

Use and limitations of telemedicine in the education of medical students: lessons from the pandemic for innovations in teaching strategies

Uso e limitações da telemedicina na formação de estudantes de medicina: lições da pandemia para inovações em estratégias de ensino

Arthur César Silveira Freitas^{1*}, Luís Guilherme Oliveira Reis¹, Maria Eduarda Jardim Mozelli Corrêa¹, Paula Jessamine dos Anjos Resende¹, Guilherme Nogueira Mendes de Oliveira²

ABSTRACT

Objective: The current public health scenario has changed abruptly and unexpectedly due to the new coronavirus (SARS-CoV-2) pandemic. Regarding that, we long to discuss here the potential, limitations and risks of the use of technological resources (which are already being used in medical care during the pandemic) also in medical education. Some areas of expertise in which academics can benefit from the use of telehealth, duly supervised by preceptors, are described. **Methods:** The method adopted was a narrative review of the literature. The search was carried out in the Latin American and Caribbean Literature in Health Sciences (LILACS), Scientific Electronic Library Online (SciELO) and Virtual Health Library (VHL) databases. The terms used to search for the articles were: “telemedicine”, “telehealth”, “medical education”, “COVID-19”, “pandemic”. Articles consistent with the research objectives were included. Those that did not deepen the topic and those published before 2010 were excluded. Relevant publications mentioned in the selected articles were also included. In addition, a search was carried out on the websites of medical entities and Brazilian health authorities to clarify rules and regulations related to the use of telemedicine in Brazil. **Conclusion:** As advantages of telemedicine in the education of medical students, we can mention the opportunity for students to become familiar with telehealth tools in medical practice, to protect patient privacy, train communication between health professionals. This practice can also expand and qualify access to interventions of medical schools, promoting equity. Among the obstacles, we can mention the absence of a telemedicine regulation that clarifies and gives legal support to telemedicine practices, especially outside the pandemic period. In addition, it is necessary to expand access to technological resources that offer secure and efficient communication regarding data protection. Therefore, we suggest that the adaptations required by the COVID-19 pandemic bring a unique opportunity to advance in the debate on the use of telemedicine in Brazil, also paying attention to the training of medical students.

Keywords: Telemedicine, Medical Education, COVID-19.

¹ Faculdade de Medicina de Diamantina da Universidade Federal dos Vales do Jequitinhonha e Mucuri – Campus JK. Diamantina, Minas Gerais, Brasil.

² Universidade Federal de Minas Gerais.

Institution:

Faculdade de Medicina de Diamantina da Universidade Federal dos Vales do Jequitinhonha e Mucuri – Campus JK. Diamantina, Minas Gerais, Brasil.

Supporting Sources:

None.

Conflicts of Interests:

None.

* Corresponding Author:

Arthur César Silveira Freitas
E-mail: arthur.cesar@ufvjm.edu.br

Received on: 20 October 2021.

Approved on: 13 January 2022.

Publication Date: 31 March 2022.

DOI: 10.5935/2238-3182.2022e32203

RESUMO

Objetivo: O atual cenário de saúde pública se alterou abrupta e inesperadamente devido à pandemia do novo coronavírus (SARS-CoV-2). Nesse sentido, buscou-se discutir as potencialidades, limitações e riscos do uso dos recursos tecnológicos (que já vêm sendo usados na assistência médica na pandemia) também na formação do estudante de medicina. Descrevem-se algumas áreas de atuação nas quais os acadêmicos podem se beneficiar do uso da telessaúde, devidamente supervisionados por preceptores. **Métodos:** O método adotado foi de revisão narrativa da literatura. A busca se realizou nas bases de dados Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS), Scientific Electronic Library Online (SciELO) e Biblioteca Virtual em Saúde (BVS). Os termos utilizados para a busca dos artigos foram: “telemedicina”, “telessaúde”, “ensino médico”, “COVID-19”, “pandemia”, e suas traduções para inglês. Foram incluídos os artigos concordantes com os objetivos da pesquisa. Foram excluídos os que tangenciaram o tema e os publicados antes do ano de 2010. Foram incluídas ainda publicações relevantes, citadas nos artigos selecionados. Além disso, foi realizada pesquisa em páginas da web de entidades médicas e autoridades brasileiras em saúde para esclarecimento de regras e normativas relacionadas ao uso da telemedicina no Brasil. **Conclusão:** Como vantagens da telemedicina na educação de estudantes de medicina podemos citar a oportunidade de estudantes se familiarizarem com ferramentas da telessaúde na prática médica, a proteger a privacidade do paciente, treinar a comunicação entre profissionais de saúde, além de ampliar e qualificar o acesso de intervenções das escolas médicas, promovendo equidade. Dentre os obstáculos, podemos citar a ausência de uma regulamentação da telemedicina que esclareça e dê sustentação legal às práticas em telemedicina, principalmente fora do período pandêmico. Além disso, é necessária ampliação do acesso aos recursos tecnológicos que ofereçam uma comunicação segura em relação a proteção de dados e eficiente. Portanto, sugerimos que as adaptações exigidas pela pandemia da COVID-19 trazem a oportunidade singular de avançarmos no debate do uso da telemedicina no Brasil, atenta também à formação do estudante de medicina.

Palavras-chave: Telemedicina, Educação Médica, COVID-19.

INTRODUCTION

The public health scenario resulted from the new coronavirus (SARS-CoV-2) pandemic has led to a series of adaptations in the personal, professional, educational, social, cultural and in several other aspects of life. Social distancing measures to reduce the risks of SARS-CoV-2 transmission, poor availability of personal protective equipment, among other factors, have led several medical schools to interrupt many of their practical activities.

Many consequences related to the mental health of students in isolation, reduced outpatient care and overload of many medical professors who work on the front lines in the fight against COVID-19 exemplify some of the many challenges faced in a pandemic context.¹

In the midst of so many challenges, it is reasonable to predict that the solutions will be equally complex. The changes arouse the need for innovations, such as the possibilities for technological advance in medicine and medical education. The innovation brought by the present discussion is the incorporation of telemedicine in the medical curriculum,

especially considering the prediction that measures of social distancing tend to continue for an indeterminate period, according to some estimates, throughout the year 2022.²

In this sense, we seek to review the potential, limitations and risks of using technological resources (which have already been widely used and valuable in medical care during the pandemic) and to assess whether telemedicine can help in the education of medical students. This review proposes a reflection on teaching modalities and medical care with the help of digital resources, as telemedicine will provide, in addition to safety for health professionals, undergraduate students, patients, and the community (especially in the sanitary context caused by SARS-Cov-2), to increase the reach of health care and improve the resolution capacity of the health system. For these reasons, the use of this resource can last, being beneficial to provide the undergraduate students contact with other work methods that may be widely implemented in the near future so that this student acquires the desirable skills.

In face of such needs, telehealth emerges as an alternative to be considered as an aid in medical training. According to

the World Health Organization³ (1997), telehealth refers to activities related to health and health services carried out at a physical distance through information and communication technologies with the purpose of global health promotion, disease control and health care, as well as to promote education and favor health management and research.

Other important definitions for understanding this practice are described by the terms "teleorientation", a modality of telemedicine in which medical professionals carry out, at a distance, the orientation and referral of patients; "telemonitoring", an act performed under medical guidance and supervision for remote health and/or disease parameters monitoring, "teleinterconsultation", an exclusive modality for exchanging information and opinions between physicians, for diagnostic or therapeutic assistance⁴; "teleconsultation", which consists in the use of technological tools that allow communication between the physician and his patient and allow adequate assistance.

There are other terms that describe the introduction of virtual health resources. For Maldonado et al.⁵ (2016) there is no consistent distinction between the concepts of telemedicine, telehealth and e-health, although some authors distinguish them depending on the context and breadth of application of the services. Next, we will review this terminology and some of the possible applications of telemedicine in medical education.

METODOLOGY

The method adopted was a narrative review of the literature, a theoretical and bibliographical research, based on existing literature. The search was carried out in the following databases: Latin American and Caribbean Literature on Health Sciences (LILACS), Scientific Electronic Library Online (SciELO) and Virtual Health Library (VHL), from August 2020 to April 2021.

The terms used to search for the articles were: "telemedicina", "telessaúde", "ensino médico", "COVID-19", "pandemia", in addition to its English translations: "telemedicine", "telehealth", "medical education", "COVID-19", "pandemic".

Articles published from 2010 onwards that addressed the topic of the use of telemedicine in the education of medical students, especially during the pandemic period, were selected. Among the articles found, a selection was made by the authors independently and later a joint selection was made among the publications that addressed the chosen topic. Other references that could help contextualize the use of telemedicine in Brazil and worldwide were also included.

A search was also carried out in the references cited by the selected articles to complement the review. In addition, a search was made on the websites of regulatory entities for rules and regulations related to the use of telemedicine in Brazil, such as the Federal Council of Medicine (CFM), the Ministry of Health and the Presidency of the Republic (through the Official Gazette of the Unity).

RESULTS

1. THE CONTEXT OF TELEMEDICINE IN BRAZIL

Telemedicine had its origin in the late twentieth century amid great advances in telecommunications. However,

despite the potential benefits of its implementation and diffusion in Brazil, discussions on this merit have still been poorly developed due to questions about ethical aspects, medical confidentiality, implementation and adherence difficulties by professionals and patients.⁵

Some characteristics of the country show how much the effective expansion of telemedicine reach could enhance health interventions. The territory of 8,547,403 km², the 5,568 cities⁶ and the concentration of medical professionals in large urban centers, where there is a higher demographic density, are characteristics that hinder the access of the most unassisted and isolated population to specialized health services.⁷ The national scenario in which telemedicine is inserted will be contextualized next.

2. INTERNET ACCESS

It is important to note that developing countries, such as Brazil, present certain challenges, especially regarding the patients' access to information technologies.

The TIC Domicílios survey⁸ (2020), the most important survey on access to information and communication technologies, carried out by the Regional Center for the Development of Studies on the Information Society (Cetic.br), indicates that 74% of Brazilians accessed the internet at least once in the three months preceding the survey. Ten years earlier, 41% of the population was in this condition. It was observed, therefore, that the growth occurred on average of 3.3% per year. Maintained at this rate, in 2028 100% of the population would be online.⁹

Access varies between households in urban (75%) and rural (51%) areas, as well as between regions. The Southeast has the highest rate (75%) and Northeast has the lowest (65%).

Family income also seems to be an important predictor of internet access, which reaches 97% in households with an income higher than ten minimum wages, compared to 55% in those with up to one minimum wage. It is worth mentioning, however, that even among those who declared they had no income, 51% have access to the internet. More data can be extracted from the survey:

Regarding the device, smartphones and other mobile devices are the most common tools to achieve internet connection (99%), followed by computers (42%), TVs (37%) and video games (9%) [...].

Regarding the frequency of use, 90% reported accessing it every day, 7% at least once a week and 2% at least once a month. The most used resources are sending messages via WhatsApp, Skype or Facebook Messenger (92%), social networks like Facebook or Snapchat (76%), video calls via Skype or WhatsApp (73%), access to e-government services (68%), sending e-mails (58%), e-commerce purchases (39%) and participating in lists or forums (11%).⁹

All of these data show that internet access in Brazil has been expanding recently and has been growing at considerable rate. Even in classes D and E and in rural areas, which includes the group of Brazilians with less access to health and technological resources, internet access exceeds 50%.

As relevant as the network access is the quality and the means of this connection, since certain tools require greater data consumption.

The same survey reveals that only 44% of Brazilians access the internet via fixed broadband (cable, optical fiber, DSL, via radio or satellite), while 26% have a mobile connection via modem or 3G or 4G chip. 1% still uses dial-up connection. Another 11% were not able to inform.⁸ The numbers vary significantly between regions and classes, which shows the complexity of the theme and the need for an individualized assessment to consider the possibility of implementing telemedicine in each area.

3. ETHICS AND REGULATION

Another point to debate is that the use of technological resources must be guided by the principles of bioethics.

In any activity that involves individual or collective health, privacy and confidentiality must be ensured. The adoption of practices based on these ethical principles is essential for the safety of patients as well as to ensure the quality of care and is already properly oriented to this type of health care.¹⁰

However, until the current outbreak of the SARS-CoV-2 pandemic the absence of sanitary impediments to face-to-face care, which is invaluable for medical practice, probably did not require a broader adoption of telemedicine resources.

With the need for social distancing brought by the pandemic, the emergency implementation of telemedicine was needed and, with that, discussions about its practical applicability became urgent¹¹ and a series of debates were proposed to improve the regulation on the subject.

On the international horizon, since 1999, with the Tel Aviv declaration, the regulation of this practice has been analyzed. Also in this context, Italy was one of the first countries in Europe to apply telemedicine resources, such as the use of Tele-Electrocardiograms by the University of Rome in the 1970s, which consolidated into an Electrocardiogram Transmission Network involving more than 50 hospitals.¹²

In the current scenario of the COVID-19 pandemic, countries such as China and the United Kingdom have shown in practice the importance of using telemedicine.

According to Ye Q et al.¹³ (2020), China used information technology during all phases of the epidemic, performing remote diagnoses with the aid of a computer that analyzed the real-time results of the reverse transcriptase reaction tests followed by polymerase chain reaction (RT-PCR) associated with the characteristics of real-time chest computed tomography, in order to make a more reliable diagnosis in clinical practice.

In the United Kingdom, according to Celuppi IC et al.¹⁴ (2021), the National Health Service (NHS) provided a telephone resource to answer any doubts the population had about the COVID-19 pandemic, as well as an official website where it was possible to identify patients with mild symptoms and refer severe cases to an appropriate service.

In Brazil, this discussion began in 2002, by resolution number 1643¹⁰ of the Federal Council of Medicine (CFM)¹⁵. After a hiatus of almost two decades, CFM Resolution no. 2227/2018 brought innovations such as teleconsultation and telesurgery, but was revoked by Resolution no. 2228/2019.

There is a legal inconsistency in this scenario regarding the veto brought by article 37 of the 2019 Code of Medical Ethics to the therapeutic conduction without

direct examination of the patient. In Article 37 itself, it is emphasized that the distance service must be regulated by the CFM.¹⁵

Thus, we observe that an update on the subject is essential, keeping up with the new demands and successful experiences in other parts of the world, especially considering the continental dimensions of the Brazilian territory and the difficulty to access medical specialties outside the large urban centers.

These points show the need for adequate regulation of telemedicine, especially in the context of the COVID-19 pandemic, since today there is no solid legal ground for the implementation of telemedicine practices in Brazil.

In March 2020, just over a month after the Ministry of Health declared the Public Health Emergency of National Importance, CFM, in its letter No. 1756/2020⁴, recognized in exceptional character the use of telemedicine in the modalities teleorientation, telemonitoring and teleinterconsultation.

Still in March 2020, the Ministry of Health, in its ordinance number 467, on a temporary basis, taking into account the aforementioned letter, provided new regulations on telemedicine actions.¹⁶

Considering the positive results of the telemedicine use in Brazil and in the world during the SARS-CoV-2 pandemic period¹⁵, it is expected that setbacks such as the prohibition of the telemedicine service in Brazil shall not occur.

Telemedicine became a critical component during the pandemic and enhanced the reach of health services, multiplying the system's capacity to face COVID-19. We believe that telemedicine is a fundamental part to obtain a definitive victory against the pandemic and should not be considered just an option or complement to react to a crisis. In this way, the dissemination of telemedicine is a path with no return, and its regulation will be remembered in the future as a historic landmark in the Unified Health System (SUS).¹⁵

The telemedicine use during the crisis caused by the coronavirus (SARS-CoV-2) was laid down by law number 13,989, of April 15, 2020¹⁷, which authorizes it for the duration of the pandemic. The law also requires the medical professional to inform the patient of all limitations inherent to the use of telemedicine, in view of the impossibility of carrying out a physical examination during the consultation, and defines telemedicine as, "among others, the exercise of medicine mediated by technologies for assistance, research, disease and injury prevention and health promotion"¹⁷.

The aforementioned bill was approved by the Presidency of the Republic of Brazil on April 15, 2020 with vetoes to the devices that allowed CFM to regulate telemedicine and that provided for the validation of medical prescriptions presented in digital format, foreseen that they have an electronic or digitized signature of the doctor who prescribed it, and its presentation in physical environment was waived.

However, after passing through the Congress and the Federal Senate, this veto was rejected and new ethical norms are being developed by a committee of CFM advisers, who declared that they agree that telemedicine will not replace the physical presence of the doctor, and that, for this, it is essential to develop structured data systems with information protection.

According to CFM, the rules developed in telemedicine are based on fundamental principles of medicine, such as the doctor-patient relationship and the context of long travels in the national territory. It is recommended to maintain the central and irreplaceable role of the physician in the service, respect for the ethical pillars of the practice of medicine, such as the preservation of the privacy of patients and the awareness that there is no substitution of traditional practice for telemedicine, but, yes, its use as a complementary strategy to facilitate patients' access to health services.¹⁸

4. PANDEMIC AND PERSPECTIVES

The COVID-19 pandemic has brought to light a new discussion about the applicability and importance of telemedicine. However, it is important to note that there is still much debate to be done on the subject, because ethical, legal and social issues are far from being fully explored.

All current legislation concerning this subject, for example, is in force only during the pandemic period, what brings uncertainty about the future of the legality of the practice. In addition, the scope of these regulations for related areas, such as medical education, still lacks regulation by agencies of the Ministry of Education and the CFM. Such regulation would make it possible to adequately expand and institutionalize the incorporation of telemedicine in the daily lives of undergraduate students.

This is also true for discussions about guaranteeing the ethical principles of this modality, which, at the moment, value the potential benefits to minimize the impacts of the pandemic, but which need constant elaboration and revision.

Technological restraints are still considerable, but there are promising prospects. Each year, the number of Brazilians with access to the internet and proper devices (such as smartphones) increases. For Corrêa, Zaganelli and Gonçalves¹¹ (2020), there is an urgent need to use this resource to guarantee the human right to health and quality of social and civil life, especially at the current moment, and that is why it is needed to study about obstacles and their respective solutions to promote access to quality health.

Below, we will suggest some possible resources to be evaluated for a reduction in the risk of transmission of infectious diseases, such as COVID-19, among students, patients and health professionals through the physical distancing provided by telehealth, maintaining supervised medical assistance in the medical teaching process. We also consider the strategies in telemedicine and medical training that can be maintained after the pandemic.

5. TELEMEDICINE IN MEDICAL TRAINING

Medical education is going through a time of adaptation in face of the SARS-CoV-2 pandemic. The adoption of strategies for the training of medical professionals aimed at the safety of both the student and the patient should be encouraged, in order to value the quality and effectiveness of teaching and health care.

Telehealth tools are promising in medical education, as they expand access to health, enable the physician to act on several fronts, such as matrix support, organization of the flow between primary and secondary care and health planning, and can even allow the student's contact since graduation with new technologies and strategies for organizing different services forms and flows.

Waseh et al.¹⁹ (2019) affirm that an increasing adoption of telehealth has been observed in several countries in the last decade. In the same path, some medical schools have already incorporated telemedicine skills into their curriculum. These authors believe that this introduction contributes to the development of skills and assists in the delivery of quality, safe and customizable health care, as well as in the increasing of the population's access to health and reducing healthcare costs in the United States.

Nilson et al.²⁰ (2018) also point out benefits such as improved quality and resolvability of health services, reduced waiting time for users, better degree of user satisfaction, improved and facilitated qualification of network professionals.

Mian and Khan²¹ (2020) point out that, although telemedicine has benefits, especially as an alternative form of health education in the face of the COVID-19 pandemic, student contact with the patient is essential for the development of medical skills essential to clinical practice.

In this sense, it should be noted that the intention of telemedicine in medical training is not to replace face-to-face clinical practice, but to add new perspectives regarding health services and, in the current pandemic context, guarantee the safety of both the student and the health team, as for the patient, in situations in which remote assistance is an alternative to face-to-face care.

According to Iancu²² (2020), there are a number of skills associated with optimized telemedicine care. These include, but are not limited, to the following: communication, physical examination, professionalism and digital literacy.²² Regarding the second, Iancu²² (2020) considers that certain physical examination techniques that can be learned involve functional physical examinations, application of remote monitoring devices and collaboration with local professionals. Virtual assessments can be extended to include home assessments.²² To the list, one could add the skills of distance learning, in order to allow the effectiveness of telemedicine while transmitting the feeling of mutual respect and acceptance of a dignified medical consultation.

The introduction of these practices in medical education would provide the development of those skills that are increasingly relevant in the daily care and tend to become essential in the near future. For Jumreornvong et al.² (2020), through a curriculum that incorporates telemedicine training, medical students could learn how to maintain a strong doctor-patient relationship, protect patient privacy and promote equity in access and treatment.

6. PRACTICE AREAS

Below, some areas of expertise are described in which academics can benefit from the use of telehealth, duly supervised by preceptors:

1. Teleconsulting, through telematriciation and teleconsultations as part of the internships in specialty clinics or even internships in hospital contexts, as well as organization of the flow between the different levels of healthcare. Teleinterconsultation provides access to specialized interventions in geographically distant centers or with little specialized support, with the purpose of promoting, among health professionals and academics, the exchange of information about patients and their demands, in order to improve diagnoses

- and procedures, in addition to rationalize referrals and demand for medical specialties. Telematriciation promotes access by the general practitioner and the primary care team to the support of a specialized team to discuss demands and allows shared actions to be taken, which may favor greater resolution in primary care;²³
2. Tele-education, in order to promote and carry out continuing education of health teams;
 3. Teleorientation, through which the health team can help the patient to solve doubts and guide assertive actions with agility. Remote assessment of the patient's clinical condition through tele-guidance defines and directs the most appropriate health care, clarifies doubts in an agile way, since face-to-face care may require long periods of time²⁴;
 4. Teleconsultations, in order to allow the maintenance of medical care for patients in more intensive social isolation. For example, some patients from risk groups for severe cases of COVID-19 may be afraid to attend the service in person, leading to uncontrolled health conditions, which could be minimized with remote supervision of these patients with the support of medical students. Teleconsultations have procedures and ethical debates to be further detailed by the legislation on telemedicine in our environment, such as free and informed consent, recording of the consultation, security and data protection, among others.²⁵

7. PREPARATION, SKILLS AND "NETIQUETTE"

Agenda planning, equipment adequacy, regular connection status verification, adaptation of the space where the professional is, preparation of a script to be followed are some of the requirements for the prosperity of telehealth tools.

In addition, the environment where the service is established should favor communication, offering adequate visualization and listening, avoiding noise and interruptions. In this context, attention to the rules of online etiquette - known as "netiquette" - is essential for the smooth running of activities. According to García-Perez²⁴ (2020), for example,

before using email or messaging, it is advisable to configure it with a notification of message receipt and define the response time, privacy settings and indicate what to do in the absence of the professional.

In the case of phone calls, Kissani et al (2020), apud García-Perez²⁴ (2020), proposes some rules:

1. It is advisable to notify if there is a delay in the call not to worry the patient, and it is pertinent to respect the patient's place on the waiting list;
2. It is convenient to call the patient by name, introduce oneself and others at the appointment, ask and record who else is listening at the patient's end;
3. It is advisable to develop a script in order not to improvise or ramble and not to forget anything. It is also good to have the patient's medical history on hand at all time;
4. It is appropriate to make changes directly to the electronic prescription or to communicate them by text message or email to the family doctor;

5. It is appropriate to fill prolonged silences with something like "uh", "ah", "yes", as the style of consultation differs from that of "face to face" and you have to seek to approach the patient in the telephone consultation;
6. It is best for the patient to hang up first at the end of the call or to wait a few seconds before hanging up, as it can be misinterpreted if the doctor abruptly ends the call;
7. It is equivalent to a "no show" if a patient does not answer a planned phone call.

8. CURRENT PRACTICAL SCENARIO

In Brazil, telemedicine is already part of medical practice through teleconsultation, teliagnosis, tele-education, clinical simulations, among other practices depending on the demands for this type of tool²⁶. This provides perspectives for medical schools to use these strategies to allow undergraduate students to have broader contact with this method of health care since their graduation.

Some universities have structured and consolidated telehealth centers for the expansion of assistance and training in health, such as the Telehealth Center, linked to the Hospital das Clínicas of the Federal University of Minas Gerais²⁷ (HC-UFGM). Founded in 1998 aiming to minimize the geographic barriers of action, today HC-UFGM provides teleconsulting, tele-education, teliagnosis, application development, among others, serves more than a thousand municipalities in Minas Gerais and has collaboration with other universities from the interior of the state. The Federal University of Jequitinhonha and Mucuri Valleys (UFVJM), for example, has been part of this network since 2016.²⁸ UFVJM has a multicampi structure, and the telehealth center is currently at the Faculty of Medicine of Teófilo Otoni (FAMMUC).

DISCUSSION

When considering this whole scenario, it is evident that new ways of practicing, teaching and learning medicine deserve continuous updating. It is a delicate subject with considerations on its limits and applications.

At the same time, virtual communication resources are a norm in the new times and already have an influence on medical practice. Therefore, there is a need for regulation, for training and for debates on ethical aspects to be able to follow the evolution of the digital world in medicine. Thus, there is an expectation that the Brazilian norms that guide the safe, scientific and ethical adoption of telemedicine in the country may evolve.

Abstaining from this debate can lead to other major problems, such as the improper use of health technologies and lack of assistance, whether due to physical distance or limitations on mobility in face of scenarios such as the pandemic of COVID-19 and the continental characteristics of Brazil. If much of this is still due to infrastructure limitations, in particular access to a quality internet connection (which undergoes considerable improvements year on year), something else may be due to an overly hesitant attitude that is observed in part of the professionals in the health area.

Adopting, without thought, each new application or new virtual tool that promises to revolutionize medical practice is

a mistake and may be the consequence of the lack of debates on the subject. Every new instrument must be rationally analyzed in order to clearly determine its potentials and limitations. New proposed practices should not replace the traditional practice of medicine. Physical examination is the lifeblood of medicine. However, there are several digital tools that can facilitate access to medical interventions.

Likewise, all ethical aspects must be considered, especially with regard to medical confidentiality. All medical practice, including telemedicine and medical training environments, must be confidential and guarantee patient privacy, and the professional must search for these safety specifications.

The needs are sufficient to stimulate the growing adoption of technological resources in the medical routine, especially in the doctor-patient relationship. The means of communication are renewed and the contact between these two entities was no longer restricted to face-to-face contact in the office before the pandemic. The use of email, messages and telephone calls, among other resources, is already part of the contemporary doctor-patient relationship.²⁹

Crisis are rarely marked by the birth of totally new ideas. In fact, they only speed up processes that were already underway and, in general, these changes remain afterwards.

Jumreornvong² (2020) considers that the current pandemic has rapidly accelerated the movement towards telemedicine and provided an opportunity for medical schools to prepare students to participate and develop the skills for this transition. For Iancu²² (2020), education is fundamental for the future success of the implementation of telemedicine and its integration with undergraduate courses allows all future professionals to have access to this type of training.

Although we cannot report a consistent experience in the use of telemedicine in teaching in our practice, due to a series of limitations imposed by the pandemic itself in our local reality, we believe that this is a relevant moment for reflections, planning and analysis of the experiences that have been employed. This critical and timely analysis can make good use of the current stimulus of telemedicine resources and break down barriers that can enhance access to healthcare in medical schools.

This narrative review intended to discuss the potentials and drawbacks of the insertion of telemedicine in the education of medical students. However, it has idiosyncratic limitations to this method. The subjectivity implicit in the selection of articles represents the main weakness, notably for inducing potential biases. On the other hand, this work highlights the potential for expanding the debate on telemedicine, the need to improve its regulation in Brazil and the potential inclusion in the training of medical students.

Therefore, the irreplaceable value of the presence of the doctor next to his patient, of the teacher next to his student, is highlighted in order to ensure, above all, the feeling of welcome. Nothing replaces that presence. However, it is possible that even in person, face to face, patients and students may feel distant from doctors and teachers. On the other hand, effective and affective communication is possible even from distance, using appropriate technological resources and developing distance communication skills.

CONCLUSION

Even though the possibilities are many, there are still lots of barriers to overcome when it comes to more consistent adoption of telemedicine both in medical practice and in the education of medical students.

Among the obstacles, we can highlight the still little widespread practice of telemedicine in Brazil and in the curriculum of Brazilian medical schools and the need for regulations that clarify and monitor the needs of the use of telemedicine in Brazil.

There is also a need to expand access to efficient digital tools that offer secure communication in relation to data protection. We can point out as strengths of this review the identification of the potential use of telemedicine in medical graduation through the training of professionals attentive to the expansion of their medical actions, trained by the required digital resources, ensuring patient privacy, in desirable medical postures in virtual environments, in addition to the inclusion of telemedicine in the practices of medical schools to promote greater equity, resolvability and quality care.

The medical experiences during the COVID-19 pandemic prompted several reflections and reformulations. We highlight here the proposal to expand the use of telemedicine in the medical curriculum as a complementary strategy that can enable a greater reach of medicine, the learning of its art and the strengthening of doctor-patient and teacher-student relationships.

REFERENCES

1. Grandisoli E, Jacobi PR, Marchini S. Educação e pandemia: desafios e perspectivas. *Jornal da USP*. São Paulo, Agosto, ano 2020, 12 ago. 2020. Disponível em: <https://jornal.usp.br/artigos/educacao-e-pandemia-desafios-e-perspectivas/>. Acesso em: 12 abr. 2021.
2. Jumreornvong O, *et al.* Telemedicine and Medical Education in the Age of COVID-19. *Academic Medicine*. 2020. Disponível em: https://journals.lww.com/academicmedicine/Fulltext/2020/12000/Telemedicine_and_Medical_Education_in_the_Age_of.27.aspx. Acesso em: 12 abr. 2021.
3. World Health Organization. A health telematics policy in support of WHO's Health-for-all strategy for global health development: report of the WHO Group Consultation on Health Telematics. Geneva, 1997. Disponível em: https://apps.who.int/iris/bitstream/handle/10665/63857/WHO_DGO_98.1.pdf?sequence=1&isAllowed=y. Acesso em: 12 abr. 2021.
4. Conselho federal de medicina. Ofício nº 1756/2020, de 19 de março de 2020. Disponível em: https://portal.Cfm.Org.Br/images/pdf/2020_oficio_telemedicina.Pdf. Acesso em: 12 abr. 2021.
5. Maldonado JMSV, Marques AB, Cruz A. Telemedicina: desafios à sua difusão no Brasil. Scielo. Rio de Janeiro, 2016. Disponível em: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2016001402005&lng=en&nrm=iso&tlng=pt. Acesso em: 12 abr. 2021.

6. Instituto Brasileiro de Geografia e Estatística. O tamanho do Brasil. 2021. Disponível em: <https://cnae.ibge.gov.br/en/component/content/article/97-7a12/7a12-voce-sabia/curiosidades/1629-o-tamanho-do-brasil.html>. Acesso em: 12 abr. 2021
7. Assis MMA, De Jesus WLA. Acesso aos serviços de saúde: abordagens, conceitos, políticas e modelo de análise. Scielo. Rio de Janeiro, 2012. Disponível em: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232012001100002&lng=en&nrm=iso&tlng=pt. Acesso em: 12 abr. 2021.
8. RESUMO Executivo TIC Domicílios 2019. In: COMITÊ GESTOR DA INTERNET NO BRASIL. TIC DOMICÍLIOS: Pesquisa Sobre o Uso das Tecnologias de Informação e Comunicação nos Domicílios Brasileiros. São Paulo, 2020, p. 23-28.
9. Valente J. Brasil tem 134 milhões de usuários de internet, aponta pesquisa: A maioria acessa a internet pelo celular. Agência Brasil. Brasília, 26/05/2020. Disponível em: <https://agenciabrasil.ebc.com.br/geral/noticia/2020-05/brasil-tem-134-milhoes-de-usuarios-de-internet-aponta-pesquisa>. Acesso em: 12 abr. 2021.
10. CONSELHO FEDERAL DE MEDICINA. Resolução nº 1643, de 07 de agosto de 2002. Define e disciplina a prestação de serviços através da Telemedicina. Disponível em: <https://abmes.org.br/arquivos/legislacoes/Resolucao-CFM-1643-2002-08-07.pdf>. Acesso em: 13 abr. 2021.
11. Corrêa JCB, Zaganelli MV, Gonçalves BDS. Telemedicina no Brasil: Desafios éticos-jurídicos em tempos de pandemia da Covid-19. *Humanidades & Tecnologia (FINOM)*, v. 25, p. 200-218, 2020.
12. Urtiga KS, et al. Telemedicina: uma visão geral do estado da arte [Tese on the Internet]. São Paulo, SP: Universidade Federal de São Paulo / Escola Paulista de Medicina – UNIFESP/EPM; 2004 [cited 2021 Apr 12]. Disponível em: <http://telemedicina.unifesp.br/pub/sbis/cbis2004/trabalhos/arquivos/652.pdf>. Mestrado em Medicina.
13. Ye Q, Zhou J, Wu H. Using Information Technology to Manage the COVID-19 Pandemic: Development of a Technical Framework Based on Practical Experience in China. *JMIR Med Inform*. 2020 Jun 8;8(6):e19515. doi: 10.2196/19515. PMID: 32479411; PMCID: PMC7282474.
14. Celuppi IC, et al. Uma análise sobre o desenvolvimento de tecnologias digitais em saúde para o enfrentamento da COVID-19 no Brasil e no mundo. *Caderno de Saúde Pública* [Internet]. 2021 [cited 2021 Apr 12]; DOI doi: 10.1590/0102-311X00243220. Available from: <https://scielosp.org/pdf/csp/2021.v37n3/e00243220/pt>
15. Garcia MVE, Garcia MAF. Telemedicine, legal certainty, and COVID-19: where are we?. *Jornal Brasileiro de Pneumologia*, ano 2020, 26 ago. 2020. Disponível em: <https://pubmed.ncbi.nlm.nih.gov/32876086/>. Acesso em: 12 abr. 2021.
16. MINISTÉRIO DA SAÚDE. Portaria nº 467, de 20 de março de 2020. Disponível em: http://www.planalto.gov.br/CCIVIL_03/Portaria/PRT/Portaria%20n%C2%BA%20467-20-ms.htm#:~:texto=PORTARIA%20N%C2%BA%20467%2C%20DE%202020,importa%C3%A2ncia%20internacional%20previstas%20no%20art. Acesso em: 13 abr. 2021.
17. BRASIL. Presidência da República. Lei n. 13.989, de 15 de abril de 2020. *Diário Oficial da União*. Brasília, 16 de abril de 2020. Disponível em: <https://www.in.gov.br/en/web/dou/-/lei-n-13-989-de-15-de-abril-de-2020-252726328>. Acesso em: 12 abr. 2021.
18. Conselho Federal de Medicina. CFM publicará nova resolução para regulamentar telemedicina. 2020. Disponível em: <https://portal.cfm.org.br/noticias/cfm-publicara-nova-resolucao-para-regulamentar-telemedicina/>. Acesso em: 12 abr. 2021.
19. Wasch S, Dicker AP. Telemedicine Training in Undergraduate Medical Education: Mixed-Methods Review. *JMIR Medical Education*, 8 abril 2019. Disponível em: <https://pubmed.ncbi.nlm.nih.gov/30958269/>. Acesso em: 12 abr. 2021.
20. Nilson LG, et al. TELESSAÚDE: DA IMPLANTAÇÃO AO ENTENDIMENTO COMO TECNOLOGIA SOCIAL. *Revista Brasileira de Tecnologias Sociais*, v. 5, n. 1, p. 33-47, 2018. Disponível em: <https://siaiap32.univali.br/seer/index.php/rbts/article/view/13400>. Acesso em: 12 abr. 2021.
21. Mian A, Khan S. Medical education during pandemics: a UK perspective. *BMC Medicine*. 2020. Disponível em: <https://bmcmedicine.biomedcentral.com/articles/10.1186/s12916-020-01577-y>. Acesso em: 12 abr. 2021.
22. Iancu AM, Kemp MT, Alam HB. Unmuting Medical Students' Education: Utilizing Telemedicine During the COVID-19 Pandemic and Beyond. *Journal of Medical Internet Research*, v. 22, p. 1-6, 2020.
23. Tostes JG, et al. Teleinterconsulta e telematriciamento: possíveis respostas para novos e antigos desafios. Associação Brasileira de Educação Médica Série de relatos: "Educação médica em tempos de pandemia" Associação Brasileira de Educação Médica – ABEM. Itajubá, 2020. Disponível em: <https://website.abem-educmed.org.br/wp-content/uploads/2020/07/Relato-Interconsultas.pdf>. Acesso em: 12 abr. 2021.
24. García-Pérez A. Telemedicina en neuropediatria. *neurologia.com*. 2020. Disponível em: <https://www.neurologia.com/articulo/2020304>. Acesso em: 12 abr. 2021.
25. Catapan SC, Calvo MCM. Teleconsulta: uma Revisão Integrativa da Interação Médico-Paciente Mediada pela Tecnologia. *Rev. bras. educ. med.*, Brasília, v. 44, n. 1, e002, 2020.
26. Rezende EJ, Melo MCB, Tavares EC, Santos AF, Souza C. Ética e telessaúde: reflexões para uma prática segura. *Rev Panam Salud Publica*. 2010;28(1):58–65
27. Centro de Telessaúde - Hospital das Clínicas - UFMG. Quem somos. Disponível em: <https://telessaude.hc.ufmg.br/quem-somos/>. Acesso em: 13 abr. 2021.
28. Marcolino MS, Ribeiro AM, Assis TGP, Cardoso CS, Antunes AP, Resende ES, et al. A telessaúde como ferramenta de apoio à Atenção Primária em Saúde: a experiência da Rede de Telessaúde de Minas Gerais. *Rev. méd. Minas Gerais*; 27: [1-7], jan.-dez. 2017.
29. Barbosa IG, et al. Psicossomática: psiquiatria e suas conexões. In: MURAD, M.G.R.; FÁBREGAS, B.C.; DE OLIVEIRA, G. N. M. *Psicologia Médica*. Rio de Janeiro: Rubio, 2014, p. 43-52.