

Evaluation of the teleconsultation process from the perspective of the provider (Oaxaca Telehealth Program, Mexico)*

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Suggested citation (Original article)

Velázquez M, Pacheco A, Silva M, Sosa D. Evaluación del proceso de teleconsulta desde la perspectiva del proveedor, Programa de Telesalud de Oaxaca, México. Rev Panam de Salud Publica. 2017;41:e22.

ABSTRACT

Objective. Identify barriers to implementation of the teleconsultation process in order to develop strategies to improve the program's operation.

Methods. A process evaluation strategy was used to study the implementation of the teleconsultation process. The program's operating manuals were compared with the information compiled on the practical implementation of the teleconsultation process. Program productivity records were also studied.

Results. The factors reported as obstacles to the teleconsultation process were: slow Internet connection, the hours available to the public, the specialized services offered, and insufficient clinical history included in teleconsultation requests. It was determined that 60% of internal medicine patients received two or more teleconsultations in the study period, as did 44% of patients of the gynecology service. Four consulting medical units accounted for 75% of the teleconsultations and the rest were distributed among 12 medical units.

Conclusions. The barriers identified in the teleconsultation process mainly affect consulting physicians; even so, productivity is on an upward trend. Despite the existing barriers, it was determined that some patients receive follow-up through the program, which favors access to care. It is necessary to standardize implementation and to conduct subsequent research on patients' health conditions.

Keywords

Telemedicine; remote consultation; Mexico.

Over the last decade, various strategies for supporting and coordinating the promotion of national telehealth strategies have been organized by the World Health Organization (WHO), the Pan American Health Organization (PAHO), the Inter-American Development Bank

(IDB), and the Economic Commission for Latin America and the Caribbean (ECLAC) (1–4).

National telehealth strategies in Latin America have increased in number since the year 2000. Mexico and Costa Rica initiated these projects in 1995 and 1996, respectively; subsequent years saw the emergence of the strategies adopted by Panama (2002), Ecuador (2006), Colombia (2007), Brazil (2007), Peru (2007), El Salvador (2010), Guatemala and Venezuela (2012) and, recently, Bolivia (1).

These strategies are aimed at reducing inequities in access to medical care, complementing primary care, and extending the scope of specialist care. Telehealth has an impact in geographical areas that are marginalized, scattered, or remote. Experiences in telehealth bear a close relation with the strategies for the digitalization and strengthening of care networks promoted by PAHO (1, 5, 6).

Although various definitions of telehealth exist, all share a common denominator: the use of information and

* Official English translation provided by the Pan American Health Organization. In the case of discrepancy between the two versions, the Spanish original shall prevail.

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communications technologies to provide medical services, education, and administrative applications such as electronic medical records (2, 7, 8).

Telehealth in Mexico

The health system in Mexico is structured around two sectors, public and private; this article provides an overview only of the public sector and its beneficiaries (9).

The public sector is divided into two major groups: 1) the Social Security institutions, which provide services to salaried workers, retirees, and their families (Mexican Social Security Institute [IMSS]; Safety Institute and Social Services for State Workers [ISSSTE]; and services for the armed forces); and 2) the institutions and programs that serve the population without social security, formed by the federal Ministry of Health; the State Health Services (SESA), which receive financing from the Popular Health Insurance System at the sub-national level; and the IMSS—*Prospera* program. The latter group includes the self-employed, workers in the informal sector, unemployed people, and people and their families who are outside the job market (9).

In 2010, in Ministry of Health and SESA hospitals, 46,648 physicians were in contact with patients (10). This represents a ratio of 1.1 physicians per thousand inhabitants without social security, a figure below the standard of three physicians per thousand inhabitants recommended by the World Health Organization (WHO) (11). Under this constraint, SESAs face the challenge of strengthening the service supply in areas marginalized and characterized by a highly dispersed population.

At the end of 2015, telemedicine services in the Mexican public sector were present in 671 medical units, 450 of them in SESAs. These units are distributed among 15 state health programs that offer teleconsultation services by video conferencing (12).

In the same period, these programs registered a productivity of 45,000 teleconsultations, in the specialties of psychiatry (31%), internal medicine (25%), gynecology (11%), pediatrics (6%), dermatology (6%), surgery (5%) and other specialties (17%). During 2015, the Oaxaca Telehealth Program accounted for 11% of all teleconsultations at the

national level, below Yucatán (71%), Tamaulipas (29%), San Luis Potosí (23%), and Nuevo León (23%) (13).

In 2014, the SESAs of Oaxaca, a state located in the southwest of Mexico, had 19 basic community hospitals (with a 12-18-bed capacity). In 17 of these, there were no specialists in internal medicine; similarly, six of these hospitals did not have ob/gyn physicians (14).

The Oaxaca Telehealth Program provides teleconsultations to a potential population of 190,100 (12), located in the catchment area of the medical units that form the Oaxaca Telehealth Network. The network has 19 consulting units, ten of which are basic community hospitals.²

The program is coordinated by a medical unit with specialists who consult general practitioners in remote areas via information and communications technologies. In this setting, teleconsultations are a real-time form of telemedicine. In these consultations, the consulting physician and the patient establish communication by video conference with the teleconsulting physician in real time (15). The teleconsultation unit is housed in a special facility for remote medical care. It has seven teleconsulting specialists: six medical specialists (surgery, gynecology, radiology, internal medicine and pediatrics) and a psychologist working from Monday to Friday with morning appointments, except for the internal medicine service, which has both a morning and afternoon schedule.

A report on the internal medicine service of the Oaxaca Telehealth Program compiled information on preoperative assessments of 142 patients from 2009 to 2011 (16). Teleconsultations were used to provide patients with preoperative assessments for elective surgeries. The maximum time required for the assessments was 15 calendar days. Furthermore, it was estimated that the care provided via telemedicine saved

an estimated average of 4,629 Mexican pesos per patient. In these cases, the program provided care within a two-week period, in comparison with 12.8 weeks reported by the SESAs (17).

The trend in the number of teleconsultations through the Oaxaca program reflects two stages in the program's implementation. Between 2007 and 2010, there were fewer than a thousand teleconsultations per year, while in the 2011–2014 period some 3,000 teleconsultations were provided per year (Figure 1). No explanation has been found for this increase in the number of consultations during this period. However, it raises questions as to the factors that would increase the program's coverage in the coming years.

Based on this question, it was found that a formative process evaluation is a pertinent research approach with the potential to directly contribute to improving a program through comments and recommendations on how the program operates in clinical practice (18, 19).

OBJECTIVE

The objective of this paper is to analyze the operational management of the teleconsultation process in order to assess whether this process meets the requirements to achieve the objectives of the Oaxaca Telehealth Program, and to issue recommendations for improvements.

Specific objectives

- Describe the operational management of the teleconsultation process from the standpoint of the health service provider.
- Identify and analyze the problems or constraints, both regulatory and operational, internal and external to the program, that hinder the teleconsultation process.
- Identify managerial strengths and weaknesses in order to issue feasible recommendations for implementation at both the regulatory and operational levels.

METHODS

This research forms part of the initiative known as “Improving Program Implementation through Embedded Research” (iPIER). This initiative is carried out by the Alliance for Health Policy

² According to the MIDAS Integrating Health Care Model (2006), community hospitals are where most health problems that require hospitalization are resolved. The community hospital's relationship within the network system should guarantee easy access to a hospital with greater problem-solving capacity and thereby help to channel patients who require it. For patients and users, travel time from the community should be no more than 60 minutes and the maximum travel distance should be 15 kilometers. Average hospital capacity is 12 to 18 hospital beds. Ministry of Health of Mexico. General Directorate of Planning and Development in Health. Planning of Medical Units: Integrating Model of Health Care MIDAS. First Edition, 2006.

and Systems Research (AHPSR), in collaboration with PAHO.

The iPIER model puts program implementers at the forefront of research in order to understand the deficiencies in health systems that create barriers to implementation, and to identify solutions to these barriers (figure 2). Research on the implementation of health programs and policies helps clarify how these initiatives actually work. Specifically, research on implementation processes facilitates the generation of evidence for promoting good clinical practice and public health. A detailed description of the methodology used for integrated research on implementation is included in the iPIER 'concept paper' (20).

Process evaluation methodology combines qualitative and quantitative elements to further explain the context in which policies are implemented. In general, this type of evaluation consists of desk research of secondary information sources, as well as primary information collected through instrument design and field work (18, 21, 22).

Information collection and analysis

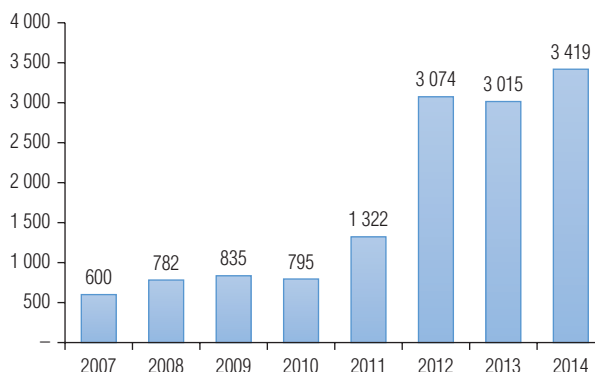
Field work began with an initial interview with the coordinator of the Oaxaca Telehealth Program, who was consulted about possible key stakeholders who could be interviewed about how to institutionalize the program. This made it possible to contact staff in the medical services and in the budget area of the SESAs of Oaxaca.

In the analysis of the teleconsultation process, importance was given to interviewing the directors of more productive hospital medical units to ascertain their strategies for achieving these results (table 1).

The available operational manuals on the teleconsultation process were compiled in the initial interview with the coordinator. Based on these documents, an e-questionnaire was developed for the 16 general practitioners who work in the medical units consulted. A questionnaire with similar topics was created for medical specialists. The information on both groups of respondents was organized according to the stages of the teleconsultation process in order to identify barriers to implementation.

Finally, data collection instruments were integrated in a report, and a full, final project report was prepared, serving

FIGURE 1. Trends in teleconsultations provided by the Oaxaca Telehealth Program, 2007-2014



Source: Prepared with information from the Oaxaca Telehealth Coordination Entity, November 2014.

Note: Data for 2014 (to 25 October 2014) are based on information from the Program's Clinical Information Registry software.

FIGURE 2. iPIER research protocol: flowchart

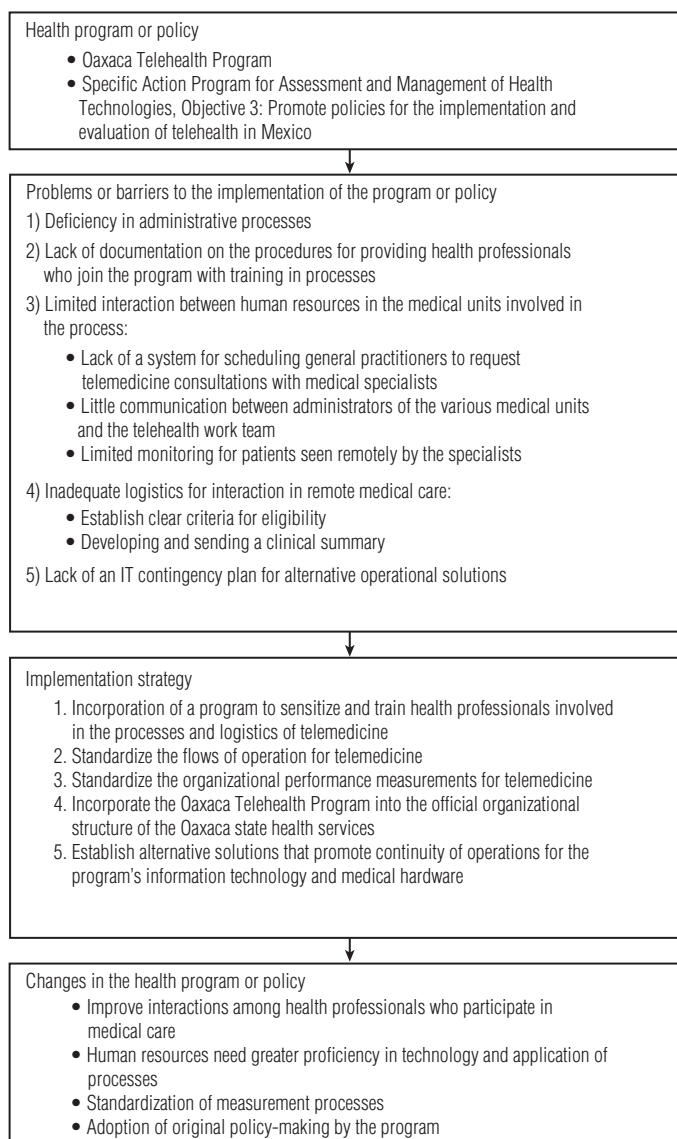


TABLE 1. Information and data collection instruments, by source and type of collection

Action	Information source	Collection instruments	Collected information
Field work	Program Coordinator	Open interview	Based on the interview with the Program Coordinator, chain sampling was used to determine which stakeholders could contribute key information on the institutionalization of the program and boost the productivity of the program in SESA Oaxaca.
Desk research	Oaxaca Telehealth Service	Documents and electronic presentations in PDF format	Presentations of managerial reports of the Oaxaca Telehealth Service
Desk research	Oaxaca Telehealth Service	Manual of procedures of the Oaxaca Telehealth Program	Organizational Chart of SESA Oaxaca
Desk research	Oaxaca Telehealth Service	Access to clinical information registry (scheduling system for teleconsultations)	User manual: Clinical information registry, 2010–2016 Teleconsultation productivity statistics
Desk research	CENETEC telehealth office	Documents and electronic presentations in pdf format	CENETEC remote medical care model
Field work	General practitioners and specialists of the Telehealth Network	On-line questionnaires compiled using Qualtrics® open source software	Of the 19 units of the Telehealth Network, 16 general practitioners in 13 units answered the questionnaire
Field work	Medical specialists of the Telehealth Network	On-line questionnaires compiled using Qualtrics® open source software	Of the six medical specialists who provide teleconsultation, all answered the questionnaires
Field work	Key stakeholders involved with the program	Semi-structured on-site interviews	Four semi-structured interviews conducted with key stakeholders in the program: in general, participants' perceptions were collected with respect to the options for ensuring the institutionalization of the program and enhancing its productivity.

SESA, State Health Systems; CENETEC, National Center for Technological Excellence in Health.

as a source of information for the preparation of this article.

Ethical considerations

The study was reviewed by the PAHO Ethics Review Committee (PAHOERC) and an official exemption was issued (PAHO-2015-03-0013). [Translator note: I consulted with Carla Saenz, who pointed out that the name should be Comité de Revisión de Ética de la OPS, and that the study received an exemption, not approval.] Before the interviews, the participants gave their informed consent of the participants was obtained; consent for the e-questionnaires was requested through the same medium.

RESULTS

The teleconsultation process

In the teleconsultation process, interaction between the consulting physician and the specialist begins with sending the teleconsultation request. The Program has a *software* program for the exchange of the patient's clinical information. This system protects the privacy of the information and handles the scheduling of teleconsultations. However, four out of six physicians said that when they receive teleconsultation requests, they regularly fail to receive sufficient patient information.

Similarly, the consulting physicians were asked about limitations they had

identified that impeded the exchange of information before, during, and after teleconsultations. Their responses included: 1) the connectivity and lack of accessories and printer; 2) lack of training among hospital colleagues; and 3) scheduling conflicts (working hours) between medical specialists and the medical unit requesting the service.

In regard to the responses received when they make teleconsultation requests, 13 out of 16 general practitioners thought that appointments were scheduled in a timely way by the medical specialists. Ten general practitioners, out of the 16 consulted, have requested teleconsultation service outside of working hours from the Telehealth Coordination Service (weekends and afternoons). Eight of the 16 general practitioners requested services in specialties unavailable in the program, including urology, oncology, and dermatology (Table 2).

When teleconsultations are interrupted as the result of poor Internet connection, the physicians indicated that they communicate by telephone, mail, or messaging services such as *WhatsApp*® to reschedule the session.

With regard to regulatory issues, it was found that there is a need to develop manuals on processes that can be used as training materials for general practitioners who request consultations.

In the interviews with the program coordinator, health center personnel, and community hospital staff, it was noted that participants in consultations tend to

be young people or families with access to computers. It was also noted that the outpatient community hospital has a place for pregnant women to stay, and there is coordination with personnel of the first-level medical units in the hospital's geographical catchment area, increasing demand for teleconsultations.

Analysis of health care coverage

In the period between 6 May 2014 and 27 August 2015, the program provided 4 140 teleconsultations to 1 525 patients in 16 medical units of the 19 that make up the Oaxaca Telehealth Network. In this period, an average of eight teleconsultations were held per day.

The internal medicine service is in the greatest demand. Two specialists provided 82% (n = 3 395) of the program's teleconsultations; consultations in the gynecology service represented 15% of all teleconsultations. Four consulting medical units accounted for 75% (n = 3 105) of teleconsultations, and the rest were provided in 12 medical units (Table 3).

Concerning patient monitoring, it was found that 40% of patients of the internal medicine service (n = 450) received one teleconsultation during the study period and 60% (n = 677) received two or more. In the gynecology service, 56% (n = 186) of patients received 1 teleconsultation and 44% (n = 145) received two or more. This is in line with the physicians' opinions on the usefulness of the telemedicine service.

TABLE 2. Strengths and weaknesses of the teleconsultation process

Strengths	Weaknesses
Thirteen out of 16 general practitioners indicated that they received training on the teleconsultation process.	Seven out of 16 general practitioners answered that they are the only physician providing teleconsultations in their medical unit.
Nine general practitioners indicated they have the support of other physicians for telemedicine activities.	Slow Internet connection hinders teleconsultation requests in the opinion of the general practitioners.
Thirteen out of 16 consulted general practitioners thought that appointment were scheduled by the medical specialists in a timely manner.	The use and collection from patients of an informed consent form for teleconsultations was not included in the responses from general practitioners and specialists in the program.
The peripheral equipment with greatest availability reported by the general practitioners was for general examinations, electrocardiographs, and ultrasonography equipment.	Four of six medical specialists answered that they do not receive sufficient background in teleconsultation requests; they commented that the information is incomplete and that only some medical units send complete information.
The clinical information registry system is a platform that allows for the exchange of patient information, making it possible to manage the scheduling of consultations and to generate the statistics required for program monitoring.	Ten general practitioners, out of 16 consulted, have requested teleconsultation services outside the working hours of the Telemedicine Coordination service (weekends and afternoons).
Continuity of care: In the scheduling system, 40% of patients of the internal medicine service have had a teleconsultation, and 60% of patients in the same service have had two or more. Similarly, 56% of gynecology patients have had one teleconsultation and 44% have had two and more.	At the time of the study, eight out of 16 general practitioners had required services from unavailable specialties in the program, for example, urology, oncology, and dermatology. The general practitioners reported limited availability of the following peripheral equipment for patient examinations during teleconsultations: digital otoscope, mydriatic fundus camera, digital laryngoscope, and portable clinical chemistry analyzer.

Source: Prepared by the authors based on research findings.

Changes after implementation research

After the dissemination of research on the SESAs of Oaxaca, the following changes were made to help institutionalize the program:

- On 24 November 2015, the Telehealth Coordination Service was integrated into the strategy for strengthening the state's networks of medical units. The service supervises patient referrals made by medical consulting units in an effort to reduce the excess burden on hospitals.
- On 15 January 2016, Oaxaca's telehealth service was recognized in the internal regulations of the Oaxaca Health Services. This represents a step forward in the formalization and establishment of the Program within the organization.
- Since 9 January 2016, the hours for consultation with specialists in the internal medicine service have been extended to Saturdays, Sundays, and holidays.

DISCUSSION

The National Telehealth Strategy in Mexico is dependent on the commitment that each institution makes to its projects in terms of human resources and materials. This includes Oaxaca's telehealth project as well as the rest of the programs within the SESAs. The use of the word "program" should not be taken to mean

TABLE 3. Teleconsultations for medical unit in the Oaxaca Telehealth Network.

Medical unit consulted	Number of teleconsultations	Participation
Community Hospital 1	1 005	24.3%
Community Hospital 2	967	23.4%
Community Hospital 3	763	18.4%
Community Hospital 4	355	8.6%
Community Hospital 5	324	7.8%
Community Hospital 6	312	7.5%
Community Hospital 7	162	3.9%
Mobile Medical Unit 1	91	2.2%
Hospital 1	88	2.1%
Health Center 1	36	0.9%
Health Center 2	25	0.6%
Other medical units (5)	12	0.3%
Total	4 140	100.0%

Source: Prepared by the authors with data from the Telemedicine Service. Clinical registry information, 2014–2015, Oaxaca Health Services, Government of the State of Oaxaca, 2010–2016.

that the organization and operation of telemedicine services has a pre-established budget.

The main challenges facing the telehealth programs are policies, infrastructure, and training of human resources.

In general, the SESAs operate in an environment of relative scarcity of physicians and medical supplies. In this regard, it may be inferred that the commitment of physicians to the telehealth program entails an opportunity cost, i.e. exchanging personal, on-site service for the provision of telehealth services, especially in the case of the general practitioners in remote areas (9). The SESAs have the challenge of providing care in marginalized, isolated, and scattered

areas, since these are the areas where most of the potential beneficiaries of the Oaxaca Telehealth Program are found. For the most disadvantaged population, medical care provided by the Telehealth Program has the potential to save on transportation expenditures. This saving is significant considering that out-of-pocket costs in Mexico, in 2014, represented 52% of health expenditure (23).

In accordance with the iPIER method, several recommendations can be found in the literature on the use of evaluation methodologies in telemedicine that suggest the use of formative evaluations, which are emerging as an area of interest in field research, as well as the application of various naturalist approaches,

which include methodologies that address mutual adaptations of services and users (24–26).

Given how productivity has become concentrated in medical units and in the internal medicine specialty, the Program's development can likewise be considered concentrated or unequal. For the time being, it is not recommended to search for cost-effectiveness studies, but to direct the program's effort toward defining treatment protocols and cataloguing diagnoses that are feasible via teleconsultation.

It is recommendable to use the logical framework methodology (27) for harmonizing proposed outcome indicators of productivity, reduced treatment times, or cost savings for patients (28). It is worth mentioning that these indicators require a period of testing in order to identify which are most useful for decision-making by program managers. On the other hand, in order to study the monitoring of medical care received by patients overall, it is sufficient to consider indicators such as first-time and subsequent consultations.

With regard to the limitations of the study, it should be noted that there were geographical difficulties in making on-site visits to the program's rural medical consulting units. During the study, the SESA workers' union in Oaxaca went on strike, which hindered implementation of the study (although, in fact, it constituted a more severe difficulty for service delivery).

With regard to studies based completely on qualitative methods (29), the qualitative sampling carried out in this study was limited by geographical constraints and by the state of SESA operations in Oaxaca. However, the method and sample were sufficient to reveal system overload in the key areas of interest of the study. Furthermore, the data collected were found to be in accordance with the information compiled through

interviews, surveys, and quantitative information.

A noteworthy aspect of the study was the collection of information from general practitioners in rural medical units through the online questionnaire. The online method made it possible to obtain responses with greater privacy, in comparison with an in-person visit to do the questionnaire. This method could be used to investigate the knowledge of the population concerning the availability of teleconsultations at medical units and to determine whether this knowledge could promote productivity.

It was observed that the barriers to the implementation of the teleconsultation process are faced mainly by the general practitioners in the consulting units. The design of telehealth programs emphasizes conditions of service supply, procurement of equipment, connectivity, and availability of teleconsulting physicians. In order to counteract this deficiency, it is necessary to estimate the availability of general practitioners or consultants, on whom the number of teleconsultation requests depends.

Coordination between the primary health care teams and the community hospital increases the program's productivity, in synchrony with the impetus provided by the director of the consulting medical unit in terms of facilitating the material conditions and the maintenance of the communications technology.

CONCLUSION

The Oaxaca Telehealth Program operates in an environment that includes the patients that have the greatest difficulty accessing specialized health services.

With regard to the care provided by the program, it is an advantage that the medical specialists work shifts devoted exclusively to telemedicine. It is desirable that the Program communicates

with the general hospitals to refer patients who require it, facilitating access to care and helping incorporate the Program into the network of services.

At the same time, the demand for care under the program faces obstacles such as participation by general practitioners (in an environment where there is a shortage of physicians), poor Internet connection, and availability of supplies and facilities for the teleconsultations.

The adoption of monitoring strategies by the telehealth program has the potential to generate the information required to impress upon policymakers the program's benefits, when seeking greater support for upgrading the technological and operational environment in which the program operates as it endeavors to reduce inequities in health.

Acknowledgements. The authors wish to thank Marcelo D'Agostino (PAHO), Etienne Vincent Langlois (AHPSP), Ludovic Reveiz (PAHO), and Gabriel Sainz Coronado (Telehealth Program) for their collaboration in the preparation of this manuscript.

Financing. This paper was financed by the PAHO/WHO Alliance for Health Policy and Systems Research (AHPSP). PAHO provided technical cooperation for the development of the project. In the context of the iPIER program, the Institute of Clinical and Health Effectiveness (IECS) provided technical assistance to facilitate the development of the protocol and the implementation of the project.

Declaration. The opinions expressed in this manuscript are the responsibility of the author and do not necessarily reflect the criteria or the policy of the RPSP/PAJPH and/or of PAHO/WHO.

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Manuscript received on 1 June 2016. Revised manuscript accepted for publication on 20 October 2016.

Evaluación del proceso de teleconsulta desde la perspectiva del proveedor, Programa de Telesalud de Oaxaca, México

RESUMEN

Objetivo. Identificar las barreras en la implementación relacionadas con el proceso de teleconsulta para desarrollar estrategias que mejoren la operación del programa.

Métodos. Se estudió la implementación del proceso de teleconsulta mediante una estrategia de evaluación de procesos. Los referentes fueron los manuales operativos del programa, los cuales fueron comparados con la información recopilada de la práctica del proceso de teleconsulta. Asimismo, se realizó un análisis de los registros de productividad del programa.

Resultados. Los factores reportados como obstáculos en el proceso de teleconsultas fueron la lentitud de la conexión a internet, el horario de atención, la oferta de especialidades y la insuficiencia de antecedentes clínicos en la solicitud de teleconsulta. Se identificó que 60% de los pacientes del servicio de medicina interna recibieron dos o más teleconsultas en el período de estudio, así como 44% de las pacientes del servicio de ginecología. Cuatro unidades médicas consultantes concentraron 75% de las teleconsultas, el resto se distribuyó en 12 unidades médicas.

Conclusiones. Las barreras identificadas en el proceso de teleconsulta afectan principalmente al médico consultante; aun así, la productividad se halla en aumento. Pese a las barreras existentes, se identificó que hay pacientes que reciben seguimiento por parte del programa, lo que favorece el acceso a la atención. Se requiere normalizar la implementación y realizar investigaciones posteriores sobre las condiciones de salud de los pacientes.

Palabras clave

Telemedicina; consulta remota; México.
