Use of Telemedicine in Pediatric Inpatient Care Hospitals during the COVID-19 Pandemic: Review of Early Scientific Literature

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Abstract

Purpose of Review: Telemedicine uses technology to connect patients with providers at a distance. While telemedicine has been documented in pediatric context before the COVID-19 pandemic, its uses are not as well reviewed by pediatricians during the COVID-19. This review focuses on the applications of telemedicine in different specialties in pediatric settings as well as challenges, strengths, limitations and future directions of setting up a pediatric telemedicine program.

Recent Findings: Since the spring of 2020, there has been rapid development of telemedicine worldwide to provide remote care. In particular, telemedicine has been used to detect symptoms of COVID-19 and to prescribe tests. Telemedicine has many advantages among others: time saving, easy access, social distancing enhancing, and patients triage, allow guidance in delivering first aid in peripheric hospitals, amplify prescription refills, low cost, and hospital attendance reduction. However, telemedicine has many disadvantages that could form challenges for health care providers, such as: Risk of technological problems, lack of accurate physical examination, and risk of misdiagnosis, presence of medico-legal issues, risk of prescriptions errors and risk of confidentiality leak. For countries without telemedicine programs, the current pandemic is an opportunity to create an organized structure to support and encourage telemedicine.

Conclusion: The impressive global conversion to telemedicine demonstrates the utility of this technology in times of social distancing. The pandemic has surely been conducive to a shift in the practice of medicine and health care. The adoption of telemedicine is likely to continue after the pandemic.

Keywords: Medical informatics; Pediatric; Telemedicine; Telehealth; COVID-19

Introduction

Telemedicine can be generally defined as the use of telecommunication technologies to provide medical information or health services [1]. It allows the exchange of valid information for diagnosis, treatment and prevention of disease or injury, research, evaluation, education, and helps to reduce hospital attendance in times of pandemics [2].

Telemedicine has developed exponentially in recent years and especially the last two years with the exceptional context of the COVID-19 pandemic.

Despite this increase, the use of telemedicine remains very limited due to several barriers to its deployment such as discomfort with telemedicine technologies on the part of patients and health professionals [2], the low capacity of technical support offered to health professionals and users during the installation and operationalization of digital solutions and, fundamentally, the absence of an effective strategy within the health authorities for the deployment and implementation of telemedicine in medical practice. Despite these barriers, many health care systems have invested in building telemedicine capacity in anticipation of a future where this technology will become more ubiquitous.

Recommendations and practices are evolving with the technology and depend on the states and health sectors using telemedicine. This review of early scientific literature post COVID-19

pandemic aims to bring together recommendations concerning the use of telemedicine in a global sense, in a pediatric context, as well as challenges faced by health care providers during implementation and use of telemedicine solutions.

Telemedicine in the Pediatric Setting

Telemedicine is being used by various areas of pediatric care and integrated into many care centers around the world. This section presents some of the uses, practices, and recommendations of telemedicine in different pediatric settings among others: Surgery, neurology, cardiology and emergency transfer.

Pediatric surgery

A recent review provides a current picture of telemedicine in pediatric surgery [3]. Despite the paucity of publications on the use of telemedicine in pediatric surgery, the number of associated programs is increasing in the United States. Telemedicine use in this setting includes mentoring, pre- and post-operative visits, primary care consultations, remote patient monitoring, burn care, urgent care, patient triage, and community intensive care unit surgical consultations.

Teleconsultation for pre- and post-operative visits in pediatric surgery is often used with a hub and spoke network. In this case, the surgeon specialist is located at a central connection point (e.g., children's hospital) and patients are at a site near their home (care center) where a Tele-facilitate or (registered nurse or other trained professional) is present and can assist the specialist with the physical examination. Visits from the patient's home are also possible after certain routine pediatric surgeries. Teleconsultation for pediatric burns expands access to the limited number of specialists. With respect to community intensive care units, the adoption of a virtual surgical presence allows these institutions to more appropriately determine whether a patient should be transferred for surgical reasons.

This review recommends incorporating a telemedicine program for pediatric surgery in hospitals [3]. According to the authors, telemedicine can enable clinicians and health systems to refer the right patient at the right time to the right place, to ensure that optimal care is provided and that the appropriate expertise is available. This is reinforced by the poor access to some pediatric specialists in countries as large as the United States.

Pediatric neurology

A recent review focuses on the evolution of telemedicine for pediatric neurology [4]. This technology focuses mainly on three aspects, namely:

•   Children hospitalized in community hospitals could have access to pediatric neurology expertise *via* telemedicine for seizures, stroke, medication, motor disorders, altered mental status, Electroencephalogram (EEG) interpretation and brain death.

•   Telemedicine outpatient clinics would allow children to be closer to home and save travel resources and time for the patient, family and provider. This type of program has been successfully implemented in pediatric epilepsy and neurodevelopmental disabilities [4]. Based on models described in the literature, these clinics could see patients for follow-ups of headaches, medication, movement disorders, and concussions.

•   Home care could be offered to the same types of patients who are unable to leave home or whose families have difficulty accessing outpatient clinics.

For inpatients and outpatients, professional videoconferencing equipment could be used with the assistance of a health care professional to optimize the neurological examination. Patients at home can use their own equipment. Telemedicine allows this patient population, as well as remote communities, to have access to pediatric neurologists.

As with any Tele-consultation, this review recommends that users be in a quiet location, allowing for the exchange of confidential information. A secure online platform, equipment to conduct a session with video, and a broadband connection are recommended. The presence of a trained health care professional for Tele-consultations is highly recommended (when performed in a hospital or in an outpatient setting), as well as support for appointment scheduling, technical support and the establishment of an electronic clinical record. Some Tele-neurology clinics are equipped with peripheral tools such as cameras that can be operated by the neurologist. Mobile telemedicine carts are also developed in some clinics (containing a computer, a webcam and a sound system) [4].

Regulations may also vary by state, and the clinician should ensure that he or she is aware of the laws and licenses required to practice in various states. Seattle Children's Hospital and the University of Washington Medical School offer pediatric Tele-neurology expertise in several states. Several pediatric specialties have telemedicine offerings, accounting for approximately 2,000 outpatient clinic Tele-visits per year in these various states. Telemedicine has been widely adopted by psychiatry and autism service lines. Telemedicine for pediatric neurology initially focused on monitoring patients with chronic conditions such as epilepsy, migraines and compulsive involuntary disorders.

The benefits of telemedicine for pediatric neurology include improved access and decreased wait times to see a specialist, more frequent and timely visits, resulting in improved quality of care, travel savings, fewer unnecessary hospitalizations and high user (patient and clinician). Telemedicine for pediatric neurology allows parents to maintain follow-up with their clinician even at a distance.

Challenges associated with the practice of neurology include an incomplete neurological physical examination. Indeed, there is no reliable way for the remote neurologist to test sensation, reflexes, tone, or strength *via* Tele-consultation. This reinforces the importance of having a qualified health care professional with the patient to assist the neurologist. Assessing a new patient with an incomplete physical exam by a remote neurologist can be more challenging than in-person. For this reason, some clinicians have chosen to perform only remote follow-ups of known patients. As with any medical visit, the possibility of medico-legal liability is present with a telehealth visit and is considered an in-person visit.

Technology has allowed pediatric Tele-neurology practices to evolve. Training new physicians in telemedicine is essential to meet the growing patient demand [4].

Pediatric cardiology

Portugal has established an effective pediatric Tele-cardiology system at the University Hospital of Coimbra. The pediatric cardiology department of this hospital has daily contact with 13 other Portuguese hospitals and some Portuguese-speaking African countries *via* a Tele-consultation platform [5]. This center is a pioneer
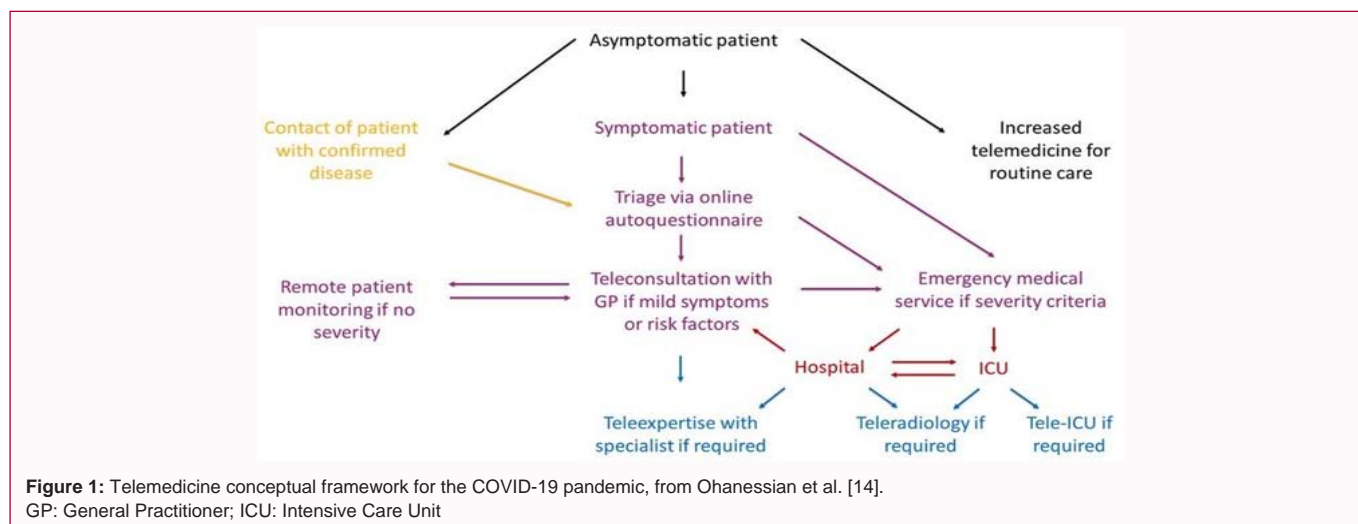
Figure 1: Telemedicine conceptual framework for the COVID-19 pandemic, from Ohanessian et al. [14].
GP: General Practitioner; ICU: Intensive Care Unit

in telemedicine and has reached a total of 32,685 Tele-consultations between 1998 and 2016. The total monetary benefit is estimated at 1.1 million Euros for the health system and approximately 420 Euros per patient. According to the authors of the study, the successful and sustainable implementation of this telemedicine program is mainly attributable to a team of motivated professionals with simple but effective technology at their disposal. The creation of a network of agreements with other Portuguese hospitals and the collaboration of the communications and technology department were also crucial, as was the reimbursement of Tele-consultations by the health service.

This case study confirms that a sustainable telemedicine service depends on a motivated team, management commitment and supportive regulations. The authors support monitoring and evaluation of this program to adapt it to demand and the changing environment. Future research should be directed toward technological developments and new user trends.

Pediatric emergency transfer

A recent study investigated the acceptability, use and effectiveness of telemedicine in the context of pediatric emergency transfer consultations [6]. The use of Tele-consultation allows for the inclusion of the patient, family, and health care personnel present at the conversation. Thus, through Tele-consultation from the emergency department to the specialty contacted, the family is informed simultaneously of any transfer. However, for these consultations, the telephone is the most common practice between clinicians. The authors encourage the use of Tele-consultation for such cases. They theorize that the stigma of telemedicine should be addressed to gain clinician buy-in, processes should be adapted to keep pace with the evolution of the technology, and users should be educated about the benefits of using telemedicine.

Telemedicine during the COVID-19 Pandemic

A pandemic context

According to Bashshur et al. [7], the current dilemma for global health systems is to maintain a supply of care for people with COVID-19 and others with chronic or acute illnesses, while protecting the healthcare workforce.

The use of health informatics has enabled the development of electronic medical records in health systems in recent years.

However, it is noted that telemedicine services are not widespread, with 6.6 recorded visits per year per 1000 practitioners in the US [8]. Telemedicine is only used by 8% of Americans in 2019 [9].

Since the spring of 2020, there has been rapid development of telemedicine worldwide to provide remote care while avoiding patient visits to health care centers that may be sources of transmission [10,11]. In particular, telemedicine has been used to detect symptoms of COVID-19 and to prescribe tests [8]. This allows for early triage of patients before they arrive in the emergency department, thereby decreasing hospital crowding and the risk of contamination [12].

A recent case study describes the transformational impact of the COVID-19 pandemic on telemedicine use at New York University's Langone Health Facility [11]. The authors report a mass migration to telemedicine use during March and April 2020. In six weeks, the center recorded 144,940 Tele-consultations involving 115,789 unique patients (who had a single Tele-consultation) and 2,656 unique healthcare professionals. Daily telemedicine visits increased from 102.4 to 801.6, a 683% increase. With virtual utilization for emergency consultations doubled compared to emergency room visits at the peak of the pandemic, these data confirm the critical role of telemedicine in expanding emergency room capacity during a pandemic. Of note, this large increase was made possible by the recruitment of health professionals from a variety of specialties for emergency visits.

This publication is a model for the adoption of effective telemedicine that is quickly implemented and has a high patient satisfaction rate. Patients of all ages quickly learned to share biometric data through their health portal and respond to triage agents on their phones prior to their video visits. The use of remote medical measurement devices (e.g., connected thermometers or blood pressure monitors) is increasingly sought after by medical staff to collect data and track patients remotely. The authors' experience in an academic health system located in an epicenter of the pandemic demonstrates that well-integrated virtual health tools can support thousands of people in a short period of time, and provide care during staff shortages [11].

This impressive global conversion to telemedicine demonstrates the utility of this technology in times of social distancing. The pandemic has surely been conducive to a shift in the practice of medicine and health care. The adoption of telemedicine is likely to continue after the pandemic.

Table 1: Advantages and disadvantages of telemedicine during the COVID-19 pandemic (Inspired by Mahajan et al. [2]).

Advantages	Disadvantages
Save time	Risk of technological problems
Easily accessible	Lack of accurate physical examination
Allow social distancing	Risk of misdiagnosis
Allow for patients triage	Need for literate patients
Allow guidance in delivering first aid if the hospital is far away	Presence of medico-legal issues
Allow for prescription refills	Risk of prescriptions errors
Not expensive	Risk of confidentiality leak
Reduce hospital attendance	
Allow for health studies	

Organization of telemedicine around the world during the pandemic

As the pandemic started in China, Asian countries were the first to respond to the virus and implement telemedicine systems. The publication by Vidal-Alaball et al. [13] describes some of the telemedicine innovations of various countries [13]. China quickly set up an emergency telemedicine consultation system, and private companies stepped up and offered 5G technologies to Sichuan University Hospital. Singapore created a tracking system to identify and report the location of a quarantined person and link their information with the results of their serum test.

This has resulted in the creation of a transmission map [13]. In South Korea, the use of telemedicine has been controversial since 2018, but Seoul University Hospital has offered telemedicine services to patients with COVID-19 at the epicenter of the outbreak.

Spain has also implemented a continuous telephone monitoring system to track symptoms of patients discharged from the hospital and readmit them in case symptoms worsen [13]. The use of the online platform La mevasalut (my health) has also increased. This platform allows citizens to access various documents in their electronic medical records and to transmit prescriptions to pharmacies. In addition, some private clinics equipped for Tele-consultations or discussions with physicians offered free consultations to the population during the peak of the pandemic.

According to Ohannessian et al. [14], the development of telemedicine has also been promoted by other countries, including the United Kingdom, the United States, France and Australia, in order to manage the pandemic. However, several countries do not have a regulatory framework to authorize, integrate and reimburse telemedicine care, even in times of pandemic. For example, Italy does not include telemedicine in the essential level of health defined by the National Health Service and no guidance was given by the authorities before March 24 regarding telemedicine, despite the strong pressure the pandemic has put on the country's health system.

The first conceptual framework for implementing telemedicine during an epidemic was published in 2015 and this model was updated this year (Figure 1) [14]. This framework could be applied widely to improve the public health response. Improved technology, access to high-speed internet, and the widespread use of smart phones make it possible to apply this framework and rapidly arrange Tele-consultations with patients [14].

In France, the preliminary existence of telemedicine regulations (2018) as well as a relaxation of Medicare billing rules [15,16] allowed healthcare professionals to quickly conduct reimbursed Tele-consultations for patients with COVID-19 symptoms. Tele-consultations then became reimbursable for follow-ups by midwives and speech therapists. Teleconsultation practices have been strongly encouraged by the French High Council for Public Health for patients with risk factors in order to reduce patient visits to the hospital [17]. The Ministry of Health has also issued practical clinical recommendations for examining patients *via* Teleconsultation. In early March, before the containment, the French Health Insurance had less than 10,000 Teleconsultations per week. During the March 23rd to 29th, 2020 containment, 486,369 Teleconsultations were billed to Medicare [16].

To encourage Teleconsultations, the United States has relaxed some prerequisites and allowed access to various natures of consultations [8]. The American Telemedicine Association (ATA) issued recommendations on the use of telemedicine as early as 1999, and these recommendations are updated regularly with new data on the subject [3]. In the United States, each state has its own regulations regarding telemedicine, including which professionals can practice it, where the patient can be located, what type of visits are allowed, what prescriptions are possible, what documentation is required, what consent is required, and how reimbursement is to be provided. Indeed, telemedicine allows clinicians to practice in various states without having to travel there. However, it is important to be aware of the various interstate regulations. The location of the patient is considered to be the locus of practice for telemedicine. In order to allow clinicians to practice without licensure in another state, some states issue licenses without telemedicine-related restrictions [3]. Note that there is also a 22-state agreement allowing clinicians to practice telemedicine if they are eligible. US federal laws do not require specific informed consent for telemedicine, but provincial laws may have various regulations. Therefore, the clinician must obtain and maintain informed consent from each patient seen via telemedicine [3].

Teleconsultation practices during the COVID-19 pandemic

Teleconsultations: A recent editorial on Teleconsultations summarizes the care settings in which Teleconsultations are appropriate and the lessons that can be learned from the literature [10]. Available data on randomized trials have shown that video-based clinical consultations are associated with high patient and professional satisfaction [18-21]. In addition, no differences are observed in disease progression or in the service used, and Teleconsultations are less expensive than traditional clinical consultations. However, these studies are mainly concerned with stable patients with chronic diseases and not with patients with acute diseases [10].

According to Greenhalgh et al. [10], Teleconsultation is not applicable to all situations, including critically ill patients, when a physical examination or procedure is required, or when comorbidities affect the patient's ability to use the technology. The authors also warn that video consultations often use software created for video conferencing that does not meet clinical needs and requires downloading, which sometimes violates information management policies.

This publication also cautions that the lessons learned about Teleconsultation are namely:

• The shift to Teleconsultation is not about using and adopting an existing technology but about implementing major changes in clinical practice. It is a difficult and demanding process that requires local and national leadership and the involvement of professional bodies to clarify the definition of good clinical practice and the establishment of modern practices.

• Lack of time does not allow for collaborative and quality continuous improvement. The urgency of the pandemic situation forces the use of existing platforms for sharing ideas and resources.

• Training is needed to best prepare clinicians and patients for Teleconsultations to spread the practice. Organizations should provide resources (material and human) to organize and support the change.

• Future studies are needed to understand the lessons learned from this clinical, organizational, technical and political transition.

Tele-expertise: Tele-expertise or Tele-case discussion is a type of telemedicine practice that allows a healthcare professional to have the opinion of a medical expert. Unlike Teleconsultation, Tele-expertise can be asynchronous (not done live *via* video conferencing) and can be done via dedicated software or a secure email system. This practice allows to have the opinion of a specialist at a distance and to improve the coordination of care. France is the first country to adopt a national reimbursement program for Tele-expertise (Ohannessian et al. [14]).

Strengths, Limitations and Future Directions

Pandemics are unique challenges for health systems. Successful experiences from several centers have shown that although telemedicine cannot solve all challenges, it has advantages and can be easily implemented [1,11,22]. With the rapid development of the internet and technologies, telemedicine offers multiple possibilities.

Advantages and disadvantages of telemedicine

Mahajan et al. [2] listed the advantages and disadvantages of telemedicine during the COVID-19 pandemic (Table 1). Telemedicine delivers equitable services to everyone, provides physical security for the patient as well as physicians and health care professionals during pandemics, and produces timely and rapid care [2]. This publication emphasizes that the very limited physical examination enabled by telemedicine can be hampered by low or no video quality. For pediatric patients, the younger the child (especially less than 2 years of age), the more difficult it is to make a diagnosis based on the history due to overlapping and nonspecific symptoms in children. In these cases, telemedicine may lead to underestimation or misinterpretation of the disease. The authors recommend that pediatricians have a low threshold for ordering baseline tests because of the limited number of tests possible *via* telemedicine. It is also possible to involve a health care staff member who would be present with the patient to assist the pediatrician with the physical examination.

In addition, the first point of contact for pediatric patients is usually not the patient but the parents or guardians. Communication, which is already difficult between a physician and his or her pediatric patient because it involves intermediaries, can be made worse by telecommunications. The authors recommend a good quality internet or telephone connection to reduce communication or interpretation errors [2].

Telemedicine also has the advantage of being able to mobilize asymptomatic care personnel in quarantine. These physicians or health care professionals can perform Teleconsultations remotely from their homes, thus not losing valuable resources [11,12].

According to Vidal-Alaball et al. [13] Telemedicine allows to:

• Reduce the time required to obtain a diagnosis, start a treatment, quarantine or stabilize a patient

• Closely monitor patients at home, thus avoiding the movement of people and reducing the risk of infection within the hospital

• Coordinate medical resources remotely

• Reduce the risk of contagion, especially by health professionals

• Inform patients

• Save costs on protective equipment

• Train health professionals

• Monitor global data provided by health organizations

Telemedicine uses information and information technology to transfer medical information for diagnosis, therapy, and learning. According to Hong et al. [1], telemedicine has some disadvantages, including a breakdown in the relationship between health professionals and their patients or between health professionals. There are also disadvantages regarding the quality of information and bureaucratic and organizational difficulties.

According to Vidal-Alaball et al. [13], one of the sensitive aspects of the pandemic was the transmission of personal information such as GPS coordinates of people in quarantine or infected with COVID-19 in China and Singapore. The U.S. government also relaxed some data use laws given the exceptional situation. The use of personal data for public health purposes may be justified by the current crisis situation, however, in normal times, telemedicine must ensure secure access and protection of personal and medical information.

Although telemedicine has many benefits, it involves the two-way transmission of health information between the patient and the health care professional. This is associated with risks of security breaches, lack of control or limitations in the collection, use and disclosure of sensitive personal information [13]. It is therefore crucial to identify the risks to the privacy and security of patients and healthcare professionals and to put regulations in place to grant appropriate access limits to each user. Some controls already exist such as data encryption, face-to-face patient identification and authentication of the device used by the patient. Some legislation is also in place to promote trusted telemedicine.

Challenges

With future technological advances (5G) and improved management of telemedicine by managers, the drawbacks cited above could be minimized and telemedicine could become a dominant sustainable solution for public health emergencies and routine medicine. The changes initiated by the COVID-19 pandemic have surely altered the place of telemedicine irreversibly in various global health systems [11]. Of note, advance planning greatly improves crisis management capabilities [12].

Patients and healthcare professionals are being led towards a new normal that includes communication with each other *via* video and audio. For healthcare professionals, this means rapidly developing skills including empathy, creating virtual consultation reports, performing physical examinations remotely, making diagnoses, or being able to advise on these new practices and skills to ensure quality [11]. Medical trainees at some institutions attend Teleconsultations with physicians to observe and learn these new practices and standards [11].

For patients, this change requires adaptation to the new technology. Rajasekaran et al. [23] emphasize the existing digital divide, which reflects inequality related to patients' socioeconomic status, ethnicity, gender, age or location. Indeed, not all patients have access to or the knowledge to use Teleconsultation equipment. This poses a real challenge for physicians who need the image to treat their patients effectively. According to the authors, access to Teleconsultation technologies should be facilitated by insurance companies or hospitals for patients identified in need. This would allow patients to rent or borrow equipment needed for Teleconsultations [23].

Telemedicine has proven to be an effective tool for managing many emergency room patients and has also transformed the work of thousands of health care professionals from various specialties [11]. It should be noted that telemedicine does not replace face-to-face care, but rather assists front-line health care workers by reducing their workload and optimizing the care of critically ill individuals [12]. In addition, a major difference from face-to-face consultations is the heavy reliance on technology [24]. This may hinder user adherence to telemedicine.

According to Harting et al. [3], the most critical and fundamental step for implementing a functional telemedicine program is institutional and provider buy-in. These two actors must agree on the vision, strategy, and goals of the program to be implemented. The institution must be prepared to support the program from the beginning to the end of its implementation financially, administratively, technically and with resources. Not all physicians in an institution need to join the program, but certain physicians in key target areas need to be identified or volunteer for the development of telemedicine. Each specialty has a unique patient base, and a good understanding of patients and disease is essential to implementing a telemedicine program. It is also crucial to know the laws and regulations of each state, the requirements of medical associations and institutions. Regarding the choice of technology, there are different vendors. The most important thing is to choose a reliable platform, adapted to the demand and that allows the maintenance of confidentiality. Technical support is an important parameter to consider, both for patients and clinicians. Finally, in order to determine how well the implementation of telemedicine is working, it is important to put in place monitoring indicators that measure the patient's perspective, the clinician's perspective and the institution's

perspective.

For Ohannessian et al. [14], several challenges must be overcome for telemedicine to be used comprehensively and integrated into public health responses to COVID-19 and other epidemics:

- Integrating telemedicine into national and international guidelines to prepare public health and organize its response

- The definition of national regulations and funding frameworks for telemedicine in the context of public health emergencies

- Establishing a strategy to rapidly define the framework for telemedicine application (use case studies, develop clinical guidelines, standardize the automatic triage questionnaire)

- Establishment of a strategy and action plan to guide health care personnel towards Teleconsultations and remote patient follow-up

- The creation of a communication toolkit to inform and educate the population on the recommended use of telemedicine

- Creation of a shared database to integrate health care personnel data with epidemiological data

- Establishing a scientific evaluation framework and dedicated research funds to describe and evaluate the impact of telemedicine during pandemics.

The authors encourage all stakeholders to address these challenges and collaborate to provide safe, evidence-based telemedicine.

Evaluation of telemedicine

Telemedicine offers opportunities to improve the delivery of care that could lead to better health outcomes. Identifying and evaluating these opportunities requires the development of an evaluation methodology based on data collected by various health systems [24]. This would allow for comparison of different telemedicine care delivery, study of rare diseases, identification of patients who may benefit from Teleconsultations, and exploration of ways to include telemedicine in the daily workload of health professionals [24]. Evaluating telemedicine programs would help to evolve health systems and the way care is delivered in normal and crisis times.

However, the current literature lacks a standardized approach to evaluate telemedicine in pediatric hospitals. Chuo et al. [24] describe the concepts considered for telemedicine evaluation in several organizations. The US National Quality Forum evaluation framework considers four domains, namely access to care, financial impact, experience, and effectiveness. The World Health Organization uses the same measures, incorporating the maturity of the telemedicine program. A publication from the Agency for Health Research and Quality emphasizes the importance of including impact on health outcomes in any telemedicine evaluation. The authors also describe the evaluation framework newly created by the Supporting Pediatric Research on Outcomes and Utilization of Telemedicine (SPROUT) based on the work of the organizations listed above. This framework groups telemedicine evaluation concepts into four measurement domains: Health outcomes, health care delivery (cost and quality), experience, and program implementation with Performance Indicators (KPIs). Data collected in these measurement domains can be used to guide health care reimbursement agencies and policy changes encouraging appropriate use of telemedicine, especially with

the explosion of telemedicine services related to COVID-19 [24].

Conclusion

Creating telemedicine programs takes time and does not happen overnight. Financial resources, technological infrastructure, and support from decision makers (policy and leadership) are needed to have functional and good quality telemedicine. The rapidity of the transition to telemedicine due to the pandemic did not allow users to anticipate the barriers to its implementation.

For countries without telemedicine programs, the current pandemic is an opportunity to create an organized structure to support and encourage telemedicine. Telemedicine is destined to be integrated into health systems, providing a safe, inexpensive and easy way to deliver health care and services. As a result, governments will be prepared for the next emerging infectious disease.

Acknowledgment

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