus.gov.br/especial/covid19/>, accessed on 07/Apr/2020) has also launched several distance courses to prepare professionals as part of an overall strategy for COVID-19 that involves access to official information and various protocols,

Box 2

On-line initiatives and data provided by the Brazil Telehealth Networks Program, for dealing with the COVID-19 epidemic.

Initiatives and data	Description
Interactive channel (chat)	Created to check symptoms and answer questions on COVID-19.
Rulings published	Rulings on COVID-19 updated daily .
Distribution of tests	Quantitative information on distribution of rapid tests to states of the country.
Information on the disease	Definition of the disease, incubation period, transmission, symptoms, comparison with other respiratory diseases, risk groups, protective measures, and treatments.
Case definition	Operational case definition: suspected, confirmed, notifications, deaths.
Treatment	Definitions and observations, notification, and recording.
Epidemiological bulletins	Descriptions of monitoring events and the disease, analyses of epidemiological situation and health problems, updated daily .
National contingency plan	Emergency public health operations.
Fake news	Exclusive space for receiving viral information, investigated by technical divisions and answered officially as to its veracity (or lack thereof).
Updates	Legislations, manuals.
Professionals and administrators	Protocols, guidelines, orientation on general and specific management, treatment and care flowcharts.
Multimedia repository	<i>Instagram cards, advertising pieces, videos, infographics.</i>

Source: Telehealth Brazil Networks (<https://www.saude.gov.br/telessaude>).

supply of orientation for health professionals and the population, and educational resources on the novel coronavirus and the pandemic.

In order to expand and prepare the health workforce to deal with COVID-19, the Brazilian Ministry of Health launched the strategic action plan called *Brazil, Count on Me: Health Professionals*, for registration of professionals in the field and their training in the official COVID-19 protocols, approved by the Center for Operations in Public Health Emergencies (COE-nCoV) via distance courses ⁵⁶. There is no direct mention of telehealth, but the structures of the National Research and Education Network (RNP, in Portuguese) and the RUTE network are natural spaces for implementing the proposal.

As discussed, there are multiple and diverse spaces and possibilities for the application of telehealth in the current epidemic. However, until the emergence of COVID-19, this field was still a work-in-progress in Brazil. Initiatives and guidelines had already multiplied long before COVID-19, but this process had not been fully consolidated, and until *Law n. 13,989/2020* ⁴⁹ there was still no fully defined regulatory framework for telemedicine/telehealth in the country. Even elsewhere in the world, telehealth's implementation is uneven, and there are various barriers, which we will address next.

Barriers and difficulties for the expanded use of telehealth in the COVID-19 epidemic

Specialists in this area have identified some difficulties for the rapid and extensive implementation of telemedicine, particularly relevant in the COVID-19 pandemic, such as activation and payment licensing requirements for providers; medical malpractice insurance applied to telemedicine; compliance with regulations on data confidentiality and security; and the establishment of protocols for managing laboratory tests, prescriptions, and scheduling ⁵⁷. As relates specifically to the COVID-19 epidemic, the literature signals particular challenges that also apply to telemedicine's use in Brazil from the perspective of the SUS (Box 3).

The use of the various possibilities of telehealth explored in this article involves infrastructure investments, including information and ICTs standards in health capable of guaranteeing interoper-

Box 3

Challenges for the use of telehealth in the public health response to the COVID-19 epidemic in Brazil.

Description	Degree of implementation
Integration of telemedicine/telehealth into the national guidelines for public health preparedness according to the International Health Regulations and national contingency plans for the epidemic.	Low
Definition of national regulations and financing structures for telemedicine/telehealth in the context of public health emergencies.	Low/Medium
Strategies to rapidly define scenarios for telemedicine/telehealth use and structures.	Medium
Development of clinical guidelines for patient care mediated by telemedicine/telehealth in various areas of health.	Medium
Standardization of automated screening questionnaires and algorithms for remote monitoring of patients.	Low
Establishment of data-sharing mechanisms for integrating data from telemedicine providers with epidemiological surveillance.	Low
Development of communications tools to inform and educate the population on the recommended use of telemedicine/telehealth.	Medium

Source: prepared by the authors, based on Ohannessian et al. ¹⁸.

ability, systems, services, human resources, and organizational models. These investments are not limited to (or resolved only with) financial resources, but require time, particularly in such diverse contexts as Brazil, which can be a limitation for achieving their full potential.

Finally, there are real limits to the use of telehealth, especially for the care needed during the current epidemic. Although on-line consultations are quicker than face-to-face visits, they diagnose nothing. No telehealth app can conclusively say whether a patient is infected with the coronavirus or whether the “virtually” selected patients require testing in person to identify the virus. ICT-mediated consultations at home may not be appropriate for severely ill patients or when comorbidities or cognitive disorders (e.g., Alzheimer’s disease or stroke sequelae) impair the patient’s ability to use the technology. Some consultations require physical examinations that may be difficult to perform remotely (such as auscultation) and ancillary diagnostic methods (obtaining images and cultures) that cannot be performed remotely ⁵⁸.

Conclusions

Telehealth is a critical component for increasing the capacity to fight the coronavirus and at the same time maintain health services functioning and safer. Telehealth can also be an effective alternative to face-to-face visits of patients that have other healthcare needs, helping safeguard the services for those most in need of personal care.

The immediate use and successful application of telehealth to deal with this global public health challenge will likely increase the public and government acceptance of such technologies for other areas of health in the future, including chronic noncommunicable diseases, both in Brazil and elsewhere in the world.

We emphasize the intensity of initiatives launched in such short time, most of which are conditioned on rules and guidelines that systematically highlight the exceptional nature of the current pandemic period. Although much remains to be built and operationalized in Brazil for telehealth to effectively occupy the spaces discussed here, it is reasonable to imagine that after this health crisis has passed, the field will take a new shape that will further strengthen Brazil’s single and universal health system, on which 212 million Brazilians rely for their rights and hopes.

Contributors

R. Caetano and R. M. Silva participated in the study conception and planning, data analysis, writing and revision of the manuscript, and approval of the final version. A. B. Silva contributed in the study conception, data analysis, writing and revision of the manuscript, and approval of the final version. A. C. C. M. Guedes, C. C. N. Paiva, G. R. Ribeiro and D. L. Santos collaborated in data collection, analysis, and interpretation, revision of the manuscript, and approval of the final version.

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Additional informations

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Resumo

A COVID-19 tem representado um desafio global aos sistemas de saúde, expandindo em velocidade crescente de óbitos, de pacientes críticos com pneumonia e necessidade de suporte respiratório. Métodos alternativos para controlar a propagação da doença, como o isolamento social, medidas extremas de quarentena e o rastreamento dos contactantes dos casos têm sido utilizados no mundo. Contudo, essas medidas podem não ser totalmente eficazes para combater a escalada da COVID-19 em compasso às preparações nacionais necessárias às novas demandas de cuidado. Ampla gama de tecnologias digitais pode ser usada para aprimorar essas estratégias de saúde pública, e a pandemia gerou um frenesi relacionado à telessaúde. No Brasil, esse campo tem crescido acentuadamente nos últimos anos. Todavia, a despeito da intensa proliferação de normativas, ainda inexistia, até a epidemia, um marco regulatório plenamente consolidado no país. O surgimento da COVID-19 marca um momento profícuo de expansão das aplicações e usos da telessaúde, como forma de melhorar a resposta do sistema de saúde à crise em curso. O artigo discute a contribuição da telessaúde para o enfrentamento da COVID-19 e as iniciativas recentes desencadeadas no país, como oportunidades para a consolidação da telemedicina e de aperfeiçoamento do Sistema Único de Saúde. Concluiu-se que a telessaúde oferece capacidades para triagem, cuidado e tratamento remotos, auxilia o monitoramento, vigilância, detecção e prevenção, e para a mitigação dos impactos aos cuidados de saúde indiretamente relacionados a COVID-19. As iniciativas desencadeadas nesse processo podem reconfigurar o espaço futuro da telemedicina na prática dos serviços no território.

COVID-19; Coronavírus; Telemedicina; Pandemias; Emergências

Resumen

La COVID-19 ha representado un desafío global para los sistemas de salud, expandiéndose rápidamente y provocando fallecimientos a una velocidad creciente de pacientes críticos con neumonía y necesidad de ventilación mecánica. Se han utilizado en el mundo métodos alternativos para controlar la propagación de la enfermedad como: aislamiento social, medidas extremas de cuarentena y rastreo de los contactos de casos positivos. No obstante, estas medidas pueden no ser totalmente eficaces para combatir la escalada de la COVID-19, en paralelo con los preparativos nacionales indispensables para las nuevas necesidades de cuidado. Por ello, se puede usar una amplia gama de tecnologías digitales para perfeccionar esas estrategias de salud pública, además, la pandemia ha generado un frenesí relacionado con la telesalud. En Brasil, este campo ha crecido acentuadamente durante los últimos años. Todavía hasta la epidemia, y a pesar de la intensa proliferación de normativas, no existía un marco regulatorio plenamente consolidado en el país. El surgimiento de la COVID-19 marca un momento fructífero de expansión de las aplicaciones y usos de la telesalud, como forma de mejorar la respuesta del sistema de salud para la crisis en curso. Este trabajo discute la contribución de la telesalud para combatir la COVID-19, así como las iniciativas recientes desencadenadas en el país como oportunidades para la consolidación de la telemedicina y del perfeccionamiento del Sistema Único de Salud. Se concluyó que la telesalud ofrece capacidades para: triaje, cuidado y tratamiento a distancia, ayuda a la supervisión, vigilancia, detección y prevención, así como para la mitigación de los impactos a los cuidados de salud indirectamente relacionados con la COVID-19. Las iniciativas desencadenadas en ese proceso pueden reconfigurar el espacio futuro de la telemedicina en la práctica de los servicios dentro de Brasil.

COVID-19; Coronavírus; Telemedicina; Pandemias; Urgencias Médicas

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