



# Analysis of the virtual healthcare model in Latin America: a systematic review of current challenges and barriers

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**Background:** The virtual care model can be used in all aspects of healthcare, such as prevention, diagnosis, treatment, and follow-up of most medical and surgical conditions. The objective of this study was to identify the current barriers to implementing and consolidating the virtual healthcare model, of “telemedicine”, in Latin American countries.

**Methods:** A systematic review was conducted through four databases: PubMed, Scopus, Web of Science, and Virtual Health, including articles in Spanish, Portuguese, and English. A combination of Boolean operators was used with the terms “telemedicine”, “telehealth”, “telecare”, “home care services”, “remote care” and the name of each Latin American country. Articles published from January 2020 to January 2023 that reported on the barriers and challenges of using the virtual care model were included.

**Results:** Nineteen articles were included. Brazil (n=5) and Argentina (n=4) were the countries where there was the greatest interest to explore barriers to virtual care. The barriers identified were categorized into five main themes: (I) technological and technical issues; (II) absence of a physical examination; (III) patient’s negative perceptions; (IV) negative perceptions among healthcare professionals; and (V) structural obstacles and those associated with the healthcare system. The main obstacles reported were connectivity problems, lack of a complete physical examination, issues of privacy, high risk of medical malpractice, and absence of local regulation.

**Conclusions:** The virtual care model is a safe and cost-effective alternative for the delivery of health services, with multiple benefits for patients and their families. The indication for the use of virtual care should be based on a risk model for patient prioritization. Likewise, the analysis of the main barriers and benefits is fundamental to consolidating this model of care and ensuring its expansion in the region.

**Keywords:** Telemedicine; virtual care model; Latin America; barriers; challenges

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## Introduction

### Background

The virtual care model is a safe and reliable alternative for the delivery of health services, with multiple benefits for

patients and their families. This model has been a strategy to provide health services closer to the communities while guaranteeing the highest quality and safety standards (1). The virtual care or telemedicine model is the delivery of healthcare services at a distance via technology and the

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term includes a wide range of applications, such as remote consultations, telerehabilitation, remote monitoring, remote patient education or teleinterpretation (e.g., radiology exams) (2). The virtual care model can be used in all aspects of healthcare, such as prevention, diagnosis, treatment, and follow-up of most medical and surgical conditions. This modality began in the 1970s due to the technological boom of the era, but it was not until the advent of the coronavirus disease 2019 (COVID-19) pandemic that it positioned itself as an optimal alternative for providing specialized care in the management of acute and chronic conditions. For this reason, it is now considered a developing field with exponential growth, both for developed and developing countries (2-4).

### *Rationale and knowledge*

Beyond just performing real-time remote outpatient consultations, virtual care is a model that enables the delivery of comprehensive inpatient care remotely, turning patients' homes into rooms attached to conventional hospitals. Virtual care has made it possible to reduce hospital length of stay and decrease the risk of nosocomial infections. In fact, patient satisfaction levels with the treatment have increased since the care process of these

patients takes place in a familiar environment, achieving better clinical results and more favorable costs for insurers (5-7). In addition, this model of health care can positively reduce the workload of healthcare workers, which translates into a minimization of the risk of burnout syndrome due to fewer hours of face-to-face work (8). Despite the multiple benefits of the virtual care model, its implementation and use around the world reflect a high degree of inequity, which varies according to the social, economic, and technological context of each country (9). In Latin America, prior to the pandemic, the implementation of this model of care was considered low compared to countries such as the United States, Canada, and Europe (3). For example, in countries such as Argentina, Colombia, Mexico, and Costa Rica, less than 30% of hospitals offered virtual care services (10). Although the COVID-19 pandemic forced the adoption of this model, there is still a gap relative to first-world countries, especially after all mobility restrictions imposed during the pandemic were lifted. In addition, the World Health Organization (WHO) in the year 2022 urged decision-makers to consolidate the use of the virtual model to guarantee access and timeliness care for a greater percentage of the population (11). We present this qualitative systematic review in accordance with the PRISMA reporting checklist (available at <https://mhealth.amegroups.com/article/view/10.21037/mhealth-23-47/rc>) (12).

#### Highlight box

##### Key findings

- Few studies have explored the challenges to the implementation of virtual care in Latin American countries.
- In Latin America, connectivity problems, lack of a complete physical examination, issues of privacy, high risk of medical malpractice, and absence of local regulation were the identified barriers and challenges to overcome.

##### What is known and what is new?

- The implementation and use of virtual care models around the world reflect a high degree of inequity, which varies according to the social, economic, and technological context of each country.
- The findings of this study can serve as a baseline for the generation of interventions and public health policies that favor the consolidation of this model in the region.

##### What is the implication, and what should change now?

- Strengthening training programs in the use of healthcare technologies, optimizing communication channels, and improving data management and cybersecurity, as well as guaranteeing interoperability with the current system, are essential for expanding the virtual model in Latin American countries.

### *Objective*

The objective of this systematic review was to identify the current barriers to the implementation and consolidation of the virtual healthcare model “telemedicine” in Latin American countries during and after the advent of COVID-19.

### **Methods**

#### *Selection criteria and search strategy*

The literature search was conducted through four databases: PubMed, Scopus, Web of Science, and Virtual Health, between February 25 and 26, 2023. The search was performed using a combination of Boolean operators with the following terms: “telemedicine”, “telehealth”, “telecare”, “home care services”, “remote care”, and the name of each Latin American country. The strategy used for the four databases consulted is described in [Table S1](#).

**Table 1** Inclusion and exclusion criteria

Inclusion criteria
Articles focused on describing or discussing the barriers and challenges of the use or implementation of telemedicine or virtual health care in Latin American countries
Articles published in English, Spanish, or Portuguese
Articles published between January 2020 and January 2023
Original articles and reviews
Exclusion criteria
Editorials, commentaries, conferences, or articles without statistical or theoretical evidence
Articles whose full text could not be obtained
Articles that use technological tools for teaching

### *Study selection and data extraction*

The identified records were managed with Rayyan software (13). After removing duplicate records, two investigators independently reviewed titles and abstracts to identify those that met the selection criteria described in *Table 1*. Subsequently, the two authors reviewed the full text of the articles pre-selected for inclusion. When discrepancies existed, these were resolved in the presence of a third reviewer. Quality assessment in the qualitative studies was performed with the tool available in the critical appraisal skill program (CASP) (14). The cross-sectional studies were evaluated with the Newcastle-Ottawa Scale (NOS) (15), and finally, a narrative synthesis of the barriers reported in Latin American countries was performed.

## **Results**

After removing duplicates, the initial search identified a total of 930 articles among the four databases. After reviewing the title and abstract of each article, a total of 38 were pre-selected. Of these, 19 studies met the selection criteria and were included in this review (*Figure 1*).

### *Characteristics of the studies*

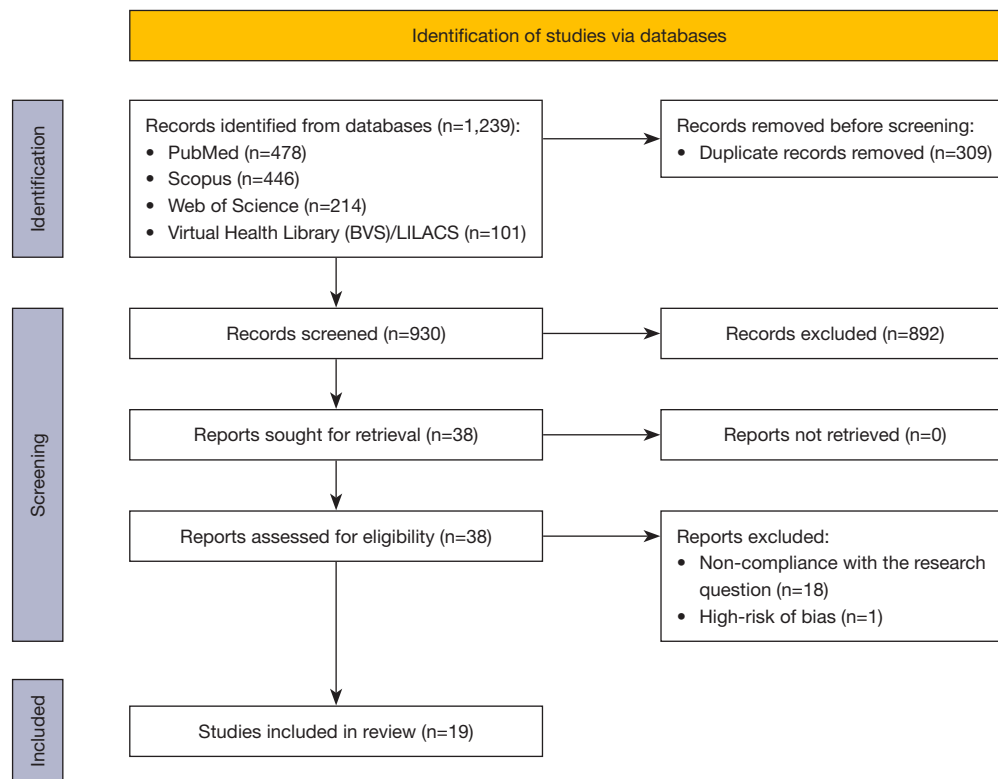
The included studies were published between January 2020 and January 2023. Of the 19 articles, 17 studies were based on data collected in a single country, and two articles performed an analysis of the realities of two or more countries. Most of the studies had a cross-sectional design (n=9), followed by a qualitative design (n=6). Two systematic

literature reviews, one mixed-approach study, and one case report were included (*Table 2*).

Individually, barriers to the use of virtual care have been most frequently explored in countries such as Brazil (n=5) and Argentina (n=4), accounting for nearly half of the reported articles. Countries such as Colombia, Chile, Mexico, Peru, and the Dominican Republic were also represented in this review (*Table 2*). Most of the studies evaluated barriers to the implementation of a virtual care model in general, with a greater emphasis on the implementation of teleconsultations (n=14). The remaining articles were conducted in the context of a home visiting care model supported by technological tools (n=2), telerehabilitation programs (n=2), and a combination of virtual care with a follow-up app (n=1). In summary, the barriers identified were categorized into five major themes: (I) technological and technical issues; (II) absence of a physical examination; (III) patient's negative perceptions; (IV) negative perceptions among healthcare professionals; and (V) structural obstacles and those associated with the healthcare system. The barriers identified within each category are described below.

### *Technological and technical issues*

Problems associated with Internet access and connectivity (17,19-21,23,26), the need for specialized equipment and software (e.g., smartphone, camera, among others) (16,21,26,29,32), as well as having the technical skills in the use of technological tools to provide and receive virtual service delivery (17,22,25,30,33) were the main barriers associated with the care process in the studies analyzed



**Figure 1** PRISMA flowchart of the search strategy.

(n=14). Although the lack of connectivity during virtual care was a recurring complaint among patients, non-attendance at virtual appointments did not exceed 5% of cases (20), but it was recognized as a factor that increases the perception of poor clinical care (21,28). From the point of view of healthcare workers, the lack of specialized software and equipment for the correct professional practice and issues of interoperability with existing institutional programs were identified as factors that affect productivity and generate the perception of work overload due to the additional procedures required compared to face-to-face care (21,26,29). Additionally, because it is not common to receive training in telemedicine during professional training (33), the requirement for additional specialized courses during professional practice was perceived as a constraint to adoption and willingness to adopt the virtual model (30). On the other hand, it was found that in older adults, the lack of skills in the use of technological tools was reported as a barrier to accessing the healthcare system (22). Similarly, the difficulty of making co-payments online was identified as a barrier to access that led to the cancellation of the service (20).

### *Absence of a physical examination*

The limitation of performing a complete and exhaustive physical examination was identified as a barrier in five studies (16,22,29,32,34) mainly when virtual care was used in patients with neurological pathologies, older adults, and in those requiring a physical rehabilitation process. During the diagnostic process of most pathologies, performing a physical examination is important, both to confirm and to rule out suspicion. For example, some authors believe that the use of the virtual care model should not be used initially in the diagnosis of neurological disorders due to the need for physical and cognitive testing to confirm the condition and to evaluate the evolution of patients during follow-up (16,34). In addition, it was also reported that gynecology and dentistry services may be limited during routine practice (21,29). From the patient's perspective, this barrier also meant that the virtual care model was perceived as insufficient, requiring a complementary face-to-face consultation (22). On the other hand, in rehabilitation programs, although the care modality is a good alternative for follow-up, some patients and physiotherapists

**Table 2** Characteristics of the included studies and main barriers identified

First author, year	Country	Journal	Study design	Virtual care intervention assessed	Findings	Limitations of the study
Caetano et al., 2020, (16)	Brazil	<i>Cadernos de Saúde Pública</i>	Systematic review	General virtual care	Limitation for performing a complete and exhaustive physical examination Limited use in the context of patients with neurological or critical pathologies Lack of local regulation for the provision of the virtual service Lack of integration of telemedicine in management guidelines Lack of standardization of use and adequate structures for virtual care Lack of implementation of specific applications to provide follow-up and virtual evaluation tools	Only the Brazilian context
Casilang et al., 2020, (17)	Dominican Republic	<i>JMIR Pediatrics and Parenting</i>	Qualitative study	General virtual care/mobile application	Lack of information and education on virtual care in the population Lack of skills in the use of technological tools (e.g., apps, computers, smartphones) High perceived costs Lack of privacy	A single hospital center in an urban area
Morais et al., 2021, (18)	Brazil	<i>Ciência &amp; Saúde Coletiv</i>	Qualitative study	Remote care	Non-acceptance by patients and/or environment	A single hospital center in an urban area
Pedernera Bradichansky et al., 2021, (19)	Argentina	<i>Archivos Argentinos de Pediatría</i>	Cross-sectional study	General virtual care	Exposure of health personnel to urban violence Connectivity problems Need for specific technological equipment (e.g., computer with camera)	Small sample size (n=8) A single hospital center in an urban area
Escobar et al., 2021, (20)	Colombia	<i>International Journal of Medical Informatics</i>	Cross-sectional study	General virtual care	Connectivity problems Difficulty in making online payments	A single hospital center in an urban area It uses institutional indicators, not a designed questionnaire
Böhm da Costa et al., 2021, (21)	Brazil	<i>International Journal of Medical Informatics</i>	Mixed study	General virtual care	Connectivity problems Lack of integration with institutional systems	Small sample size (n=26) A single hospital center in an urban area

**Table 2** (continued)

Table 2 (continued)

First author, year	Country	Journal	Study design	Virtual care intervention assessed	Findings	Limitations of the study
Loza et al., 2021, (22)	Argentina	<i>Medwave</i>	Qualitative study	General virtual care	Lack of technological resources  Lack of skill in the use of technological tools (e.g., apps, computers, smartphones)  Limitation for performing a complete and thorough physical examination	A single hospital center in an urban area  Phone interviews
Palma et al., 2021, (23)	Argentina	<i>Journal of Pain and Symptom Management</i>	Cross-sectional study	General virtual care	Connectivity problems	A single hospital center in an urban area
Catapan et al., 2021, (24)	Brazil	<i>Epidemiologia e Serviços de Saúde</i>	Cross-sectional study	General virtual care	Territorial inequalities in access to information and communication technologies	Ecological approach
Chávarri-Guerra et al., 2021, (25)	Mexico	<i>The Oncologist</i>	Cross-sectional study	General virtual care	Lack of privacy Lack of skills in the use of technological tools (e.g., apps, computers, smartphones)	A single hospital center in an urban area
García-Huidobro et al., 2022, (26)	Chile	<i>Health Promotion Practice</i>	Qualitative study	Remote care	Connectivity problems Lack of institutional motivation to create and promote remote care Lack of integration with the institutional medical record system Perception of work overload High costs associated with the implementation process and staff training	Email exchanges to measure resource utilization to recruit clinics, providers, and patients.
Mayela et al., 2022, (27)	Mexico	<i>Neurology India</i>	Cross-sectional study	General virtual care	Lower quality of the doctor-patient relationship Lower perceived consultation time	A single hospital center in an urban area
Michell et al., 2022, (28)	Chile, Brazil and Colombia	<i>Salud Pública de México</i>	Case report	Virtual rehabilitation	High implementation costs Non-reimbursement by insurers to providers for virtual service delivery Resistance on the part of health personnel to offer virtual care Poor quality of care associated with technological limitations (e.g., camera resolution, connectivity, interference) Low perception of therapeutic benefit by patients and health personnel Lack of privacy Lack of local regulation for the provision of the virtual service	Only the Chilean, Brazilian and Colombian contexts are analyzed

Table 2 (continued)

Table 2 (continued)

First author, year	Country	Journal	Study design	Virtual care intervention assessed	Findings	Limitations of the study
Gutiérrez et al., 2022, (29)	Colombia	<i>Sustainability</i>	Qualitative study	General virtual care	Lack of resources for the acquisition of specialized software Lack of clarity on the fees associated with virtual services Limitation for performing a complete and exhaustive physical examination Lack of clarity on medical liability for possible adverse events and/or medical errors	A single hospital center in an urban area
Piskorz et al., 2022, (30)	Mexico, Argentina, Colombia, Brazil, Venezuela, Guatemala and Paraguay	<i>Blood pressure</i>	Cross-sectional study	General virtual care	Lack of training in the use of the platforms developed for the virtual provision of the service Lack of local regulation and clarity on the form of reimbursement/payment by insurers	Voluntary survey with low response rate (3.2% to 24%)
Sarti et al., 2022, (31)	Brazil	<i>Cadernos de Saúde Pública</i>	Cross-sectional study	General virtual care	Absence of institutional virtual assistance programs	Only one region in Brazil
Aliaga-Castillo et al., 2022, (32)	Chile	<i>Musculoskeletal Science and Practice</i>	Qualitative study	Virtual rehabilitation	Lack of specialized equipment at home.  Shorter perceived consultation time	A single hospital center in urban area Small sample size (n=12)
García-Gutiérrez et al., 2023, (33)	Peru	<i>BMC Medical Education</i>	Cross-sectional study	General virtual care	Limitation for performing a complete and exhaustive physical examination In rehabilitation processes, it limits the feedback made by the specialists to the patients Decreased patient safety Lack of privacy Increases the possibility of medical malpractice	Participants were recruited from a single free online course
Alonso et al., 2023, (34)	Argentina	<i>Neurological Sciences</i>	Systematic review/expert consensus	General virtual care	Lack of training during professional training in telemedicine Lack of local regulation for the provision of the virtual service Limitation for performing a complete and thorough physical examination	Only the Argentine context

General virtual care: remote consultations/teleconsultations, or remote patient education; virtual rehabilitation: home exercises with remote supervision; remote care: home visits and remote patient monitoring.

reported difficulties in carrying out direct supervision and, consequently, proper feedback (32).

### *Patient perceptions*

Lack of privacy was one of the main barriers expressed by patients due to the risks of cyber-attacks and reliability in handling data and their clinical information (17,28). This aspect was also found to be compromised because some patients reported requiring support from their caregivers during the provision of the service, which diminished the privacy of the information shared with their treating physician and the quality of the physician-patient relationship (25,27). Some patients have the misconception belief that the virtual care model is not good for therapeutic benefit (22,28). In the study by Morais *et al.* (18) which included a face-to-face encounter for home health care, some patients or caregivers showed resistance to accepting healthcare staff inside their homes because they believed their privacy is violated. Another perception reported was the perceived high costs due to the need to pay for monthly internet or cell phone services (17), as well as the perception of shorter consultation time (27,32). These barriers may be attributed to the lack of implementation of patient and clinical staff education programs on the benefits and advantages of the virtual care model (16).

### *Perceptions of healthcare professionals*

Four studies identified barriers to the use of the virtual care model associated with healthcare personnel's beliefs or perceptions about service delivery (18,28,29,32). Among clinicians, a concern about the benefit or effectiveness of the care model in treating patients' health conditions was identified (28), which consequently led to an increased perception of the risk of committing medical malpractice and jeopardizing patient safety (33). In the context of performing specialized teleconsultation with support from a general practitioner at the remote site of care, a concern was found regarding the use of this model by specialists due to shared medical responsibility (29). Additionally, in two studies, clinicians also reported a lack of privacy during care as a barrier to its use (28,33). In the virtual model that includes face-to-face follow-up in patients' homes, exposure to urban violence was a barrier reported by healthcare workers in Brazil (18).

### *Structural barriers associated to the healthcare system*

The need for specific local laws to regulate the provision of virtual services, including the process of implementation, use, and integration with the current model, was identified as a common barrier among Latin American countries (16,28,30,34). This was reflected in the various problems encountered concerning the rates established and the reimbursements offered by the insurers to the hospital institutions (28-30). Gutiérrez *et al.* (29) reported that the billing process was the greatest obstacle identified due to the absence of regulations in Colombia governing service rates. On the other hand, the lack of motivation and standardized programs within health institutions was also a reported barrier to the use of the virtual model (26,31). For example, in Brazil, the prevalence of use during primary care was higher in hospitals with institutional programs (73.3% *vs.* 32.7%) (31), which had trained personnel and the necessary equipment for the adequate provision of virtual services. The high costs associated with the acquisition of specialized equipment and software, as well as the training of health personnel, were another barrier identified for the implementation of virtual care in Latin America (26,28). In addition, the existence of structural inequalities and access to information and communication tools is also a limitation in guaranteeing the use of virtual care throughout the territories (24).

## **Discussion**

### *Key findings*

This is the first systematic review performed with studies conducted in Latin America that reports on barriers to the implementation of the virtual care or telemedicine model in the region. Specifically, the aim was to explore the main challenges to improve the coverage, in order to serve as a baseline for the generation of interventions and public health policies that favor the consolidation of this model. The findings from this research can help to design different strategies seeking to overcome the identified challenges.

Despite substantial interest and investment in virtual care by governments in developed and developing countries, widespread adoption was modest before the pandemic. As the COVID-19 pandemic evolved, the main health actors were pressured to have to use virtual care to attend the health needs of patients and comply with the isolation regulations imposed by governments. Today, virtual care



should not be treated differently from other elements of the health care experience, primarily because it has proven to be a positive experience for patients and providers, with better health outcomes and lower costs (35).

### *Strengths and limitations*

The main limitation of this review is the design of the included studies because most were conducted in a single hospital center, in specific areas of healthcare, and with limited sample sizes. Therefore, the findings summarized here may not reflect the opinion of the entire region. Furthermore, no published studies were found for all the countries, which limits the generalizability of the findings. During the literature search, only studies conducted in the context of outpatient care were identified, and consequently, it was not possible to assess the virtual care model in hospitalized patients.

### *Comparison with similar research and explanations of findings*

The transition from face-to-face care to a virtual care model is occurring, moving from being an elective component to becoming a fundamental part of healthcare delivery. Following the COVID-19 pandemic, the virtual care model has grown around the world in terms of the number of services provided, as well as in terms of indications in the different clinical specialties (36). This phenomenon has also been observed in Latin American countries, which has led physicians, patients, and regulatory bodies to support this transformation and merger with the current model. This model has also been recognized as a tool that improves the opportunities for care and combats health inequity, which is mainly attributed to the remoteness of the territories, the difficulty of mobilization, and the centralization of some medical specialties in cities with a high concentration of population (3,36). Additionally, it is worth mentioned that due to the epidemiological transition and the increase in life expectancy, virtual care will be considered a great alternative to strengthen the care of these elderly people and to reduce the burden attributed to the chronic diseases prevalent in this age group.

Virtual care is highly likely to be a cost-effective model for the treatment of a broad spectrum of pathologies (37,38). For example, the incorporation of telemedicine during screening for blinding eye diseases in rural and urban populations in China has allowed the timely identification of

cases in early stages while reducing medical cost compared to traditional screening (incremental cost-effectiveness ratio of \$2,567 vs. \$7,251) (39). In cases with stroke in England, the use of telemedicine has optimized rapid access to acute care, with total healthcare cost savings of £482k and £471k with respect to traditional services (40). Similar results have been obtained with improved patient outcomes and lower medical costs in the management of rheumatoid arthritis (41), diabetes (42), musculoskeletal or dermatological conditions (43,44).

Although the COVID-19 pandemic allowed us to visualize the potential of this model of care, it was also an opportunity to identify those barriers or challenges that must be overcome to consolidate and allow its expansion. Similar to the results of other studies conducted in several countries (45,46), access and lack of knowledge about the use of electronic devices were the main barriers identified to accessing virtual care services. It is important to highlight that, in different clinical scenarios, including the management of oncology patients, it has been reported that around 90% of users are in favor and satisfied with the virtual care model (47). Health services in most Latin American countries are provided under a universal public insurance model in which the public and private sectors coexist to achieve universal health coverage (e.g., Argentina, Chile, Colombia, México), with equal access to drugs, surgical procedures, and medical and dental services (48). Health systems are financed by taxes and contributions from individuals according to their ability to pay (e.g., employed, or self-employed), so their sustainability depends on the balance between the percentage of subsidized and contributed population. The systems operate under a free/regulated competition market allowing public and private providers to compete on cost and quality, which leads to a decentralized nature in the provision of services to individuals because the same patient can be attended by several providers simultaneously in order to reduce costs. Although government regulations contain costs and set fair rates/prices, in the context of virtual care, the lack of suitable legislation has resulted in insignificant rates and reimbursement, which is an obstacle to its widespread use in the region. Furthermore, compared to developed countries, the lack of integration between virtual and face-to-face providers may end up increasing the decentralization of healthcare delivery.

The willingness of national governments to provide sufficient infrastructure throughout the territories is paramount to overcoming barriers related to access to the

internet or electronic devices. For example, based on the World Bank report, the Latin American region has a gap in the connectivity percentage of its populations compared to the United States and Europe, with 76% coverage compared to 92% and 87%, respectively (49). Given that in rural or remote areas it is difficult to ensure that the entire population has the necessary technology to access virtual care, equipped government and/or private healthcare centers should be available to serve as intermediaries between the virtual programs of highly complex hospital institutions and patients. Beyond the technological aspects, national governments and Ministries of Health should also be concerned with developing and implementing standards to regulate the provision of virtual healthcare services, delimiting indications for use, operational aspects, costs, and the civil liability of institutions and medical personnel. In the region, Colombia, Panama, and Peru have been the countries with the greatest progress in the regulatory framework, including the degree of governance and protection of personal data in the context of virtual healthcare (50).

During the diagnostic process, a complete physical examination together with a detailed clinical history is the fundamental basis for the suspicion of any pathology, taking even more relevance in some specialties, such as neurology, orthopedics, rheumatology, or dermatology (51). Therefore, the impossibility of palpating the patient and not being able to perform certain signs or clinical tests during the medical consultation represents a weakness of the virtual care model, as evidenced in this study. To mitigate this barrier, it is necessary to implement clinical practice guidelines that combine mixed face-to-face and remote visits, in addition to an exhaustive dialogue with patients, so that the physician can extract the necessary information to rule out or suspect a particular diagnosis (52). In the particular case of neurology, the implementation of a sequential care model has been proposed, visualizing it as a tool during the clinical follow-up of patients already diagnosed for whom the physical examination is of minor relevance (34).

In addition, it has been shown that virtual physical assessments may achieve similar accuracy to face-to-face assessments if patients receive standardized, organized, and clear instructions and have the appropriate devices (53-55). Specific procedures should be developed for each clinical specialty or pathology to guide the questions and instructions given to patients to improve self-assessment. For example, Askanase *et al.* (56) developed a protocol for virtual physical examination in patients with systemic lupus

erythematosus and are currently conducting a study to assess the degree of concordance with the face-to-face findings. However, this study is still in the recruitment phase.

### ***Implications and actions needed***

As with any transformation, socialization and education of all those involved in the virtual care model are essential for achieving acceptance of the model. This implies that each country and hospital center must identify the environmental factors that generate the greatest resistance to the expansion of the model to generate intervention strategies. Generally, these include strengthening training programs on the use of healthcare technologies, optimizing communication channels, and improving data management and cybersecurity. In addition, ensuring interoperability with the current system is another challenge to be overcome, especially in Latin American countries that have fragmented healthcare systems and limited interaction between the different stakeholders.

### **Conclusions**

In conclusion, the virtual care model is a safe and cost-effective alternative for the delivery of health services, with multiple benefits for patients and their families. Therefore, virtual care offers a great alternative for strengthening healthcare systems, enabling a better performance in two indicators on which the health sector is working hard: timeliness of care and coverage. At the same time, this alternative encourages disease promotion and prevention activities. Likewise, the analysis of the main barriers and benefits is fundamental to consolidating this model of care and ensuring its expansion in the region. We hope this research shed new lights that encourage further research in this field.

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### **Footnote**

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*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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