

The Science Transfer Series: Telemedicine in education, research and assistance

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Telemedicine is considered to be the delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of diseases and injuries, research and evaluation, and for the continuing education of healthcare providers, all in the interest of advancing the health of individuals and their communities. The term ‘telemedicine’ first came into use in the 1970s, but it is not a new concept and initiatives that fit the aforementioned definition have been applied since the early 1900s.

To a large extent, the development of telemedicine has followed the advent of new technologies. The beginning of the 20th century welcomed the widespread use of telephones, an invention that has been used for medical work since its creation. Physicians communicated medical information to ships at sea using radios in the 1920s. Commercial air travel also adopted radio-based telemedicine for passengers taken ill mid-flight. Telemedicine experienced a boom with the Space Race and development of satellite technologies, enabling healthcare to be delivered in remote locations without the presence of a doctor.

In recent times there has been an exponential proliferation of telemedicine initiatives around the world, both in number and diversity. This is in large part due to the internet and mobile phones. Internationally, the World Health Organization’s health-for-all policy for the 21st century centers on telemedicine and health telematics.

Due to these technological advances, health professionals in remote areas are able to access information relevant to patient disease, diagnosis and therapy via the Internet, enabling the improvement of health services in areas lacking in specialist opinion. PUCRS University, through the Telemedicine Laboratory of the Microgravity Center, at the School of Engineering, has been developing projects in this area, with the intention of filling the gaps in current provision of health services in Brazil, which lack efficient

tools to solve problems and difficulties in the diffusion of specialist services.

This Laboratory, coordinated by Prof. Helena Willhelm de Oliveira of the PUCRS School of Dentistry, aims to expand the frontiers of health services through the development of research projects, using new communication technologies. To accomplish this goal, the Telemedicine Laboratory develops inter-institutional and multidisciplinary projects which are divided into three subareas: education, research and assistance.

Education

eLectures connect PUCRS students, professors and professionals to four European universities via video-conference: Aachen (Germany), Warsaw (Poland), Kaunas (Lithuania) and Plymouth (England). Since the beginning of this activity in 2008, 19 presentations have been accomplished during 14 eLectures.

The Telemedicine Laboratory also developed “point-to-point” activities with the Kaunas University of Medicine, in partnership with both the School of Dentistry and the eHealth Student Group of PUCRS, with the objective of discussing topics related to oral and eye diseases.

The interaction between students from different cultural backgrounds enabled them to have a more complete educational experience and to exchange eHealth knowledge, whilst also bringing them into contact with video-communication technology.

Research

The Telemedicine Laboratory conducts research projects aimed at improving tools (software and equipment), technique and assistance models, including study protocols and data collection and analysis.

Among them, can be noted: 1) The development of a web portal, with the objective of permitting the exchange

of information between health professionals located in remote areas and specialists in reference centers, enabling asynchronous communication. 2) The development and validation of an illumination device adaptable for use with medium sized, non-professional digital cameras, to facilitate the acquisition of dermatological and dental images of a higher quality.

The integration of these acquisition and transmission tools enabled the establishment of Teledentistry and Teledermatology systems, thus providing an improvement in health care in these remote and deprived regions.

Assistance

The Telemedicine Laboratory has been developing health assistance projects since its inception. With the support of the Brazilian National Health Foundation (FUNASA), the Indian Culture Research Nucleus of PUCRS, and the Schools of Medicine, Dentistry and Pharmacy of PUCRS, it was possible to organize 3 assistance missions to remote areas of the Brazilian territory.

During the periods of 8th to 28th January 2007, and 5th to 23rd January 2008, patient interviews related to the areas of Teledermatology and Teleodontology were accomplished, in partnership with the Health Secretary Office of Ji-Parana City, Rondonia State, Brazil. These two initial missions allowed urban and rural populations of the area to have access to an expert opinion, enabling 357 patient cases to have a specialized second-opinion.

In July 2008, a multidisciplinary team from PUCRS visited the *Parque Nacional do Xingu*, Mato Grosso State, Brazil, with the objective of assisting health professionals from

the *Polo Leonardo Villas Boas* area, providing access to specialist opinion in cardiology, dentistry and dermatology. A total of 112 patients from local communities were interviewed.

It can be seen that eHealth technologies emerge as a solution for the exchange of health expertise between remote locations and reference centers. However, standardization of communication protocols, internet access, tools and systems validation, and a growth in awareness are some of the issues that must be addressed to allow its wider implementation. These developments are critical to enable the knowledge transfer from research projects to health programs and system, either public or private.

Over the first 10 years of its existence, the Microgravity Center has consolidated itself as a leading research and education center in Brazil, acquiring wide international recognition. Through the development of a Telemedicine Laboratory, this work has continued. Important research and academic activities related to assistance missions for remote areas of Brazil have taken place, and new international partnerships have been forged.

Websites of interest:

www.litesa.org

www.pucrs.br/feng/microg/

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