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INFLUENCE OF TELEMEDICINE AND ITS DIMENSIONS ON HEALTH PROMOTION

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ABSTRACT

Introduction: Multidisciplinary health promotion activities were interrupted during the pandemic with telemedicine temporarily replacing face-to-face patient care as an alternative. Objective: The objective of the research was to determine the influence of Telemedicine and its dimensions on health promotion.
Method: The type of study is cross-sectional. It was carried out in a public hospital where 120 users participated during the period September - November 2022, using instruments validated by experts and having as inclusion criteria the patients attended in the four remote services: Teleconsultation, Teleguidance, Telemonitoring and Teleinterconsultation, being analyzed statistically by correlation coefficient and logistic regression.
Results: A response rate of 76.4% was obtained, in which 58.3% presented a high level of satisfaction with the use of Telemedicine, showing a positive influence on health promotion (r=0.669, p<0.05; OR 9.28 [95 % CI, 4.54 - 18.98; p<0.05]).
Conclusion: It was determined that there is a relationship between Telemedicine and its dimensions towards health promotion as well as high satisfaction on the part of the users.
Keywords: health promotion, telemedicine, teleconsultation, teleorientation, telemonitoring.

INTRODUCTION

Public health is in permanent evolution according to the situation of each country, focusing on aspects related to health promotion, prevention and interventions. In this sense, it involves the care of the individual as a unique human being and as part of a society. In addition, in the 21st century, healthcare systems coexist with various aspects such as population aging, migration to cities, global competitiveness, demand for information management, population beliefs, and economic and/or budgetary constraints[1]. In this sense, public health has been undermined at the beginning of 2020 as a consequence of the global crisis that all countries have faced due to the SARS-CoV-2 virus infection, since the health crisis that has arisen has made visible the limitations of the different health systems, which was evidenced in the collective health component and in the health care services that highlighted the inequities in the social and economic determinants, especially in Latin American countries [2]. In addition, human resource gaps, such as shortages of medical supplies, biomedical equipment and medicines, were also revealed[3].
In this sense, the different governments had the need to implement and/or reinforce strategies that would allow health personnel to continue providing care to users of the different health services. To this end, they adopted various remote care modalities, making use of Information and Communication Technologies (ICT) and several other services, including Telemedicine, which is a modality designed to ensure that health care can continue to be provided to users, thus avoiding the need for them to visit health facilities in person and thereby prevent the spread of the virus [4]. This is an unexpected challenge for public health, since the health policies of the different governments have been faced with unknown events and existing resources, which have revealed shortcomings in the health structures at both the legal and regulatory levels [3], for example, in the USA, face-to-face care decreased due to the use of Telemedicine [5]. For all these reasons, the COVID 19 pandemic has made public health -ori-

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ented in its purposes aimed at promoting health and preventing disease- transcend beyond its statutes and concepts, incorporating into this new scenario regulations and statutes that regulate the actions of health professionals [6].

In Latin America, one of the main supports to the health system, which was immersed in this health situation, is Telehealth, which although it is true that in several countries it was regulated with some guidelines in the areas of application, it took off due to the mentioned pandemic and is being used until today. Its implementation was due to the need to continue providing health services in contrast to the different health measures that were implemented to curb the incidence of new cases, such as social distancing and home isolation. Thus, various modalities of remote health care were implemented by publishing various legislative and regulatory decrees, with the aim of guaranteeing that the population would continue to receive health care considering their health diagnoses and/or avoiding complications,[1,7] Within this framework, the Law No. 30421 was passed in Peru, which establishes general provisions related to the National Telehealth Network, detailing the development axes that define Telemedicine, which is considered to be the provision of health-oriented services.[8]

In Peru, the modality of Telemedicine care covers 4 dimensions according to the Regulation of Law No. 30421, Framework Law of Telehealth [8], where Teleconsultation is defined as the remote service in which health personnel attends a user to provide a diagnosis within the framework of their skills and competences. This requires the use of ICTs by the users to optimally achieve the objectives pursued, such as health promotion, disease prevention, diagnosis, treatment, rehabilitation and palliative care, as appropriate. Likewise, it is also related to the issue of drug treatment in accordance with the limits of prescription of drugs according to the competence of health professionals or others provided by the Ministry of Health. Whereas, Teleorientation encompasses the set of actions where health professionals use ICTs to provide health counseling and advice to health users with the aim of promoting health, preventing disease, supporting recovery and reducing sequelae. In the same sense, Telemonitoring encompasses the permanent monitoring and/or follow-up by health professionals of users who suffer from chronic diseases and, therefore, are already aware of their diagnosis and treatment. For this purpose, clinical information and medical history is of great importance as it is based on medical standards, biomedical parameters and/or ancillary tests as a means of monitoring their health. Likewise, medication prescriptions may or may not be included depending on medical judgment and the competence of other healthcare professionals. Finally, Teleinterconsultation is the remote consultation requested by a health professional to another specialist, for the attention of a specific health case, in which users may or may not be present. This will make it possible to reconsider the medication treatment or also the performance of auxiliary tests that allow an optimal treatment according to the norms stipulated by the Ministry of Health.

In this sense, Telemedicine is emerging as a sustainable health strategy, proposed by the United Nations in the framework of the 2019-2030 Agenda [9]. Its purpose is to remove the access barrier for users living in distant locations to health facilities, avoid unnecessary travel, strengthen the use of human and logistical resources, allowing their efficient use. In addition, it allows the population to receive care from home, reduces health gaps and obstacles related to health inequalities, making it possible to guarantee a healthy life and the well-being of the population [1], in such a way that coordination, continuity and integration of the different health systems can be improved, as well as coordinated work between general practitioners and specialists. Moreover, as in other health professionals and the participation of patients in primary care [10], it will allow better control of chronic and metabolic diseases, which in users who suffer from them represent a high risk of mortality due to COVID-19 [11].

In Peru, being a developing country, together with its geographical distribution, health systems are mostly made up of first level primary care facilities and one of their main functions is health promotion, which is a fundamental part of the strengthening of the health systems. Another purpose is to respond to the health needs of individuals, families and communities considering a high level of solidarity and equity, covering not only clinical services from primary care, but also assessing the living conditions and social environment by establishing connections with health professionals [9]. Therefore, knowing that health promotion is an essential function of public health and should be integrated into all aspects related to health processes, the present research aimed to determine the influence of telemedicine and its dimensions on health promotion in patients treated in a public hospital in the city of Trujillo, presenting as an alternative hypothesis the direct influence of telemedicine through its dimensions on health promotion.

METHODS

DESCRIPTION OF THE DESIGN

The design consists of a cross-sectional, retrospective study conducted in a hospital in northern Peru, in which activities are carried out at different levels of prevention. The data collected covered the period from September to November 2022, which was obtained through telephone calls and the completion of virtual surveys through online digital platforms, as well as access to digitized medical records. This will provide demographic data, user care services, diagnosis codes and other characteristics that will allow us to determine whether the inclusion criteria have been met.

POPULATION

The study included 120 health users out of a total of 157 (response rate 76.4%), to which a non-randomized probability sample was applied, grouped according to the outpatient services in which they were attended, and considering as inclusion criteria patients over 18 years of age, of both sexes, who had been provided with the four remote care services covered by Telemedicine: Teleconsultation, Teleguidance, Telemonitoring and Teleinterconsultation. On the other hand, participants with cognitive and/or mental deficits ad who had not been treated under the 4 telemedicine modalities were excluded.

INSTRUMENTS

In relation to the application of the questionnaires, the approval of the hospital's ethics committee was obtained; likewise, telephone calls were made to users and informed consent was requested by means of virtual forms sent through digital tools. For the validation of the questionnaires, a pilot sample of 30 people (not included in the study) was used for both variables, obtaining an overall Cronbach's alpha of 0.89, in addition to being validated by 5 telemedicine experts. The questionnaires for both variables were formulated using a Likert scale with the following values: never = 1, almost never = 2, sometimes = 3, almost always = 4, always = 5, with high scores ranging from 74 to 100 points, regular 47 to 73 points and low scores for those below 47 points. Regarding the telemedicine dimensions, each one was represented by 5 items each, with a Likert scale mentioned above, being stratified from 5 to 11 points as low, 12 to 18 as regular and 19 to 25 as high.

STATISTICAL ANALYSIS

In the statistical analysis, a methodological approach was used to understand the complex interaction between socio-demographic variables and levels of satisfaction with Telemedicine. Initially, participants were stratified by age group and gender, using descriptive statistics by frequency tables and percentages, presenting age as mean and standard deviation. The normality of the data distribution was assessed using the Kolmogorov-Smirnov test, which allowed them to select parametric and non-parametric correlation tests according to the distribution of each variable. They specifically used Pearson's correlation to establish the relationship between age and Telemedicine, and Spearman's correlation to analyse the association between health promotion and Telemedicine, establishing a statistical significance level of $p<0.05$. For further analysis, a logistic regression model was implemented to estimate the association between socio-demographic variables, Telemedicine dimensions and level of health promotion satisfaction, calculating odds ratios with 95% confidence intervals. Data processing was performed using Microsoft Office Excel and statistical analysis with SPSS V.26.0, rigorously following the ethical principles of the Declaration of Helsinki, which guarantees the scientific integrity of the study and the accurate interpretation of the results obtained.

RESULTS

The univariate analysis in table 1 revealed a demographic profile with female predominance, representing 69.2% of participants. The average age was 45.37 years (SD ±15.27), with a significant concentration of participants under 55 years of age (69.2%).

In terms of Telemedicine dimensions, heterogeneous levels of satisfaction were observed. Teleconsultation and Tele-guidance showed the highest percentages of satisfaction, with 77.5% and 65.8% respectively. In contrast, the Tele-consultation dimension showed the highest percentage of low satisfaction, reaching 17.5%, with a remarkable 81% representation of women.

The overall analysis of Telemedicine yielded a mean score of 74.79 (SD ±17.97), with a high level of satisfaction in 58.3% of cases. This high level was mainly represented by women (71.4%) and participants under 55 years of age (67.5%). Some 33.3% of the participants rated the experience as fair, while 8.3% considered it to be of low satisfaction.

Regarding health promotion, the results were equally significant. Half of the participants rated the health promotion as good, with 60% of the participants being female. 42.5% rated it as fair, and only 7.5% as low satisfaction.

Table 1. Sociodemographic characteristics of patients and satisfaction levels of Telemedicine dimensions.

Variable	Categories	Number of Cases	%	Mean (SD)
Age (years)	< 55	83	69,2	45,37 (15,27)
	55-64	26	21,7	
	>64	11	9,2	
Gender	Female	83	69,2	
	Male	37	30,8	
Teleconsultation	Low	4	3,3	20.93 (4.44)
	Regular	23	19,2	
	High	93	77,5	

Variable	Categories	Number of Cases	%	Mean (SD)
Teleorientation	Low	9	7,5	19.77 (5)
	Regular	32	26,7	
	Alto	79	65,8	
Telemonitoring	Low	18	15	17.88 (5.4)
	Regular	48	40	
	High	54	45	
Teleinterconsultation	Low	21	17,5	16.42 (4.9)
	Regular	54	47	
	High	45	37,5	

SD: Standard Deviation

Inferential statistical analysis revealed remarkable findings. A non-significant inverse correlation was found between age and Telemedicine (r: -0.076, p>0.05). However, a strong and statistically significant correlation was observed between Telemedicine and health promotion (r=0.669, p<0.05). This correlation remained consistent across all Telemedicine dimensions: Teleconsultation (r=0.639), Teleguidance (r=0.634), Telemonitoring (r=0.587) and Teleinterconsultation (r=0.605), all with statistical significance (p<0.05).

Multivariate analysis using logistic regression showed interesting results. Compared to participants older than 64 years, younger age groups were less associated with Telemedicine satisfaction, although without statistical significance (under 55 years: OR 0.68 [95 % CI, 0.16 -2.9; p>0.05]; 55-64 years: OR 0.77 [95 % CI, 0.1 - 3.7; p>0.05]). Notably, women were significantly associated with a higher degree of satisfaction in Telemedicine use (OR 1.27 [95% CI, 0.59-2.73; p<0.05]) compared to men (OR 0.46 [95% CI, 0.20-1.01; p>0.05]), suggesting a differentiation in perception in favour of women.

Table 2. Association of sociodemographic variables and telemedicine dimensions with the level of health promotion satisfaction through logistic regression.

Variable	Level	OR	Confidence interval at 95%.	
			Inferior	Superior
Gender (ref = Male)	Female	0.460	0.208	1.018
Age (ref = over 64 years old)	under 55 years old	0.606	0.165	2.220
	55-64 years	0.537	0.128	2.257
Telemedicine (Dimensions)	Teleconsultation	15.834	5.163	48.560
	Teleorientation	11.437	5.150	25.399
	Telemonitoring	5.769	3.098	10.741
	Teleinterconsultation	5.371	2.887	9.992

*:p<0.05

Regarding the age variable in table 2, the results showed that age groups younger than 64 years were not significantly associated with the level of health promotion satisfaction. (under 55 years: OR 0.60 [95 % CI, 0.16 - 2.22; p>0.05]; 55-64 years: OR 0.53 [95 % CI, 0.12 - 2.25; p>0.05]), indicating a non-statistically significant variability in the perception of health promotion according to age.

A crucial finding was the significant association between Telemedicine and health promotion, with an OR of 9.28 (95% CI, 4.54-18.98; p<0.05), suggesting a substantial impact of Telemedicine on health promotion. However, the most striking aspect of the analysis was the significant associations with each dimension of Telemedicine, especially Teleconsultation, which emerged as the dimension with the most notable impact, showing an OR 15.83 (95% CI, 5.16-48.56; p<0.05). This result suggests that Teleconsultation has a substantial influence on health promotion, significantly outperforming other dimensions.

This consistency in the results contrasts our hypothesis where Telemedicine through its dimensions has a positive and statistically significant influence on health promotion, with Teleconsultation standing out as the most influential dimension.

DISCUSSION

There is little knowledge about the application of Telemedicine in the different stages of health promotion [12], since to date no studies have been found where the relationship between both variables is mentioned. Currently, international studies focus Telemedicine on activities that are separate from health care and health promotion. Similarly, few studies were found indicating the repercussions of Telemedicine and its dimensions towards health promotion, despite the fact that some authors mention that 50% of Telemedicine use occurs in primary care activities [13].

On the other hand, the findings show that more than half of the patients have a high level of satisfaction, similar to other studies [14-16]. On the other hand, there are studies in which face-to-face care generates greater satisfaction due to the nature of the disease, in which the user necessarily requires direct attention from the health professional [17], which is supported by a North American study that showed that there is no difference between face-to-face care and telemedicine [18].

An influential factor in telemedicine care was gender, for example in Brazil, where it was shown that men are the biggest users of telemedicine [19], in contrast to our country, where women predominate (69.2%), as corroborated by several studies [20-22]. This difference occurs in our research because it encompasses all health promotion activities, while in Scofano et al. [19], it was in home care for patients undergoing hemodialysis. Another influential factor was age, which was in agreement with young adults, and which was associated with greater use of telemedicine, with a representativeness of around one third of the participants [20,22,13].

The association between satisfaction with the Teleconsultation and its influence on satisfaction with health promotion was also determined ($r=0.639$, $p<0.05$; OR 15.834 [95 % CI, 5.163 - 48.560; $p<0.05$]). This is verified with other studies focused on prevention in which prenatal visits were made by telephone, generating satisfaction in almost all the participants [23]. Likewise, if it focuses on other specialties applied to Telemedicine, such as Teledermatology, where it is compared with face-to-face care, indicating the similarity, thus generating high satisfaction between the two [24]. In addition, studies have been carried out, which include two healthcare centers comparing the degree of satisfaction, thus generating a satisfaction rate of over 60% in both [25], having even mentioned the privacy generated by remote care compared to face-to-face care, being an important factor for its acceptance, considering additionally a lower cost and efficiency in time, especially for adults [26].

On the other hand, there are systematic reviews on the effectiveness of Teleconsultation in primary care where it is considered an effective alternative; however, it brings with it a high attrition rate and cannot be applicable to all [27]. This result is corroborated by the study carried out in Peru, a country with ethnic diversity and in the process of development, where there is a high percentage of rural areas with limited access to Internet and health services, generating a negative social impact since the use of ICTs is limited to the use of text messaging and direct telephone calls, without making use of videoconferencing applications. In addition, there is the slow progress in the implementation of broadband communication networks, generating negative effects on the quality of health care [28]. Therefore, some studies have shown that there is no significant effect at the time of intervening in lifestyles, as in the case of nutritional control both in primary (home) care and in the follow-up of discharged patients, since they consider that they present a risk similar to that of patients who do not receive care [29,30].

Regarding Teleorientation, given in primary care as in the case of Galán's study [31], carried out in a medical post where their main activity is prevention and health promotion, they showed that one fifth of the participants presented low satisfaction, while 36.6% considered it high, being different from our result (65.8%), being surpassed by other international studies where they presented up to 95.3% satisfaction as in oncology patients [32], as well as activities of prevention and control of blood pressure in pregnant women [33]. A limitation in relation to Teleorientation is that there are not many studies that evaluate this dimension; moreover, in all the selected studies the sample was homogeneous and the sample size was small.

Telemonitoring, as is known, is applicable to diagnosis or clinical follow-up through laboratory tests and treatment. This is supported by studies which conclude that it is an accessible tool especially in primary care for various age groups, especially when directed at older adults and in the control and treatment of patients with chronic diseases, such as hypertension and diabetes mellitus, finding improvements in glucose levels between 6 to 12 months of control [34,35], even mentioning that there was no difference between face-to-face care and telemonitoring in diabetic patients [36], in addition to the participation of multidisciplinary personnel such as pharmaceutical chemists who contribute to initiate and adjust medications according to the patient's needs in order to improve the quality of care, in addition to telemanagement, which is addressed by chemists as they are implementing telemedicine, which is already a reality in several countries [37].

On the other hand, although it is considered an accessible tool, its effectiveness decreases in some specific contexts, such as the deficiency of Telepharmacy in urban areas, especially in the delivery of medicines to oncology patients [16]. More difficulty is encountered

in rural areas, due to the series of barriers presented by professionals, since when applying telemonitoring, factors such as technological literacy, knowledge of the use of technology by patients, as well as age and beliefs, must be considered [34,38,39]. Even in hospital activity, this dimension does not have a positive impact on patients infected by COVID 19, since although they were previously monitored by pulse oximetry, they did not have a positive influence on hospital readmissions, hospital stay and the mortality generated by this pandemic. On the contrary, they presented a 12% increase in emergency room attendance and 24% increase in admission to the intensive care unit [40,41].

Teleinterconsultation is a dimension that has been little addressed by international research, and a Peruvian study showed 47.7% satisfaction with this dimension, although it has a negative evaluation in different aspects such as the "structure" dimension, which shows a lack of training and acceptance on the part of health professionals. In addition, other barriers are connectivity as well as aspects of the process itself, where the time of attention is insufficient, since the maximum time of attention is considered to be 8 minutes (a standard time of attention in Peru is between 15 to 20 minutes per patient). Finally, on the outcome aspect, as mentioned above, this is limited to text messages either by vis SMS or WhatsApp, which is associated with connectivity limitations [42]. A similar problem is experienced in Brazil where, in addition to the aforementioned problems, multiculturalism intervenes in the doctor/patient relationship as they consider the implementation of an informed consent for the exposure of the patient to more than one health professional. For this task, it is difficult to gather more than one at the same time for the care of a patient due to the professionals' schedules [43].

LIMITATIONS

We recognize that this study has limitations, particularly because the study involves data collected from a single hospital. This restricts generalization due to the sample size, and the inclusion criteria that the users had to meet, since they had to be attended by means of the 4 dimensions of Telemedicine, even though no study has been found in which these dimensions of health promotion are addressed in a single investigation, thus limiting absolute comparisons. This study also fails to address individual-level barriers for the use of Telemedicine in rural populations.

CONCLUSIONS

The study significantly corroborates that Telemedicine, through its four dimensions (Teleconsultation, Teleguidance, Telemonitoring and Teleinterconsultation), presents a positive and statistically significant relationship with health promotion, evidenced by a strong correlation between them. The results show that more than half of the patients reported a high level of satisfaction, being predominantly women and under 55 years of age, with a significant correlation in each dimension, especially the Teleconsultation dimension which showed the strongest association with health promotion, suggesting its potential as a strategic tool in primary care. The study highlights that Telemedicine not only represents a technological alternative, but a comprehensive strategy that can overcome geographical barriers, optimise human and logistical resources, and potentially reduce inequalities in access to health services, especially in contexts such as Peru, where geographical and socio-economic diversity represents a significant challenge for traditional health care.

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CONFLICT OF INTEREST

There is no conflict of interest.

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