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Telemedicine and medical education in the COVID-19 pandemic: Achievements, challenges and prospects

Dr. Luis Alex Valenzuela-Fernández

Universidad César Vallejo, Lima-Perú

Corresponding author email: lvalenzuelaf@ucvvirtual.edu.pe

Dr. Yolvi Javier Ocaña-Fernández

Universidad Nacional Mayor de San Marcos, Lima-Perú

Dr. María Alina Cueva-Ríos

Universidad Nacional de Jaén, Cajamarca-Perú

Dr. Luis Alberto Núñez-Lira

Universidad Nacional Mayor de San Marcos, Lima-Perú

Abstract---Due to the global urgency produced by the Covid-19 pandemic, the development of alternative, viable processes, accessible through low-cost and technological resources, became more than necessary. Such is the case of telemedicine which, since its appearance towards the end of the 1960s through telephone consultations, has been transformed according to technological development. Information and communication technologies currently allow the provision of information and medical care services in diverse and distant locations, which is why it turns out to be relevant in the case of the current pandemic. This review work is aimed at examining the current state of the scope in the use of telemedicine that occurred during the current Covid-19 pandemic, its link in the case of medical education in various realities; as well as the analysis, evaluation and proposals on the benefits and concomitant challenges regarding telemedicine in the future.

Keywords---telemedicine, telehealth, medical education, COVID-19 pandemic.

Introduction

The term telemedicine was first introduced in 1969, describing it as the provision of medical care without the usual confrontation between doctor and patient [1], which initially emerged as a useful means of providing medical assistance either in rural areas or where the access to care results in great difficulty, mainly aimed at improving the management of chronic diseases, mainly in emergencies [2,3]. According to the American Telemedicine Association (ATA), telemedicine uses electronic communications in order to exchange medical information from one area to another, aiming to improve the health status of patients; and telehealth effectively connects people and their health care providers when personal interaction is not clinically necessary and also facilitates doctor-to-doctor consultation [4].

Telemedicine is generally defined as a combination of technologies and devices capable of remotely obtaining information about a patient's health status, to help decide if there is a need or urgency to intervene [2]. On the other hand, telemedicine refers to the provision of digital or remote medical care services using information and communication technologies (ICT) for the treatment of patients [5]. In general, telemedicine is related to communications through electronic devices for services such as follow-up, consultation with specialists and medication management; while telehealth is a generic term that incorporates the use of digital or electronic information and communication technologies (ICT) to complement the health education of patients and professionals, clinical health care, health administration and public health, fact that generally tends to improve health care as a whole [4].

During these unprecedented times, the terms telemedicine and telehealth have become popular, although they have been known and used for decades [4]. Since the declaration of the Covid-19 disease outbreak as a pandemic in March 2020 by the WHO (World Health Organization); The use of telemedicine has been promoted and expanded, as in the particular case of video-consultations in order to reduce the risks of transmission, as was the case in the United Kingdom and North America [6].

The adoption of technology-based resources are often effective in mitigating extreme exogenous impacts such as natural disasters and diseases [7, 8, 9, 1]. In the field of health, among so many resources, is that of telemedicine. Telemedicine is understood as the use and orientation of technology for health care in order to allow the so-called "distance healing" [7,3]. On the other hand, the scenario triggered by the Covid-19 pandemic has provided the right conditions for a qualitative leap to occur in the development of telemedicine [10]. In this regard, Ohannessian announced that the technological improvements and cost reduction of telemedicine solutions combined with high-speed internet and the widespread use of Smartphones make the application and rapid deployment of video- consultations from the patient's home [6]. On the other hand, it has a particular feature of a logical order that justifies the praxis of telemedicine being developed alongside distance medical education since, if in the not too distant future doctors will develop their activities based on telemedicine, It is urgent that they are trained for such events [9].

State of telemedicine

In this peculiar period, telemedicine plays a very important role since the activities carried out by telemedicine tend to avoid close contact and reduce the possibility of latent infection by Covid-19 [3,2,4]. Health professionals and various organizations around the world have found in the use of technology the fundamental ally to be able to face the cases caused by Covid-19 [7]. In this regard, one of the first contributions referring to the usefulness of telemedicine regarding the Covid-19 pandemic, was published as a commentary in the New England Journal of Medicine and entitled "Virtually perfect?", where the authors focus on the important benefits of telemedicine for health systems regarding the management of the pandemic [9,11].

The Covid-19 pandemic has rapidly and radically altered the way physicians provide care to patients, as medical centers now respond to the pandemic through the rapid adoption of digital tools and technologies such as telemedicine. and virtual care [2,5,4]. Public administrations in various countries around the globe invest part of their budget in the field of telemedicine, especially in cases experienced by Covid-19, with the specific objective of reducing the number of patients who interact with emergency services. and thus be able to stop the spread of the disease. For example, the Australian Department of Health has allowed medical personnel to provide services through telemedicine while at the same time encouraging citizens to be able to access health services remotely in cases of risk of exposure to the Covid-19 [7].

Telemedicine provides a new approach to broader electronic health care to help combat the Covid-19 pandemic [12]. Among other applications of telemedicine, it makes it possible to identify and track subpopulations and infected areas while providing self-assessment capabilities of the processes developed. Although the regulatory and payment structures, licenses, accreditation in all health centers and the implementation of programs take time to work; but health systems that have already invested in telemedicine are well positioned to ensure care for patients affected by Covid-19 [9].

The integration of telemedicine in health care practices during the pandemic has been proving to be useful for citizens, patients, medical professionals and health care organizations alike [7]. For example, a telehealth visit can be carried out without exposing the staff through the use of Smartphones or tablets that allow communication, through an application or video call, with a doctor through a dedicated connection [9]. Telehealth reduces the spread of infections while allowing the patient to continue with their diagnostic-therapeutic process [13]. For example, in the case of China's Shandong province, telemedicine provided guidance on prevention and treatment, training, communication, and remote consulting for community residents and medical staff [14].

Regarding what was mentioned above, in the field of telemedicine, simple e-health tools (electronic health) are usually useful to provide patients affected by Covid-19 the possibility of maintaining communication between peers and at the same time the easy obtaining of relevant health information, an aspect that probably

tends to lead to a maintained quality of life and better mental health of the affected individual [11,6].

Telemedicine and medical education, achievements and perspectives

The global crisis catalyzed the development of innovative e-learning solutions by building on existing technology and other digital-based tools in order to further advance the education of medical students while ensuring public health and safety both of students and teachers [15,14,13]. Due to this, the events experienced by the pandemic have led to the requirement of having digital skills, a requirement that will become absolutely necessary to function conveniently in the so-called technology-based environments, which continue to increase more and more due to their great utility. [16]. Telemedicine became more common, not only in clinical settings but also in medical schools, as a modality for medical education during the COVID-19 pandemic [17,18]. In this way, telemedicine is effectively offering medical schools a timely opportunity to incorporate this virtual method of training into the training curricula of future physicians [4]. Due to the aforementioned events, teachers have overcome the challenge of teaching in this new context, for which they have incorporated learning and developing technological advances to facilitate their work [10].

The pandemic deeply affected the training of doctors, in all specialties, not just limited to Internal Medicine; but, fortunately, we live in an era where technology is easily accessible and the exchange of information, such as lectures and educational material, can be done in a timely manner [18,4,5]. Telemedicine is a useful means of engaging medical students in patient care, especially in times of crisis [19]. In several North American states, the use of telemedicine is severely restricted by regulatory agencies; but, due to the advance of cases due to the pandemic, they have had to waive some federal rules in order to make it easier for doctors to provide care remotely, that is, through telemedicine [20,9,6].

The 2019 coronavirus disease pandemic has changed the medical education platform for North American students. In this sense, medical schools were forced to quickly reorganize the dynamics of the educational curricula of traditional platforms in order to incorporate telemedicine, made the telemedicine platform compatible with many specialties, allowing students several options to continue their education without interruption during the pandemic. The event of the pandemic affected medical education, as was the case for many residents and students of the Lincoln Medical Center in New York, since traditionally the training of resident doctors did not contemplate the use of telemedicine; but that in response to the severity of cases due to the Covid-19 pandemic, the Accreditation Council for Graduate Medical Education generated a provision in May 2020 to allow residents to participate in telemedicine [4].

In the event that telemedicine becomes a permanent component of medical resident training programs, it is urgent to define the learning objectives and expectations regarding telemedicine, prioritizing aspects such as how much telemedicine clinical experience is appropriate for a telemedicine program. residency, outlining the number of patients a resident will need to observe during a clinical session and whether clinical sessions should be dedicated exclusively to

telemedicine visits versus a hybrid clinical session with a combination of face-to-face and telemedicine visits. In addition, each institution must establish its guidelines and monitoring methods in order to ensure that the resident receives adequate supervision and safety during training [15,1].

Regarding virtual healthcare or e-health, Leite et al. [7] consider telemedicine as a new means that allows the support and promotion of clinical care, education and long-distance medical care, which includes from the first response to recovery, in addition to having a low cost and wide coverage. According to Hernández et al. [10], due to the pandemic, many teachers have gone through exceptionally unique medical scenarios, which, if these clinical events are used in a relevant way, have valuable reference material to share expertise, as well as generate new and better teaching strategies. -learning for the benefit of students in the medical area.

An element to be taken into account for future research refers to the potential of telemedicine to solve many problems related to patient management during the pandemic; but as far as is known, its potential has not yet been described and taken into consideration from the perspective of patients and there is also a wide lack of knowledge about the possible great benefits of telemedicine [11]. For this reason, it is necessary to generate viable strategies to quickly define the spectrum of action of telemedicine, the scenarios of use cases, the development of clinical guidelines; and the standardization of automatic triage questionnaires and remote algorithms for patient monitoring in the event of any possible case of outbreak at a local, national or global scale [6].

Challenges

Within the field of telemedicine applications is the development of Apps or applications that allow identifying and tracking subpopulations and infected areas, as well as providing self-assessment capabilities; as is the case of Brazil, on which Leite et al. They mentioned the development of the application or app called “Coronavirus SUS” which, among other things, facilitated the diagnosis of a possible infection, which could also send the data to the nearest emergency department or health care center for tests. , a fact that substantially improved the levels of efficiency and effectiveness compared to traditional medical care. In addition, the Brazilian application also made it possible to collect evidence-based information on the spread, reducing the prevalence of false news, which helped reduce social panic. The combination of prevention, triage and information in a single application has become a telemedicine tool, reducing the demands of the public health system in Brazil and, in turn, helping to avoid the collapse of the health system; a similar initiative is being explored in the US [7].

On the other hand, it cannot be taken as dogma or assume the fact that telemedicine in itself is the panacea that allows improving medical care due to the various challenges that its application poses [21, 7]. Due to what happened in the pandemic, organizations and those responsible for formulating policies, throughout the world, should be encouraged to take advantage of the telemedicine experiences generated during the pandemic in order to make electronic medical care practices viable, as long as they are respected. the privacy and data protection laws of users [22,7]. Therefore, it is advisable and healthy to

address the challenges and collaborate to promote safe use, based on evidence obtained in the practice of telemedicine during the current pandemic and for future outbreaks. At the same time, in countries without integrated telemedicine within their national health delivery system, the pandemic results in a call to adopt and adapt the necessary changes that support a widespread adoption of telemedicine [6,11] . Telemedicine is expected to provide timely care and minimize exposure to protect physicians and patients [5,23].

Currently one of the dilemmas that, in a certain way, slows down the development of telemedicine has focused on commercial reimbursement, since only 20% of states require payment parity between telemedicine and face-to-face services [9]. Although some countries, such as the United Kingdom, the United States and France (which particularly authorized, reimbursed and actively promoted the use of telemedicine) have managed to standardize an updated framework regarding telemedicine during the pandemic, these achievements are sensitive to being able to apply on a large scale to improve the response to the pandemic in most countries; but many of them lack a regulatory framework to authorize, integrate and reimburse telemedicine services, even in emergency situations and outbreaks, as for example in the case of the Italian National Health Service, whose regulations do not contemplate telemedicine at the levels essential services to citizens [6].

Among the advantages of the development of telemedicine, in the future, it includes a key factor that is profitability, as well as the ability to expand access to specialized services and the potential to help mitigate the imminent or possible shortage of medical personnel. . On the other hand, the disadvantages may include aspects such as the absence or obsolescence of technological resources available in certain parts of the country, problems with the security of patient data, and user-friendly platforms that allow traditional patient examination [15,24]. . One aspect that plays against telemedicine is that it decreases the number of patient visits due to telephone consultations, video calls, exchanges of photographic documentation, messages through mobile devices, email or other support applications for computers or Smartphone [13].

In the case of most developing countries, it is possible that they cannot fully adopt telemedicine specifically in remote and rural areas due to the low penetration of the use of smart devices and the limited expansion of networks based on 3G, 4G technologies. or 5G [25], coupled with the lack of a fully designed legal framework to regulate the use of innovative IT solutions such as telemedicine in health care [26, 3].

The fact that telemedicine platforms will tend to grow exponentially due to the Covid-19 pandemic is foreseeable, a fact that will allow medical schools in North America and other latitudes to modify their curricula by incorporating telemedicine programs based on the e-learning (tele-education) at a distance [22 , 4]. The positive experience in the use of telemedicine suggests establishing similar professional telemedicine platforms, using remote technologies to integrate resources, share information and support health care providers [3,24].

Conclusions

One of the priority challenges in the application of telemedicine lies in being able to incorporate, adapt, redesign and integrate non-conventional but updated and innovative practices into synchronous or asynchronous learning schemes in order to reinforce teaching-learning processes. of telemedicine. According to experience, telemedicine has had a great effect on the training of medical residents in terms not only of patient care, but also of patient education. Since it is possible that telemedicine will become the norm in the foreseeable future, long-term supervision planning should be generated in order to ensure adequate training of residents and monitoring of how telemedicine affects the experience. resident learning.

The positive impact of telemedicine, from the perspective of assistance in the provision of services, ranges from virtual triage to the mitigation of negative psychological effects resulting from the social isolation experienced by the population in various locations around the globe, hence the need and feasibility of its implementation. A key aspect in the use of telemedicine is to be able to increase the frontier in medical care in a country by enabling remote medical care, without reducing the quality of care, thereby generating more successful prevention by attenuating direct interaction and with This is the inherent risk that is so regular in the provision of traditional services. Disasters and pandemics pose unique challenges to health care delivery, and while telehealth will not solve them all, it is seen as the ideal resource for scenarios where the lack of infrastructure remains and medical personnel are not adequate enough to care. to the patients. As a climax, it is expected that this review will become the motivating axis for future research work and, in turn, lead to substantial situations of significant reflection on telemedicine and distance healing.

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