

Journal of the International Society for Telemedicine and eHealth, Vol 5 (2017)

PPSUS: USE OF INFORMATION TECHNOLOGY IN PRIMARY CARE THROUGH THE MOBILE VIRTUAL AMBULATORY SYSTEM; TECHNOLOGICAL SOLUTION FOR THE STRENGTHENING OF THE HEALTH SYSTEM IN THE STATE OF AMAZONAS

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Abstract

The Amazon is a large state, which hinders access to healthcare for residents of the most remote areas. The project evaluated the use of Information and Communication Technologies in primary care, through the virtual clinic system mobile and a mobile communication device (tablet). The project was developed over 24 months. In the first 12 months the virtual clinic was developed, technical teams were capacitated and participation of municipalities approved. In all, 30 municipalities were selected with 15 receiving the tablet and 15 only having access to the virtual clinic. Over the following 12 months the teleconsultation and tele-education activities were monitoring, and project evaluation undertaken. Between June 2015 and July 2016 there were 386 teleconsultation, of which 250 (64.8%) came from the participating municipalities of the PPSUS project using the tablet, 21 (5.4%) from those without tablet and 115 (29.8%) were from municipalities not participating in the project. The advantages of use of both the mobile device and the virtual clinic were verified through the analysis of the evaluation forms and the data of Telehealth Platform. The need for innovation in health practices, especially with regard to care in the State of Amazonas was also verified. There is a strong need to institutionalise the use of Telehealth Platform, and improve available technology with updated tools and good Internet connection. The project was successful in developing the project and collecting data, providing evidence of the need to improve the health services offered to the population and the importance of general medical monitoring as a precursor of teleconsultation by medical experts in order to minimise social and financial impacts, avoid unnecessary travel and procedures.

Keywords:telehealth; telemedicine; technology; medical informatics; teleconsultation

J Int Soc Telemed eHealth 2017;5(GKR):e16

Introduction

The *Telessaúde Brasil Redes* Program is an initiative of the Ministry of Health in partnership with the Ministry of Science and Technology. Its main objective is to provide support to professionals working in the primary care network (doctors, dentists, nurses, technicians and community health agents and others), members of the *Estratégia Saúde da Família (ESF)* the most remote areas of the Brazilian territory, through the exchange of specialised knowledge and information mediated by information and communication technologies. To expand coverage of primary care, in difficult to reach areas in the interior of the state of Amazonas, it was proposed to use information technology with software and mobile devices, thereby providing virtual mobile clinic teleconsultation.

The objectives of the study were to evaluate the effectiveness of using the software (Virtual Ambulatory) on the mobile device (Tablet) in primary care, and quantitatively analyse teleconsultations held at the Technical Scientific Nucleus of Telehealth of the University of the state of Amazonas between participating municipalities between June 2015 to July 2016.

Methods

The project was developed by the Nucleus of Telehealth of Amazonas, located at the School of Health Sciences of the University of the state of Amazonas. This is an analytical, cross-sectional, observational research and it was decided to undertake the study in a group of previously selected municipalities.

In the first stage of the project, in the first year of execution, software was developed (Virtual Ambulatory). The app was deployed on mobile tablet devices used in the study. The second stage was the selection of the 30 participating municipalities with *Saúde da Família* teams that are part of the telehealth network of the Nucleus of Amazonas. Fifteen of these, received tablets and used the technology of mobile virtual clinic, and the other 15 did not use the Virtual Ambulatory application. After twelve months of use, information was collected through questionnaires with multiple choice questions.

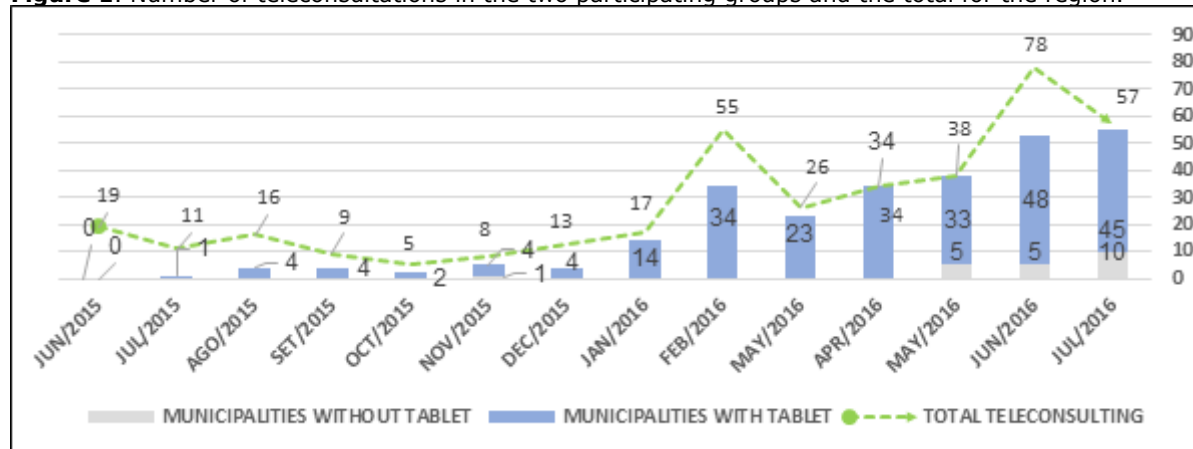
Consent of health professionals involved in the study was obtained according to the Free and Enlightened Consent Term (Resolution 196 of 10/10/1996-CONASA / MS). Only professionals who were registered in their municipalities participated. Training was conducted on the use of the Virtual Ambulatory software. After twelve months of using the app, data were collected for technical and statistical evaluation and a comparative study was made between the groups using the mobile device and the group without the device.

Evaluation happened continuously with the participation of the stakeholders involved in the projects, both in the academic and care areas. After 24 months from the start of the project, the participating municipalities submitted the project final evaluation form PPSUS. This form was used as a verification tool for the software and mobile device providing access to telehealth in primary care, in addition to providing alternatives for improving telehealth access in municipalities.

Results

The results obtained are based on the data sent by the municipalities in the final evaluation form, as well as information extracted from the Telehealth Platform. There was a significant increase in the number of teleconsultations during the year of evaluation of the project (June 2015 - July 2016), especially, in the municipalities that receive the mobile communication device. (Figure 1)

Figure 1. Number of teleconsultations in the two participating groups and the total for the region.



Between June 2015 and July 2016 there were 386 teleconsultations, of which 250 (64.7%) came from the 15 participating municipalities with a tablet, 21 (5.4%) from the 15 without a tablet and 115 (29.8%) came from municipalities not participating in the project.

Three questions in the final evaluation form were not answered by two municipalities, this was due to the high turnover of managers and health teams in the interior of the state of Amazonas. The final evaluation of the use of the mobile virtual ambulatory system is shown in Figure 2.

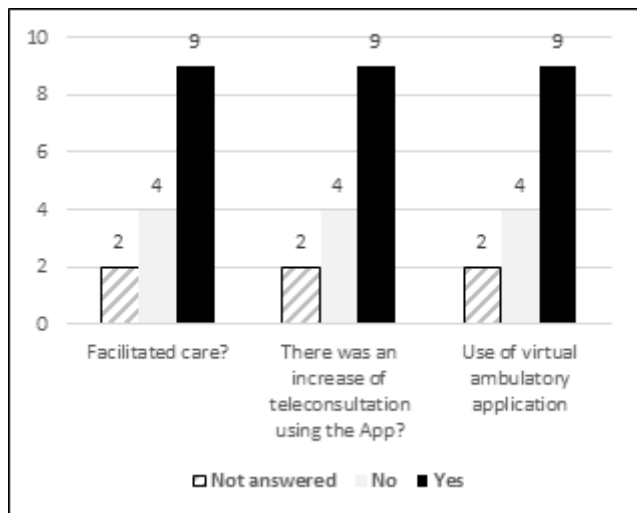


Figure 2. Final evaluation of the use of the mobile virtual ambulatory system.

Suggested improvements of the application related to the application interface, increasing the number of filters and making it available on IOS devices. They felt that the use of the virtual mobile clinic could be improved by insertion of teleconsultations in the Telehealth Platform, monitoring of teleconsultations of the municipality. Difficulties were mainly related to Internet connection and climatic interferences. The technical difficulties reported were promptly answered by the technician team of the Telehealth Hub of Amazonas. One medical professional rejected the tool and did not use it.

Of the 15 municipalities that did not receive a tablet three questions of the evaluation form were not answered by five municipalities, again due to the high turnover of managers and health teams in the interior of the state of Amazonas. All felt that the mobile ambulatory app would facilitate basic care. Other municipalities felt that the introduction of technology in primary care improves health within the state. (Figure 3)

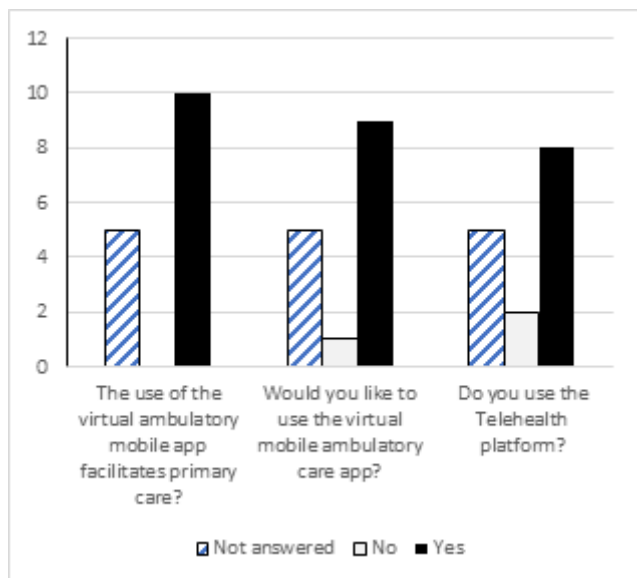


Figure 3. Responses of municipalities not using the App.

Suggested improvements to the app, from those who did not use it in the study were insertion of teleconsultations in the Telehealth Platform and monitoring of teleconsultations of the municipality. They also identified difficulties in data transmission; lack of guidance in inserting data; interference due to climate; lack of equipment to forward cases.

Through the comparison of data, it was verified that the municipalities participating in the project were responsible for 70.2% of the total teleconsultations performed. The 229 teleconsultations carried out by the municipalities that received the tablet were responsible for 59.3% of the total teleconsultations in the region. Those municipalities not participating in the PPSUS project also sent 115 teleconsultations, 29.8% of the total consultations.

The benefits of the project have a direct impact on the quality of life of the population of the interior of the state, with 271 virtual ambulatory visits not requiring patients to travel to Manaus to obtain a second opinion from a medical specialist. The benefits include; reduction of time and transportation costs for patients; easier and faster access to specialists, especially in cases of accidents and emergencies; reduced queues and pressure on hospitals already compromised by lack of resources; and increased quality of educational programs for doctors, residents and other professionals located in areas outside of specialised centres.

Discussion

According to Costa, "the Amazon deserves to be highlighted as a regional hub that, from the point of view of health, education and even social life, can only be rescued by telecommunication technologies combined with information technology".¹ The use of information technology in primary care through the "Virtual Ambulatory" system in the mobile device is a new tool for specialised medical care through the Telehealth Platform, an instrument to strengthen the health system in the state of Amazonas.

Regarding the cost issues, Kahn points out that "Telemedicine also has the potential to substantially reduce healthcare costs. For providers, using telemedicine may be more efficient than seeing patients in brick-and-mortar offices, since it reduces the time and space needed to run a medical practice. For patients, telemedicine can reduce travel expenses and the opportunity costs associated with obtaining care, such as missed hours or days of work² as evidenced in our study.

According to Pinto, "Information, when selected, helps to think, (re) think and learn, expanding possibilities to create and (re) create and, thus, are all active subjects and information actors",³ strengthening the initiative of the second opinion offered through specialised telemedicine medical care.

There was a significant increase in the number of teleconsulting in the municipalities participating in the project that received the mobile device to the detriment of those who did not receive it, showing its effectiveness. It supports the National Policy on Permanent Health Education,⁴ "The use of technological resources, particularly in professional updating, is of great importance, which is why it has reached great development. It allows for flexibility and openness in access to knowledge and information, facilitates the formation of virtual communities in areas of interest, overcomes problems of distance and access to bibliographies, enhances the circulation of data and the development of debates and, in general, offers a more dynamic, timely and personalised user membership than the classroom teaching activities".² The results were also influenced and impacted on by professional turnover, issues of Internet connectivity and resistance of professionals to use the new technology.

The core of Telehealth was directly involved in solving technical eventualities and training project participants. Professionals perceived the impact of the "Virtual Ambulatory" app positively, especially regarding assisting the population and ease of use of the mobile tool. Issues regarding the interface and climatic interference in Internet connectivity were also noted.

The Acción e-Salud Program of Action created in Mexico to reduce the distance between the marginalised population and the specialised health services says, "En lo que toca a los daños a la salud, los padecimientos infecto-contagiosos se han reducido como causas de enfermedad y muerte para algunos grupos de situación económica ventajosa, en los cuales se han incrementado, en cambio los crónico-degenerativos como la hipertensión, la diabetes y el cáncer; mientras que en los sectores menos favorecidos prevalecen los primeros, con agravantes como el repunte de la tuberculosis pulmonar, entre otros padecimientos, en un contexto de desnutrición, baja escolaridad, aislamiento geográfico y social, así como escasez o inexistencia de servicios básicos", characterising the need for technological intervention in basic care as a way to guarantee equity.⁵

Similar studies were carried out in Spain through a program called "Telecita", being the gateway to primary health care, this was a major breakthrough in the health system in Spain.³

The "Virtual Ambulatory" app is an instrument capable of contributing to universal access to specialised medical care (second opinion), helping to guarantee the principles in basic care recommended by the SUS.

Conclusion

The project identified the need for innovative practices in health, especially regarding basic care in the state of Amazonas. In addition, there is a clear need for the institutionalisation of the use of the Telehealth Platform by professionals in the interior, as well as adequate training with up-to-date instruments and a good quality Internet connection. Reducing professional turnover is of fundamental importance for the full development of telehealth in the interior. Use of the mobile device and the virtual

ambulatory app increased the number of teleconsultations and exceeded that of all the other municipalities in Amazonas combined. The project was successful in the development and collection of data, and highlighted the need to improve the health services offered to the population of Amazonas and the importance of teleconsulting by specialist physicians in order to minimise social and financial impacts through avoiding unnecessary travel and procedures.

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Conflict of interest. The authors declare no conflicts of interest.

Reference

1. Costa CA, Souza PE, Wen CL, Böhm GM, Mota MEC. Telehealth in the Amazon: development, results and perspectives. *Lat Am J Telehealth* 2009;1:170-183.
2. Kahn JK. Virtual visits—confronting the challenges of telemedicine. *N Engl J Med* 2015;372(18):1684–1685.
3. Pinto, I. C et al. Os Sistemas de informação em atenção primária como instrumento de gestão em saúde: análise de experiências na Espanha. *Caderno de Saúde Coletiva* 2010;18(2):291-297.
4. Política Nacional de Educação Permanente em Saúde. DF: Ministério da Saúde/Secretaria de Gestão do Trabalho e da Educação na Saúde, 2009.
5. Programa de Acción: e-Salud Telemedicina. Mx: Secretaria de Salud, 2002.

Costa CA, et al., *J Int Soc Telemed eHealth* 2017;5(GKR):e16