TELEMEDICINE AS A HEALTH PROMOTION TOOL: A MULTIDISCIPLINARY VISION

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Abstract

Telemedicine is a resource that contributes to improving the quality of medical care, reducing the time between diagnosis and therapy, and helping extend specialised and quality medical services to remote or poor locations. Teledermatology and Telecardiology encompass the application of telecommunication and computer technologies in dermatological and cardiological practice. The aim of this paper was to report the integration of a multidisciplinary health team providing remote assistance for diagnosis and management of dermatological and cardiovascular diseases, wherein second opinion was given to teams treating patients with difficulty in travelling to face-to-face consultations. Details were referred to the Hospital São Lucas, using a process provided by the MicroG eHealth platform, and specialists issued expert second opinions on each case. In this sense, teledermatology and telecardiology reports served as a tool to assist the general practitioner and family physician in deciding whether or not to refer patients to a specialist service.

Keywords: eHealth; telemedicine; remote assistance; teledermatology; telecardiology

Introduction

New information technologies have enabled an ever-increasing exchange of data across the Internet, with the advent of high-speed networks in Brazil. Telemedicine has used this evolution to transmit information between geographically distant points, enabling the provision of quality care, carried out by a specialist, to reach remote areas and those with few resources.[1]

Studies regarding the efficacy of Telemedicine in various countries have demonstrated it to be a resource contributing significantly to improvements in the quality of medical care, facilitating a reduction in time between diagnosis and therapy, and permitting the extension of specialised and quality medical services to regions where such services do not exist.[2]

Teledermatology is a branch of telemedicine focused on the application of telecommunication and information technologies to dermatological practice. Dermatology is an ideal specialisation for the application of modern telemedicine techniques, as it a very visual area. Studies have demonstrated high levels of concordance for diagnosis and management in teledermatology when compared to person-to-person consultations.[3]

Its main aim is to provide a specialist medical second opinion, giving assistance in the diagnosis of skin diseases to health teams in populations who have difficulties in travelling to face-to-face consultations. In addition, teledermatology has shown itself to be useful as a screening mechanism for determining the urgency or need for face-to-face clinical assessment. In this way, teledermatology serves as a tool to assist the general practitioner and family doctor in deciding whether or not to refer to a specialised service. A study analysing the cost-effectiveness of monitoring patients with psoriasis concluded that teledermatology was cheaper and as effective as the person-to-person consultation.[4]

The use of teledermatology, specifically in the area of cutaneous oncology, is described as an efficient, accurate and cost-effective diagnostic tool in the selection of suspected melanoma lesions for referral to specialised treatment centres.[5] In research by Congalton et al.[5] the use of teledermatology in the diagnosis of melanoma achieved a positive predictive value of 63%, with a reduction in costs in comparison to a conventional clinical diagnosis. In addition, one melanoma per 1.6 suspected lesions biopsied and one melanoma in every 12.8 referred to the service was detected. Forty-nine cases of non-melanoma skin cancer were also identified.[5]

Cardiovascular diseases, especially coronary artery disease, are the leading cause of death in many countries. Telecardiology, due to its importance, can have a significant impact on population health, particularly when implemented in distant rural areas. Remote transmission of the electrocardiogram (ECG) can be used in different clinical situations, by distinct methods, such as via telephone line or the Internet.[6,7] The ECG is a research method with well-established diagnostic and prognostic value for the investigation of cardiovascular diseases. Its integration into telehealth provides a diagnostic tool noted for its ease of use, easy transmission, low-cost and wide clinical application.[5]

In the context of this research area, Information Technology (IT) tools provide a wealth of possibilities, among them the secure transmission of data, with the key pillars being availability, confidentiality and integrity.8 A system focused on supporting dermatology and cardiology practice was created for this purpose, called the MicroG eHealth platform, which allowed consultations to be performed at points geographically distant from a central office, providing the specialist with a medical history, including main complaints and motive for the consultation, photos of the lesion area from various angles in the case of dermatological consultations, as well as the ECG reading for heart disease patients.[1,9]

The aim of this paper was to report the integration of a multidisciplinary health team providing remote assistance for the diagnosis and management of dermatological and cardiovascular diseases, wherein second opinion was given to teams treating patients with difficulty in travelling to face-to-face specialist consultations.

Methods

Data collection was performed by the multidisciplinary team (University professors and students from the areas of Medicine, Pharmacy, Engineering and IT) at the Sao Jose Hosptial, in Palmares do Sul, a city with 11 thousand inhabitants, located 100 km from the state capital Porto Alegre, RS. The data collected during the telemedicine project respected the confidentiality of the patient-physician relationship. Medical data and patient anamneses were referred to the Hospital São Lucas, of the Pontifical Catholic University of Rio Grande do Sul (HSL/PUCRS), Porto Alegre, where specialists issued an expert second opinion on each case. In this sense, teledermatology and telecardiology reports serve as a tool to assist the general practitioner and family physician in deciding whether or not patient referral to a specialist service is required.[10] The Internet connection was provided through integration of a mobile phone as the server for three microcomputers using the MicroG eHealth platform, developed by the MicroG Centre, PUCRS, assimilating the screening and exam data, and ensuring connection during the data capture and data transmission processes to the central server.

Patient data were transmitted via the Internet from the remote location hospital to a central point at the HSL/PUCRS. Three computers at the remote location were connected to a local area network, with a mobile phone acting as the router. The assistance team from the MicroG Centre supplied all equipment, computers and diagnostic devices used. One computer was used in the triage process, registering patient details and their general medical history, while the two remaining computers were used for the disease specific consultation, one for cardiology and one for dermatology. The MicroG eHealth platform was installed on the computers to provide communication with the data base system of the MicroG Centre, as shown at Figure 1.

Medical specialists at the HSL/PUCRS were given access to the MicroG eHealth platform via their computers, using personally allocated user names and passwords. Specialists were able to view the collected patient data, skin photos or ECGs, appropriate to their specialism, from which they formulated a hypothesis regarding the patient health issue and gave treatment suggestions.

After the diagnostic hypothesis was produced, it could be viewed by the medical team at the remote location hospital and the information used by the doctor to discuss the diagnosis and treatment options with the patient. In circumstances whereby a specialist was not available at the time of the patient examination, the medical report was encrypted and returned to the remote location hospital via e-mail.

Results and Discussion

In 2016, a total of 46 cardiology and 29 dermatology patients were treated at the hospital unit in a rural town, near the capital city of Porto Alegre. The mean (± standard deviation) size of an individual

electronic medical record sent from the remote hospital location via the MicroG eHealth platform was 1.3±1.5 MB for dermatology and 0.6±0.5 MB for cardiology patients. Considering these sizes, the time taken to transmit a medical record using the 3.1 Mbps into associated sets, hence simplifying the process of data collection and insertion. Furthermore, the system was able to receive the upload of medical records and images, maintaining their quality when downloaded at the receiving end, which is an important aspect for

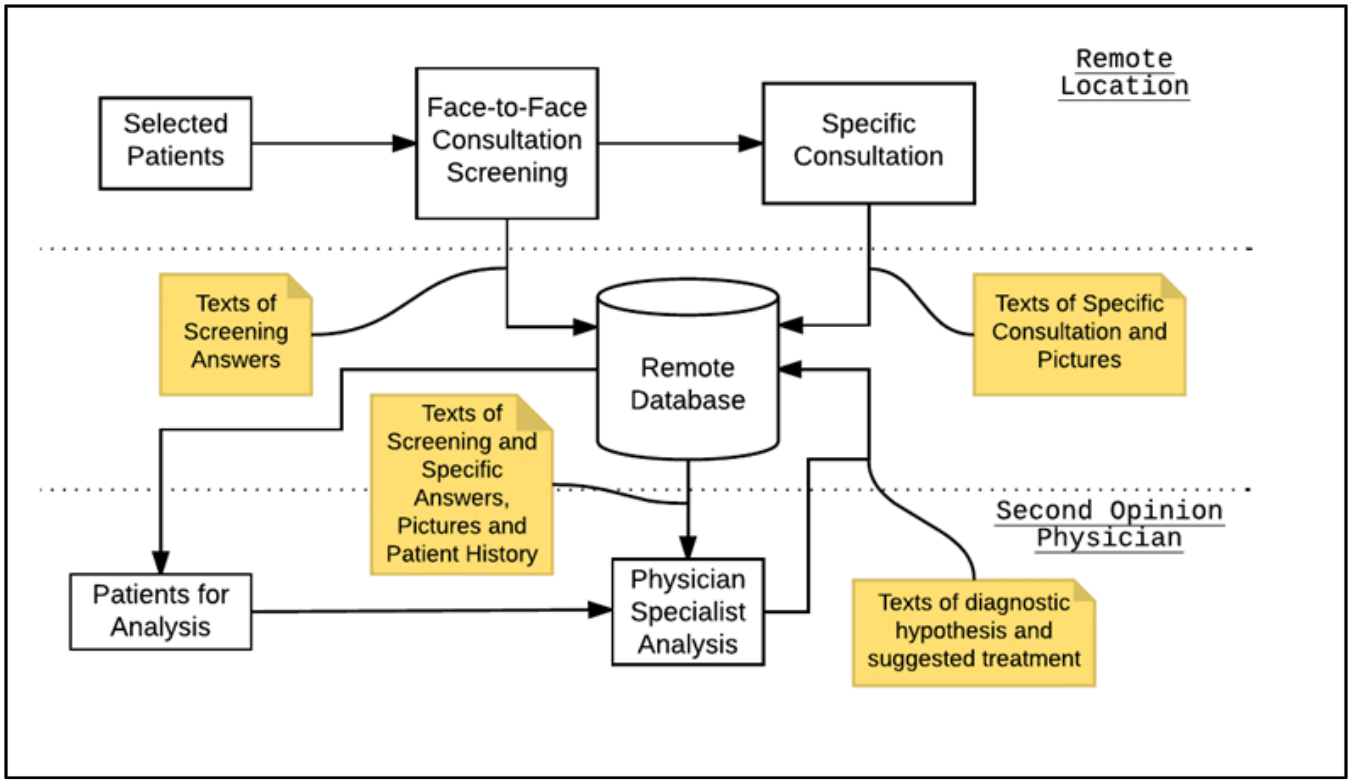

Figure 1. Block diagram showing the use of the MicroG eHealth Platform.

the 3G system[11] was 3.4 seconds for dermatology and 1.6 seconds for cardiology files. The increased transmission time for dermatology medical records can be explained by the greater number of photo images attached, in comparison to the cardiology records.

Data transmission followed 3G principles provided by the telephone service operator. These included air interface encryption, which ensures the validity of authentication at the start and throughout the call, preventing a session from being hijacked, and providing a temporary user identity which is local to the area, once an initial message is exchanged over the air.[12]

In addition to the 3G system security, the MicroG eHealth platform provided user names and passwords to both the HSL/PUCRS and remote location operators, ensuring the protection and confidentiality of all the shared data, with access to the eHealth platform restricted to authorised users only. The platform also provided forms organized and grouped ensuring quality data from which a second opinion can be made.

The specialist second opinion response times from the HSL/PUCRS end of the eHealth platform took less than 15 min with a good connection and simple case, whereby the specialist was able to easily reach a hypothesis, with the written text of the diagnostic record being transmitted rapidly to the remote location as no images were included.

Conclusion

The delivery of remote assistance for the diagnosis and management of dermatological and cardiovascular diseases was made possible through the integration of a multidisciplinary health team, and using the MicroG eHealth platform as a tool for the collection, organisation and transmission of data to a hospital for the provision of a specialist second opinion. In this way, it is possible to reduce the number of patients

requiring face-to-face consultations, saving valuable medical resources, decreasing patient travel time and optimising diagnosis and disease management.

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

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