Implementation of telemedicine specialized appointment in Eastern Amazon State of Pará

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Abstract

Introduction: *Telemedicine program was first implemented in Brazil in 2007, by Health Ministry Decret, in which was set the goals of the program: permanent education and changes in medical work.* Method*: Various Municipal Health Secretariats underwent agreements in order to establish a integrated and specialized medical consultancy network, using teleconference technologies and Electronic Health Records to accomplish it, allowing a specialized doctor located at the capital to guide and observe a generalist medic through the physical examination and therapeutic conduction.* Results/Discussion: *Telemedicine system was able to cover an area of up to 36.133.135 km2, allow up to 674.770 people to have access to specialized health, perform 1125 medical consultations in seven months; which diminished the queue from five years to three months of waiting for clinical examination. In addition, the consultations have kept a good quality for the whole health team and the patients, who could receive correct diagnosis on the first consult most of the times, as well as received longitudinal attendance.* Conclusion: *Telemedicine is an effective, secure and revolutionary alternative to grant universal health access to distant populations.*
Keywords: *Teleneurology; Telecardiology; Telecare.*

Resumen

Implementación de citas especializadas en telemedicina en el este del Amazonas, Estado de Pará. Introducción*: El programa de telemedicina se implementó por primera vez en Brasil en 2007, por el Decreto del Ministerio de Salud, en el que se establecieron los objetivos del programa: educación permanente y cambios en el trabajo médico.* Método*: Varias Secretarías Municipales de Salud se sometieron a acuerdos para establecer una red de consultoría médica integrada y especializada, utilizando tecnologías de teleconferencia y Registros Electrónicos de Salud para lograrlo, permitiendo que un médico especializado ubicado en la capital guíe y observe a un médico generalista a través del examen físico y conducción terapéutica.* Resultados / Discusión*: El sistema de telemedicina se ha podido cubrir un área de hasta 36.133.135 km2, permitir que hasta 674.770 personas tengan acceso a servicios de salud especializados, realizar 1125 consultas médicas en siete meses; lo que disminuyó la cola de cinco años a tres meses de espera para el examen clínico. Además, las consultas han mantenido una buena calidad para todo el equipo de salud y los pacientes, que podrían recibir un diagnóstico correcto en la primera consulta la mayoría de las veces, así como también recibir asistencia longitudinal.* Conclusión*: La telemedicina es una alternativa efectiva, segura y revolucionaria para garantizar el acceso universal a la salud de poblaciones distantes.*
Palabras-clave: *Teleneurología; Telecardiología; Teleasistencia.*

Resumo

Implementação de consultas especializadas em telemedicina no leste da Amazônia, Estado do Pará. Introdução*: O programa de telemedicina foi implementado pela primeira vez no Brasil em 2007, por Decreto do Ministério da Saúde, no qual foram estabelecidos os objetivos do programa: educação permanente e mudanças no trabalho médico.* Método*: Várias Secretarias Municipais de Saúde assinaram acordos para estabelecer uma rede de consultoria médica integrada e especializada, usando tecnologias de teleconferência e Registros Eletrônicos de saúde para isso, permitindo que um médico especializado localizado na capital guie e observe um clínico geral através do exame físico e condução terapêutica.* Resultados / Discussão*: O sistema de telemedicina conseguiu cobrir uma área de até 36.133.135 km2, permitindo que até 674.770 pessoas tenham acesso a serviços de saúde especializados, realizar 1125 consultas médicas em sete meses; o que reduziu a fila cinco anos para três meses de espera pelo exame clínico. Além disso, as consultas mantiveram boa qualidade para toda a equipe de saúde e pacientes, que poderiam receber um diagnóstico correto na primeira consulta na maioria das vezes, além de receber assistência longitudinal.* Conclusão*: A telemedicina é uma alternativa eficaz, segura e revolucionária para garantir o acesso universal à saúde de populações distantes.*
Palavras-chave: *Teleneurologia; Telecardiologia; Teleassistência.*

Introduction

The Brazilian Telemedicine Program was created in 2007 by the Ministry of Health, to promote support to health care, through permanent education and change in working practices. Nevertheless, the program was reformulated in 2011 and renamed the National Program Telehealth Brazil Networks, aiming at consolidating the health care networks, focusing on primary care, through the warranty of its services and the integration with university centers, so as providing teleconsulting, telediagnosis, and tele education resources. The Telemedicine system is based on the use of electronic and telecommunication's tools (telephony, videoconferences and instant messages) to aid in the assistance of distant locations. Thus, Brazil, in accordance with other Latin American countries, has adopted governmental measures to implement and expand telemedicine programs in order to ensure better access to health services, likewise promoting its decentralization, and making a multidisciplinary and longitudinal assistance network that integrates the different levels of health care[1, 2].

This program is in consonance with the World Health Organization (WHO), which, for example, in 2015 traced strategies to foment digital health concepts' insertion in tuberculosis prevention and Directly Observed Treatment (TDO). From this point on, a patient remote monitoring arises: the video TDO (VTDO), more effective than face-to-face TDO in clinical settings, as observed by Lam et al (2018) when comparing a group of patients treated for Latent Tuberculosis Infection (LTBI) with TDO to another that received the same treatment but using VTDO, in 2013, at the New York City Department of Health and Mental Hygiene (NYC DOHMH) clinics. In addition, Watterson et al. (2018) and Fortmann et al. (2017) reported improvements in glycated hemoglobin profile of low-income patients with type 2 diabetes mellitus after using an intervention program via text messages, which sent reminders of medication intake schedules and informations about their illnesses[3-7].

Brazil's northern region is the biggest in matters of occupied area, with a total of 3 853 676,948 km^2, but with a very small population density (4.72 inhabitants / km^2), that is unequally distributed and mostly concentrated in urban centers (Belém, Macapá) or by the riverbank (Manaus, Boa Vista, Rio Branco, Porto Velho), as already described in literature to other regions, leaving populations far from large centers with low access to health care services. Furthermore, the Amazon Region, although the geographic formations are predominantly vast plains and forests, with rich watersheds, low altitude and a little discrepancy from a spot to another, is an area that still has limited communication between distant places[8-10].

The state of Pará is the second largest in the country, encompassing a total area of 1,247,955,238 km2, with per capita income of R$ 446.76, a population density of 6.07 inhabitants/km2, with an HDI of 0.656; 72.36 years of life expectancy; and a mortality rate of 16.7 per thousand live births. Due to its extended area and asymmetrical population dispersion, the state has difficulties in assuring access to a good quality health for the entire people, with a coverage rate of 53.17%, which can be verified by its network in the Family Health Strategy, composed by 14922 Community Health Agents (ACS), when it should have at least 22215 ACSs. Several measures have been taken to defeat these issues, such as the division of the state into health regions[8, 11-13].

Method

Ethical aspects

All medical records from the current research were manipulated according to The Declaration of Helsinki and Nuremberg Code, in addition to the Research Standards Involving Human Beings (Res. CNS 466/12) from the National Health Council, after being approved by UEPA Ethics Committee on Human Research, authorized by the advisor professor Dr. Emanuel de Jesus Soares de Sousa, by the Telemedicine System of the State University of Pará (UEPA), by the Center of Biological Sciences and Health of the State University of Pará and by the patients through the Term of Commitment of Data Using, being prohibited the use of any data with objectives other than those obtained in the study.

Research protocol

The system used to perform the appointments and to store information was Systel (systel.net.com), which consists in a virtual platform of tele consulting, where the specialist physician supports the generalist physician working at a distant clinic. The generalist is responsible for the general physical examination and specific for each system physical examination, following the specialist's orientation e repassing any peculiar finding through verbalization or written on medical record. The system allows instant communication between both professionals via tele conference and instant update on electronic medical record, in which both physicians can interfere and dialogue. Moreover, data logging was also registered in production worksheets of COSEMS (Conselho das Secretarias Municipais de Saúde - Council of Municipal Health Secretariats), with posterior comparison with collected data from others databases (IBGE, DATASUS).

Study design

This is a cross-sectional, observational, retrospective study with data analysis. It is performed through the follow-up of patients during medical consultations and data collection by electronic medical record.

Patients

Data collection was executed through a semi-structured interview, with the registration of the exams performed at the time of the consultation or that are recorded in the medical records / local database. The protocols used are confidential and are only kept by researchers from the moment of

application until a period of 5 years after the data collection according to Resolution No. 466 of December 12, 2012 of the National Health Council, being used only for scientific purposes of the present study and, after this period, will be incinerated without being allowed to provide information on the subjects of the research.

Inclusion criteria

Were included in this study patient's charts whose medical appointments with specialists were performed through the Telemedicine Program and whose medical records were correctly registered.

Statistical analysis

The sample was evaluated by descriptive statistics, using measures of central tendency (arithmetic mean), variance (standard deviation) and absolute and relative frequencies. For the evaluation of qualitative characteristics, the Chi-square of adhesion and independence test was used.. These data were later evaluated by the Kruskall-Walis test with Dunn post-test. All statistical inference was calculated using the software BioEstat 5.4 and Graphpad Prism 6, considering a significant p-value ≤ 0.05.

Risks and benefits

It is assumed that in this research there is a possibility of an eventual loss of collected data and, consequently, the exposure of patients' personal information. Due to this, in order to ensure confidentiality, it is ensured that such data will be handled with care, according to ethical aspects, as well as stored in safe places with access restricted to the researchers.

As for the benefits of the study, the knowledge derived from it may contribute to greater future investments and more participation of specialists in the Telemedicine Program, in order to contribute to the care of patients in need. It is also important to highlight the contribution of research to foster education, clinical case discussions and communication among health professionals, which tends to add much knowledge to those involved. In addition, the product of this study may serve as a theoretical basis for future work, which may lead to more results in the area and thus generate relevant repercussions not only to the scientific community but also to the health of the population.

Results/Discussion

Telemedicine systems are solutions capable of offering healthcare access across large territories that would otherwise be covered by insufficient infrastructure and personnel, being proven highly efficient in rural and isolated communities (Table 1). In a study lasting 8 months, 1125 specialized medical appointments were registered, averaging 40 monthly appointments, greatly reducing waiting times from a maximum of 5 years to an average of 3 months. Accurate diagnosis and therapy were stablished in 88% of evaluated cases. These results were proportional across all population centers included in the study[14].

Velázquez[15] report that a large portion of medical professionals working in internal and family medicine departments, when faced with complex cases, feel more confident in their decisions when a second opinion from another specialist is available. Under most circumstances, this would delay treatment for these patients. Through telemedicine platforms, both professionals can instantly discuss and establish more accurate diagnosis and therapies, while also improving overall service efficiency. Other studies have already evaluated satisfaction levels across patients, their families, and health professionals, highlighting the quality, the cost-effectiveness and the viability of this platform[15-17].

Further research has evaluated the heterogeneous distribution of medical staff throughout different regions, highlighting the concentration of healthcare coverage at larger population centers, while access gradually declines as distances increase. This imbalance is further emphasized through the better outcomes displayed by telemedicine solutions in assessments conducted at locations farther away from these hubs. Moreover, comparing the total number of appointments between different locations also illustrates the discrepancies in availability of specialized healthcare. Thus, it becomes clear that telemedicine has the potential to reshape the structure of primary health care, offering higher complexity medical assistance to remote populations. In this study, the city of Breves deserves special mention, in light of the extremely positive results displayed in spite of its distance from the capital, Belém. (Images 3 and 4, Table 3)[12,13,18].

Additionally, the reduction of costs is another interest for the consolidation of telemedicine. More accurately diagnosing and treating conditions, in association to more prevention opportunities, help lower public expenses and social costs of possible complications; while covered communities also benefit financially, as longer, more expensive travels to central regions are no longer needed[18,19].

A visible change in previous coverage models is also noted, common in more neglected areas, where public medical services were provided through temporary measures, such as "health caravans", with sub sequential interruption of follow-up patient evaluations, compromising the assessment of failed therapies and differential diagnosis. Teleconference follow-ups also offer to patients more comfort in post-operative recovery, while also reducing mortality rates and the need for further hospitalization[17-19].

Nonetheless, it is important to clarify that larger urban areas were still responsible for most appointments evaluated (Images 5 and 6). Despite their potential, telemedice systems are heavily dependent on technological infrastructure, such as cell and internet coverage, limiting best results to places with better conditions, such as the cities of Cametá and Breves (Images 3 and 4). Furthermore, the lack of results from locations more than 232km away occurs due to the structural division of healthcare regions, since these cities are not under jurisdiction of the capitol[11, 20].

So, telemedicine implementation obstacle still present worldwide is medical team's resistance in adopting new e-health assistive technologies on everyday routine, being related to traditional medical organization, which is not adapted to instantaneous information exchange and professional skills between different medics and between medic and patient. It is important to mark that these barriers are independent to factors as wealth, resources, infrastructure or regional necessities, being dependent of hospital and outpatient management reformulation, through educative programs in order to aware medical team and reduce discomfort on new technologies application. Because of its short implementation history telemedicine, still has some obstacles to face[17, 21].

Finally, it is extremely important to consider future implementation of more robust technical solutions, with special regard to data security and integrity improvements. As evaluated by Meurer[22], the use of obsolete hardware and/or unsafe software, or even the lack of basic security precautions, may directly compromise the digital platforms used by telemedicine services, and thus affect the confidentiality, integrity, availability, and even patient safety. These considerations further justify investments on technological infrastructure dedicated towards this service[22].

Conclusion

Given the information, it is clear that telemedicine appointment allowed larger access to specialized care to general population, for it has allowed communication between health professionals by technological resources and exchange information, through teleconference and electronical medical records amongst other resources in order to improve appointment and to start treatment early. This service has offered large health coverage in wide area and large population, keeping good quality in attendance, with faster, easier and efficient access to health services. In addition, it had positive impact in cost reduction in health services implementation, as well as prevention of further complications by providing early health access to clinical settings on early stages.

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