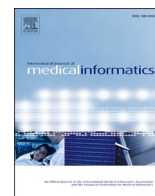




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Teleconsultation for outpatient care of patients during the Covid-19 pandemic at a University Hospital in Colombia

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ARTICLE INFO

Keywords:
eHealth
Telemedicine
Tele consultation
Indicators

ABSTRACT

Background: During the COVID 19 pandemic, direct-to-consumer telehealth (DTC) services allowed patients real-time virtual access to healthcare providers, especially those with an established relationship. In Colombia, this care modality was implemented between 2019 and 2020, under national considerations, it was implemented for outpatient care in a highly complex university hospital in Cali, Colombia.

Methods: A descriptive study with prospective information collection was used to describe the implementation of the outpatient teleconsultation care model for patients. We constructed the clinical and process indicators with which we evaluated the model.

Findings: A total of 56,560 patients from our institution were treated by virtual outpatient consultation during the first nine months of the health emergency declared by COVID 19 in Colombia. The strategy made it possible to achieve coverage more significant than 100% in Cali and the departments of Colombia. Attention by teleconsultation was 19% of the total ambulatory care. The effectiveness in carrying out scheduled teleconsultations had an overall result of 91.5%. The accessibility results demonstrated the need to strengthen connectivity and accessibility to payments and strengthen technology adoption in the institution, health personnel, and patients.

Interpretation: Implementing an outpatient teleconsultation model allowed the continuity of the management with comprehensive coverage nationwide from a highly complex hospital in southwestern Colombia. The indicators' analysis should help strengthen the policies of access to telemedicine, especially with the consequences of the pandemic in low- and middle-income countries. Latin American evidence is necessary to establish the safety profile of telemedicine and the costs associated with the provision.

1. Introduction

Telehealth or electronic health is defined as providing health care services by health professionals, using technologies to exchange information in the diagnosis, treatment, prevention, and clinical surveillance of diseases [1]. By allowing a virtual response to medical events, telehealth can increase the system's capacity in the context of natural, health, or biological disasters while minimizing the logistical and security problems associated with the deployment of health professionals for the care of an affected area [2].

During the COVID 19 pandemic, direct-to-consumer telehealth (DTC) services allowed patients real-time virtual access to healthcare providers, especially those with an established relationship. The main objective was to ensure the continuity of medical management and timely evaluations, with less spread and contagion of the virus [3].

For Colombia, the implementation of information technologies began in 2002, and since October 2019, telemedicine between patients and health care providers was allowed. As a guideline of the Ministry of Health, during the COVID 19 pandemic, the execution was stimulated to ensure the treatment of patients with non-critical, chronic diseases and

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<https://doi.org/10.1016/j.ijmedinf.2021.104589>

Received 11 August 2021; Received in revised form 15 September 2021; Accepted 19 September 2021

Available online 21 September 2021

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allow the replenishment of medicines. The Fundacion Valle del Lili (FVL), University Hospital, a highly complex reference center in southwestern Colombia, implemented the 'Siempre' (Always in English) outpatient teleconsultation care model achieve these objectives. This article describes the implementation process and the result indicators evidenced by this type of provision from April to December 2020.

2. Methods

Design: A descriptive study with prospective information collection was used to describe the implementation of the outpatient teleconsultation care model for patients in southwestern Colombia. FVL is a private, non-profit institution, accredited as a university hospital, that provides highly complex health services for patients from the Southwest of Colombia, located in Santiago de Cali. As a reference center, it serves patients from all the Colombian health system insurers and has 65 specialties to perform telemedicine.

Telemedicine service: In Colombia, telehealth has a broad regulatory and normative framework that establishes the enabling and operating conditions [4-6]. In 2019, the field of action in telemedicine was specified for each specialty, setting the telemedicine categories interchangeable with each other. Telemedicine between a patient and a provider's healthcare professional is called interactive telemedicine. In this modality, the relationship is established at a distance using a video call tool in real-time to provide health services in any of its phases, including prescription of drugs. On March 12, 2020, Health Ministry declared a state of health emergency caused by COVID-19 throughout the Colombian territory to guarantee the right to comprehensive health, including Telehealth strategies [7].

The technological platforms in telemedicine must guarantee the protection of personal data, authenticity, integrity, availability, and reliability of the data and must use necessary techniques to avoid the risk of impersonation, alteration, loss of confidentiality, any fraudulent or unauthorized access. For this reason, FVL used Microsoft Teams with licensing for video calls. The integration of scheduling, authorizations, payments, and telemedicine execution through the Always application, an in-house product from FVL. The registration of the consultation, the generation of orders, and the medical formulation were carried out in the clinical history of the SAP, the institutional computer system. Once the consultation is finished, information in PDF is sent to the user's email, who has previously authorized for contact. All the medical and healthcare personnel responsible for the outpatient consultation were trained in using the teleconsultation platform and process.

The General System of Social Security in Health finances the services provided in the telemedicine modality when providers are registered in the Special Registry of Health Providers -REPS. Teleconsultation can collect payments or copayments through the internet, depending on the insured's agreements. For this reason, it was necessary to strengthen the institutional online payment system and processes.

Population: All patients treated through the outpatient teleconsultation service from April to December 2020 were included. From the beginning of the project, contraindications for outpatient teleconsultation care were established. These contraindications included: patients who required taking vital signs and face-to-face physical examination for clinical decision-making; pediatric patients who required weight and height for clinical decision-making or unaccompanied at home; patients with acute clinical events that required face-to-face clinical evaluation and psychiatric patients or injunctions with unaccompanied decision-making disability at home.

Quality indicators: Information on the sociodemographic, clinical characteristics, and the process of the care model was collected. We constructed the clinical and process indicators with which we evaluated the model (Table 1). The source of information was the FVL medical history and the institutional care records. All the indicators were integrated into the institutional quality management model.

The scope of telemedicine in Colombia [8] and the coverage goals

Table 1
Outpatient teleconsultation indicators FVL.

Indicator	Description	Indicator type	Goal
<i>Process indicators</i>			
Consultation care coverage in telemedicine modality Cali (City)	No. of locations served by Telemedicine in Cali / No. of sectors that make up the target population of the program	Accessibility - Opportunity	>50%
Consultation care coverage in telemedicine modality Valle del Cauca (State)	No. of cities served by Telemedicine in Valle del Cauca / No. of cities that make up the target population of the program	Accessibility - opportunity	>10%
Consultation care coverage in telemedicine modality Colombia (Country)	No. of states served by Telemedicine in Colombia / No. of states that make up the target population of the program	Accessibility - opportunity	>10%
Proportion of outpatient teleconsultation patients	Total Outpatient Teleconsultation / Total consultations made in the period (face-to-face and Teleconsultation)	Accessibility - opportunity	>10%
Effectiveness of scheduled teleconsultations	No. of Teleconsultations attended / total Teleconsultations scheduled ×100	Effectiveness	>85%
Percentage of cancellations per patient in teleconsultation	Appointments canceled during the period/total appointments scheduled during the period ×100	Satisfaction - accessibility	< 6%
Percentage of no attendance at teleconsultations	Total absences to scheduled appointments during the period/total appointments scheduled during the period ×100	Satisfaction - accessibility	< 5%
Percentage of cancellations by doctor in teleconsultation	Total scheduled appointments canceled by doctor during the period / total appointments scheduled during the period ×100	Satisfaction - accessibility	< 0.4%
Percentage of scheduled users who were not attended due to technical conditions	No. of teleconsultations canceled due to technical problems / total appointments scheduled in the period	Satisfaction - accessibility	< 0.5%
User satisfaction with excellent / good rating	No. of responses with an excellent plus good rating in patient satisfaction surveys / No. of total responses (excellent plus good plus fair plus poor) ×100	Generation of value in health	>98%
User satisfaction with excellent rating	No. of responses with an excellent plus good rating in patient satisfaction surveys / No. of total responses (excellent plus good plus fair plus poor) ×100	Generation of value in health	>85%
<i>Clinical indicators</i>			
Distribution of Tele Consultations by Specialty	Number and percentage of teleconsultations by specialty / total teleconsultations attended by specialty	Accessibility - opportunity	>10%
Percentage of teleconsultations by age group	Number of teleconsultations attended to patients according to age group / Total teleconsultations attended in the period ×100	Accessibility - opportunity	>10% (each group)
• Early Childhood: From 7 days to 5 years, 11 months and 29 days.			

(continued on next page)

Table 1 (continued)

Indicator	Description	Indicator type	Goal
• Childhood: From 6 to 11 years, 11 months and 29 days.			
• Adolescence: 12 to 17 years.			
• Youth: From 18 to 28 years old.			
• Adulthood: From 29 to 59 years old			
• Old age: 60 years and older			

proposed by the Panamerican Health Organization to reduce access inequities [9] were used to establish the goal of coverage indicators. The goals to evaluate teleconsultation’s behavior were defined based on the historical records of the institution and literature on the behavior of the face-to-face external consultation in the country [10,11].

3. Results

From April 1 to December 31, 2020, 56,560 teleconsultations and 233,760 face-to-face consultations were registered; Fig. 1 reports the monthly distribution. This number of teleconsultations represents 19,48% of the total care (face-to-face consultations plus teleconsultations) attended in 2020. During the study period, Tuesday and Wednesday concentrated most of the attention (Fig. 2).

Cali’s initial coverage goal was to reach 50% of the communes (distribution of neighborhoods by sectors) in the city. However, it achieved a total of 118%, which allows establishing that teleconsultation service covers 100% of all communes, with more than 183 neighborhoods served. In the department (political-administrative division of Colombia) of Valle del Cauca, coverage was 83% of the cities, and for Colombia, achieved coverage was 520%. This result is because the coverage initially proposed was in five departments, and the final scope was 26 (81% of the Colombian departments). The Valle del Cauca, Cauca, Nariño, and Risaralda were the departments with the highest care volume.

One of the goals proposed was that telemedicine achieved 10% of all outpatient’s attentions. For this indicator, all the months achieved the

goal, with 19,48% of the attentions carried out by telemedicine. The highest percentages of 31.7% and 33.9% were reached in April and May, with a gradual decrease until 12.6% in December (Fig. 3). On March 12th, it was declared a state of emergency by COVID-19 in Colombia. In the beginning, the restrictions allowed the reunion of 500 persons maximum, but on March 22th, the local government ordered the mandatory social distancing through the presidential decree 457. At this point, The Health and Social Protection Ministry recommended canceling no essential ambulatory care and encouraged the use of telemedicine. Nevertheless, in June, the country started reopening and was promoted selective social distancing according to risks factors, resuming face-to-face medical care (Fig. 1).

The effectiveness in carrying out scheduled teleconsultations had an overall result of 91.5%, an indicator with a result greater than 85% set as a target. 7.9% of the patients canceled the consultation, not meeting the proposed goal of less than 6%. The analysis of the causes of this behavior allowed us to identify that the difficulties in paying the moderating fees established by the insurers and the connection problems were the main reasons for cancellation. The non-attendance patients were 4.6% (within the established goal), and due to the cancellation of the medical group, not carried out 0.9% of the teleconsultations. This indicator also did not meet the established strategic goal. The percentage of scheduled users who did not attend due to technical conditions was 0.027%. When compared the data of the in-person outpatient consultations attended in 2020 with the previous results, it found that 5% of scheduled face-to-face consultations were canceled, 6% were absent, and 3% were re-assigned appointments.

User satisfaction as a generator of value in health was carried out through an institutional process of online surveys evaluating the treatment received by the healthcare, medical and administrative groups. 3558 patients responded to the satisfaction survey. The percentage of patients surveyed with an excellent/good rating was 98.32% and with an excellent rating of 84.39%.

The distribution of teleconsultation by specialties for the year 2020 reported that psychiatry was the specialty with the highest number of patients attended with 15.2%, followed by endocrinology (9.9%), psychology (7.8%), pediatrics (6,4%), and internal medicine (5.8%). The services of infectiology, adult haemato-oncology, obstetric gynecology, neurology, and dermatology complete the first ten services evaluated by patients with a care range of 3 to 4%. A total of 64 specialties used the

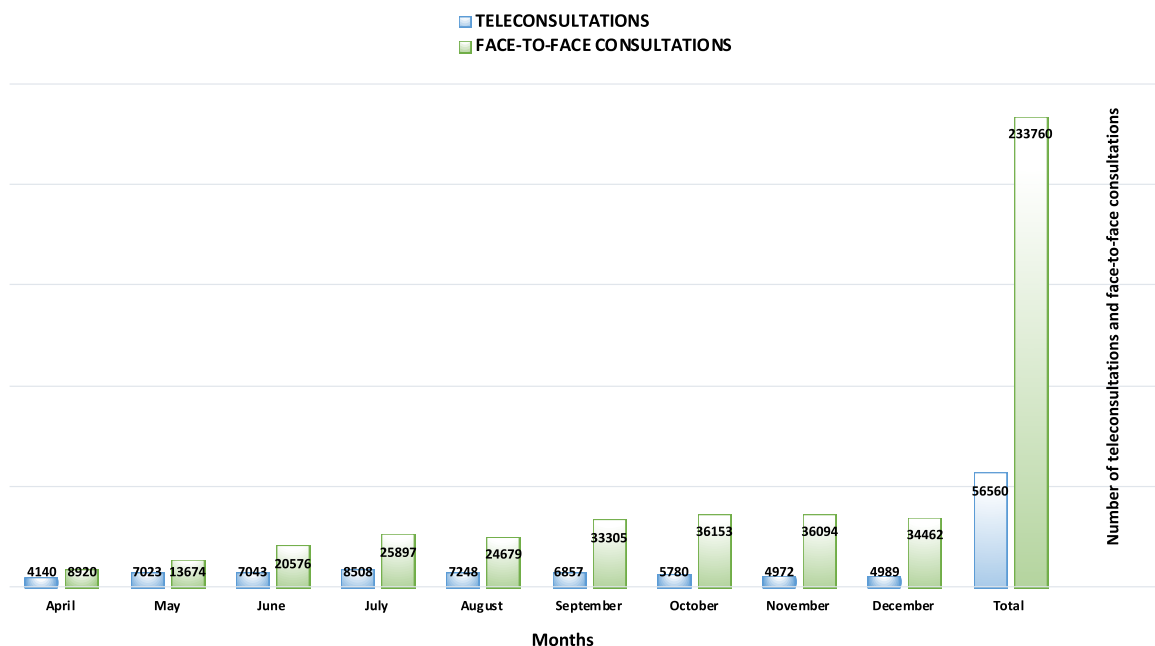


Fig. 1. Monthly distribution of teleconsultations and face-to-face consultations for outpatients, 2020.

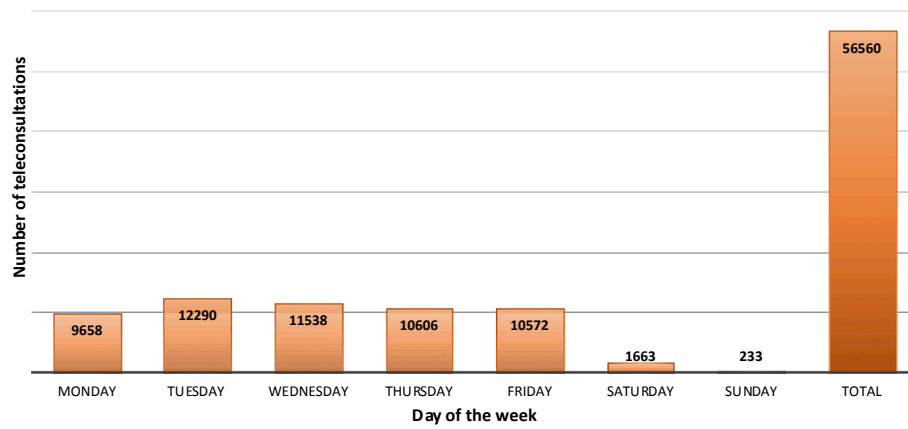


Fig. 2. Number of teleconsultations according to the day of the week, 2020.

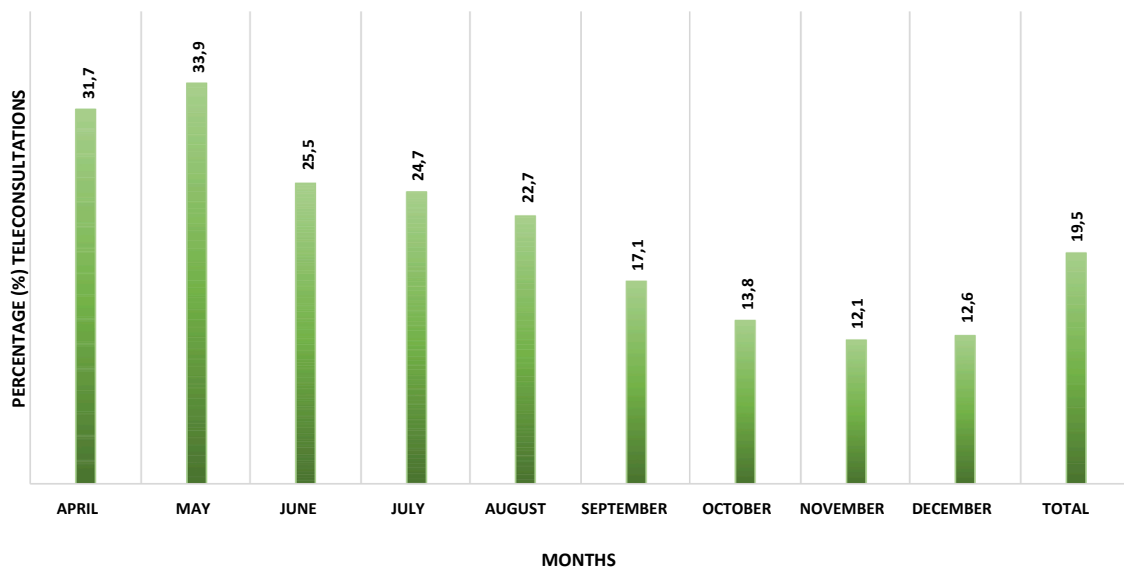


Fig. 3. The proportion of teleconsultations to all outpatient's attentions, 2020.

virtual modality. Table 2 summarizes the most prevalent diagnoses of care by teleconsultation.

Table 3 summarized the indicator of the distribution of outpatient teleconsultations according to age groups. Not reached the proposed goal of 10% in the early childhood, childhood, and adolescence groups,

Table 2
Ten leading diagnoses of teleconsultation, 2020.

Diagnoses	Total number of attentions	%
Hypothyroidism	1647	2,91
Encounter for routine child health examination	1462	2,58
Malignant neoplasm of unspecified site, unspecified female breast.	1416	2,50
Generalized anxiety disorder	1330	2,35
Emergency use of U07.1 (COVID-19, virus identified)	1318	2,33
Severe episodes of depression without psychotic symptoms	1107	1,95
Obesity due to excess calories	935	1,65
Essential (primary) hypertension	857	1,51
Malignant neoplasm of thyroid gland	757	1,33
Malignant neoplasm of prostate	640	1,13
Recurrent depressive disorder, current episode moderate	586	1,03

Table 3
Percentage of teleconsultations by age group.

Percentage of teleconsultations by age group	
Early Childhood: From 7 days to 5 years, 11 months and 29 days.	7,83%
Childhood: From 6 to 11 years, 11 months and 29 days.	5,65%
Adolescence: 12 to 17 years	8,25%
Youth: From 18 to 28 years old.	12,97%
Adulthood: From 29 to 59 years old	38,93%
Old age: 60 years and older	26,37%

which represents the effectiveness of the logistics of the service.

4. Discussion

A total of 56,560 patients from our institution were treated by virtual outpatient consultation during the first nine months of the health emergency declared by COVID 19 in Colombia. This number of care exceeded all expectations raised for the continuity of medical care in the new reality and highlighted the need to strengthen telemedicine between providers and patients, parallel with the global trend. The practical and efficient integration of a telemedicine program requires education of the medical staff and the patient, video, and audio platforms to facilitate communication and the adoption of a new payment

and billing system [12,13]. The institutional team methodically evaluated each aspect for this rapid implementation.

One of the most impressive results of this study was the coverage achieved by outpatient teleconsultation at the city, regional, and country levels. Within the framework of the need to achieve universal coverage for health care at all levels, these findings may represent a hopeful response in the medium term. Universal health coverage (UHC) guarantees that all people can receive the quality health services they need without suffering financial difficulties [14,15]. However, by 2019, a gap of more than 70 points remained between the locations with the highest and lowest levels of adequate UHC coverage in 204 countries [16]. The effective coverage index of universal health coverage applied in the Based on the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019 had a performance for effective universal health coverage of 60.3 (58.7–61.9). To accelerate this indicator, concerted actions on non-communicable diseases, better spending on health with better performance, and innovative efforts to reach the population are necessary, such as teleconsultation.

The COVID-19 pandemic has represented a health, social and economic challenge with blockade measures, cessation of industrial and commercial production in most sectors, job reductions, and layoffs. It is estimated that more than 420,000,000 people globally will live in absolute poverty with incomes below \$ 1.90 a day [17]. This economic impact also negatively affects health care access, significantly increasing costs associated with transferring patients from distant places, both for patients and insurers. The use of telemedicine can be a handy alternative in these conditions, especially when verifying the possibility of having high coverage even in a middle-income country. This hypothesis, however, must be confirmed with solid evidence in this regard in low- and middle-income countries. Being able to reach the coverage indicators and exceeding them, providing coverage and access to medicine in almost all the government departments, has been a definitive result for the project's continuity.

The program effectiveness result, defined as the coverage of more than 10% of the consultations attended virtually, was achieved during the study period. In addition to caring for patients, it was essential for hospitals to financially sustain services to cover expenses and avoid a greater risk of financial failure [18]. Private healthcare facilities in the United States, for example, reported an average 60% decrease in patient volume and a 55% decrease in admissions since the start of the public health emergency [19]. Carrying out a high number of teleconsultations gave financial support to outpatient services during the most significant crisis.

The results in terms of accessibility and patient satisfaction did not reach the expected goals, and the analysis of these results confirmed the challenges and barriers to the implementation of telemedicine identified in the evidence, adapted to the Latin American scenario. These barriers have been established for organizations, health personnel, and patients. The cost of implementing a telemedicine service, the problems of paying for care, and the difficulties of cyber legal responsibility have had a greater weight for health institutions to limit their telehealth offer [20]. In our case, during the creation and implementation of this new service, we consider strategies to face these limitations within the institution's scope.

Our greatest challenge was undoubtedly creating an implementation model in record time, which would ensure efficiency in the workflow at all levels of the outpatient practice. According to the evidence, at the personnel in charge of providing the telehealth service, the barriers that impede growth are the limitations of technically trained personnel and resistance to change [20]. Telemedicine required significant changes in existing workflows, investing time in training new techniques, affecting care efficiency and effectiveness. In this sense, the project had to redouble its efforts to educate new technology and establish communication channels for personnel with more excellent resistance and apathy to telehealth. The COVID-19 pandemic has led to a dramatic increase in the adoption of technology in healthcare. Health personnel in low- and

middle-income countries, who were generally not adept at using telemedicine, were forced to establish and learn about telemedicine in their clinical practice. In our institution, very few of the medical and assistance group members of the face-to-face outpatient consultation of our institution knew the basic principles of the exercise of telemedicine before its implementation in April 2020.

Our analyzes also corroborated the barriers established in the literature for patients. Age, level of education, lack of computer skills, inadequate internet coverage, and bandwidth in homes [20] were the main limitations to achieve the proposed indicators. These determinants need large-scale and multi-stakeholder strategies to remedy the drawbacks found. For example, until the beginning of the pandemic, the use of the internet in Colombia was not considered an essential public service. During the pandemic year, the country increased internet access to 7 million fixed internet access points, representing 15 accesses for every 100 inhabitants [21]. Information and communication technologies contribute to the health system's transformation when incorporated into its value chain and constitute a fundamental instrument for planning, management, and health care evaluation. The Inter-American Development Bank has stated that these objectives require a new form of digital health governance to achieve better coverage for patients [22]. Progress in these measures at the level of developing countries, added to the collective efforts of institutions and insurers, will determine the actual progress in coverage for patients.

The payment policies of teleconsultations by insurers have been controversial worldwide. In many countries, coverage restrictions apply to telehealth services because of the potential for overuse, fraud, and poor quality care. The increase in users, which reflects more the possibility of achieving the necessary health coverage than inappropriate use, has generated concern in provision costs [18]. In our country, universal coverage of telemedicine care does not exist. It is dependent on the agreements established between hospitals with insurance companies, which undoubtedly limits the growth of the offer.

For this reason, a process of immediate consultation with all health providers was necessary when the emergency was declared to provide the care described. Additionally, the payment of moderating fees or copayments by users led to the creation of large-scale online payment processes, for which most institutions in Latin America were not prepared. In our case, this aspect significantly limited access to pay to users who previously did not use or knew about this type of services and gender, a permanent process of education and support for patients.

The results of generating value in users in our study were satisfactory for the project implementing team: Offering an alternative of continuity in the established management and accompanying high-risk patients at the time of crisis, with solutions quickly found was valued by users at all levels. However, there are still lessons learned that should lead to better service delivery. With the sole exception of the physical examination, the quality of telemedicine care must be the same as face-to-face care, and the care process must not jeopardize patient safety. The speed at which telemedicine services were implemented prevented the standardization of infrastructure, staffing, workflow, protocols, and logistics, impacting quality [23]. Clear medical protocols that establish the appropriate conditions should be generated of teleconsultation, reporting, and sending of documentation, standards of medical records, and follow-ups [24]. We still need to develop evidence on the security of the protocols used in telemedicine and better understand the ethical obligations, conflict of interest, and protection of personal health information in virtual outpatient care [25].

The distribution of care demonstrated the high impact of telemedicine in mental health processes. It opened an exciting space for discussion in the Latin American scenario, where accessibility to specialists in psychiatry or psychology has historically been limited. The necessary but extreme measures to prevent the spread of the COVID 19 virus have had a psychological impact on all levels, with changes that resemble post-traumatic stress disorder. A review and meta-analysis of nine articles on telemedicine in the COVID 19 era showed that 23% of users

consult psychological counseling [26]. Digital communication to provide mental health support, provide counseling and link people through online social media must be harnessed in its unique ability to meet serious challenges to address psychological support needs in times of crisis. These efforts can be managed at the regional level, breaking the paradigm of face-to-face care or even with the minimum requirement that both the counselor and the counselee speak the same language [26].

The distribution of care by age group establishes an opportunity gap for virtual care in early childhood, childhood, and adolescence populations. As a strategy to reduce this gap, it is essential to establish the clinical safety of virtual care, the impact, and the true scope once a plateau of telemedicine use is reached in the post-pandemic scenario. This unknown scenario and telemedicine must be prepared for the appearance of new peaks of disease, a greater demand for patients who have not been treated in a local health system, patients with new forms of acute and chronic conditions, mainly due to the postponement of care for severe cases and the economic impact of the pandemic on health institutions [26].

The COVID 19 pandemic has been established as an invisible disaster that has affected the entire world [27], with catastrophic consequences for low- and middle-income countries. The usefulness of telemedicine for disaster recovery has been described since 1988. Although its incorporation has not become an acceptable practice for most countries, it can be integrated to help manage the most affected countries, such as Latin America. As has been established, despite resistance to change, there is now a new virtual medical world order. Telemedicine has taken center stage requiring the attention of traditional medical services in low-resource countries [27].

This study was limited in its degree of analysis to the description of the results obtained in the evaluation model by indicators and warrants an additional evaluation to examine specific subpopulations of patients in terms of the safety of care and associated costs. Moreover, although teleconsultation allowed drug prescription, there is no information about completed prescriptions during encounters or others indicators to evaluate teleconsultation's effectiveness. Likewise, this study lacks a specific control group; future projects should provide comparisons that determine strong evidence for the use of telemedicine in the management of low- and high-risk outpatients.

5. Conclusion

Implementing an outpatient teleconsultation model allowed the continuity of the management with comprehensive coverage nationwide from a highly complex hospital in southwestern Colombia. The analyzes of precise follow-up indicators corroborate the worldwide need to implement strategies that improve telemedicine access in the barriers identified in the evidence. These models of care can help reduce the gap in care in low- and middle-income countries, becoming an engine of social innovation, especially in the post-pandemic era.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRedit authorship contribution statement

María Fernanda Escobar: Conceptualization, Formal analysis, Visualization, Writing – original draft, Writing – review & editing, Supervision, Project administration. **Juan Fernando Henao:** Conceptualization, Visualization, Writing – original draft, Writing – review & editing. **Diana Prieto:** Conceptualization, Visualization, Writing – original draft, Writing – review & editing. **María Paula Echavarría:** Conceptualization, Visualization, Writing – original draft, Writing – review & editing. **Juan Carlos Gallego:** Conceptualization, Visualization, Writing – original draft, Writing – review & editing. **Daniela Nasner:**

Conceptualization, Visualization, Writing – original draft, Writing – review & editing. **Diana Marcela Martínez-Ruíz:** Conceptualization, Formal analysis, Visualization, Writing – original draft, Writing – review & editing. **Jorge Eduardo Velasco:** Conceptualization, Data curation, Visualization, Writing – original draft, Writing – review & editing. **Juliana Alarcón:** Conceptualization, Data curation, Formal analysis, Visualization, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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