Teleeducation in health: Virtual learning environments in focus

Aline Teixeira Gomes[1]; Márcia Maria Pereira Rendeiro[2]

INTRODUCTION: The new information and communication technologies emerge after the third industrial revolution, characterized by digitalization of information, communication in networks and the potential for interactivity. (PRADO et al., 2012).

In the 2000s, we highlight the creation of the Moodle software, developed with the purpose of being a learning community based on socio-constructive theories of learning. Thus, the virtual learning environment can be considered the key artifact for E-learning (SEIXAS et al., 2012).

This scenario has boosted new learning processes, strategies and behaviors.

The necessities of updating and permanent education, as well as emergency in training professionals with communication skills related to information and communication technologies stimulated the offering of courses and online classes at the health field. So tele-education, which comprises a bias of Telehealth, characterizes itself by the inclusion of such educational process, through information and communication technologies.

That said, the present study aims to identify the challenges and opportunities related to virtual learning environments in health. To do this, two key questions need to be raised: What are the difficulties encountered in the conception of virtual learning environments and online courses? And what are the possibilities and advantages noticed on this adhesion?

METHODS: In order to achieve the objectives outlined, it was chosen to perform a research of the bibliographic type. Taking into account that the study is of qualitative and exploratory nature, it was done a bibliographic review with the aim of identifying the challenges and opportunities related to virtual learning environments in health.

The research was conducted through electronic means where it was sought to obtain scientific articles published in the period between 2010 and 2015. The temporal delimitation is justified by the fact that, as the artifacts change, new technologies are incorporated to educative practice in the course of time, being necessary to observe such changes. The survey of articles in the scientific literature was held in Latin American literature database and Caribbean in Health Sciences (LILACS) of the Virtual Health Library (BVS), which are available in Portuguese, and the text available in its entirety.

In this research, it was used as a keyword the expression: virtual learning environment. After a bibliography composition, it was used the method of content analysis by thematic approach, in which the resulting themes are grouped into thematic categories.

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RESULTS: This way 44 publications were found, being 41 scientific articles, and of these, 41 as full texts, which results 41 articles on a full version in Portuguese.

The thematic categories found were: development of virtual learning environments, courses and learning objects; and evaluation of learning proposals or resources of the virtual learning environment adopted. After grouping the mentioned categories, a selection was done with the following standard: scientific articles that perform approaches about the development of virtual learning environments, courses and educational objects for graduating in health for academic purposes or permanent education.

According to the standard were selected 10 articles reporting experiences about the conception and development of learning objects, courses and virtual learning environments for the teaching in health, 6 for academic purposes and 4 for professional education purposes; 6 in the nursing field, 2 in the medical field and 2 in the health field.

The highest number of articles found reports the application of academic courses with the use of virtual learning environments in tests with undergraduate students, especially in the nursing field. The courses for professional education follow the same trend as the field.

The articles related to experiences about the perception of courses discourse about the stages covered, which those are corresponding to the conception, according to Filatro (2008): Analysis; Design; and Development.

Regarding the main difficulties encountered in the conception of courses and virtual learning environments, the highlights were: the knowledge gap not found in the literature (GROSSI and KOBAYASHI, 2013); and lack of specialized professionals for the process of production and supply (SEIXAS et al., 2012).

Taking into account the possibilities and advantages of using the virtual learning environment and of the tele-education, it can be affirmed that they provide the use of several medias, enabling the development of more dynamic and autonomous learning strategies (RABEH et al., 2012) and allow a learning process based on dialogue and two-way communication process, adding value to the experience and knowledge of the students. (RODRIGUES and PERES, 2013).

CONCLUSIONS: Therefore, tele-education in health is an educational process that can contribute to both permanent education and for the training of new professionals, putting them in new learning situations and developing new skills and competences. To do this it is important that these potentialities are adhered and the studies about the subject in-depth. ■

Research Training within a Postgraduate Program on Tele-health at a Brazilian Medical School

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INTRODUCTION: Two recent editorials underlined the relevance of research methods (RM). According to the first: "now more than ever, medical educators at all levels are tasked with delivering foundational concepts and content" and "medical schools throughout the country are recognizing the value of medical student engagement in research". Regarding the later: "an overview of the literature on the adequate use of research methods in the field of health reveals countless questions that lead us to reflect on the importance of methodological quality for the execution and analysis of every study, which is a fundamental element for consistency and later clear dissemination. And there are more than a few problems in this area."

According to Greenhalgh, studies that do not test the authors´ hypothesis, inappropriate study design, practical difficulties leading authors to compromise on the original protocol, small sample size, uncontrolled or inadequately controlled studies, incorrect use of statistical and unjustified conclusions from data findings consist the commonest reasons why papers are rejected.

For a novice researcher to understand and incorporate RM principles on his/her research project may be challenging. Yet, barriers may exist for inexperienced faculties willing to offer a RM discipline.

Describe and evaluate a Research Training Discipline (RTD) for postgraduate students.

METHODS: At the School of Medicine, Universidade do Estado do Rio de Janeiro (UERJ), Brazil, there is a group of faculties teaching and researching on SM´s related topics. In the last twenty years, the Departamento de Tecnologia, Informação e Educação em Saúde (DTIES-UERJ) has been offering disciplines for undergraduate medicine students, master and doctoral postgraduate students: Medical Informatics, Statistics, Epidemiology, Information Literacy (IL), Scientific Writing. The Hospital Universitário Pedro Ernesto (HUPE-UERJ) holds an active Telehealth center. In 2015, Telessaude-UERJ launched the Postgraduate Program on Telemedicine and Telehealth (PPTT-UERJ). DTIES faculties were invited to design and mentor disciplines under distance education (DE) modality to PPTT-UERJ students.

Experimental, before and after educational intervention. Population: PPTT-UERJ Students (PPTTSs). Passing criteria consisted of curriculum, English exam, interview and a preliminary Research Protocol (RP). Study participants (SPs): PPTTSs who answered an online IL questionnaire. Measures of Outcome:

(1) Forum participation used as a proxy for student engagement: Number of individual posts divided by total number of posts;

(2) Pre-Post test assessing preliminary and updated RP. The RP sections Introduction, Objectives and Methods will

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be graded according to Yes/No questions: "Research question clearly defined?"; "Overall study design adequate to answer the research question?"; "Overall study design described?"; "Participants adequately described?"; "Inclusion and exclusion criteria described?"; "Main outcome measure clear?". Questions were adapted from The British Medical Journal´s peer-review checklist (http://www.bmj.com/about-bmj/resources-reviewers/guidance-peer-reviewers).

Finally, by the end of the RTD, SPs will evaluate it using a validated instrument from the Escola Nacional de Saúde Pública (http://www.ensp.fiocruz.br).

RESULTS: There exist eleven ongoing PPTTSs, ten returned the online IL questionnaire. SPs (n=10) are mainly women (n=6); age range from 24-59 years old (mean=37.6), with heterogeneous graduation background. All have Internet access from home. Seven reported making use of Google Scholar, reference bibliographic databases and SciELO when seeking scientific and technical information. For strategies when searching bibliographic databases, only two mentioned Decs/Mesh terms. Regarding problems frequently faced while doing literature search, nine reported having to browse across a high amount of documents retrieved, while three referred problems selecting keywords for a good search strategy. In order to obtain the full-text documents, eight mentioned SciELO, two mentioned CAPES Portal; four reported going to a library.

RTD Outline:

RTD Opening Welcoming Videoconference

IL Questionnaire

Module1 – Basic research concepts and fundaments. Forum: RTD follow-up.

Module2 – Writing the Research Project. Research Subject, Research Question and Research Design. Forum: "O Método Científico e os Tipos de Pesquisa" (video).

Module3 – Information Literacy. Videoconference. Forum: "Tema, Problema, Hipóteses e Variáveis" (video).

Module4 – Information Literacy. Online exercises on Lilacs/BVS and SciELO Portal. Forum: Considerations research theory x practice.

Module5 – Qualitative and Quantitative research. Data collecting methods. Forum: "Métodos quantitativos, qualitativos e coleta de dados" (video).

Module6 – Information Literacy. Videoconference. Forum: Online Journal Club.

Module7 – Information Literacy. Online exercises on Medline/PubMed, CAPES Portal. Forum: "Estilo e Redação de um texto, observação e linguagem científica" (video).

Module8 – Aspects of the Scientific Writing. IMRD article structure. New RP submission. Forum: "Normas da ABNT" (video).

RTD evaluation

CONCLUSIONS: The RTD is still ongoing. SPs are presently at Module7. RTD may finish by the end of June 2015. The RTD has been mentored by one faculty and an undergraduate student from UERJ´s School of Education. It has been a challenging and time-consuming process. It seems SPs are satisfied with the course design. We are, however, unsure about the mentoring activities; to mentor students under DE requires a wide set of habilites we were not aware of. ■

M-health to battle maternal death in third world countries

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INTRODUCTION: 800 women dies every day related to pregnancy and deliveries from preventable causes, according to WHO. Global numbers from 2013 estimates more than 289,000 women die every year.

The majority of maternal deaths happen in low-income countries especially in sub-Sahara Africa, like Tanzania. The problem is multi causal and possible solutions interact with different underlying factors. Leading experts states that between 70 - 88 % maternal deaths are preventable or have treatable causes.

Tanzania is a country with limited recourses, general poverty, and severe lack of educated/skilled health personal. Tanzania is one of the biggest sub-Sahara African countries and counts for more than 8.000 deaths annually contributing to 3 % of the global maternal deaths (MD).

The most common cause of death is severe bleeding (25 %), followed by sepsis (15 %) and eclampsia (12%) and obstructed labor (8 %) and for example; active management of the third stage of labor reduces postpartum bleeding.

According to annual reports from WHO concerning Tanzania only 40 % of the population have access to electricity, but on the other hand mobile phones have been growing and more than 80 % of the population have access to or own a mobile phone (WHO Health).

METHODS: Qualitative study with participatory field study through focus group discussions (FGD) and observational studies in the Moshi Region in Tanzania. Thirteen midwives at three maternity wards at 3 different hospitals were included in this study, as well as a group of 16 pregnant women.

We introduced the midwives to the smartphone with an application called Safe Delivery App, SDA, and how to use the SDA (guided tour through the different functions and features of the app). The SDA was then downloaded to each of the midwifes for at test period for a minimum of three days. This was followed by an introduction and daily observations in the maternity ward of the midwives with the smartphones. Thirdly a focus group interview was held with the midwives about the usage of the smartphones and their experiences with the SDA at the end of the 3 to 5 days test period. Besides the work with the midwives the SDA was demonstrated at the ground outside one hospital to approximatly16 pregnant women with a follow up discussion. All interviews were taped and transcribed and some conversations were written as notes. The data was analyzed according to Value-expectancy theories to show if the midwives could be motivated for behavior change.

RESULTS: The informants in general all appreciated the smartphone as a tool to make better performance in the maternity ward. We looked at over all acceptability, engagement and relevance: Over all: "Easy compared to books",

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"…. easy to find the right subject", "…it is to use in spare time or if we are more than one (staff)", "I use it... if I forget something", "…to teach students", "…take it home and learn".

Engagement: Statements about the informants/participants receiving the smartphone and to what degree they actively used and shared the SDA. B: "I shared with my people in the labor room. I am sure what they saw and have liked it". SA: "I enjoyed everything". A: "The students were very happy. They have said that they have learned new things".

Relevance: how the informants would like to perform differently or what they have learned from the SDA "... if we have a smartphone like this, if we can see the videos, but a book you can not take with home", "if I forget something", "better than books", "more accessible", "easy to get an overview (trough the videos)".

Learning: what kind of learning experience do the informants express they have acquired based on their participation in the test period? To what degree do participants acquire the intended knowledge, skills, attitudes, confidence and commitment based on their participation in your training?

Knowledge and skills: "Now I know: how to (perform) good management of 2. Stage labor. Express an increase in knowledge by stating "now" as opposed to before the information in the app was available, and improvement of skill "to good management of..."

"What to do if a newborn have a low score", express knowledge and skills improvement after watching the videos.

Attitude how the app can be an asset and worthwhile if applied in the maternity ward: "We need one at the ward... because not all have a smartphone ... easy to find the right stuff (subject)", "We are (feel) very bad if we see mama bleeding, but now when we see mother bleeding...". "I empty the bladder before..." - display more confidence related to knowledge of the order of different procedures in 2. stage management.

Confidence: "I think I can do it on the job.", "When I proceed to read about PPH", "And now I ask myself: How can I treat eclapsia?"

Behavior: to what degree do participants apply what they learned during training once back on the job?

CONCLUSIONS: The phones with the SDA were well received and became immediately accepted among the participating midwives in the test period. Acceptances lead the midwives to share videos and information's in the app amongst themselves as well as other staff at the hospital and even outside the hospital. Thus the different recipients, whom have different needs and even by random people "outside the hospital walls", the information's in app was both appreciated, accepted and changed awareness about giving birth, towards changing behavior and also pointed out the importance of educating the society on the importance of delivering at hospitals.

Also, right from the start, the informants received the app as a learning tool. The information's in the app provided the midwives with information enough to convince them that they could and would change ways of doing basic emergency procedures in the future.

The app seems to both have a role as a learning tool for better emergency procedures, but also as a tool to help the midwifes educate mothers, colleagues and other interested what midwifery is all about and how lives of mothers can be saved with simple procedures in due time. ■

Assessment of efficacy from mobile applications to aid at management of diabetes mellitus and cardiovascular diseases patients: a systematic review

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INTRODUCTION: In 2014 the global prevalence of diabetes (DB) was estimated to be 9% among adults aged 18 years old or more. Cardiovascular diseases (CVDs) are the number one cause of death globally and are responsible for between 50-80% of deaths in people with DB. By 2030 more than 23 million people will die annually from CVDs. However there is good evidence that a large proportion of cases and complications of DB and CVDs can be prevented by lifestyle changes. DB and CVDs self-management education is significant contributor to metabolic and psychological outcomes among people with those diseases and those who are at risk. The worldwide prevalence of mobile phones makes them a powerful platform for providing individualized health care delivered at the patient's convenience. Smartphones allow individual users to install, configure, and run specialized applications on their phone. According to industry estimates, 500 million smartphone users worldwide will be using a health care application by 2015, and by 2018, 50 percent of the more than 3.4 billion smartphone and tablet users will have downloaded mobile health applications. Objectives- Systematic review the clinical trials that measured efficacy of mobile applications to aid at management of DB and CVDs patients.

METHODS: We searched electronic databases, including PubMed, LILACS and Cochrane Library, using combined MESH terms of 'cardiovascular diseases', 'hypertension', 'diabetes mellitus, type 2', 'diabetes mellitus, type 1', 'mobile applications', 'telemedicine' and their entry terms. We also manually searched the reference lists of retrieved publications, systematic reviews and database of specific journals. In addition, we performed gray literature search, including the following sources: the Digital Library of Theses and Dissertations of University of São Paulo (USP) and Federal University of Minas Gerais (UFMG) and ProQuest Dissertation & Theses Database.

Two independent reviewers scanned titles, abstracts and whole texts to identify potential relevant articles. Dissimilar results were analyzed by a third reviewer. Data collection was performed by two independent researchers. Studies were considered relevant if they were clinical trials with participants of any age and gender, chronic diseases defined at objectives and use of a mobile application as intervention. Studies were excluded if it had not a control group, if it presented just partial results, if the participants were not randomized or have gestational diabetes, if the use of smartphone was just to transmit data or the mobile application is directed to health professionals. We filtered the search by year between 2008 to 2015. The articles were restricted when the research was executed after 2007. This rule was included because in 2008 the main application stores (Apple Store and Google Play) were created and the use of apps increased exponentially.

Evaluations of methodological quality and risk of bias were performed independently by two reviewers, and disagreements between the two were solved by consensus. Methodological quality was assessed using the modified Jadad scale, in which a study is given a score ranging from 0 to 6, with 6 representing trials of the highest quality. Risk of bias was assessed according to the recommendations of the Cochrane Collaboration, with each domain classified as having either a low, high or unclear risk of bias.

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RESULTS: The literature identified 973 published original articles. There were 12 randomized controlled trials (RCTs) which met inclusion criteria to be analyzed. The studies were realized on North America (4), Europe (7) and Australia (1). Seven of RCTs were multicenter, 5 were at one center. The duration of RCTs were: 1 month (2); 6 months (4); 9 and 10 months (1); 12 months (4).

Diseases assessed at each study were: Diabetes Mellitus (DM) type 1 (4); DM type 2 (5); Heart failure (2) and DM type 2 plus obesity (1). Eleven RCTs were realized with adults, 1 with teenagers. The total missing of the sample was 30%. Missings were not connect by technology and device. Most participants were men at 7 RCTs, women at 4 and equal at 1. Eight RCTs checked school education, at 6, 80% or more from the sample had at least high school education. Prevalence of pathologies were presented at 9 RCTs: less than 5 years (3), between 5 to 10 years (4), more than 10 years (2). Four RCTs showed 16 to 17% of sample is smokers.

Mobile application (app) is the target intervention however some RCTs offered beyond that as communication with health providers (2 RCTs) and communication with health providers plus a webportal (3). The main function of apps is feedback from biochemical parameters. Other functions are motivational messages, chat, videoconference, graphics, adjustment of bolus insulin, aid function to a healthy feed as a calculated amount of carbohydrates to ingest, aid at physical activities, plan individual healthy goals and alerts to remind take medicines. Just 1 RCT did not identify the app used, 9 apps were utilized at the others RCTs.

Nine RCTs measured glycated hemoglobin. In 4 RCTs, reduction was significantly ($P<0.025$) to intervention group compared to control. Six RCTs assessed weight, at 1 had significantly reduction ($P=0.021$) at intervention group compared to control. Three RCTs measured level of HDL and triglycerides, at 1, the level of HDL increased significantly at control group ($P=0.0005$). Triglycerides decreased at intervention group and increased at control significantly ($P=0.04$) in 1 RCT. Occurrence of hypoglycemia was registered at 4 RCTs. In 1 study, intervention group presented protection to avoid episodes of a severe level of hypoglycemia, the relative risk was 0.14. Quality of life was measured by questionnaires at 6 RCTs, 4 found significantly positive results to intervention group.

CONCLUSIONS: Our results show that apps can aid people manage better some prevalence diseases as diabetes. The most part of outcomes not show significant differences between use a smartphone or usual care by participants. It means that people using a health app with remote counseling could have the same quality of life than people who visit regularly health professionals or do a conventional treatment. This can be a great achievement to reduce costs of health. The perception of quality of life from users of apps is linked to empowerment of their health.

To CVDs we need to develop more studies using apps. We found just 2 RCTs with heart failure participants but one was to improve medication adherence.

Usage of health and fitness apps has grown exponentially since 2013. Looking at data from over 6,800 iPhone and iPad apps listed under the health and fitness category, Flurry Analytics reports a 62% increase in the usage of health and fitness apps during first semester of 2014, while the overall mobile app industry has only seen a 33% increase. If this industry is growing quickly it is a signal that more apps need to be assessed about efficacy, effectiveness and security. ■

Tele-education as a sensibilization strategy for the treatment of craniofacial deformities

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INTRODUCTION: Treatment of patients with craniofacial deformity requires monitoring, from birth to adulthood, the work of a multidisciplinary team, with the purpose of preventing and treating aesthetic, functional and psychosocial disorders, providing proper integration into society. Such management is most effective when various aspects of treatment are integrated and considered in treatment planning. In patients with craniofacial deformities the absence of appropriate treatment can lead to irreversible sequelae often that compromise the aesthetic and functional aspects. These consequences are of stigma and discrimination among peers, which may affect the quality of life of these children and their families. Noncompliance with treatment is a major problem worldwide, especially in developing countries where poverty and illiteracy are major social challenges. In turn, the cost of untreated or inadequately treated are enormous. However, as a long and complex treatment, causes a great social cost "burden of care" so the family point of view, as the structure itself involved. In this scenario an educational intervention based on learning objects has been developed that could contribute to an awareness of the importance of treatment by patients and families to improve not just membership, but the fulfillment of all stages of treatment.

METHODS: The study was conducted by the Telehealth Core IMIP (NTES-IMIP) in partnership with the Center of Attention to Defects of IMIP face (CADEFI-IMIP). The project was divided into three phases: preparing the content, production and evaluation of learning objects. The content of the construction phase stories have been prepared so that they can approach the most real situations experienced in the treatment planning of patients involved in the treatment of craniofacial deformities. In the production phase the learning objects were developed in cartoon format and explanatory videos and the last phase was conducted to validate the learning objects.

RESULTS: Seven learning objects were created reporting situations experienced in planning and treatment of patients and family members of CADEFI. From the seven learning objects, four were in cartoon format, covering topics such as ways to find the reference center, the main craniofacial deformities, the etiology of craniofacial deformities and treatment. The other three objects were developed in explanatory video formats bringing content as the dynamics of the center, the role of each professional and the main clinical strategies for the service.

CONCLUSIONS: With the implementation of the actions proposed in this study, it is expected the construction of understanding of craniofacials deformities, sensitize patients and families on the importance of treatment of craniofacials deformities, strengthen the bond and confidence of patients and families with the center, with the ultimate aim of increasing the membership of treatment to patients and families. ■

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Tele-Education as a Support Tool in Combating Abuse of Psychoactive Drugs: A Literature Review

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INTRODUCTION: Since the emergence of the Internet, the speed of information flow has increased considerably on a global scale, and both economic and interpersonal relations have been constantly undergoing reformulations and changes, no longer being seen only as a face-to-face relationship. Thus, social networks over the internet have become the largest vehicle of communication between individuals, since the beginning of the XXI century[1]. Social networks can also be seen as a means of non-formal education, as they contribute to teaching and learning. This is the context in which distance education in health operates, contributing to building a collaborative network of communication and establishing links between the participants and exchanges of experience based on the reality of each individual. Concurrent with the increased use of social networking over the internet, the number of people using psychoactive drugs has also increased throughout society and in all social classes. This increase in consumption can be evidenced by the frequency with which we can observe the large number of users on the streets of Brazil. And in 2010, the Census conducted by IBGE pointed out that 1.2% (2.3 million) of the population uses or may have already used crack (psychoactive drugs). Dependence on psychoactive substances.

METHODS: This is a descriptive literature survey, in which it was decided to search for articles in national and international journals from 2000 to 2014, available in the PubMed® database. The following MESH TERMS were used: "Telehealth"; "Drug addicition"; "Social Networks". We selected all articles published in Portuguese and English involving the drug user population, and data collection was carried out through social networks over the internet or by phone. Literature review articles were excluded.

The analysis was performed according to the year of publication, type of research, data collection instrument used and expected results. Eight articles on the use of social networks as a support tool in combating the abuse of psychoactive drugs were found. Of these, six were selected which fit the criteria.

RESULTS: The results showed that the first publications on the subject occurred in the United States starting in 2006. It was observed that none of the articles used data collection based on social networks over the internet, such as through Facebook®. No research performed on the topic in Brazil was found. Regarding the type of drug, three articles (50%) talked about alcohol abuse, two (33.3%) about tobacco use and one (16.7%) about opioid use. In 83.3% of the articles surveyed, five articles used the phone as a data collection mechanism and only one (16.7%) was based on data collection via internet. In the studies analyzed, intervention by phone brought improved treatment for most patients with alcohol dependence. Only in one of the articles was there no specific positive effect identified from intervention via social networks. In articles related to tobacco use, the intervention was successful for a 24-week period on average.

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Meanwhile, the intervention with opioid users showed positive results when followed by medication.

CONCLUSIONS: Our findings suggest that distance education can be a powerful mechanism to support reduction or cessation of use of psychoactive drugs, especially if used in conjunction with conventional therapy. Due to the internet becoming the biggest vehicle currently available for information dissemination, this favors social networks (via the internet) establishing themselves as a powerful means of dissemination, and being used as mechanisms for distance education in health, to contribute to reducing psychoactive drug abuse and enhancing individual well-being. ■

Tele-Education: Screening and Diabetic Foot Prevention in the Primary Health Care

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INTRODUCTION: By the year 2012, over 371 million people worldwide were diagnosed with diabetes, complex polygenic and multifactorial disease, progressing to chronic complications. However, among these we highlight the diabetic foot complications, which result from infection, ulceration and / or deep tissue destruction associated with neurological disorders and peripheral artery disease. The correct evaluation of the feet of a diabetic patient is crucial in accurate indication of lifestyle changes and treatment to prevent ulcers, amputations, absenteeism from work, long periods of hospitalization, early retirement and mortality in addition to the very high financial costs for the Health System. The simple measures such as implementing a screening clinic and diabetic foot prevention through the training of a multidisciplinary team, patients and their families, reduce amputation rates by 50% to 80%.

Objectives: Develop course distance education, on tracking risk of developing diabetic foot in order to enable health professionals working in the Primary Health Care, allowing access the scientific content and simulation of various aspects of patient doctor interaction in the form of virtual clinical cases followed by a self-assessment questionnaire. This instrument is intended to operate in the primary prevention in order to detect patients at risk a develop diabetic foot.

METHODS: This is a methodological development work with a quantitative approach. For the analysis of the instrument's qualities, attending a group of experts, constituting the apparent validation of the instrument. The virtual graphical interface model multimedia, created from the validated instruments, brought together two formats: Clinical cases (simulation) and Diagram of diagnosis and management to the foot of risk.

The script of the Virtual Interface was structured from the construction of virtual learning environments methodology. It brings together a combination of activities and access screens that allow the achievement of intended actions through asynchronous interaction (forms); registration and evaluation (database and analytical basis - score); and access to educational content (information material and route consolidation of knowledge).

For the production of tool items was elaborated an evaluative scale multidimensional, structured from the definition of specific content on the pathophysiology and treatment of diabetic foot and specific skills for your tracking and management, based on the Guidelines of the International Working Group on the Diabetic Foot, American Diabetes Association and International Diabetes Federation. The definition of such content generated grid of fundamental knowledge, called content array. It was determined then the relevance of each subject within the proposed theme, which led to construction of clinical cases and evaluative questionnaires.

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To start defining the skills content, five simulated clinical cases were built, with a gradual scale of developments in relation to difficulty, followed by five multiple choice questions addressing diagnosis and management. Produced are five classes in modules in Power Point format, which were recorded and transmitted through Adobe Connect tool, with 20 minutes duration each. Five simulated clinical cases were generated in PDF and inserted in Goiás telehealth platform. The questionnaires of demographic data and performance evaluation were developed in HTML form and evaluative logic in ASP.NET architecture. This information was recorded on MySQL data bank. The project had the participation of Endocrinology Services, Vascular Surgery, Nursing and Telehealth, Faculty of Medicine, Federal University of Goiás.

RESULTS: A prototype of the virtual environment was set up and the virtual graphical interface linked to a database was hosted in telehealth-GO UFG system platform. The tool developed can be used as support for lifelong learning, formative assessment, especially in the Healthcare System.

CONCLUSIONS: The instrument proved to be easy to understand and potential use of applicability, analysis and replicability in evaluating the professional basic area. We believe that developing a course along with an application for mobile devices, would not only support with scientific evidence for risk assessment and classification of diabetic foot, as well as the training of professionals in care, allowing a quality management of patients evaluated preventing complications and amputations. ■

Tele-Education: Detection and Diabetic Foot Treatment in Primary Health Care by Teamwork Multidisciplinary

Eldeci Cardoso da Silva[1]; Alexandre Chater Taleb[2]; Jonatas Abreu Fernandes[3]; Vinícius de Alcântara Malveste[4]; Rafael da Luz Bastos[5]

INTRODUCTION: Diabetic foot is the term used to name changes and complications that occurred, singly or together, feet and lower members of diabetics, which result from infection and ulceration associated with neuropathy and peripheral artery disease, which can progress to high rates of hospital stay, amputations, mortality, early retirement mortality. Due to the high cost associated with ulcers on the feet, the impact of this problem is not restricted only to the patient but also affects the entire health system.

The average of patients for each of these professionals is 110 thousand. The demographics of these professionals this concentrated in the capitals and major cities. These data demonstrate the need for training of Primary Health Care and Health Strategy Family professionals to deal with this disease more effectively, thus avoiding unnecessary referrals to overwhelm tertiary health centers, creating thus an unmet demand for these services.

Develop an distance education course, on the screening and treatment of diabetic foot in order to enable health professionals working in the Primary Health Care by simulation content various aspects of physician-patient interaction, in the form of virtual clinical cases prevention in order to detect patients with foot injuries, followed by a self-assessment questionnaire.

METHODS: The model of virtual graphical multimedia interface, created was: Clinical cases (simulation) and Diagram diagnosis and management to the foot of risk. The script of the Virtual Interface was structured from the construction of virtual learning environments methodology. It brings together a combination of activities and access screens that allow the achievement of intended actions through asynchronous interaction (forms); registration and evaluation (database and analytical basis - score); and access to educational content (information material and route consolidation of knowledge).

For the production of tool items was elaborated an evaluative scale multidimensional, structured from the definition of specific content on the pathophysiology and treatment of diabetic foot and specific skills for your tracking and management, based on the Guidelines of the International Working Group on the Diabetic Foot, American Diabetes Association and International Diabetes Federation.

The definition of such content generated grid of fundamental knowledge, called content array. To start defining the skills content, six simulated clinical cases were built, with a gradual scale of developments in relation to difficulty, followed by five multiple choice questions addressing diagnosis and management.

For the construction of clinical, elaborate affairs didactically divided in identification; Chief complaint; History of pre-

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sent illness; Interrogation symptomatic; Background: family, personal and pathological; Physical exam; Laboratory tests. Diagnosis (s) treatment (s). The six CCVS cover situations that include the classification of Wagner (1981) for ulcer: CCVS-1 (Grade 0 or foot at risk); CCVS-2 (Grade 1 - shallow ulcer without involvement of adjacent tissues); CCVS-3 (Grade 2 - deep ulcer involving muscles, ligaments, without infection); CCVS-4 (Grade 3 - deep ulcer with cellulitis / abscess / osteomyelitis); CCVS-5 (Grade 4 - Gangrene located, fingers and / or heel); CCVS-6 (Grade 5 - almost all foot gangrene). The pictures were standardized in regions plant, calcaneal dorsal, lateral and E Side D.

Developed six classes in modules in Power Point format, addressing the following topics on the diabetic foot: Patho-physiology Classification of ulcers, diagnostic methods, drug treatment, surgical treatment, preventive, curative and structure of a Diabetic Foot Service.

Classes were recorded for broadcast by Adobe Connect tool, with 20 minutes duration each. Six simulated clinical were generated in PDF and inserted in Goiás telehealth platform.

The questionnaires of demographic data and performance evaluation were developed in HTML form and evaluative logic in ASP.NET architecture. This information was recorded on MySQL data bank. The project had the participation of Endocrinology Services, Vascular Surgery, Nursing and Telehealth.

RESULTS: Developed a distance learning tool with attention to the skills needed to multidisciplinary teams, especially those working in Primary Health Care and Health Strategy Family in order to promote continuing education on the management of diabetic foot.

These data demonstrate the need for training of Primary Health Care and Health Strategy Family professionals to deal with this disease more effectively, thus avoiding unnecessary referrals to overwhelm tertiary health centers, creating thus an unmet demand for these services.

It is essential training of interdisciplinary teams (medical doctor, nurse and practical nurse) in primary care, for the classification of risk and control of the initial clinical complications of the feet of diabetics, by protocols and flowcharts, with secondary and tertiary levels, offering specialized and immediate care (with clear guidelines of reference services).

CONCLUSIONS: The correct evaluation of a diabetic patient is crucial in accurate indication of changes in lifestyle and prescription drugs for proper control of this chronic, multifactorial disease.

It is a virtual tool, available online for all health professionals through telehealth, therefore, includes real-time of all professionals, in order to simulate in a virtual environment, real situations experienced in medical practice, and allow the display of scientific content.

The instrument allows the identification of theoretical and practical weaknesses presented by professionals related to the management of diabetic foot.

The instrument can be used as developed skills and evaluation as a support bracket for permanent education.

The data show the need for training of Primary Health Care and Health Strategy Family professionals to deal with this disease more effectively, thus avoiding unnecessary referrals to overwhelm tertiary health centers, creating thus an unmet demand for these services. ■

Diabetic foot. Diabetic foot screening. Risk assessment. Health informatics. Tele-education

Using WhatsApp on Adolescent Health Education

Gláucia Regina Motta da Silveira Castro[1]; Alexandra Maria Monteiro[2]; Stella Regina Taquette[3]

INTRODUCTION: In a study with college students, using "WhatsApp" as an instrument of informal education with a face-to-face control group, was established that the level of learning presented important differences in the process. Being the group where used the "WhatsApp" which presented a more uniform growth, showing it to be a very useful instrument in the discussion of educational content (AMRY, 2014). In this way, it is considered to be essential the study of this tool in order to use it for the development of new forms of education in health that are at once attractive and effective in addressing adolescents and its use in health education is our object of study. In order to capture deeper levels of perception of teenagers, we decided to perform a case study with a qualitative approach to analyze the perceptions of adolescents regarding the use of WhatsApp in health education activities. This study is justified by the need still current to promote adolescent health through education and by radical change suffered in ways and means of communication from the advent of the internet, which resulted in a change at the interests and at the form of relationship used by them.

METHODS: The subject of this study will be teenagers that participating in educational activities in a health primary care service to Adolescents. The Teenagers will be invited to participate in the study during the educational activities sections of the waiting room. After the accepting of the invitation, the reseacher will read the term of informed and free consent and will answer questions of the teen and of his responsible as to the study, which then will be asked to sign the term.

The subjects and their responsible will receive a copy of the term signed by the researcher with contact details for further information or requests. The criteria for inclusion of adolescents will be: access and use the Internet frequently, at least once a day by phone, be "WhatsApp" tool user, be user of alcohol or having a friend or a closer relative that use alcohol more than once a week. The exclusion criteria will be: have disease or any problem that may influence its capacity of perception of the subject and/or in their ability to interact with the group.

The approach of the subjects and the data collection will be from the creation of a virtual community by using the tool "WhatsApp". The community will consist of paired form in gender and age and composed of ten to twelve participants. In order to ensure the anonymity of the subjects, the teenagers who accept to participate in research, will receive new phone numbers chips and a unique password that will be asked for confirmation of your access to the Group and will guarantee your identity to the researchers and anonymity in the group. The activities of the group will be scheduled to occur at agree with the participants hour, however, the participation of the subjects can occur synchronously or asynchronously, as occurs usually in communities of WhatsApp.

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RESULTS: The virtual community will be used in two phases: a first time will be held an educational activity on the topic "problems related to the use and abuse of alcohol" and a second time where will be held a focus group about the perception of the Group about the use of the tool in the educational activity. Teenagers will be stimulated by the moderator by dialogues, pictures, videos and/or sounds and songs to address the issue the way they prefer. The virtual community will be available throughout the period of application of the educational activity and data collection, and will be closed in view of the discretion of the saturation of answers.

The answers participants of the focus groups will be saved and the data collected will be categorized and analyzed in the light of the theoretical framework.

CONCLUSIONS: This study will be submitted to the Research Ethics Committee, getting the data-collection stage dependent on approval by this Committee. To the subjects will be guaranteed all rights related on the human being research standards of the National Council of health. On the occasion of the call to the research, the subjects and their responsible will be informed of all potential discomforts and benefits of the study, being guaranteed their anonymity and remoteness of the research at any time, simply by the lead researcher is informed in advance.

The results of this study will be disseminated through publications and scientific presentations. ■

An evaluation of regional community-based cardiac tele-rehab programs

Katelin Gresty[1]; Jennifer Harris[2]; Jennifer L. Reed[3]; Judy King[4]

INTRODUCTION: Making quality healthcare services accessible for people living in rural areas in a large geographic country such as Canada is challenging. The greatest barriers to access include limited resources and infrastructure; lack of culturally and linguistically appropriate services; availability of transportation; and, distance required to travel for services. Canadians living in rural, remote or northern communities have higher all-cause mortality rates when compared to Canadians living in urban areas. Telemedicine programs in Ontario, the most populated province in Canada, have resulted in patients avoiding 237.221.884 km of travel and the equivalent of $60M CAD in costs. Continued development of telemedicine programs, such as Tele-Rehab, will be an essential to improve access to healthcare services in rural regions. The University of Ottawa Heart Institute (UOHI) and its regional partners have expanded their cardiovascular rehabilitation programs into four rural communities through video telecommunication. The goal of this project was to complete a mixed methods quality assurance evaluation of involved community-based programs to measure potential changes in clinical outcomes from baseline to follow-up, and describe the experiences of the participants and administrators involved in the community based Cardiac Tele-Rehab programs and to identify facilitators and barriers to participation and delivery.

METHODS: Healthcare professionals trained by the UOHI staff deliver the Cardiac Tele-Rehab programs independently. Patients participate in two one-hour sessions per week for 8-12 weeks. Each session begins with a 10-minute warm-up activity, followed by 30 minutes of moderate-intensity individually prescribed aerobic exercise, and ends with gentle resistance training and an educational session. The remote program is completed in conjunction with patients at the UOHI, but is operationally independent. The quantitative component of this evaluation included previously collected baseline and follow-up measures completed by the community-based Cardiac Tele-Rehab programs. Measures included resting heart rate (HR); blood pressure (BP); weight; height; waist circumference (WC); six minute walk test (6MWT); Duke Activity Status Index (DASI); Godin Leisure Time Exercise Questionnaire (GLTEQ); SF-12; and, lipid profiles. Changes in quantitative measures from baseline to follow-up were examined using paired t-tests. All quantitative data are presented as mean ± SD. The qualitative component of the evaluation used a general descriptive approach within a constructivist paradigm. The data collected provided descriptive information about the impact and overall satisfaction of the program from all parties directly involved as well as suggestions for improvement. Individual telephone interviews with program participants were conducted once they had completed their Cardiac Tele-Rehab program. A semi-structured interview guide was used to identify barriers and facilitators to participation from the participants as well as their overall experiences with the program. The experiences of the program administrators were collected through a focus group. The focus group consisted of the healthcare professionals who administered the Cardiac Tele-Rehab programs. A descriptive analysis was performed on the transcribed interviews and focus group, and main themes were derived. Data analysis was undertaken using an inductive thematic analysis approach.

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RESULTS: Interim analysis was performed with 23 participants. Initial data analysis demonstrated that there was a significant improvement in time spent in vigorous intensity aerobic physical activity per week after completion of the community-based Cardiac Tele-Rehab program (baseline: 0 minutes per week vs. follow-up: 15.4 minutes per week, p=0.030). A significant improvement in 6MWT distance upon completion of the program was also observed (baseline: 497.1 m vs. follow-up: 534.3 m, p=0.042). Notable trends (p>0.05) for improvement in total physical activity minutes performed per week (baseline: 161.3 min vs. follow-up: 213.9 min, p=0.217) and Godin Leisure Time Activity Score (baseline: 22.3 vs. follow-up: 35.7, p=0.058) were also detected. No significant changes in other outcome measures were observed at this time. The qualitative sample was comprised of participants from three of the four programs including males and females (aged 56 to 78 years). Transcripts were analyzed to derive the main facilitators and barriers to participation in the community-based Cardiac Tele-Rehab programs. The two main facilitators to participation that emerged included distance from program location, and feelings of community. Concerning the barriers to participation, the two common themes that emerged included difficulties with video telecommunication equipment, and challenges with logistics of program delivery. The focus group of program administrators is scheduled to be conducted in July 2015. Results will be reported in the final version of this report in October 2015.

CONCLUSIONS: The aim of this evaluation was to measure potential changes in clinical outcomes as well as describe the experiences of the program participants involved in the community-based cardiac Tele-Rehab programs. Our preliminary results suggest that community-based Cardiac Tele-Rehab programs may be effective at improving physical activity participation and functional capacity. The facilitators and barriers to participation identified through this evaluation enabled us to ascertain that the community-based Cardiac Tele-Rehab programs are providing residents of small rural communities access to cardiac rehabilitation that would have otherwise been unfeasible. Questions that remain to be answered surround the necessity of the continued connection with the UOHI once the community-based Cardiac Tele-Rehab programs have successfully launched. It also remains to be determined whether the services currently being delivered through the video telecommunication technology could be delivered by another method. Continued research in this field to demonstrate the importance of these types of programs will contribute to further funding and expansion of services, making cardiac rehabilitation available to even more residents of rural communities. ■

e-Prevention in Latin America and Caribbean

Veronique Inés Thouvenout[1]; Alfonso Molina[2]; José López Rodas[3]; Wilson Delgado Azañero[4]; Lady Murrugarra[5]

INTRODUCTION: Telemedicine in the developing world mirrors prevention activities to a large extent. The primary benefit of telemedicine lies in facilitating remote access to prevention and care (i.e. by increasing speed of access and/or reducing cost of access). It is thus a technique which can be used to reduce inequity of access to health care. Since the developing world contains many examples of barriers to accessible health care, there are good reasons for supposing, a priori, that telemedicine would be a useful technique in the 21st century.

Although formal health economic studies have not been performed, there is some limited information about costs and benefits. The developing world contains some 5.400 million people in 127 countries. Suppose that one in every 10 people sees a health-care professional each year, and that in one in 100 of these interactions, the health-care professional concerned would like to seek a second opinion. Then there would be some 5 million referrals to be dealt with each year.

Objective: e-Prevention's goal is to accelerate technology development, deployment, and implementation for sustainability and widespread public health impact.

METHODS: The agreement covers the three following axes:

(a)Telemedicine: support to various forms of investigations on knowledge and skills of participating nurses / personal in the hospital, health center;

(b) Library: support to investigations for access to informational resources; public cabins;

(c) e-Prevention Contents & quality service: Support to generate the bases for the establishment of strategic alliances between the public institutions and participant organizations of the civil society with a view to the implementation of joint initiatives or to the collaboration in concrete actions in strategies for the prevention in the region doing use of the ICT. The adoption of measures would be due to encourage to facilitate the access to the Internet and to increase in general the knowledge of the ICT. Sufficient diversity to serve individuals and communities.

RESULTS: To support the visibility and dissemination of the development of an e-Prevention.

CONCLUSIONS: The information and communication technology (ICT) 'revolution' has been hailed as the enabling force for developing countries to become more active participants in the global economy. Developed countries are concerned about how to address the dramatic changes in development, urbanization, ageing environmental shifts that are modifying in the diseases.

Two cultural factors, language and education matter a lot in ICT application by young generation.

The use of education technology to make a difference is not just providing nurses with access to ICT, but also providing integrity properly in the hospital by using the appropriate application at different areas. ■

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Telehealth and Speech-language Pathology and Audiology analysis of a training program in genetic syndromes in two Brazilian states

Luciana Paula Maximino[1]; Mirela Machado Picolini-Pereira[2]; José Luiz Brito de Carvalho[3]; Lyana Caravalho e Souza[4]; Wanderléia Quinhoneiro Blasca[5]

INTRODUCTION: With the high occurrence of genetic anomalies in Brazil and the communicative disorders manifestations associated to these conditions, the development of educative actions that comprise these illnesses can bring unique benefits in the identification and appropriate treatment of these clinical pictures. In this context, the practice of telehealth in Speech-language Pathology and Audiology becomes a viable alternative. The objective of this study was to develop and to analyze an educational program on genetic syndromes for students of elementary education in two Brazilian states using a model of Interactive Tele-education.

METHODS: The study was carried out in 4 schools: two in the state of São Paulo, Southeast Region, Brazil, and two in the state of Amazonas, North Region, Brazil. Forty-five students, both genders, aged between 13 and 14 years, of the 9th grade of the basic education of both public and private system, were divided into two groups: 21 of São Paulo Group (SPG) and 24 of Amazonas Group (AMG). The educational program lasted about 3 months and was divided into two stages including both classroom and distance activities on genetic syndromes. The classroom activity was carried out separately in each school, with expository lessons, graphs and audiovisual contents. In the activity at a distance the educational content was presented to students by means of the Interactive Tele-education model. In this stage, the students had access a Cybertutor, using the Young Doctor Project methodology. In order to measure the effectiveness of the educational program, the Problem Situation Questionnaire (PSQ) and the Web Site Motivational Analysis Checklist adapted (FPM) were used.

RESULTS: The program developed was effective for knowledge acquisition in 80% of the groups. Results of the ELASI showed the educational program provided more favorable attitude in relation to the inclusion of these individuals with genetic syndromes in both groups. FPM showed a high satisfaction index from the participants in relation to the Interactive Tele-education, evaluating the program as "impressive". No statistically significant differences between the groups regarding type of school or state were observed. Thus, this tool can be used for educational purposes in genetic syndromes of other populations, in several regions of the country.

CONCLUSIONS: We developed an educational program in genetic syndromes for elementary students, using Interactive Tele-education. The application of this model with classroom and distance activities proved to be an effective program of health education for achieving high motivational satisfaction for the proposed population. There were no statistically significant differences between the groups regarding the type of school public or private or the evaluated Brazilian state, another finding that reinforces that this tool could be used for training in genetic syndromes for other populations and other regions of the country. ■

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Interactive teleducation: Technical-Scientific exchange between professionals who work with cleft palate

Luciana Paula Maximino[1]; Ticiana Cristina de Freitas Zambonato[2]; Mariza Ribeiro Feninam[3]; Mirela Machado Picolini-Pereira[4]; Wanderléia Quinhoneiro Blasca[5]

INTRODUCTION: Due to the intense relationship between cleft palate and hearing loss, this work had as objective to develop and to analyze the effectiveness of a virtual environment of transmission of information on cleft palate and hearing loss for professionals, with the use of Interactive Teleducation.

METHODS: As methodology, an environment of learning in blog format was developed, containing information about cleft lip and palate and hearing loss, encompassing specific content directed to the incidence, etiology and types of cleft lip and palate; hearing loss; selection and adaptation of hearing aids, functioning of the auditory tube, otitis media, etiology of the alteration of the middle ear in individuals with cleft palate, influence of the otitis in the language development; treatment for otitis media: surgical intervention and systematic follow up and adaptation of hearing aids. This blog was made available on the Internet, and the evaluation was made through two questionnaires, being the first one Emory (Emory University Rollins School of Public Health 1998), translated into Portuguese (BASTOS, 2011), and the second questionnaire corresponds to the specific evaluation of the blog content.

RESULTS: The evaluation was carried through by 75 professionals of the HRAC-USP-Bauru and others, through spontaneous demand. The blog was elaborated and made available on the web on the address: *www.fissuraeaudicao.wordpress.com*. In the analyzed period from August 2010 to June 25, 2012, there were 13.746 visits, being the most visited page about cleft lip and palate - types of cleft lip and palate, with 4.064 accesses. In addition to Brazil, several countries accessed the contents of the blog. The most used search term was "auditory tube". The majority of the blog evaluators (70.7%) consisted of professional Speech and Language Pathologists. Of these, 89% considered the blog excellent and 11% adequate. In regard to the content, out of the 70 professionals who had answered this questionnaire as a whole, 69% had considered it excellent, 27% adequate and 4% considered the content poor, being these last ones Speech and Language Pathologists.

CONCLUSIONS: Thus, a virtual environment, in blog format, containing information on cleft palate and hearing loss for health professionals was developed and evaluated by the majority of the judges as excellent. ■

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Analysis of the implementation of Tele-Education in Tuberculosis in the Municipality of Praia Grande

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INTRODUCTION: The optimization of the resources spent by health systems has been shown to be obligatory for all Nations, irrespective of their economic strength.

In this perspective, the basic attention increasingly assumes importance in improving the quality of life, being the first point of attention and the main gateway of the unified health system. On the other hand, the growing volume of knowledge produced prevents your appropriation by health professionals, requiring continuing education and support of specialist centres. In this context, the national Telehealth Networks Brazil presents itself as representing a resolutive opportunity outreach proposal by integrating technology, communication and permanent education, tools for improving the quality of health care. In parallel to the evolution of telehealth implementation, grows the need to better evaluate it in relation to its effectiveness in producing quality products and services and in appropriate volume to demand.

Objective: analyze the implementation of an activity in tele-education about tuberculosis in the municipality of Praia Grande SP. To this end, seeks to identify the facilities and difficulties experienced by the professionals in the use of the tool, describe the expectations of health professionals regarding telehealth and verify the impact of tele-education in the daily work of health professionals.

METHODS: The present work is characterized by an exploratory descriptive study with a qualitative approach. The universe of research included 30 health professionals between nurses, doctors and dentists working in the ESF in the municipality of Praia Grande, which were designated by the Municipal Health Secretariat, after University have offered free travel to their managers.

The course: "training in tuberculosis. Disease control and prevention" was conceived by the research group "health education Technologies" of the Catholic University, in partnership with the Instituto de Infectologia Emílio Ribas (IER) and the Centre for the epidemiological surveillance of the State of São Paulo (CVE). Based on the recommendations for Manual control of Tuberculosis in Brazil-Ministry of health, 2013, was predicted for ten weeks of activities. Each week, students accessing at least one video produced by the group, a set of text and performed an interactive activity (Forum, text production, resolution of questionnaire). Completing the activity, there was discussion of a case as a means of evaluation. As virtual learning environment, was used the moodle platform, customized by the University.

The professionals were previously registered in the Telehealth Program Brazil networks. Were excluded from the study

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the professionals who have not completed the course. After the end of the course, the subject of research (11 professionals who have completed the course) were contacted and, after signing the informed consent – FICS, responded to a questionnaire with semistructured questions were defined. The answers were recorded and the secrecy was guaranteed.

All the recordings were transcribed in detail, faithful to declarations; after this procedure, began the stage of categorization of data through exhaustive and repetitive reading of depositions transcribed, aiming to identify the most relevant information. Before this, based on an analysis of the discourses, emerged some categories, analyzed below.

RESULTS: The use of tele-education as rational strategy for the professional qualification of evidence emerges as first element contents to the proposal. The process for EAD has practical character, by avoiding the displacement and facilitate daily work, enabling access to information for the acquisition of new knowledge, as updating the content already learned as an undergraduate. Suggests the introduction of new courses, with new themes.

A second category is referred to as express real impact on professional performance after using the tele-education, depending on the development of critical reflection in relation to the information, in order to apply them later in your daily work.

The stimulus that comes from reflection, in part, the participation of professionals who participated in the course videos, sharing its expertise in the control of tuberculosis. Most of the subjects of the research reported change in job performance after the course depending on the presentation of concrete examples. Changes in the approach to the patient, as well as exchange of experiences between professionals and drive greater reflection of its role in the control of tuberculosis were some of the items punctuated by professionals.

As third category, emerges the need for real support of the managers for the implementation of tele-education. Reports of lack of structure for the realization of the course during business hours, as the proposal of the programme, was a common point to all respondents. The difficulty in being released by the local Manager of the drive is also aimed at some testimonials, left the course in time other than professional.

Although it is not the scope of the study, but the analysis of the interviews expose additional difficulties as public policy, presented by other works consulted, which is the grip of the local Manager, physical structure consistent and actual availability of health professionals.

CONCLUSIONS: It is concluded that the tool of tele-education is of great importance for the qualification of professional who works in the basic attention and for the improvement of the quality of the customer service of the unified health system. However, in order for your proposal to be achieved, it is necessary to raise awareness on the part of managers of the importance of permanent education of these professionals, including working hours, in addition to providing the necessary structure and organization, thus increasing the stimulus to these workers so that they exceed your difficulties in management and technology that can take advantage of its benefits. ■

Investigative Game: teaching and learning strategy in e-learning courses in Health

Maria Mirislene Vasconcelos Ferreira[1]; Ana Josiele Ferreira Coutinho[2]; Luiz Roberto de Oliveira[3]

INTRODUCTION: The growing integration between digital technologies of information and communications (TDICs) and distance learning (Odl) enable new learning strategies, among which the games stand out. These resources have been used as a health education strategy for the doctors of Professional Valuation Program of Basic Care (PROVAB) and the More Doctors Program, from the use of clinical cases allowing the use of this teaching format. In the course of Health of the Elderly Person an investigative game was developed in Unit III - Damages in the Elderly Health, contemplating the diverse themes which constitute it. The production of this feature came about thanks to a partnership between the Core Technologies and Distance Education of the Federal University of Ceará (UFC) and the Open University of SUS, with the aim of promoting learning through resolution of interactive clinical cases.

METHODS: The methodology to be used in this work will be quantitative usability, because the gauging of knowledge about the subjects studied in the teaching material of the course will be conducted through the game. The activities of the game, following pedagogical proposal of formative assessment, were divided into clinical cases addressing the following subjects: urinary incontinence, Parkinson's disease and tremor, Osteoporosis, Cognitive Assessment and Management, Depression, Imbalance and Vertigo. Each issue contains a clinical case with questions, each with five alternatives ("a" through "e"), only one correct, and each alternative has a feedback explaining the reason why it is considered right or wrong. A map of one region in Brazil was added on the screen of clinical cases, describing a religious, cultural and geographical curiosity, three cues to assist the player in question's answer, with a hint from a doctor, a hint from a family member and a hint from a patient of the clinical case. The game was thought in an illustrative way, where each subject has an elderly patient and an icon to identify the pathology of the theme.

RESULTS: The course will be offered nationally and clinical cases have been developed respecting the geographical divisions of Brazil. Through this course it is desired to promote better qualification for health professionals who work in PROVAB and More Doctors, particularly those who work with the elderly.

CONCLUSIONS: The challenge in the game takes the student to the task of seeking to make the correct answers in order to obtain a final grade. It was sought through this game not just a mere effort of memorization, but rather a means of strengthening the teaching process contributing to improve learning. It is expected to provide learning through ludic ways in order to promote the acceptance and adherence of medical students from courses mentioned as target audience. ■

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The unintended consequences of telehealth

Hassane Alami[1]; Marie-Pierre Gagnon[2]; Jean-Paul Fortin[3]

INTRODUCTION: Telehealth's role in improving access to quality health care, particularly in rural and remote areas, and supporting more effective and efficient health services is increasingly recognised. Over the last two decades, telehealth initiatives have bloomed around the globe, but its implementation remains very complex because of the many challenges and questions related to its use. Available evidence around telehealth usually deals with its benefits for patients, health care professionals, organizations or systems, but rarely are its negative or unintended consequences documented.

Objective: This study aims at identifying and analyzing some of the unintended, unanticipated and negative consequences related to telehealth.

METHODS: We used a multi-methods design, including: 1) a literature review on the unintended consequences of telehealth; 2) a secondary analysis of interviews and informal exchanges with stakeholders (physicians, managers, technologists, and project leaders) involved in a telepathology project in the province of Quebec (Canada). We performed a thematic analysis of content from published studies and interview transcripts.

RESULTS: We identified a total of 56 published studies that provided information about the unintended consequences of telehealth and analyzed transcripts from six individual interviews and five groups meeting (2-7 people per group) with stakeholders involved in the Quebec telepathology network. Unintended consequences can be grouped into the following themes: relationship between patient and healthcare professionals; information security, confidentiality, and privacy; recruitment and retention of health care professionals; and issues related to transborder practice. Telehealth is bringing numerous and important changes in the way health care is provided, but there is a persistent gap in research regarding the potentially deleterious effects of telehealth. Notably, telehealth modifies the nature of roles and relationships between health care professionals, but also between patients and their care providers. Moreover, telehealth brings up ethical, regulatory, economic and organizational considerations that should be considered before its implementation in order to avoid potential harms to patients, health care professionals and organizations. Furthermore, some issues related to the large-scale diffusion of telehealth should also appear on the radar from the early stages of telehealth projects in order to minimize potential threats.

CONCLUSIONS: This study provides a first attempt to synthesize unintended, unanticipated and negative consequences that should be considered when implementing telehealth services, particularly in this era of globalization. Future work is needed to identify which of these consequences could significantly jeopardize the benefits that have been associated with telehealth, especially for vulnerable populations. ■

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Cost comparison analysis of a telemedical platform as amendment of aeromedical retrieval services in Australia

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INTRODUCTION: Aeromedical retrieval services (MedEvac) are an essential element of emergency medical services especially in rural areas, remote regions, off-shore and in extreme environments. Patients benefit from the timely access to health care. MedEvac operations are usually controlled and supervised in a coordination center. Specialists in the center validate the data provided in emergency calls and use it for a decision-making process to decide whether MedEvac is necessary or not.

Telemedicine delivers health care services across distances. It can provide medical expertise to the point of care using e.g. video communication systems. Patient data and additional relevant information can be transmitted to medical experts in the coordination center or in hospitals improving the decision-making process.

Aeromedical evacuation of employees or citizens is very expensive for companies or for the public health care system. Consequently a reduction of unnecessary evacuations could create a financial benefit for the sponsors. To determine the cost savings for a customer using telemedicine, a cost-comparison analysis (CCA) was carried out for Australia where aeromedical retrieval services are day-to-day business due to long distances and extreme environments.

The main topic of the CCA is the comparison of aeromedical retrieval services with and without the amendment of telemedical services.

METHODS: To determine the economic potential, a CCA was carried out using data on current costs and prospective financial benefits.

Literature search: The most frequent illnesses and injuries in the oil and gas industry were determined in a query on PubMed. Articles published before 2008 were omitted to include only recent data. The publications had to be in the context of telemedicine. Articles on health economic evaluation in the field of telemedicine were identified as well. The articles should not have been published before 2002.

Health economic evaluation: The cost-comparison analysis should identify the break-even when the amendment of telemedicine to aeromedical retrieval services provides a financial benefit to a customer. The average costs per hour of MedEvac of a service provider in Australia, the CareFlight Group Queensland, were calculated. Next, costs for a telemedical platform were estimated and included into a calculation that considers the potential avoidance of aeromedical retrieval. A telemedical platform fulfilling the requirements of an oil&gas company and providing telemedical services from physicians of 6 disciplines to 10 remote stations has been designed basing on equipment of the Scotty

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Group Austria GmbH. Scotty is providing their equipment e.g. for the Telemedical Networks of the German Armed Forces. The health economic evaluation assumes that the technology is used for 5 years before being renewed.

RESULTS: The platform consists of a system located at the coordination center capable to link remote stations and medical experts (AUD 57,140), 6 systems located at different medical experts (AUD 120,000) and 10 portable systems located at the remote stations, e.g. offshore rigs (AUD 564,500).

Total technology costs are AUD 741,640.

Medical experts are paid on a flat-rate premium of AUD 2,000 per month.

6 experts x 60 months X AUD 2,000 = AUD 720,000.

Costs for the staff at the coordination center is estimated as 1 person at AUD 150,000 per year

AUD 150,00 x 5 years = AUD 750,000.

720,000 (experts) + 750,000 (staff) + 740,000 (technology) =AUD 2,210,000

Overhead costs for communication and premises and running costs are estimated and determined at 10% of the total system costs = AUD 221,000.

Total service costs are AUD 2,431,000 or AUD 243,100 per remote station within 5 years.

This corresponds to yearly costs per remote customer station of AUD 48,620

Costs for medical evacuation: In the business year 2012 to 2013 CareFlight Group Queensland performed 575 life-saving helicopter missions with average costs of AUD 12,000 per four hours flight time. That results in costs of AUD 7,187,500 for lifesaving helicopter missions in one business year. Costs per hour are AUD 3,000.

Literature shows that some 14% of the MedEvac were not necessary. For CareFlight this would be some 80 helicopter missions of average 4 flight hours, a total of 320 flight hours, or 960.000 per year.

But CareFlight doesn't exclusively serve offshore rigs or mines but other customers like the public sector as well. Thus the calculation bases on costs per hour of evacuation which are AUD 3,000 to be able to calculate a break-even point for the remote station from the customers' point of view.

The costs for a remote station amortize after 48,620/3,000 per hour = 16.2 hours of avoided flights per year.

16.2 hours (to be saved) / 14 x 100=118 hours (MedEvac overall)

A telemedical service for remote locations where aeromedical retrieval is day-to-day business in medical emergencies provides an economic benefit if the average number of hours paid for retrieval exceeds 118.

Basing on the assumed rates the break-even is reached when a remote site pays 118 hours x AUD 3,000= AUD 354,000 or more per year for aeromedical retrieval.

CONCLUSIONS: Recent analysis showed that telemedicine is able to prevent unnecessary helicopter evacuations due to the additional information provided in comparison to emergency calls via telephone or radio.

Offering telemedical emergency assessment to improve the decision making process on aeromedical retrieval can be a unique selling proposition (USP) for MedEvac providers as they avoid unnecessary evacuation and thus convince customers to contract them.

A business model could for instance base on a pay per use billing. But to calculate the appropriate rates it is of interest how often the service would be used for non-critical cases of illnesses and injuries as well to deliver medical expert support quicker.

Oil, gas or mining industry benefits from the avoidance of aeromedical evacuations as much as from a prompter medical care for their employees avoiding disease- or injury-related absenteeism even in non-critical cases.

Telemedicine thus can create a win-win situation for both providers and their customers if the break-even is reached or surpassed. ■

Self-instructional courses as learning tools for Health Professionals

Matheus Manzano Machado[1]; Paulo Roberto Volpato Dias[2]; Márcia Maria Pereira Rendeiro[3]; Marcelo Henrique da Costa[4]; Renata Fernanda de Morais[5]

INTRODUCTION: According to Moreira et al (2014), domestic violence and its impact on health has been object of research in public health field, demonstrating that this is a phenomenon of high prevalence and major impact on mental and physical health.

The paper presents the learning perception achievements by students of the distance learning and self instructional course "*approach of violence in the home care*" and have as objective to analyze their profiles and map their learning perception, outlining the favorable aspects to the implementation of self instructional courses as a learning tools' trend for health professionals in large scale.

The course examines the impact of violence on health, on family environment and on professional everyday of home care, by guiding health professionals in the approach of violence, covering the processes of identification, management and forwarding.

This free access course was developed by the core of the Open University of the Unique Health System of the University of the State of Rio de Janeiro (UNA-SUS/UERJ), through a software runned on a Virtual Learning Environment (VLE) called Moodle, and adopting the exploitation of resources that encourage students' autonomy as a pedagogical strategy in their teaching and learning processes.

METHODS: It is a qualitative-quantitative, cross-sectional and observational study, to analyze the profiles of the students in the course "*approach of violence in home care*" and map their learning perception.

For this, we used data extracted from the "*User Profile Form*" and the "*module evaluation form*" available in the moodle VLE.

All percentage surveys presented in this paper represent the averages drawn from the analysis of student perception data about 10 relevant themes of the general content of the course. These data were analyzed on a 0-5 scale, where the lowest grade indicates any knowledge in the field, and 5, indicates a good knowledge.

The forms were developed with the moodle feedback module, which allows you to create online forms and automatically generates the graphical analysis of the responses, allowing the export of data in excel spreadsheets.

The "user profile form" approached the student's general profile collecting gender information; geographic data; digital profile for browsing habits and infoculture absorption; familiarity with digital devices; learning autonomy and experience with distance learning courses. Also in this form was a self-evaluation about the prior knowledge perception

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of the topics to be covered in the course.

The "*module evaluation form*" approached the student's level of satisfaction regarding the course's methodological, educational and mediatic criteria.

Finally, this form used a self-evaluation about the same topics covered in the course, during the period of its offer and / or after its completion, in order to map the evolution of the student's learning perception.

Data were tabulated and compared in percentage analysis in order to enable an accurate assessment of the above mentioned indicators, since before the start of the course's offering to its end.

RESULTS: It was found that 26.75% of the students enrolled in the course responded to the forms. The profile analysis of the students showed that they are, in majority, female professionals (86%), prevailing the general age group from 21 to 40 years (73%) and highlighting Southeast (43%) and Northeast regions of Brazil (31 %).

Regarding the professional profile, the predominant area of operation was nursing (40%). Among the relevant data from the survey of digital profile, it is highlighted that 90.4% of the students already performed online courses, 82.4% use computers every day, 94.4% access the internet daily or more than once a day, 66% remain one to three hours a connected access, 88% own Facebook profile.

As regards the level of difficulty in the assimilation of computer technological resources used in the VLE, 73.7% of the students has great ease and only 1.9% have great difficulty.

The use of self-instructional courses as a teaching method, aims to encourage self-learning, making students aware of their responsibility of professional development and capable to involve the acquired knowledge in decision making when performing a procedure in the clinical field.

Other relevant data were mapped referring to the students' infoculture level: 68.3% carry out academic research, 69.4% use virtual scientific libraries and 68.7% read newspapers and / or digital magazines.

According to the results of the comparative survey regarding the students' prior knowledge perception and learning perception about the course topics at level 5, there was an average increase of 51.78%. But the comparison of the students' lack of knowledge perception about the same issues, surveyed after the course, showed zero percentage for this situation. These two assessments show a significant evolution in the students' learning perception.

Based on these data, we estimate that the average corresponding to the evolution of the students' learning perception at level 5 and reduction of lack of knowledge (level 0) were, respectively: 14% to 62.5%, and 7.3% for 0.0%. This reveals a significant curve of evolution.

For the self-evaluation related to the quality of the course methodology and its learning objects, the average approval reached 96%, which demonstrates the quality of mediatic and educational interaction, of the questioning of developed themes and of the andragogical practices.

CONCLUSIONS: This work shows favorable indicators for investment in self-instructional courses as learning tools in health education.

By analyzing their potential scope for the number of subscribers and target audiences, its portability of access and

logistical simplicity of implementation, due to the absence of mentoring, supervision and on-site events, we conclude that self-instructional courses represent an efficient alternative of enhancement for health professionals. This is evident when we point out that the professional demand of them often does not allow attendance commitment or even an admission in monitored distance education courses, with more inflexible access requirement.

Significant numbers in this study indicate a great potential to stimulate self-learning and infoculture. This enabled students to realize a major evolution of learning perception throughout the course.

By concluding that the modality of distance education has great potential for technical enhancement and applicability of market and research, it becomes a gateway to other courses that will approach priority issues for the brazilian unique health system.

In this way, we can propose and glimpse the establishment of self-instructional courses as learning tools in order to become an investment trend in health education, promoting so, the fomentation of the distance education culture. ■

Ethnic differences in patients accessing telephone based healthcare in the UK: A cross-sectional study comparing use of the NHS 111 medical helpline with Emergency Department attendance

Meena Rafiq[1]; Jessica Carter[2]; Lanlin Liu[3]

INTRODUCTION: Emergency departments in the UK are reaching breaking point. With attendances at an all time high, alternative health services are needed to relieve pressures on departments. There are a number of existing 'out-of-hour' and urgent care services available in the UK, but poor public awareness and confusion about which services to use and how to access them has resulted in inappropriate use of emergency departments.

NHS 111 is a new medical helpline introduced in April 2013 to provide a single point of access for patients to call with urgent but non-life-threatening health issues. It delivers telephone healthcare advice or triages patients to the most appropriate local services, to improve access to urgent care services. The increasing diversity of the UK population means that, to be widely effective, the helpline must be accessible to all ethnicities. Previous studies have shown underutilization of similar telehealth systems by ethnic minorities. This is the first study to investigate utilization of NHS 111, one of the largest UK telemedicine programs, across different ethnicities and compare this with local emergency department attendances. It aims to understand ethnic differences in patient groups engaging with face-to-face versus telemedicine services, to help identify potential barriers to accessing telehealthcare.

METHODS: Data was collected from NHS 111 call logs submitted to the South East London Commissioning Support Unit over a one-year period, between July 2013–July 2014 and from Emergency Department attendances at Kings College Hospital, based in South East London, between April–June 2014. Missing data and cases where ethnicity was not declared were excluded from the analysis. Ethnicity data was available for 134,243 NHS 111 calls (78.5%) across 6 South East London boroughs and from 33,742 (95%) Emergency Department attendances. Ethnicity was classified according to the Office for National Statistics (ONS) census categories to ensure consistency and allow for statistical comparison.

Expected frequencies for NHS 111 calls and Emergency Department attendances for each ethnic group were calculated using percentages from population data for South East London, obtained from the ONS 2011 UK census. Chi Squared analysis was performed to compare actual NHS 111 and local Emergency Department usage for each ethnic group with the expected usage, and to test for statistical significance ($p<0.05$).

RESULTS: There was a statistically significant difference in the proportion of calls to NHS 111 from each ethnic group when compared to the constituent local population using Chi Squared analysis ($X=25530$, $df=15$, $p=<0.001$). Calls from white british individuals to NHS 111 were significantly higher than expected and presented the greatest over-representation, with a standardized residual (SR) of 54.96. NHS 111 usage was also statistically higher than expected

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in mixed white and black caribbean, indian and pakistani individuals (SR=11.06, 7.74, 6.93 respectively). The poorest engagement with the NHS 111 helpline was seen in black african and black other individuals, with SR of -46.29 and -49.78 respectively. White other, chinese and asian other patients were also underusing the service, with significantly lower than expected call numbers (SR=-32.50, -31.82, -27.56 respectively).

When comparing NHS 111 calls with local Emergency Department attendances according to ethnicity, significantly contrasting results were found. Black other patients accounted for the greatest overrepresentation of Emergency Department use, with significantly higher than expected attendance rates (SR=108.04). This was also seen in any other unspecified, white other and black african patients, who were found to attend Emergency Departments significantly more than expected (SR=41.85, 27.24, 16.34 respectively). High usage of both the NHS 111 helpline and Emergency Departments was seen in Black Caribbean (SR=5.40, 36.73) and mixed other patients (SR=39.21, 11.24). The greatest underrepresentation of Emergency Department use was seen in white british patients, with attendance rates significantly lower than expected (SR=-54.11). This was also seen in mixed asian, mixed white and black caribbean, chinese and indian patients with SR's of -13.36, -12.96, -12.11, -11.72 respectively.

CONCLUSIONS: Variation in patients accessing the NHS 111 helpline and presenting to Emergency departments is influenced by ethnicity. Ethnic groups with the greatest uptake of NHS 111 had lower than expected Emergency Department attendances (white british, mixed caribbean and white, indian). Conversely, ethnic groups with poor uptake of the NHS 111 helpline had higher than expected Emergency Department attendances (black other, black african, white other). Some groups demonstrated high usage of both services (black caribbean and mixed other). These findings suggest that introduction of the NHS 111 telehealth line may be related to reduced Emergency Department attendances in select ethnic groups where implementation has been successful. There is still poor uptake of the NHS 111 helpline in specific ethnic groups and further studies are needed to identify potential obstacles to accessing the NHS 111 telehealth service in these patient populations. Understanding and addressing these barriers is essential to optimize the potential of telehealthcare and ensure equal opportunity in accessing it. ■

Assessment of health informatics competencies in training of undergraduate healthcare professionals in Rwanda

Nishimwe Aurore[1] ; Marc Nyssen[2]; Ngenzi Joseph Lune[3]

INTRODUCTION: The concept "health informatics" is a discipline that is as old as healthcare itself. It was born the day a clinician first wrote down some impressions about a patient's illness, and used these to learn how to treat the next patient. Healthcare professionals often lack knowledge of systematically processing data and information which affects the decision-making process. Furthermore, in order to enhance their practices through better use of information resources, healthcare professionals are often asked to use information technologies for which they have poor appreciation and limited skills. Nevertheless, as more health information technologies become part of the health care environment, the need for healthcare professionals with health informatics competencies is growing.

Aim: The aim of the current study is to assess health informatics competencies in existing curricula for training undergraduate health care professionals in Rwanda.

METHODS: A descriptive cross – sectional study with a review of document approach was conducted. Using a census method, the study assessed thirty curricula designed for training undergraduate health care professionals in University of Rwanda, College of Medicine and Health Sciences during the academic year 2013 - 2014. The college consists of 5 schools: the School of Medicine and Pharmacy, the School of Health Sciences, the School of Dentistry, the School of Nursing and Midwifery and the School of Public Health. The College of Medicine and Health Sciences has been chosen because it is the only public healthcare professional training facility in Rwanda.

Data collection was carried out using a standardized questionnaire designed to assess health informatics competencies in undergraduate level. Data collection was done in October 2014 after the study was granted an explicit authorization from competent authorities.

SPSS 21 was used for data coding, processing and analysis. Frequency tables were used to summarize categorical variables. Descriptive statistics were used to describe numerical variables. One-way ANOVA was used to compare means differences across schools and undergraduate programmes.

RESULTS: Only 11 out of 23 competences (47.8%) had a score of presence greater than 50% in the assessed curricula. Use of personal application software for documentation, ability to use personal computers, Ability to communicate electronically and basic informatics terminology were the most frequent competencies in curricula and each one accounted for 70% (n=21). Socio-organizational and socio-technical issues and methods of project management and change management were totally absent from the assessed curricula. Weakly represented competences were decision support systems (3.3%), methods for decision support and their application to patient management (3.3%),

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the principles of medical decision-making (6.7%), and the need for systematic information processing in healthcare (10%). The remaining competencies had a presence score between 10 and 50%. Health informatics competencies in Curricula from the School of Medicine and Pharmacy were significantly higher than others ($p<0.001$) and the Bridging program was less likely to contain assessed health informatics competencies ($p<0.05$).

CONCLUSIONS: There is a low presence of health informatics competencies in the studied curricula. To insure that healthcare professionals have the knowledge, skills, and attitudes to effectively and efficiently interact with today's health information technologies, more health informatics competencies need to be included and assessed in all undergraduate curricula leading to a healthcare professionals' qualification. ■

Short Message Service delivered in mobiles phones as tool to improve health education in stoke patients: a pilot study

Raquel de França Ferreira[1]; Pamela Cristina Oliveira dos Santos[2]; Rafael Elias de Lima Escalfoni[3]; Cláudia Maria Messias[4]; Vagner Wilian Batista e Sá[5]

INTRODUCTION: Technology applied to wireless phones has been a very promising field in whole world. It has revolutionized the lives of its users expanding channels of communications in voice and written data. The World Health Organization recognizes that advanced information and telecommunications technologies should be employed in all its extension, whenever possible, in order to create effective and transparent communication channels that allow sharing and interactive learning between the various groups in society.

Objective: We conducted a study to evaluate the usability and acceptability of the health education program using a technology of phone short message service (SMS) for subjects with stroke.

METHODS: A 14-day, prospective nonrandomized pilot study was conducted between February and April 2015. All study documents and procedures were approved by the Secretaria Municipal de Saúde do Município do Rio de Janeiro Ethics Committee (nº 466/2012). All participants involved in study were informed about the research procedures and agreed to participate by signing the consent forms.

Three subjects (2 femme, mean age ± DP; 53.0 ± 15.9 years) with unique event of stroke up to 12 months from diagnosis and been admitted to a stroke unit in the physical therapy clinic from Castelo Branco University. Socio-demographic and clinical variables and variables related to the level of autonomy (Barthel index in Portuguese) were applied as a pre-test. The survey form evaluating the impact of SMS were recorded as post-test. Data were analyzed using descriptive statistic.

The Short Messages were sent to the patients using a mobile phone (Samsung SIII – Android 4.2) with APP Mightytext (http://mightytext.net/) that send and receive SMS and MMS from computer or tablet, using your current Android phone number from anywhere including schedule messages, and text directly from email. Messages stay in sync with your phone´s SMS inbox.

Each subjects has received two messages a day, during 14 days, totalizing 28 messages delivered in randomized hours of the day. The SMS were elaborated from folders, web pages as from Associação Brasil AVC (http://www.abavc.org.br/), American Stroke association (http://www.strokeassociation.org/STROKEORG/), and papers from scientific literature.

RESULTS: The number of submitted SMS messages was 28 messages per patient with the total number of 42 messages over 14-days for all patients. A total of 3 phone calls were primarily made to ensure that the patients had received the messages at the middle the trial.

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The results of autonomy evaluated with Barthel index show low value to the male subject (4 points) and high value to the femme subjects (80 an 78 points) of the total from 100 points of the scale.

The SMS post-test form show that all subjects used cell phone for more than four years, and responded that the SMS delivered for 14-days have helped to understand the illness and healing process. All subjects answers that two messages delivered per day were considered sufficient, and messages were easy to understand, always using tips present in messages to learn about the stroke, and that would again receive messages via mobile health education in the future.

CONCLUSIONS: Text messages via short message service (SMS) have the advantage of instant transmission at low cost and, given the ubiquity of mobile phones, may be the ideal platform for the delivery of stroke patients. In addition, the SMS can be delivered directly to a particular individual mobile, or can also be used to send a single message to a large number of people. This pilot study showed that it is possible to use the technology of mobiles phones to realize health education as a tool to improve communication among professionals and individuals with stroke. A randomized controlled trial of longer duration is needed to assess the efficacy and sustainability of SMS-program included different phases of stroke. ■

Health Education: Educational Game For Guidance In Telecardiology

Raquel de Melo Rolim[1]; Marcia Maria Rendeiro[2]; Luiz Roberto de Oliveira[3]

INTRODUCTION: It is obvious that, in recent years, the bibliographical production in health grows apace around the world, contributing to the daily life of researchers and professionals in the sector. Among the means used to spread this production, social networks and video games have been growing in popularity, gaining fans and creating potential for use in all areas of health, aiming to facilitate the process of learning and socialization. The aim of this work is to develop an educational game with different educational interactive resources for the telecardiology area in order to provide to the physicians from the Telehealth Program Brazil Networks, who work in remote areas, the option to identify cardiology changes in their patients and to obtain support from a shift professional of telecardiology in the decision making.

METHODS: To achieve the proposed goal we will make use of quantitative research, in order to measure the usability of the game and its potential to facilitate the daily work of general practitioners in the field of basic attention. As target audience, at first, doctors who work in the unified health system (SUS) were chosen, in the State of Ceará and that use telecardiology services to help in the diagnosis of diseases. For the definition of professionals we will use the accessibility or convenience sampling to be selected in accordance with the available and representative informations for the study. For the elaboration of the game it will be used the knowledge and willingness of shift doctors working in the Telehealth Network in Ceará. The game will be developed using interactive learning resources, with the help of the Information and Communications Technologies-ICT's. The main focus will be to give priority to the use of text, video, clinical cases and animations, making it easier to reduce the cognitive load and the understanding of theoretical and practical foundations that subsidize the practice of telecardiology. The service will be offered by the Telehealth Core of Ceará, allocated in the Core Technologies and Distance Education in the Health Area of the Federal University of Ceará - NUTEDS/UFC. The application will be installed on volunteers' mobile phones for 30 days testing. After this period, volunteers will evaluate the usability features of the game and how these may influence in solving everyday problems of Basic Health Care. Results obtained during this period will serve to improve the application. This is an aspect with potential influence in improving the work of these professionals in order to stimulate and strengthen through good practices of telecardiology telehealth, conscious use of opinion formation in decision-making, prescription and discoveries of diseases.

RESULTS: It is expected, through the use of this game to improve knowledge about indications and best practices in the use of telecardiology and to widen the efficaciousness and basic quality in health. It is expected that the results of telemedicine, specifically of telecardiology, allowing in the near future, enter new areas in this context and raise awareness to these professional in relation to the rational use of resources for public health at the expense of quality

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services, minimizing the risks and loss. The use of the game, in this context, constitutes itself as a tool for training and constant updating of these professionals, supporting their permanent learning needs in the short, medium and long term on the basis of the presented needs and circumstances. Adaptability and flexibility in the construction of educational games, coupled with the ease in which they may be made available on mobile devices and therefore become differentials as specially suitable for the use with medical professional given the avalanche of new knowledge currently produced.

CONCLUSIONS: The intention is to understand the real performance of electronic educational game on skill development of professionals who use the telecardiology service of Telehealth Core of Ceará. In addition, the game will provide physicians with the opportunity to deepen their concepts and knowledge in the use of teleconsultation in cardiology and in second opinion formation, with expectation to assist this audience in the best use of the Telehealth Program. In confirming these expectations it is believed that the results can be extended to other areas of telemedicine, confirming some of the main features of the educational games as a competitive differential in distance education and permanent education in the health area. ■

Distance education in geriatrics and gerontology through the study of publications on the subject

Rejane Laeta[1]; Luciana Branco da Motta[2]

INTRODUCTION: The age profile of the population is changing all over the world. The United Nations (UN) estimates that it will have 2 billion people aged 60 or more in 2025. Nowadays in Brazil the elderly population is 12.6% or 24.85 million people.

In general, it is observed among the elderly clinical, social and functional characteristics as the prevalence of chronic diseases and the presence of multiple conditions which determine the complexity in diagnosis and treatment. It is estimated that 25-30% of people over 85 years have some form of cognitive impairment.

However, there are no specialists in sufficient numbers for the care of this elderly population in ever increasing numbers. Thus it is necessary to prepare health professionals to meet the peculiarities of this population.

In this perspective, Tele-education with the use of information and communication technologies can be a health professional training strategy.

Objective: This review study aims to reveal published works that have as theme training courses in Distance Education in Geriatrics and Gerontology offered to health professionals, emphasizing its features and characteristics of participating professionals.

METHODS: PubMed / Medline Search, from 2004 to 2015, using: Distance Education, Online Courses, Aging, Aged and Geriatrics. The focus was on studies that had the online training in geriatrics / gerontology, with multidisciplinary features.

RESULTS: Thirty six articles were included in this review. Among these, 31 were related to the theme of distance education courses with content in Geriatrics and/or Gerontology, and a total of 19 jobs had a multidisciplinary approach. Most studies discussed the implementation of programs and six of them also evaluated the programs. Three articles compared the face to face, EAD or mixed approaches. Others brought diverse themes as examples of tools to facilitate learning, using the Internet, pedagogical models among others.

CONCLUSIONS: Preliminary findings suggest a growing interest in professional training focused on the quality of care for the elderly, despite the number of articles published on the subject are still small. ■

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The access and use of the Telehealth program in Rio de Janeiro city: preliminary analysis of PMAQ-AB

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INTRODUCTION: One of the federal incentives to ensure quality standards, attendance and evaluating the work of health teams is the National Program for Improving Access and Quality of Primary Care (PMAQ-AB), whose goal is to induce the expansion of access and improved quality of AB, nationally, regionally and locally comparable standards of government actions aimed at Primary Care.

Adhering to the program, the city participates in the external evaluation (third stage) conducted by the Department of Primary Care (DAB), in partnership with educational institutions. Evaluators of quality interviewed health professionals about working process of the AB team, which approached strategies for Permanent Education and the Telehealth Brazil Networks Program.

The National Policy of Permanent Education in Health (PNEPS) includes, among several actions, the use of new Information and Communication Technologies (ICTs), aiming at qualification of health care, and the Telehealth is configured as one of the integral strategies of this Policy. The objective of this study was to know the status of implementation of primary care teams in the state and the results of the performance evaluation, and the strategies of Permanent Education used by health professionals in the city of Rio de Janeiro and the use of PTBR.

METHODS: It is a research of quantitative analysis, descriptive and analytical, which used secondary data from the 1st PMAQ Cycle (National Program for Improving Access and Primary Care Quality), held from May to October 2012, related to the year of 2011/2012, available on the address <<http://dab.saude.gov.br/portaldab/ape_pmaq.php?conteudo=microdados>>. It was selected the city of Rio de Janeiro because it has the largest populated size of Rio de Janeiro state and to have obtained a growing trend in the implementation of the Family Health Strategy over the last years.

According to the Ministry of Health in 2000, the year of implementation of the family health team in the city of Rio de Janeiro, the estimated population coverage was 0.80 with 13 family health teams, currently having a 44,70 coverage with 828 family health teams.

The Telehealth Brazil Networks in primary care has prioritized the development of actions to support the health care and for permanent education of primary care teams, aiming at education for work. It offers to professionals and employees of the Health Care Networks in the Unified Health System teleconsulting services, telediagnostics, according to the formative opinion and tele-education.

Keep in mind that the Telehealth, constitutes itself as a network that connects health managers, educational institutions and SUS health services in an online cooperative work process whose goal is to increase the clinical resoluteness

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of primary care teams, expanding the clinical and care capacity; improve the quality of referrals for specialized care, reducing the number of unnecessary referrals; and computerize the Basic Health Units.

The measured variables were information related to the application of Module I, Observation on the Health Unit (BHU), it was verified the existence of information technology equipment and Telehealth in the health units.

The observed variables related to Module II - Interview with the professional about Primary Care team work process - in regard to Permanent education in the process of qualification of the actions developed, focusing on actions which the team participates or participated in the last year related to Brazil Telehealth Network program, having the data tabulated and analyzed by percentage.

RESULTS: About the 1st cycle have been contracted 324 primary care teams (EAB) and 243 EAB with oral health distributed in 179 UBS.

In Module I, it was verified the existence of information technology equipment and Telehealth in UBS, consisting of computers (177), camera (89), speaker (79), stabilizer (176) Microphone (29), printer (177), television (162) and internet access (165), and see if the team had Telehealth (36).

In Module II it was observed that from the 324 professionals of the primary care teams interviewed, only 02 replied that in the city of Rio de Janeiro there was no permanent education activities involving primary care professionals.

Among the permanent education activities that the team participates or participated in the last year, 324 health professionals interviewed, highlighted in ascending order, in-person courses (320), exchange of experiences (230), tutoring / preceptorship (123), EaD / UnaSUS (89) Telehealth (59) and Telemedicine University Network (10).

Regarding the Telehealth Program, the 59 professionals interviewed indicated the staff participation in the Telehealth, only 26 of these professionals used the telehealth for second formative opinion, 12 for telediagnostics, 21 for teleconsulting and 24 for others.

The external evaluation of PMAQ-AB happened about two years before the publication of Ordinance N°402 /GM/MS of 24/02/2010 establishing Brazil Telehealth Program in order to qualify, increase the solving capability and strengthen the "Strategy for Family Health ", from the supply of denominated Second Formative Opinion and other educational activities aimed at several professionals from these teams; and a year before the publication of Ordinance N° 2,546 /GM/MS on October 27th, 2011, which redefines and expands Brazil Telehealth Program, which is now called the National Telehealth Program Brazil Networks.

In the same year, 2011, it was published the Ordinance No. 2554 from MS, instituting UBS Renewal Program, the computerization component and Brazil Telehealth Networks in primary care, integrated into the National Telehealth Program Brazil Networks.

For purposes of this Ordinance, the computerization should ensure the participation of UBS in Brazil Telehealth Network and contemplate them for computer equipment and ensure the connectivity and the use of information technologies aimed at qualification of actions and services offered by this point of attention; the integration of this point of care with the other attention points members of the Health Care Network; and to the development of telehealth

actions, matrix support, training and permanent education.

CONCLUSIONS: The PTBR AB aims to increase the solving capability and quality of health care and permanent education of AB teams, and being a recent practice in the health network, demands the involvement of several actors for their effective implementation.

It was observed that only 79 health units had camera, 89 speaker and 29 microphone, which demonstrates a denial as the structure can guarantee connectivity.

It is important to emphasize that in the interview with the health professional, one of the questions concerning about the use of telehealth services, didn't have reference to the Tele-education, as claimed by Ordinance N°2546 /GM/MS of October 27th, 2011, which mentions the teleconsulting services, telediagnostics, second formative opinion and tele-education.

In this regard, we emphasize the importance of local managers in the implementation of Computerization component and Telehealth Brazil Networks in primary care, provide the physical, technological and organizational conditions in the work process of the AB teams, monitor and evaluate the telehealth in your city, promoting integration of the health professionals with the actions of Brazil Telehealth Network and include the telehealth Points deployed in health facilities in the National Registry System of Health Facilities. ■

Cognitive rehabilitation in three-dimensional virtual environment based on mobile computing: a game proposal

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INTRODUCTION: Currently, there is increasing interest in Cognitive Rehabilitation area because technological advances have expanded new forms of treatments that stimulate the basic cognitive functions. Computers and related technologies are enabling an improvement in the quality of life of people with losses resulting from brain damages. The games provide new learning approaches to speed up the recovery process of people with disabilities due to disease or trauma. The games can promote the identification, analysis and recovery of cognitive deficits.

One of the highlights in this area is the Virtual Reality (VR) technology, which has been explored, with positive results in many experiments. The Virtual Reality technology has been widely used in the game area, providing opportunities to offer some situations closer to the real world. To reinforce this perception, recent studies indicate success in the recovery of cognitive abilities in patients using interactive software.

From the technological evolution of mobile devices, this paper aims at presenting the development process of an interactive game that uses VR technology on mobile devices, for people with cognitive impairments. This game may be used at any time and serves to continually stimulate the patients' attention and memory processes.

METHODS: The "Android" platform was chosen for this game development, motivated by the wide variety of devices available in various sizes, price ranges and purposes, as well as the open source feature of its Software Development Kit that uses Java as programming language.

The game operates a three dimensional environment and interfaces with touch and movement sensitivity. The game objective is to select a predetermined object, among many others, in the shortest possible time. The game has several phases with different difficulty levels. The object to be selected by the player will appear in the screen corner, separated from the game area. In the center of the screen a set of different objects is displayed, according to the player difficulty phase. Each object can be distinguished from other objects by color and shape. The player should, with a touch on the screen, select the object that he/she believes to be the correct one. When the correct object is selected, the application will play a sound, increment the counter and exchange the position of objects. When the selected object is incorrect, the game emits an error sound. If correct object was selected five times, the player changes phase and the application displays a report showing how many times he missed, how long it took to complete a level, calculating his/her score.

Each step is formed by a set of objects and a target object. The goal should always be different from other objects being presented. The player can turn the device to move the camera during a match to better visualize the depth of field in the displayed scene.

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There is also the possibility to resize the objects using the zoom mechanism: the player uses two fingers in a pincer movement on the screen. The objects considered in the game are: cylinder, cone, cube, sphere, ellipsoid and pyramid. The objects may appear in different colors and sizes from each other.

Each match consists of the following elements: Time - past time since the start of the match; Total failed attempts - number of failed attempts; Phase - the match phase; Goal - object to be selected by the player to complete the step; Objects - the number of objects that will be displayed on the screen.

RESULTS: The developed software has a high degree of playability. The integration of technologies was efficient in terms of layout and answers to players. The inherent mobility of mobile devices allows the players to perform an exercise at any time and place. He/she can develop these activities without harming his/her routine. In general, individuals using games tend to have fun and are thus more motivated to continue therapy.

Before being tested with real patients, the game was evaluated by two computer scientists and two doctors, who considered that the game explores a widespread technology and is easily accessible; the interface is quite simple and has a wide potential use for people with different kinds of neuropsychiatric problems, expanding the possibilities of stimulating attention and memory.

CONCLUSIONS: Nowadays, we have an increasing demand for treatment and social reintegration of disabled people, minimizing their motor and cognitive disabilities. At the other side, researches must be done to find specific practices to develop good software and to integrate a multidisciplinary team. Doctors and computer scientists must work in a collaborative way.

In this sense, the game development process adopted in this work followed a series of steps, which are composed by the definition of technology requirements with therapists, software design, implementation and evaluation with different experts.

The intent of this study was to explore the mobile platforms as viable solution for the implementation of Cognitive Rehabilitation techniques using digital games.

The next steps of this software must consider an evolutionary navigation in the game levels, more complex exercises that explore activities of daily living and an integration of intelligent strategies. ■

The Incorporation of Information and Communication Technologies in Professional Education Health: contributions to cancer care network

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INTRODUCTION: In the global context of increased chronic degenerative diseases, the cancer becomes relevant for epidemiological profile and displayed social impact. According to Brazilian National Cancer Institute the estimate is the occurrence of more than 500,000 new cases of cancer per year in Brazil, reinforcing the magnitude of the problem, which is the second leading cause of death in the country. Many people are requiring specialized care. For every 1,000 new cases of cancer, over 50% require chemotherapy, radiotherapy and surgery. Given this situation, the training of professionals in oncology is essential to develop actions for the cancer care. The use of Tele-Education can achieve workers in different parts of the country, allowing constant contact between these professionals and supporters of the educational process.

The aim of this study was to analyze, under the political and structural aspects, such as are used Information and Communication Technologies (ICT) for High Complexity Assistance Centers in Oncology in education of health professionals working in cancer care network in Brazil, identifying the technological mediation models used and discuss the resulting contributions of tele-education, to overcome the geographic, temporal and financial access to professional education in oncology.

METHODS: The study was conducted through a documentary, bibliographical and survey research. After approval by the research ethics committee, there was a first contact with the coordinators of the study centers or continuing education coordinators of the all 44 Brazilian High Complexity Assistance Centers in Oncology, explaining the research objectives. The FormSUS tool (System for creating DataSUS forms) was used for sending the online form to institutions that agreed to participate.

The first part of the questionnaire aimed to characterize the profile of the participating institutions and the second part dealt more specifically the teaching activities in these institutions, aiming to gather information on the use of ICT in education in oncology. These questions covers topics such as the types of courses offered, teaching structure models used, and the kind of technologies used for professional qualification. These questions were designed to identify the usage profile of educational technologies in these institutions. In addition, the questionnaire included the thinking about contributions or difficulties of tele-education for continuing education of professionals, support coming from other centers for the use of technology and the reasons for non-use of new technologies in education. Thus obtaining subsidies for the discussion of the contributions from technological resources for oncology education and bases for understanding the limitations faced by the centers in this process.

Data were tabulated on a spreadsheet and recorded in graphs and tables. Simple statistical analysis of qualitative and quantitative variables was performed. For nominal variables elements of the set have been grouped into categories.

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The analysis was performed from the number of cases count, using percentages and reason to establish comparison between the categories and the number of elements with each attribute under consideration. Specifically for some data related to the public or private nature, location, type of technologies used and offered teaching model, there was a multidimensional analysis considering the variables simultaneously, toward the synthesis and in-depth analysis and establishing correlations.

RESULTS: From the data analysis, identified the pattern of use of technology for permanent health education in 17 High Complexity Assistance Centers in Oncology, public and private, located in all regions of the country. These Brazilian centers are mostly private (73%) and the research participants also had this provider profile, 76% private and 24% public. All institutions offer programs and courses for health professionals, either in person (100%), blended (23%) and the distance (17%). Of all participants, 53% reported using little or no use communication technologies to teaching, although none of them have pointed not consider this efficiency. Most trains its professionals through classroom teaching, using the technologies related to this type of modality. While some (6%) having no knowledge of use of ICT to professional qualifications, other (41%) use distance learning and blended for this qualification.

Despite the widespread use of internet for communication processes in society, there is still a limited use of new ICT such as mobile, internet, learning portal, multimedia room, Special Interest Groups (SIG), video conferencing, telemedicine, social networking, virtual learning environment, by the respondents oncology centers to qualify the professional who works in oncology. This occurs, according to participants, by factors related to necessary infrastructure (57%), the cost (35%) and the lack of knowledge (14%) for incorporation of these technologies (35%) and the lack of trained personnel for this use in the institutions.

The majority (88%) recognizes as a contribution of ICT in professional education, the possibility to disseminate content to a large number of professionals and to update them in the workplace. This corroborates the meaning assigned by government policies analyzed.

CONCLUSIONS: The results show a profile of little use of ICT in the professional qualification processes in the oncology centers who participated in this study. The expansion of the technological contribution in training depends on greater knowledge of these institutions on the potential of interactive educational technologies, government investment in programs that promote the interaction of the cancer care network and effective pedagogical planning of professional education in health, considering the use of available technological resources as part of the teaching and learning process.

The oncology care network as cooperative work network for cancer control, can have its performance enhanced by technologies that contribute to improvements in the strengthening of associations of people and institutions, overcoming the difficulties of distance and financial costs to the learning, by promoting activities related to tele-education, such as teleconferencing for the exchange technical and managerial experience among the centers and development activities in virtual learning environments for network professionals.

The use of ICT combined with pedagogical project of integral professional education, can democratize the real technological advances, stimulating multicenter collaboration, providing autonomy and hence a more qualified labor process to serve the society, it is important to take steps to strengthen and qualify this use. ■

Network Analysis of Collaboration Structure in Telemedicine University Network (Rede Universitária de Telemedicina RUTE) in Brazil

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INTRODUCTION: The Telemedicine University Network (RUTE) created in 2006 by the Ministry of Science, Technology and Innovation (MCTI) and coordinated by the National Education and Research Network (RNP) integrates over than 130 university hospitals and public medical colleges of the country in a network of teaching and care, aiming to strengthen actions in telemedicine in these institutions. In its first phase, started in 2006, 19 institutions were benefited. With the expansion of the network, a phase II was announced in August 2007. The total number of integrated institution benefited passed to 57, distributed in all states of Brazil and covering all university hospitals belonging to federal universities. In July 2009 was launched a phase III with more than 60 certified teaching hospitals and 15 federal institutions, all public.

One of RUTE integration actions is to promote the special interest groups (SIGs). Currently, RUTE has 60 SIGs in different health specialties and subspecialties formed by groups of health professionals that discuss various areas of Medicine. This study aims to implement a process of evaluation in the RUTE and their existing collaboration on telemedicine and telehealth practices through social network analysis of RUTE Specials Interest Groups (SIGs).

METHODS: The use of telemedicine in developing countries presents itself as a strategic measure, especially in underserved areas of health services with real opportunities to ensure access and education of professionals [1]. However, there are segments of society that despite intensive use of technology, not yet suffered, or at least there is still little scientific evidence on practical and comprehensive of its ongoing processes of information processing and communication technologies, such as health [2].

Used as a basis for social network analysis, the mathematical language of graphs structuring networks composed by nodes, or vertices, who are the actors of social networks, connected by a group of lines, or edges, corresponding to links between actors. The fundamental difference between the literature and the SNA is that the emphasis is not on the characteristics of actors but the connection between the links. In resume, the observation unit is composed by the actors and their ties [3].

This analysis is based on the information collected from the units and SIGs using survey methods [4], analysis and data visualization to show the networks results and major trends. Also previously collected data by the national coordination of the network was used. In the period of data collection which lasted from April to July 2014, coordinators of the first 100 RUTE units and 60 SIGs were invited to answer an online survey about their current status. Based on these

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data, containing detailed information about registration of institutions and RUTE units on 60 SIGs, was carried out a process of descriptive statistical analysis [5] and data visualization in forms of graph to represent the collaboration network on RUTE. The information was developed based on data for the years 2008-2014.

RESULTS: Based on SIGs data available for the network national coordination and the collected information, results about the collaboration network were analyzed. The RUTE network [6] is now formed by approximately 100 units that being part of 60 SIGs. The Federal University of São Paulo (UNIFESP) is the most collaborative institution, participating in 34 SIGs and coordinating 17 SIGs, followed by Rio de Janeiro State University (UERJ) that participates and coordinate 25 and 4 SIGs respectively.

The SIG Intensive Nursing (SIG Enfermagem Intensiva) is the group that has largest number of participants, with a total of 144 registered institutions.

We detected that 15% of institutions are not actively participating in any SIG. The percentage increase in overall participation in SIGs was 70% for 2010 from 2014. Also, 15% of total SIGs hold meetings by web conferencing and the other 85% use video conferencing in their meetings, with an average of 50 sessions per month and 3 daily sessions in 2014.

As part of data visualization, a graph was produced and the analyzed. The analysis identify that RUTE units (nodes) considered more collaborative are located in the center of the graph and are interconnected according to the SIGs coordination number. Those units are: UNIFESP, UERJ, UFBA, ISCMPA and UFSC.

The graph represent also the collaborative relation of RUTE units in form of communities, where groups of nodes that have same color mean higher degree of relation and common participation in the same SIGs, and RUTE units with smaller collaboration degree: FioCruz-Canal Saúde, Amparo Maternal, HMOB, CHMSA, FMTAM and UFRJ-IG.

CONCLUSIONS: This paper describes the current representation of SIGs collaboration status of the network, with its topological structure, the main goals, and methods. In the graph representation, the RUTE units (nodes) considered more collaborative are located in the center of the graph and are interconnected according to the SIGs coordination number.

The information was developed based on data for the years 2008-2014 and results indicate a high quantitative asset growth of SIGs collaboration of units and RUTE institutions [7]. Therefore, the growth of collaboration found in the study was significant, indicating a positive trend for RUTE project on interest, participation and reporting actions in telehealth in the country [8]. ■

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Effects of Mobile Health Nursing Intervention on Maternal Health Services uptake among Antenatal Clinic Attendees in Oyo South Senatorial District, Oyo State

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INTRODUCTION: Compliance with Antenatal Care (ANC) and Postnatal Care (PNC) regimen is a known determinant of pregnancy outcomes. In most developing countries, access to Skilled Birth Delivery (SBD) and Childhood Immunization (CIm), socio-cultural beliefs, physical and financial barriers significantly influence perinatal health outcome. Mobile health (M-Health) is an emerging strategy for improving healthcare utilization and compliance but the extent to which it may influence uptake of available maternal and infant welfare services in Nigeria is not documented in literature. Nurses are the fulcrum for maternal healthcare but their knowledge and roles in the use of M-Health are not known in Nigeria. This study was designed to assess the effects of M-Health Nursing Intervention (MHNI) on uptake of maternal health services in Oyo South Senatorial District.

METHODS: This quasi-experimental study involved four out of nine local government areas randomly selected and allocated into Experimental (EG) and Control (CG) groups [a semi-urban and an urban each]. All the 12 Primary Health Care facilities which had nursing personnel were purposively selected. Forty-eight nurses (EG: 21 nurses; CG:27 nurses) and 383 literate pregnant women (EG:191 women; CG:192 women) at gestational age of 4-6 months, registered at the PHC were recruited consecutively. Experimental group nurses were trained on M-Health and mobile telephones were given to nurses and registered pregnant women to facilitate communication. Over an 8-month period, pregnant women received free voice calls and health promotion text messages from nurses. At baseline, 3-month and 6-month, nurses' knowledge about MHNI was assessed in EG and CG using a non-weighted 42-item pretested questionnaire. Outcome evaluation checklist was used to document utilisation and completion of the following six indices among pregnant women: ANC, PNC attendance, SBD, Intermittent Preventive Treatments in pregnancy (IPTp), Tetanus Toxoid (TT), and CIm within 6 weeks of birth. Data were analysed using descriptive statistics, Chi-square, repeated measures ANOVA and logistic regression at p= 0.05.

RESULTS: In the EG, knowledge score significantly increased from 21.9±4.5 at baseline to 23.6±4.6 and 23.2±5.6 at three-month and six-month respectively while there was no significant difference in knowledge score among CG over the study period. Comparing EG with CG, significant differences were documented in ANC attendance (66.8% versus 53.1%; OR:1.7, CI: 1.2-2.7), uptake of IPTp (47.6% versus 18.4%; OR:1.7, CI: 1.2-2.7), CIm (62.6% versus 46.9%; OR:1.9, CI: 1.3-2.8) and TT (64.5% versus 54.1%; OR:1.02, CI: 0.5-1.9), SBD (69.8% versus 36.3%; OR:1.0, CI: 0.6-1.6), PNC (69.0% versus 51.0%; OR :2.1, CI: 1.4-3.2). Significantly more women in the EG who completed ANC had IPTp (OR: 14.9, CI: 6.3-35.7); TT (OR: 8.2, CI: 1.7-39.9) and SBD (OR: 2.3, CI: 1.2-4.5) than those who did not. Likewise in CG, more women who completed ANC had IPTp (OR: 21.9, CI: 5.1-94.1) and SBD (OR: 2.0, CI: 1.1-3.8).

CONCLUSIONS: Mobile health nursing intervention improved uptake of maternal health services among pregnant women. Policy makers need to consider the adoption of mobile health to enhance uptake of maternal health services and improve pregnancy outcome. ■

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A Mobile Application for Localizing Medical Services

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INTRODUCTION: The ease of access in Brazil to mobile technologies is reflected by their growing use by the population, promoting an unprecedented digital inclusion. These devices have become increasingly connected to the internet, generating a significant increase in network access. Public health service in Brazil faces rising difficulty in meeting the demands of the population. A solution was sought to apply this new technology in the form of an application for mobile devices to enable users to perform searches for medical and care centres within their local region. The application search engine is based on the user location, provided by the in-built geo-system of the mobile device. Search results display the nearest health care providers. It is possible to filter the results according to parameters, such as the name of the health professional or care centre, health insurance and medical specialities. The use of a large-scale application will gather and make available information from several service networks. The target audience for the application will be extremely diverse and, therefore, a priority feature must be the development of an easy-to-use interface containing all information that may be required.

To develop an open-access application for mobile devices using the Android platform.

METHODS: Development of the application that searches for locally relevant medical services via a mobile device is being carried out using different technologies and software design patterns. The method used in the creation of this project was based on the cascade model and formed of eight steps:

Step 1 - Market research: perform a systematic review to identify programs, sites and applications with the same purpose in the Brazilian market;

Step 2 - Scope: definition of the features to be developed;

Step 3 - Architecture, requirements and use cases: Architecture definition and raising the requirements for application operation, as well as development of use cases based on the proposed scope in step 2;

Step 4 - POC: creating a proof of concept to assess project feasibility;

Step 5 - Sketches: creation of sketches of all screens to validate the application usability;

Step 6 - Development: Architecture implementation and development of features based on the use cases;

Step 7 - Testing and approval;

Step 8 - Publication: Public availability of application on Google Play.

RESULTS: Step 1 - The systematic review was performed using 3 search engines. A search through the Google tool was performed to check websites with the desired features. Searches for specific applications on the Android and

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iPhone platforms were conducted using Google Play and the AppStore, respectively. Several sites were found where it is possible to perform a search for physicians and specialties in a region, as well as applications that perform a search for health care facilities through geolocation, however, no applications were found that integrated health care facilities, health professionals, medical specialties and health plans. Moreover, no applications were found that allowed interaction via the application between the search user and service provider;

Step 2 - The basic features of the application were defined:

Map: Geolocation information is employed to determine user position and identifies the health care facilities, physicians and specialties. The main relevant information of the selected location is displayed, as well as options to phone the establishment, route details to the location address, and interaction for evaluation and feedback of the health care facility;

Health Care locations: List all health care facilities registered in the database. It allows access to details of address, telephone, opening hours, health plans accepted, and medical specialties;

Physicians and Specialists: List all physicians and their specialties registered in the database. It allows text search and access to details of address, telephone, health plans accepted and medical specialties;

Step 3 - The application architecture was developed in 3 independent layers:

Presentation: Responsible for providing the information on the mobile device. Implemented using Java through Android Studio IDE;

Business: Contains functions and business rules and is responsible for transmitting the database information to mobile devices. Implemented using Java through Eclipse IDE. This layer uses cloud-based servers through Amazon AWS service;

Data: Responsible for storing all information that will be used by the application. This storage is performed by PostgreSQL. The layer uses cloud-based servers through Amazon AWS service;

Step 4 - The POC was developed using FireMonkey IDE. After creating the prototype, project viability was observed and all the used technological resources were made accessible to mobile application developers;

Step 5 - Creating sketches, using the Pencil tool, was used to validate the usability and subsequent demonstrations for developers to better understand the intended interface standards;

Step 6 - Early stages of development;

Step 7 - Unrealized;

Step 8 – Unrealized.

CONCLUSIONS: This project is in the early stages of development. The mobile application is required to contain information regarding doctors, medical specialties, health insurance plans, and locations of health care services, as well as providing an interactive way for the user to assess the current availability situation of the desired service. The geolocation capabilities of the mobile devices will be employed to enable the user to dynamically and automatically search for information relevant to the locality, enhancing their experience with the application. ■

A Computational Approach for Collecting Clinical-Management Teleconsultation Data

Andrei de Souza Inácio[1]; Alexandre Savaris[2]; Harley Miguel Wagner[3]; Aldo von Wangenheim[4]

INTRODUCTION: Telediagnosis in Santa Catarina state, Brazil, is a supporting instrument to activities related to primary care, aiming to provide tools for the improvement of quality aspects in the referral of patients and in the management of healthcare resources. Based on the already established concept of telediagnosis adopted by the Santa Catarina's State Department for Public Health (SES/SC), a computational approach is developed to provide the integration of examination reports with clinical management data. The developed approach focuses on dermatological examinations offered in the primary care level, composing the so-called Clinical-Management Teleconsultation service.

In Brazil, it is common to associate telediagnosis to the remote evaluation of examination data and the issuing of examination reports, following a telemedicine workflow. The approach adopted by the Santa Catarina state aims to scenario, providing resources for continuous training and formation of healthcare professionals engaged to primary care activities.

This paper describes the computational approach developed to integrate clinical-management data with examination reports based on the risk rate defined by protocols for dermatology, incurring in automatic generation of teleconsultation instances. The collection of such instances is available for future search and retrieval by healthcare professionals, composing a knowledge base built upon experience.

METHODS: The proposed approach integrates the Santa Catarina's Statewide Telemedicine and Telehealth System (STT/SC), a web-based computational platform available since 2005, built as a result from a joint effort between the Santa Catarina's State Department for Public Health, the National Institute of Science and Technology for Digital Convergence (INCoD), and the Federal University of Santa Catarina (UFSC). Specifically, the approach includes a set of functionalities in the examination reports module and in the teleconsultations module of STT/SC, following specifications from examination protocols for dermatology, including the risk rate evaluation.

Currently, the telediagnosis workflow for dermatological examinations supported by STT/SC is composed of three main steps: request, execution and report. In the request step, data from clinical history, lesions, and diagnosis are gathered to compose an examination entry. These data are available on the next step (i.e. execution), being interpreted by a primary care professional, which is responsible for the issuing of an examination report (the third step). During the reporting time, the healthcare professional chooses a risk rate for the examination (using a color code related to the gravity of findings), suggesting whenever necessary the clinical management to be adopted. For examinations whose risk rate is coded as blue, STT/SC automatically generates a teleconsultation entry. The resulted entry includes anonymized data for the patient, codes from the ICD-10 (International Statistical Classification of Diseases and Related Health Problems), dermatosis specification, and additional observations for the reporting step. At the time of its generation, the teleconsultation entry is already available for search and retrieval, allowing primary care professionals

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to access its content through web interfaces or mobile applications.

RESULTS: The computational approach integrated to STT/SC improves the access to telediagnosis- and teleconsultation-related data by primary care professionals, allowing the visualization of its content as a whole, in each step of the acquisition, evaluation, and referral workflow. Healthcare professionals following the established workflow became aware of information regarding lesions, risk rates, and clinical management, as well as treatment protocols to be applied on each case.

Regarding workload, the automatic generation of teleconsultation entries from examination reports eliminates the need of a second input performed by healthcare professionals, minimizing typos and contributing on the creation of a well-formed collection of cases for future reference.

Data consolidated from telediagnosis and teleconsultations are available for search and retrieval, composing a knowledge base accessible through web and mobile applications. Considering that the whole content generated during the three-step workflow is available, professionals can perform queries on this knowledge base applying filters by clinical management data, risk rates, or even lesion types and locations. Such queries, due to its flexibility, facilitate the adoption of the practice by experience – using previous knowledge on solving cases to guide the resolution of new ones.

CONCLUSIONS: The adoption of a well-defined workflow, together with the automation on generating Clinical-Management Teleconsultations through the development and adaptation of computational resources, contribute to the creation of scenarios characterized by the high productivity for healthcare professionals and high availability of telediagnosis and teleconsultation data. In these scenarios, professionals benefit from a standardized workflow that guides its activities, by the automation on generating data in a systematic way, and in retrieving historical data to be used as a basis for the evaluation of new cases. Patients, in turn, benefit from reports including general and therapeutic orientations, as well as better referrals according to the evaluation of its conditions. ■

Teledentistry improves dental traumatic injuries diagnosis in pediatric dentistry

Barbara Monteiro Grisolia[1]; Luciana Pomarico Ribeiro[2]; Lucianne Cople Maia[3]; Aline de Almeida Neves[4]

INTRODUCTION: Information technologies and its uses represent a pathway to contribute to support specialized care by dental professionals accross distances. Different kinds of technologies, platforms and media can be used to send images and patient's information with the purpose of assisting in diagnoses and treatment planning. The purpose of this study was evaluate if diagnosis of dental traumatic lesions can be improved by teledentistry.

METHODS: Ten clinical cases arising from patients having their first appointment at the Pediatric Dentist Unit on Federal University of Rio de Janeiro were evaluated and the dental traumatic injuries classification was perfomed by a specialized team ("golden-standard diagnostic"). Intra-oral photographs and scanned dental radiographs were collected and sent by email in a digital file with the patient's clinical history to two external graders: a pediatric dentist (E) and a generalist dentist (C). Both professionals were asked to realize the diagnosis of traumatic lesions. Trauma injuries were classified in dental (D) and periodontal (P). The agreement between diagnosis given by the graders was evaluated by assigning values to answers: (1= all injuries were correct identified; 0.5= half of injuries were correct identified; 0.25=1/3 of injuries correct identified).

RESULTS: Percentage of agreement were 65.8% to E and 57.9% to C. D cases had higher agreement percentage (86.4% for E; 77.3% for C) than P cases (61.5% to E; 38.5% to C).

CONCLUSIONS: Based on the findings of this study, implementation of teledentistry services in cases of dental trauma can assist on the quality of diagnoses of dental trauma injuries. ■

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Tele-spirometry in primary health care: a randomized clinical trial in southern Brazil (research protocol)

Cynthia Goulart Molina-Bastos[1]; Sabrina Dalbosco Gadenz[2]; Maria Angela Fontoura Moreira[3]; Erno Harzheim[4]; Marcelo Rodrigues Gonçalves[5]

INTRODUCTION: Chronic respiratory diseases (CRD) are important causes of morbidity and mortality in Brazil and represent from 25 to 30% of hospitalizations for ambulatory care sensitive conditions. Asthma and Chronic Obstructive Pulmonary Disease (COPD) have an expressive impact on the use of direct and indirect resources in health. Spirometry is considered the gold standard test for diagnosis and management of CRD. The availability of spirometry in primary health care (PHC) is cost-effective, especially when associated with continuing professional development.

The National Telehealth Program is a partnership between the Ministry of Health and Universities. It aims to integrate the Family Health Strategy (FHS) teams of the various regions of the country with reference universities. Quality of services provided in PHC is thus improved with reduction of health costsand patients referral to other cities. Rio Grande do Sul State Center was entitled "Telematics and Telemedicine Project in Support of Primary Health Care in Brazil: Rio Grande do Sul Center (TelessaúdeRS)". It is attached to the Postgraduate Epidemiology Program, at the Federal University of Rio Grande do Sul. Main actions of the Center, is the first remote diagnostics service for chronic respiratory diseases in Brazil, which since September 2013 has performed

METHODS: We conducted a cluster randomised controlled trial. The FHS teams of three cities of Rio Grande do Sul are randomized into two groups (intervention and control). To be elegible teams have to be in the National Register of Health Facilities as FHS. Patients are included according to the following criteria: = 12 years old, suspected clinical diagnosis of asthma and / or COPD and respiratory symptoms. Asthmatic patients are considered symptomatic if Asthma Control Test (ACT) score does not exceed nineteen and patients with COPD who present score =1 in Modified Medical Research Council (mMRC) questionnaire. Institutionalized individuals, patients with difficulty in answering the questionnaire, spirometry with restrictive pattern or withdraw to participate in the study, are excluded.

Physicians received training and support material. Patients included in the study do a spirometry at baseline and another after 22 weeks. Exam scheduling and survey questionnaire is done by telephone.

The intervention consists of teleconsulting by a TelessaúdeRS physician with specific training in CRD. Feedback is sent about the exam indication. Recommendations of management, based on clinical evidence, are given. Patients receive follow-up with nurses in order to enhance adherence and improve management of crisis, through telephone calls, approximately 45 and 90 days after the test.

RESULTS: The primary outcome measure of the study is the control of respiratory symptoms by ACT and mMRC

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scores and improvement of spirometric values. Secondary outcomes are reduction of referrals to specialized ambulatory care and emergency rooms, change in treatment of CRD (inhaled corticosteroids, short and long-acting bronchodilator among others) and cost-effectiveness measures.

CONCLUSIONS: This study will evaluate the effect of tele-consulting in controlling asthma and COPD in PHC, the proportion of referrals avoided by qualifying medical assistance and cost-effectiveness of this work process. Consequently, may contribute to the control of CRD, especially in southern Brazil and be a telecare model for other places. ■

The study was approved by the Research Ethics Committee (CEP / HCPA and ZIP / SMSPoa) under CAAE number: 22719013.7.3001.5338

Decision Support System on Infant Dehydration

Diego Rodrigues Tavares[1]; Alexandra Monteiro[2]; Luiz Roberto de Oliveira[3]

INTRODUCTION: Since the advent of Information and Communication Technologies (TICs), in determining complex transformations in human activities, there were also significant changes in the health area, with decisive impact on the practical professional exercise. Decision Support Systems (DSS) are one of the highlights, especially those developed for the use in mobile devices. The aim of this work is to present a proposal for an application, aiming to support decision purposes in the infant dehydration treatment.

METHODS: It is a groundbreaking exploratory study which emerges as a way of contributing to the qualification of health professionals working in primary care. User access will be free of charge, and in addition to the general registration data it will require the identification of users' location by the National Register of Health Establishments. The application will provide a calculator that will guide rehydration in children dehydrated, also offering examples of related clinical cases, providing conceptual support material on infant dehydration. The application data will be stored offline, allowing database synchronization whenever internet access is available, aiming to make a report of the epidemiological map of infant dehydration cases in Brazil.

RESULTS: The application is under development so there are no preliminary results of the study, but it is expected that from the development and availability of this SAD, and other amenities in it, to enable healthcare professionals to improve the quality of care to dehydrated children by reducing therefore the rates of infant mortality from dehydration. On the other hand, it is expected to contribute to the paradigm changes of health professionals through the use of multimedia in telehealth, particularly in primary care and in remote areas. Furthermore, for the database information, the incorporation of the SAD and other applications will allow to integrate TDICs at health services, providing options by which health professionals can streamline the water and electrolyte replacement and, in addition, they feed the records of the system with real data, allowing to obtain statistics based on reliable data, improving the system and contributing to the research on the topic.

CONCLUSIONS: The incorporation of a SAD in the operation of infant dehydration may contribute to the reduction of infant mortality since dehydration in infancy is one of the main causes. ■

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Distance Education and Presencial Education in Hearing Health: Literature Review

Maria Thereza Raab Forastieri Piccino[1]; Camila de Castro Corrêa[2]; Wanderléia Quinhoneiro Blasca[3]

INTRODUCTION: Distance education is a teaching mode that allows self-learning, with mediation of systematically organized teaching resources, presented in different formats of information. Thus, the Tele-education should be considered as a teaching methodology that enables the construction of a collaborative network of knowledge, especially when it comes to health related issues. Objective: Analyze studies that perform a comparative analysis between distance education and classroom education in Tele-education in Audiology.

METHODS: A literature review was performed from the following databases: PubMed, Bireme, Embase, Web of Science, Scopus. The descriptors were used DeCs "Hearing", "Distance Education"; "Telemedicine"; "Health education". As inclusion criteria, were admitted to study in the Portuguese, English and Spanish languages; and to provide a comparison between the teaching methodologies distance and presence in telehealth specifically in Audiology. Regarding the exclusion criteria were disregarded the literature review of studies and case study. Through the crossings performed on the selected databases, the titles were analyzed subsequently abstracts and full articles by selecting the relevant o the objective of this work.

RESULTS: From the search, 621 articles were found in total, of years 1984 to 2013, 94 located in PubMed, 172 in Scopus, 252 in Embase, 96 in Web of Science, 07 in Bireme. Titles were analyzed, total of 220. Then, 97 works selected, and finally through the analysis of the full papers, 8 were selected that comprised the final result. Articles considered were located in Bireme (0 jobs), in Pubmed (2 papers); Scopus (4 works), Web of science (1 work), Embase (1 job). Two articles were of the year 2004, 1 article of 2005, 1 of 2007, 3 of 2009 and 1 of 2010. In all considered work, it has been conducting classroom training to a group and to another, training through videoconferencing, in which we observed a significant difference in the performance of the individuals, pre and post-training in both approaches. The amount of selected articles shows the need for more research involving tele-education hearing. They were found in the databases many works carried out at the level of diagnosis, such as Teleaudiometry as well and teleconsultation examinations performed by otolaryngologists. On the other hand, research involving tele-education, distance education and hearing are beginning to emerge. With regard to professional training, health agents and people directly linked to people with hearing problems, there was a shortage of literature. In databases Scopus and Embase there was a higher amount of work and Bireme smaller amount. The crosses with the selected descriptors covered a lot of jobs that were not relevant to the purpose of the study. As for the methodology presented in the work showed resemblance to each other and were appropriate to the studies. The results suggest that more research is done, considering that the subject studied provide renovation and modernization in clinical care and education.

CONCLUSIONS: With the analysis of studies comparing distance education and classroom education, it could verify the need for further deepening of such an investigation in order to establish the effectiveness of tele-education in audiology. ■

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Deployment of telehealth services to medical practices: an important tool to expand the Unified Health System (SUS) in Brazil

Euder Alexandre Nunes[1]; Candice Heimann[2]; Claúdia Prado[3]; Adélia Delfina da Motta Silva Correia[4]

INTRODUCTION: Information and communication technologies in the field of health, regarding to the applicability and use of telehealth are in constant improvement due to qualifying capacity assistance to the population by promoting health by expert professionals, even from a distance. In 1989, the Ministry of Science, Technology and Innovation, in Brazil, created the National Network of Education and Research (RNP) and in 2005 formed the Telemedicine University Network (RUTE), that contributed to effect the telehealth actions in Brazil. Another proposal is the National Telehealth Program created by the Ministry of Health in 2007, renamed in 2011 to Brazil Telehealth Network, which aims to further actions of primary care and improving access and quality of health care for citizens in the Family Health Strategy (ESF) in the Unified Health System (SUS) using remote assistance, remote diagnostics, second formative opinion and teleducation. In the face of such facts, the purpose of this article is to highlight the main problems in the implementation of telehealth services to medical practices in order to promote and encourage research in the area, as well as serve as a voice for issues related to the good practice of information and communication technologies.

METHODS: The method comprised a literature in SciELO databases and LILACS, from 2006 to 2013. As inclusion criterion, the following descriptors were selected: telehealth, telemedicine, teleducation and telenursing, all in Portuguese and that addressed the implementation difficulties of such services. There were identified 10 articles with the theoretical addressed.

RESULTS: From the literature search it was revealed that telehealth spread is to shorten distances and provide information exchange, favoring the improvement in primary health care, providing access to education and training of health professionals. Regarding the diagnosis, there is concern regarding the clinical data digitization and its transmission through the network to network security, which is a widely discussed topic. The surveys indicate that information and communication technologies (ICT) have provided a care distances to health professionals and available to offer services to patients without the need to shift to the reference centers. The strengths of use of technology in health care are access to specialists, care qualification in primary health care and the availability of resources for lifelong learning. The use of telehealth services should be linked to the rational use of ICT, among preparation of projects for the development of distance service networks, subsidized by government agencies considering that the main problems in the use of the health technologies are vulnerability of data, the need for constant maintenance in software, dependence on a data center and broadband type of access point as well as the slowness in high demand

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access times. The telehealth, as a public policy of the SUS, presents specific factors that hinder its expansion due to lack of technical infrastructure. Investments and technological implementations in the industry do not match the need to deploy telehealth, preventing the spread of the forward program to the principles of universal access, comprehensive and equal in attention. The health education initiatives allied ICT presenting challenging due to the limited experience of health professionals to digital aspects, the tiny supply of materials for training in virtual environments and lack of trained teachers for conducting distance activities. The professional training through distance learning must be linked to a new teaching process, combined with investments in interactive tools and building materials suitable for online environments. As benefits in healthcare, the use of technological resources has proven to be a solution to the lack of diagnostic tests and specialized professionals in remote areas through remote diagnostics. But sending patient data over the Internet must be associated with safety requirements to ensure integrity, privacy and timeliness of the information provided electronically. Information security investments to this software should be planned and taken into account in developing any remote diagnostics project aiming to not face with the lack of credibility on the service provided.

CONCLUSIONS: The telehealth has been emerging as a tool to contribute to the care practices of health professionals through the services offered by the Program. In various regions of Brazil are successful experiences in the incorporation of services, however, are also observed problems that hinder its spread and incorporation in large proportions, such as lack of investment in connectivity in remote areas of large cities. Insufficient training of professionals to work with ICT is also a barrier to effect the teleducation actions as a form of continuing education for health care. Maintaining the confidentiality and integrity of patient data in telehealth services also shows a challenge. These obstacles must be addressed through public policies that can ensure the regulation and regularity of telehealth services as well as investments for its implementation in all national areas, ensuring sufficient resources consistent to its ability to optimize health intervention strategies and decision-making processes related to the definition of diagnostics, in order to provide improvement to primary care quality in Unified Health System (SUS). ■

Evaluation of Telehealth Insert on Primary Care

Fábio Herrmann[1]; Gustavo Guthmann Pesenatto[2]; Helena W. de Oliveira[3]; Thaís Russomano[4]; Edison Huttner[5]

INTRODUCTION: Brazil is a country with an uneven distribution of financial resources and consequent social inequalities. A lack of access to medical specialists exists in smaller towns and remote areas, causing delays in diagnosis and inadequate management of diseases. Telehealth can provide access to information exchange and virtual case discussions, supporting health professionals in clinical decisions. The development of this research grew from the positive results gained in implementing telemedicine care activities in Brazil. These were: namely: the Ji-Paraná/RO region in January 2007 and 2008; the Alto Xingu region in July 2008; the Manaus/AM region in July 2010; and in the city of Palmares do Sul in July 2012. These activities were developed by the Telehealth Lab of the MicroG, together with the Centre of Studies and Research and Indigenous Culture (*Núcleo de Estudos e Pesquisa e Cultura Indígena*), and in partnership with the Brazilian National Health Foundation (*Fundação Nacional de Saúde - FUNASA*). To evaluate the insertion of telehealth into primary care as a complementary resource for local health teams. Specific objectives aim to: evaluate progress in team problem solving; assess the level of knowledge of health care teams and patients regarding telehealth; improve the quality of care.

METHODS: Studies on the effectiveness of telehealth in several countries have shown it to be a resource that contributes significantly to improving quality of health-related expert assistance. Consequently, the Telehealth Laboratory of the Pontifical Catholic University of Rio Grande do Sul (PUCRS) developed a Telehealth Platform. The development project will have five distinct phases: Team Preparation; Telecare; Data collection; Data Analyses; Medical data release. Health areas providing second opinions will include: dermatology (skin lesions); cardiology (electrocardiogram); dentistry (mouth and face injuries); and pharmacy (interactions). All health professionals involved in the Telecare phase will receive training from the Telehealth Laboratory team of the Microgravity Centre. The telehealth process of patient care will be divided into four stages: Patient screening (patients selected by local health teams according to available health speciality and prior to arrival of the PUCRS team); Consultation (individual patient consultations performed by the PUCRS Telehealth and local health teams for collection of patient clinical information, and acquisition of photographs and exams); Data transmission (data sent via internet to PUCRS using the Telehealth Platform Project, and password-protected secure access to data by participating experts); Specialist second opinion (experts to send second opinion for cases analysed based on the received data; opinion may include diagnosis and therapeutic management).

RESULTS: A Telehealth Platform was created in the Delphi programming language to serve as an access and storage platform for patient data. Information entered in text form is sent to a MySQL relational database, while files (images and exams) are transferred to a server via File Transfer Protocol (FTP). A Virtual Private Network is employed to ensure safe transmission. Data-entry fields are included for patient information, divided by specialty, which also displays the

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expert's information. Thus, the Basic Health Units are able to send patient data to referral centres and request second opinions. The selection of patients to be visited/treated and decisions regarding the need for second opinion are at the discretion of local health teams.

CONCLUSIONS: This is an ongoing project. The expert opinions received will be analysed by the local health teams, and final decisions regarding any diagnosis or subsequent treatment will be at their discretion. A survey using structured interviews will be conducted to assess the level of knowledge of health care teams and patients in relation to telehealth and its applications, together with the reality of the medical assistance in a health unit. In addition, a further survey will be carried out with the health teams involved in the local management of clinical cases that did not require referring-on to a higher level of medical care. ■

Telecommunications in practice nurses of assistance for monitoring the post high Hospital of Helderly: an integrative review

Fernanda M. Pinheiro[1]; Fátima Helena do Espírito Santo[2]; Rosimere Ferreira Santana[3]; Renata Miranda de Sousa[4]; Camille Farias Peres[5]

INTRODUCTION: Technological developments in communications industry revolutionizes the relationship between individuals and communities. These technologies are strategies that enable a critical analysis of practice, allowing for consideration of ways to provide health care (GODOY; GUIMARAES, 2014). Objective: To describe how telemonitoring technology in nursing care to the elderly hypertensive.

METHODS: This is an integrative review held in May 2015. In order to search the scientific literature gaps of knowledge about the topic under study, we used the strategy peak as evidence-based research tool that It proposes that clinical problems of healthcare practice, are initially fragmented later to be organized (SANTOS; PIMENTA; NOBRE, 2007). It adopted the level of scientific evidence by study type the Oxford Centre classification for Evidence-Based Medicine, periodicals selected grade of recommendation A. To do this we used the following MeSH Terms: Aged or Hypertension; Telemedicine; Therapeutics; Patient Readmission to search productions in the scientific basis MEDLINE via PubMed. Among the terms used if the Boolean operator "and". The following eligibility criteria applied: Portuguese, English or Spanish; abstract and journal available in full online. For Exclusion criteria were indicated: theme focused on diseases in non-cardiovascular health. After conducting a survey of journals and select according to the inclusion criteria, 44 studies were presented. After duplication journals and unrelated theme, 07 publications were selected for analysis and discussion of the background.

RESULTS: Efficiently taking care of frail elderly will become an increasingly important part of the reform of health care (TAKAHASHI et al, 2012). Almost 25% of patients hospitalized with coronary artery disease are readmitted within 30 days (FELTNER et al, 2014). Studies confirm the need for evaluation of the telephone intervention efficacy in standardized case management in order to reduce the use of health services in patients (RIEGEL et al, 2002; TAKAHASHI et al, 2012), such as admissions (RIEGEL et al, 2002 ; BENATAR et al, 2003; TAKAHASHI et al, 2012). Management strategies of the disease and patient compliance aimed at maintaining a satisfactory condition can reduce the need for hospitalizations in patients with cardiovascular disease, length of hospital stay, reduce hospital costs and perhaps improve humanistic outcomes and quality of life (RIEGEL et al, 2002; BENATAR et al, 2003). Study shows that a telemedicine system that combines monitoring with motivational support tools added to a comprehensive multidisciplinary care can reduce the number of hospital admissions and the number of days of hospitalization in patients with heart disease (RIEGEL et al, 2002; BENATAR et al, 2003; CHAUDHRY et al, 2010; DOMINGOS et al, 2011; FELTNER et al, 2014). However, refers to the importance of evaluating the effectiveness and comparative effectiveness of high care interventions to reduce readmission rates and mortality of hospitalized adults (TAKAHASHI et al, 2012; Feltner et al, 2014). Study

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said 205 participants were selected, with an average age of 80.3 years (TAKAHASHI et al, 2012). The average age was 61 years, where 42.0% of patients were female (CHAUDHRY et al, 2010). Another study included in the study 92 patients (71% male) with a mean age of 66.3 ± 11.5 years (SUNDAY et al, 2011). The average age of participants was 63.06 ± 12.09 years; 136 (63.0%) were female; and 186 (86.1%) were African American (BENATAR et al, 2003). Diabetes Mellitus, hypertension and coronary artery disease were the most common underlying medical conditions and 54.0% of patients had chronic kidney disease (CHAUDHRY et al, 2010). Study indicates that the primary endpoint was a composite of readmission for any reason or death from any cause within 180 days after the selection (CHAUDHRY et al, 2010). Secondary outcomes should include hospitalization for any reason or death from any cause, hospitalization for heart disease, the number of days in the hospital, number of hospitalizations for any cause (BENATAR et al, 2003).

CONCLUSIONS: A telemonitoring system serves as a motivational support tool able to reduce the number of hospital admissions and the number of days of hospitalization in patients with heart disease. The use of this tool can be applied enabling the chronic diseases not transmissible, prevention of complications, health guidance and consequently stimulating self-care, encouraging adherence, thereby contributing to the hospital readmissions. ■

Communication technology in the post High Elderly: an analysis to reduce hospital readmission

Fernanda M. Pinheiro[1]; Rosimere Ferreira Santana[2]; Fátima Helena do Espírito Santo[3]; Renata Miranda de Sousa[4]; Gabriela C. O. Miranda[5]

INTRODUCTION: Hospital exposes the elderly to various aspects of vulnerability (2) risk to embrittlement, increasing the chances of complications, costs and readmissions (3.4). Thus, the hospital readmission is an important indicator of low efficiency of the health system, and therefore characterizes the effectiveness of care during the hospital stay (4).

In the face of technological advances and integration of communication technology in health care, for nursing, the American Nurses Association considers the telehealth as a broad term that includes telemedicine and the telenursing, as well as other areas of health, defining it as activities or provided health care services apart by barriers of distance and time and using technologies such as telephones, computers or interactive video transmission (8).

The telemonitoring can be a complementary strategy in the health care of the elderly in post discharge. Due to lack of studies that portray the elderly situation after hospital discharge (9), this paper aims to analyze the hospital after elderly through telemonitoring.

METHODS: Quantitative, descriptive study conducted in a university hospital located in the state of Rio de Janeiro during the months of December / 2014 to March / 2015. Were selected as participants in the selected 43 elderly medical wards of the hospital, where for inclusion criteria were used: age greater than or equal to 60 years, both sexes, and to exclude participants whose functional capacity evaluation, classify them as totally dependent to perform activities of daily life, who died during the search.

Identified hospital discharge according to the Admission form and high in the institution, these elderly began to be monitored by phone calls for a month. For data analysis, we used simple statistical analysis, presented in percentage (%) for categorical data and mean ± SD for numeric data.

The study followed the recommendations of Resolution 466/12 of the National Council of Health Ministry of Health and was approved by the Research Ethics Committee of the institution under the Opinion No. 925 237. The research was funded by the Foundation for Research of the State of Rio de Janeiro (FAPERJ).

RESULTS: From December / 2014 to March / 2015, 43 elderly were selected for the survey, including 25 men (58.14%) and 18 women (41.86%) with a mean age distribution of 71,46 anos (± 8.89).

Telemonitoring the elderly, considering sociodemographic characteristics, 20 were married (46.51%) of which 17 (39.53%) males and 03 (06,97%) were females. As for health status, there was a higher prevalence of cardiovascular

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diseases (32.55%): Heart Failure, Hypertension and unstable angina, followed by respiratory diseases (27.90%): obstructive pulmonary disease, pulmonary nodules and pulmonary emphysema. The hospitalization of the elderly was 26.64 days of hospitalization, with predominance of stay between 8-30 days (48.83%).

Among those who were health monitoring before admission, 27 elderly (62.79%) perform this on an outpatient unit, followed by 6 (13.95%) for basic health unit. However it was found that 10 (23.26%) elderly did not make any kind of medical care and no reported use services of the Family Health Strategy program.

In the post hospital discharge analysis, during the telephone follow-up, 25 (58.13%) elderly did not have complications for use in any emergency department or hospital.

However, 8 (18.60%) seniors used the health service, of which 6 (16.66%) of the emergency service, 4 (36.36%) men and two (18.18%) women, and 5 (13.88%) elderly were readmitted in telemonitoring period.

It was identified in the high post, 3 (3.75%) deaths, all male. Of these deaths, previous diagnosis to death were: disease of the respiratory tract (emphysema and pulmonary nodule) and genitourinary tract disease (chronic renal insufficiency). They found no 4 (9.30%) seniors in their phone records in high post.

Regarding the use of health services, there was an average of 49.90 days of use after hospital discharge (± 24.85); 2 (18.18%) seniors used the health service after 30 days, 7 (63.63%) between 31/60 days and 2 (18.18%) aged over a period = 61 days after hospital discharge.

As for medical care post discharge, 22 (61.11%) elderly conducted medical monitoring and 14 (38.88%) did not do any follow-up, however, of these, 8 (22.22%) were awaiting vacancy for outpatient visit marking the cardiologist.

CONCLUSIONS: The study found that the post hospital discharge telemonitoring enables to evaluate the evolution of the elderly and the use of health services by the same, therefore, a viable technology in the care of elderly health to identify risk situations, preventing complications and readmissions by evaluation and continuous support in the post hospital discharge. We must invest in new technologies and strategies to health care of the elderly seeking greater effectiveness of treatment and reduce the complications of chronic diseases that weaken these individuals and culminate in recurrent hospitalizations. ■

Mobile Apps for Quit Tobacco

Jakir Hossain Bhuiyan Masud[1]

INTRODUCTION: Mobile health (mHealth) is an emerging discipline for medical and public health practice. Mobile health program supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs) and other wireless devices. Bangladesh, being a producing-cum-consuming country, bears the double burden of tobacco. Recently conducted Global Adult Tobacco Survey (GATS) shows that, 43% people use both smoking and smokeless tobacco. A WHO study conducted in 2004 estimated that 57,000 lives are lost annually due to tobacco-attributable diseases and 382,000 people become disable. According to GATS Bangladesh 2009 shows, 7 out of 10 want to quit tobacco. But there is no quit line, only have some tobacco cessation clinics. The project was done to develop a mobile app to quit tobacco and empower people about health issues regarding tobacco.

METHODS: I designed the mobile app in Java platform that was a mHealth project of our Global Health Informatics course at the Massachusetts Institute of Technology (MIT), The University of the Philippines Medical Informatics Unit (MIU) and Sana .The project was conducted from February to May 2014. The SMS, mobile call and awareness message were designed in this app. The method shows process of mobile application.

RESULTS: The mobile application helps people who want to quit through his/her smart phone. They can call, SMS, writing question in discussion forum. The output shows in wireframe.

CONCLUSIONS: The application will help people to aware about tobacco that leads to quit tobacco. ■

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Development of mobile application for vaccine record in adolescent, adult and elderly

Valéria Conceição de Oliveira[1]; Jhonatan Fernando de Oliveira[2]; Jéssica Pereira Lopes[3]; Júlia Nunes Neves dos Santos[4]

INTRODUCTION: Unknown adult vaccination status continues to be a major issue facing health services since individuals do not usually keep proof of immunization. Most adults do not seek out immunization services and when they do, they are normally unable to furnish immunization records. Therefore, with the goal of providing swift and easy access to patient information, many institutions have been searching for solutions; one of these is to avail professionals of on-site technology. The portable device is one of the technologies that could afford numerous benefits considering its widespread utilization in the fields of information technology, allowing the user to tap into knowledge and information available in health centers. This would accelerate patient data retrieval and enable the rendering of continuous assistance. It must be emphasized that the mobile phone - a mobile technology, is accessible and present across all social strata. This ensures high potential for use in education, health and full-time caregiving. To this extent, the objective of this trial was to develop an application capable of recording and tracking vaccinal status via portable devices.

METHODS: Technological production trial developed at the Federal University of São João del-Rei Dona Lindu Midwest Campus (UFSJ/CCO) in association with the Minas Gerais Federal Center for Technological Education (CEFET-MG), both located in the city of Divinópolis. It was supervised by two professors from the CCO campus and one professor from CEFET and involved a high-school student, a medical student and a computer engineering student.

The application was developed on the Application Programming Interface (API) 19 Android platform. Work tools included JAVA Programming Language, Astah Community UML Modelling software, Toad Data Modeler data modeling software, SQLite data bank, Software Kit for Android Development and Eclipse Integrated Development Environment.

Elaboration of the proposed application was rooted in the concept of the evolutionary software process model in which delivery of an increasingly more complete version at each iteration is considered primary practice. (PRESSMAN, 2006) Each iteration embodied the framework of Communication, Modeling and Construction processes.

In the communication process, requirements gathering for defining application functionalities was carried out by the high school student and the engineering student through interviews with the qualified nurse and the medical student. In the subsequent process, modeling was executed using Unified Modeling Language in order to create the following diagrams: Use-Case, Classes, Sequence, and Entity and Relationship. Finally, software was coded by the high-school student and the computer engineering student under the supervision of the CEFET professor and based on documentation developed in the earlier stages.

At the end of each iterative process, a version of the application was generated for assessment by the advising pro-

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fessors and the medical student. Based on participant feedback, corrections and improvements were planned for implementation at the next iteration. In all, seven iterations were needed before defining the final version of the application.

RESULTS: Based on requirements gathering and analysis, the system was modeled and Use-Cases Diagram, Classes Diagram, Sequence Diagram, and Entity and Relationship Diagram elaborated.

The Use-Cases Diagram illustrates major system functionalities from the user standpoint. The Classes Diagram represents the framework and interclass relation and is intended for use as an object model and as an aid during the software coding stage. The Sequence diagram aims to represent the interclass messages exchanged whilst performing an operation. The Entity and Relationship Diagram models the system database.

The mobile vaccine tracking application for adolescents, adults and elderly persons allows the end-user, assisted by a healthcare provider, to keep an immunization record, even though for the meanwhile it is still not considered a valid document. Moreover, the application is helpful to the nurse in the vaccine administration process for once the first dose is recorded, a calendar for that vaccine is automatically generated.

The User Registration screen presents user data for submission on first-time access. Following registration, an Initial screen is displayed whereby access may be had to other areas and to a list of due doses. A user can click on any item on the list and confirm doses administered.

A vaccine can be added by choosing the vaccine and selecting administration date of first dose. Depending on the type of vaccine selected, the system displays a request for the user to enter information concerning the number of doses in that vaccinal cycle.

The software displays user reminders for upcoming due vaccines. Reminders are automatically updated and excluded only after confirmation of dose administration on the Initial screen. The application allows users to schedule reminders as well as to specify how many days they want the same to be sent.

And lastly, on-screen visualization of doses administered virtually likens the application to a vaccination card, where one can see all vaccines administered with their respective dates.

CONCLUSIONS: The application for recording adolescent, adult and elderly person vaccinations was developed to serve as an immunization record that allows the user to visualize administered and due vaccinations as well as to receive reminders to update his/her card.

Project execution integrates a larger project "Vaccination in the palm of your hand", whose approval by FAPEMIG was published in First Projects Notice nº 17/2013. In this first stage of the project, a mobile phone application was developed and in the second stage, plans include developing a means of exporting data to the application from the National Immunization Information System Program (SI-PNI) and conducting usability tests.

As health service information systems continue to improve, so does the need to develop systems whose goal is to improve patient access to health information such as vaccinal status. Therefore, development of this tool would make standardized aggregation of immunization records feasible whilst facilitating lifelong conservation of proof of immunization and providing swift access to information. ■

Mapping Archetypes to Nursing Terminologies: A Case Study

Leandro França de Mello[1]; Joyce Rocha de Matos Nogueira[2]; Timothy Wayne Cook[3]; Luciana Tricai Cavalini[4]

INTRODUCTION: Healthcare applications have been developed to support nursing professionals in the assessment and care of disabled patients by the inclusion of the Functional Status concepts; however, such initiatives are incipient, and the data modeling approach commonly adopted by these applications and conventional Electronic Medical Records turn them into "data silos". In other words, they are self-contained applications that are unable to communicate with the longitudinal Electronic Health Record of the patient.

There are global efforts for the development of terminology systems for nursing practice, and these vocabularies should allow data sharing between distributed, independently developed healthcare information systems. The knowledge representation of the Functional Status, mainly used for the record of the Activities of Daily Living (ADL) of disabled patients, is published as part of the Nursing Outcome Indicators Catalog of the International Classification for Nursing Practice (NOIC-ICNP).

However, there are technical difficulties to harmonize interface terminologies that represent the nursing practice at the point of care to controlled terminologies, such as the NOIC-ICNP. These challenges occur out of the consensus approach used in defining controlled vocabularies, since consensus in healthcare is difficult to achieve. The objective of this is study is map openEHR archetypes to the NOIC-ICNP.

METHODS: Given the scenario described above, there is a perceived need for the achievement of a semantically and syntactically unified representation of nursing terminologies. This could allow independent development of systems and still maintain the semantic context for information exchange between healthcare applications. Thus, it is important to improve the analytical methods of mapping nursing terminologies to structured and detailed clinical models that provide system interoperability at the semantic level, such as the openEHR specifications. The term binding capabilities of openEHR are well defined in the specifications but they have not been widely implemented. Thus, this study has the goal to add to the existing knowledge in nursing terminology mapping by proposing a new approach on the representation of term sets in structured models such as openEHR archetypes.

The NOIC-ICNP terms related to the Functional Status were selected since they are a well-defined healthcare concept for common use in nursing practice. The knowledge representation was performed according to the multilevel model-driven approach, which produces a separation between the information model and the concept model in order to provide semantic interoperability, as originally proposed by the openEHR specifications [8]. In there, an archetype is defined as the maximum data set for a particular healthcare concept. This means that all data elements that are part of a healthcare concept should be represented in the correspondent archetype, in the form of restrictions to the Reference Model classes.

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The correspondence between the terminology and the openEHR archetypes studied was performed by consensus. The titles from the NOIC-ICNP Tables 1 to 4 (Section 1) related to the concept of Functional Status were used as keywords, which were used for browsing the Clinical Knowledge Manager (CKM), the global and official repository of validated openEHR archetypes, which resulted in finding the "Barthel Index" archetype, which did not specify any terminology bindings to controlled vocabularies.

The NOIC-ICNP terms were then matched one by one to the correspondent archetype nodes, trying to find the best match. Thus, when the archetype nodes matched the NOIC-ICNP terms in structure, granularity, data types and conceptual model, the match was regarded as "exact". When there was no direct correspondence between the archetype nodes and the NOIC-ICNP terms, or when there was not complete semantic correspondence between them, the best match was chosen and the necessary adjustments were reported.

RESULTS: The "Barthel Index" archetype, when compared to the 54 NOIC-ICNP terms related to the Functional Status-showed that that some of the nodes of the archetype did not match to any NOIC-ICNP term, and some archetype nodes mapped to more than one NOIC-ICNP term.

In the chapter of the Functional Status for acute care, complex continuing care, long term care and home care corresponded to the same archetype node. For instance, for the concept "Walking" (categorized as: in general; in room or in corridor; Locomotion on unit or off unit; in home or outside of home), the terms "Positive ability to walk" (code 10028333) corresponded to the internal code "Independent" (archetype node = [at0039]) of the ELEMENT "Mobility" [at0017], while the term "Impaired ability to walk" (code 10001046) corresponded to three internal codes of the ELEMENT "Mobility" [at0017]: Immobile or < 50 meters" [at0018], "Wheel chair independent" [at0019] and "Walks with help" [at0020]. Similar situations occurred for the NOIC-ICNP terms related to Transfer (in general or to the toilet), Toilet use, Bed mobility, Eating, and Dressing (in general; upper body or lower body).

The NOIC-ICNP terms related to the Instrumental Activities of Daily Living (IADL) did not match any of the "Barthel Index" archetype nodes, since the Barthel Index does not evaluate them, and a new archetype, "Instrumental Activities of Daily Living", was model to allow direct mapping of the corresponding terms.

For the IADL archetype, OBSERVATION was chosen as the archetype root class, since, according to the openEHR Archetype Object Model, these information are recorded from the patient observation performed by a healthcare provider during an encounter.

For the 'items' attribute of the ITEM_TREE class, the cardinality was set from zero to unbounded, meaning that no data item of this archetype is mandatory, but any combination thereof, of any size, is allowed.

The tree of items of the "IADL" archetype consists of the following constraint definitions of on seven instances of the ELEMENT class: meal preparation [at0004]; ordinary housework [at0007]; managing finances [at0010]; managing medications [at0013]; phone use [at0016]; shopping [at0019]; and transportation[at0022]. The 'occurrences' attribute values of these ELEMENT class instances were set from 0 to 1, which means that the record of these data elements is optional. The 'value' attribute of these ELEMENT class instances was constrained to the DV_CODED_TEXT data type class whose values were associated to a local terminology.

CONCLUSIONS: This study presented the process of modeling the terms related to the concept of Functional Status as represented on the NIC-ICNP as openEHR archetypes. The search for a compatible archetype resulted in the use of the "Barthel Index" archetype for the mapping, which needed to be supplemented by modeling a new archetype for IADL concepts.

In order to better understand the technical challenges of the mapping proposed in the is study, it is important to notice that, in effect, all terms defined in an archetype are pre-coordinated by definition. Thus, universal models such as archetypes can be a barrier to the adaptation of the knowledge representation of the dynamics of the nursing practice at the point of care due to their top-down nature.

Despite the technical difficulties, there is an increasing consensus on the superiority of multilevel model-driven approaches such as the openEHR specifications in playing the role of the desired "common language" or the "universal model" that unifies nursing (in particular) and healthcare (in general) terminologies. Thus, it will possible to develop purpose-specific, but semantically interoperable, healthcare applications for the record of information and the computerized aid to the continuing care. ■

Migration of Legacy Healthcare Information Systems to the Semantic Web: A Case Study

Leandro França de Mello[1]; Joyce Rocha de Matos Nogueira[2]; Iayza Maia Rodrigues de Oliveira[3]; Timothy Wayne Cook[4]; Luciana Tricai Cavalini[5]

INTRODUCTION: The Cervix Cancer Information System (SISCOLO) was developed by the Brazilian Ministry of Health to support the structuring of the National Program for Control of Cervical and Breast Cancer. The SISCOLO is, therefore, a strategic tool for the execution of cancer control activities inside the Brazilian healthcare system. However, in its current software architecture, SISCOLO does not allow information exchange either with the other official, with hospital-based Electronic Medical Records or clinical research databases, which limits the application of the important information contained therein.

With the emergence of the Semantic Web, it has became more viable the achievement of semantic interoperability across healthcare information systems. However, it is important to keep the legacy systems operating before their migration to Semantic Web-compliant applications. This might be possible to attain with the XML implementation of the Multilevel Model-Driven (MMD) methodology. Thus, the present study has the objective to present the method of data model migration from the legacy SISCOLO database to a Semantic Web compliant technology.

METHODS: The SISCOLO Coordination and Laboratory Manuals provided the original data model of the SISCOLO database. Each field from the SISCOLO database was represented as a Pluggable complexType (PcT). The PcTs were arranged in Clusters, according to the original SISCOLO screens. The complete data model composed a series of Concept Constraint Definitions (CCD) for each segment of the SISCOLO user interface. This knowledge modeling process was executed according to the Multilevel Healthcare Information Modeling (MLHIM) specifications, in which the CCDs are the Domain Models, or detailed clinical models. The CCDs were generated by the application Concept Constraint Definition Generator (CCD-Gen) in XML Schema 1.1 format, including one sample XML instance for each CCD. Data validation was performed with two independent XML validators, Saxxon-EE and Xerces, included in the oXygen XML editor 14.2.

RESULTS: A total number of 243 PcTs were modeled, organized into 52 Clusters that produced 9 CareEntry (clinical) and 1 DemographicEntry CCDs. The PcTs datatypes produced were: DvBoolean (30.9%), DvString (text) (30.5%), DvIdentifier (3.9%), DvTemporal (dates and times) (9.0%), DvCount (2.2%) and DvQuantity (1.3%).

A sample of 5,000 simulated XML data instances was produced and persisted in a eXist-DB database, called SISCOLO-EMR. Each XML instance was validated to its correspondent CCD, which were validated to the MLHIM Reference Model. Data from the new SISCOLO database presented a data validation rate of 100%.

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CONCLUSIONS: It was possible to migrate the SISCOLO data model to a Semantic Web compliant technology, by the adoption of the MMD technology as implemented in the MLHIM specifications. If technology could be embraced by the healthcare software industry, it would be expected that the semantic interoperability across healthcare information systems could be achieved. For a governmental system such as SISCOLO, such level of interoperability could lead to significant improvement in the cost-effectiveness of female cancel control activities. ■

Patient Diagnosis over the Cloud

Luan Henrique Santos Simoes Almeida[1]; Marcelo Oliveira[2]

INTRODUCTION: Medical images is an important tool to aid the diagnosis and currently several procedures have images as basic input. Therefore, providing resources capable of providing better benefits to professionals who manipulate medical images it is important. The amount of medical imaging data generated are increasing each year due to their widespread use to support diagnosis. The PACS arrived as a mechanism to manage this entire sum produced by centralizing into a database. Though the use of the PACS is an approach widely used to store digital images it is limited in the current scenario, with high cost investment in data centers and limited physical storage. Therefore, adopt a scalable environment that can persist data as long as needed and withstand varying loads is essential. Cloud computing provides a scalable and elastic environment for a set of computing resources as a service, providing low-cost storage, through pay-per-use policy, with high reliability and security. Thus, cloud computing becomes the ideal setting to several health applications. This paper proposes a web platform on a cloud computing environment that provides a safe imaging system capable of assist patient diagnosis remotely and with a strong storage capacity.

METHODS: To perform experiments it was used the DCM4che PACS along with PostgreSQL database, the Amazon public cloud and 1761 CT images in the DICOM standard. It was developed a daemon as a directory watcher to monitor the PACS. At the time the images are retrieve by the PACS, the daemon starts a process to anonymize this images to be sent to the cloud. The anonymization process occurs with the reading the image file, identifying the DICOM tags and converting these tags to a relational database format to be used in the PostgreSQL database. This anonymization process is important to protect patient information, using only some identifiers to identify the patient by a health professional. To provide the full image file again, the patient information that was extracted to anonym the file is stored locally in a database alongside with some file and procedure informations. The image files are sent to a public cloud that contains Oviyam as a web based DICOM viewer and a DCM4che instance to work alongside Oviyam.

RESULTS: The environment was built to be a fail-safe system by using log reports. Through these log reports the environment will be able to recognize in which task the process stopped and continue from that point. As was stated, it is possible to identify the images, if needed, that were stored on cloud by downloading the images from the cloud and using the informations regarding this file images that were stored in the PostgreSQL database to identify. The identification of the images is only possible to be performed on the clinic or hospital that uploaded the image to the cloud and not from anywhere. The images can be viewed through Oviyam from any location and any device that supports HTML5 and with internet connection by providing the login and password credentials to a manager in the public cloud.

CONCLUSIONS: With the solution presented it is possible to enable access to centralized storage of patient images and eletronic health records (EHRs) and integrate a whole estate or even an entire country EHR system. Using a centralized database allows integration between other health bases within the big data concept in a near future. ■

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Telemedicine conferences helping mass casualty victims from nightclub fire in Brazil

Luciano Silveira Eifler[1]; Gustavo Pereira Fraga[2]; Antônio Carlos da Cunha Marttos[3]; Fabio Leite Gastal[4]

INTRODUCTION: Mass casualty disasters caused by fires require complex management in a multidisciplinary setting. Telemedicine may improve communication and enables sharing of clinical information to manage severely burned patients. This study aims to present the use of telemedicine in the second worst fire disaster in Brazilian history.

METHODS: A nightclub fire occurred after pyrotechnic displays were used during a music show attended by 1,500 people and causing the immediate death of 234 people in the city of Santa Maria. Nearly 150 victims were initially evaluated in the first two hours in a local hospital used as the triage setting due to its proximity to the site of the incident. Eighty-two patients were intubated due to inhalation injury and respiratory distress. In the first 24 hours after the incident, 54 patients were transferred to 8 hospitals in the state of Rio Grande do Sul (RS) using aeromedical transport. The Brazilian Trauma Society (SBAIT), with the support of the University of Miami, organized seven videoconferences from the 3rd to the 30th day after the incident to discuss treatment modalities to those patients. Physicians who directly participated in the care of the patients answered a survey using Likert methodology.

RESULTS: Twenty-five centers (average: 8 per videoconference), including six treating hospitals from Brazil as well as specialized centers in the USA, Canada, and other countries participated in the videoconferences. Discussions regarding the indications and use of routine bronchoscopy, management of inhalation injury, the use of hydroxocobalamin for cyanide poisoning, and extracorporeal membrane oxygenation support were carried out. Thirty percent of physicians taking care of the patients had no previous experience with telemedicine, and 92% identified the conferences relevant to their patient's management and considered it a good learning tool.

CONCLUSIONS: Telemedicine is applicable in mass casualty situations to improve communication between treating centers and those with specific expertise and it also contributes to the management of complex injured patients when local expertise is limited. ■

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BH-Telehealth Program: Teleconsulation perception by subspecialists and managers

Maria do Carmo Barros de Melo[1]; Marilene Vinhal Nunes[2]; Sandra S. Mitraud[3]; Raiana R. Figueiredo[4]; Raphael A. T. Aguiar[5]

INTRODUCTION: Telehealth has great potential to improve access to care, but its adoption in routine health care has been slow. The BH-Telehealth Program (Belo Horizonte Telessaúde, in Portuguese, Minas Gerais State – Brazil) was established in 2004. This project resulted from the combination of interests between the Municipality of Belo Horizonte, the Federal University of Minas Gerais, the Ministry of Health and the European Union - @lis project - creating an environment to practice sustainability to the work of the Family Health Program. The program offers support care for professionals in the public health system of primary health care (UBS – Unidade Básica de Saúde in portuguese). The use of teleconsultation did not achieve its main goal of increasing the resolution of the Primary Health Care service the way it was expected up now. Studies have investigated physicians' acceptance of various telehealth applications in the lasts years. It is important to study the perception of managers and teleconsultants specialists, because they are strategic actors in the process and it was not investigated in previous studies. The aim of this study is to evaluate the perception of managers and teleconsultants specialists about the numbers of teleconsultations request in the primary care health.

METHODS: The present study analyzed the organizational, technological and cultural factors related to the incorporation of technology through qualitative methodology. Interviews were performed and analyzed according to the content analysis technique. The NVIVO® software was used to analyze of the interviews. Information from the teleconsultations was obtained from the records present in the information management system of the BH-Telehealth. Quantitative analysis and data collection were conducted. The study was approved by both the Federal University of Minas Gerais (Universidade Federal de Minas Gerais in portuguese) and the SMSA-BH (Municipal Department of Health, Belo Horizonte/ Secretaria Municipal de Saúde da Prefeitura Municipal de Belo Horizonte – in portuguese) Ethics in Research Committee (CAAE: 21863813.1.0000.5149). Interviewees agreed to provide information for the study by signing the Informed Consent Form and their identities will kept confidential. FAPEMIG (Minas Gerais State Research Fundantion/Fundação de Amparo à Pesquisa do Estado de Minas Gerais in portuguese) gaves financial help and CAPES (Coordination for the Improvement of Higher Education Personnel/Coordenação de Aperfeiçoamento de Pessoal de Nível Superior in portuguese) gaves support for this study.

RESULTS: From 2006 to 2013, 1,827 subspecialist teleconsultations were performed. The data demonstrated that the more requested subspecialists were angiologists (n= 510), cardiologists (n= 199), endocrinologists (n= 153) and neurologists (n= 99). Until now, 27 interviews were conducted: 7 from the staff managers, 7 from the UBS managers and

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13 from the specialists. All the interviews declared they knew of and agreed with the benefits of the teleconsultation system. The answers indicated that more support from the managers of the services and from the central organization is needed. Implementing telemedicine requires understanding the health-care and decision to integrate telemedicine within that environment. There are many barriers for the use of the teleconsultation system. The teleconsultants required a dedicated time to answer the requests and to respond to the primary care professionals in order to improve the relationship. The BH-Telehealth Program is considered a great allied in offering support for the continuity of comprehensive healthcare through the use of teleconsultation. This system allow the patient's problem to be solved in the UBS, reducing referrals to specialty centers and increasing the resolubility of primary care, contributing to effectiveness of health care. The medical profession is characterized by relative autonomy of physicians and their independence in decision-making and this is perceived as one of the barriers for the use of telehealth tools. Some discussions have been reported in the literature on the behavior of the physician to seek or not to seek a second opinion. Some determining factors where the professional is located, the belief that the patient's problem is not serious and does not require a deeper approach, and the time available to perform this activity. Sometimes the use of a new technology depends on institutional and management rules, but the adherence to the system depends mainly on the perception of users regarding the characteristics of innovation. The structure and systematization of teleconsultations also need to be reassessed, mainly the specific place and a time for the physician to access the system. It is important to train and stimulate the physicians to use the tools in order to get the best of it. In an addition, the UBS manager and the municipal health secretary have to encourage the use and promote this type of healthcare. Several published studies have described the barriers and factors associated with telehealth adoption and acceptance.

CONCLUSIONS: The data analysis of the interviews demonstrated that teleconsultation system is under-utilized by primary care professionals. Some changes in the coordination of BH Telehealth program within the SMSA- BH may be factors that contributed to this fact, as well as professional lack of motivation from primary health care to access the system. Specific teleconsultants often report that requests are carried out incompletely and that the data provided do not allow the appropriate response. Telehealth has several problems related to its adoption by users and incorporation in daily practice of health practitioners. Further reflections about the results in order to improve the use of the teleconsultations in the BH-telehealth program are necessary. The end result may point to possible strategies for increased use of teleconsultation in the city of Belo Horizonte, impacting on user assistance quality, providing greater link between patients and healthcare team and reducing waiting list for specialist consultation. This system also has the potential to reduce costs by reducing transportation and optimizing patients' daily routine. This study may help policy makers define strategies to improve the use of teleconsultation services. ■

Nursing teleconsultations of a telehealth network on primary care assistance in a developing country

Milena Soriano Marcolino[1]; Julia Pereira Afonso dos Santos[2]; Izabella de Oliveira Antunes[3]; Diomildo Ferriera Andrade Junior[4]; Maria Beatriz Moreira Alkmim[5]

INTRODUCTION: Nurses have a central role in primary care in Brazil, through the coordination of the Family Health teams, on education and direct assistance to users, through nursing consultations and by performing preventive procedures. Telehealth has been implemented in Brazil to provide support primary care practitioners and to strength the Family Health Strategy. The Telehealth Network of Minas Gerais (TNMG) is a public telehealth service composed by 6 public universities that attends primary care of 780 cities in Minas Gerais state, Brazil. The objective of this study is to analyze the teleconsultations requested by nurses sent to the Telehealth Network of Minas Gerais and to perform a socio-economic analysis from the cities from where the teleconsultations were originated.

METHODS: This retrospective and observational study analyzed all consecutive teleconsultations requested by nurses to the TNMG, from the beginning of the service in April 2007 to February 2014, and the cities from where teleconsultations were originated. TNMG coverage was 182 cities in 2007, 279 cities in 2009, 657 cities in 2011 and 722 in 2014. Characteristics of the cities included population, average Human Development Index (HDI), per capita income, percentage of poor people, life expectancy and infant mortality. The definition of poor of the United Nations Development Programme was used: percentage of the population with power of purchasing of less than $1.25/day. To convert Brazilian Reais (BRL) to American Dollars (USD), the conversion rate in 04/29/2015 was used. The HDI was published by the United Nations Development Program as a composite statistic of life expectancy index, education index, and income index used to rank countries or cities. Teleconsultations were classified according to the professionals who requested them, the specialist who answered them and type of query. Each teleconsultation might contain more than one query. A sample of consecutive teleconsultations about wound care from July to September 2011 was selected to investigate the most common types of wounds in those teleconsultations.

RESULTS: Through the study, 30,258 teleconsultations requested by nurses were analyzed from 632 cities. The majority was directed to medical subspecialties, mostly dermatology (20.2%), gynecology/obstetric (12.9%), internal medicine (5.2%) and pediatrics (4.9%); and 20.7% were directed to nurses, especially general nursing (10.6%), wound care (7.1%) and pediatric nursing (1.3%). The majority of the queries were about etiology (34.1%), non-pharmacological treatment (21.3%), pharmacological treatment (20.3%), medical or nurse advice (17.2%), patient follow-up (14.7%), vaccination (8.6%), surgical treatment (5.7%) and pregnancy assistance (5.1%). With respect to the sample of wound care teleconsultations (n=207), 18.4% were about vascular ulcers, 12.6% pressure ulcers, 9.2% diabetic foot ulcer, 1.4% burning wounds and 1.0% ostomy care. In 34.8% of the cases, the nurse asked about wound dressings and, in

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19.8%, about systemic or topic medications. With respect to the cities from where the teleconsultations were originated, 33.2% had less than 5,000 inhabitants, 35.9% 5,000-10,000 inhabitants, 23.7% 10,000-20,000 inhabitants, 6.6% 20,000-100,000 inhabitants and only 0.6% of the teleconsultations were originated in cities with more than 100,000 inhabitants. The median HDI was 0.655 (Interquartile range [IQR] 0.62-0.68, range 0.536 to 0.776), the median per capita income was $132.50 (IQR $105.58- $177.77, range $62.68-R$380.94); the median percentage of poor in the city population was 20.52% (IQR 10.89-31.55, range 1%-58%), the median life expectancy at birth was 73.79 (IQR 72.74-75.04, range 68.4-77.7); the median infant mortality was 17,3 (IQR 15.3-19, range 11.2-27.8).

Discussion: This study, in a large sample of teleconsultations from nurses of 632 cities, showed that the majority of nurses who sent teleconsultations were in remote, small, impoverished municipalities and that the majority of teleconsultations were sent to medical subspecialties, as dermatology and gynecology/obstetrics. Minas Gerais state can be considered representative of the country, as age distribution and percentage of urbanization are similar to the overall national pattern, as is the social inequality: the north and the northeast of Minas Gerais have Human Development Index (HDI) similar to the North and Northeast Brazil, and while the west and the south of the state have HDI similar to the areas with the highest HDI of the country. As the whole country, specialized care is concentrated in the largest cities, consequently telehealth is an important tool to contribute to improvement of quality of care. The analysis of the types of doubt, including the specific analysis of teleconsultations in wound care, is important to select topics to tele-educational activities.

CONCLUSIONS: This study, in a large sample of teleconsultations requested by nurses, gives an ideia of the most common types of query of these professionals, what can be useful to select the most important topics for training strategies. Further studies are needed to explore the effectiveness of nursing teleconsultations to improve clinical outcomes. ■

Innovative e-Health Strategies towards a Healthier Aging Population

Patrícia de Oliveira Dias[1]; Edmilson Siqueira[2]; Robert Timm[3]; Anna Casalinho[4]; Janaína Bender[5]

INTRODUCTION: The world population is clearly getting older, a trend that imposes the immediate adoption of several preventive and supportive strategies to our society, aiming to tackle the upcoming burden of chronic diseases. Such huge initiatives should cover the establishment of basic infrastructure at home level as well as building suitable mobility and other outdoor supportive facilities, focusing on efficiently designing and building cities that match the "elderly-friendly" concept. Tele-medicine and e-Health play a major role in current health practice, providing both educational and diagnostic tools favoring better assistance of patients - covering almost all areas of health care. Since 2014, a geriatric institution - *Asilo de Mendigos de Pelotas* (AMP) - founded in 1882 and located in the city of Pelotas in the south of Brazil, started the implementation of e-geriatric methods, namely: Tele-dermatology and Tele-cardiology, both through mobile e-Health technology. Objectives. The Tele-geriatric project of the AMP aims to: 1) provide early diagnosis and remote tele-dermatology advice for a variety of skin lesions, 2) offer immediate tele-electrocardiographic (Tele-ECG) diagnosis and specialized cardiologic advice in selected geriatric cases and, 3) allow the clinical follow up of patients through a Web-based clinical form.

METHODS: The project was implemented at the AMP, a century-old geriatric institution, headquartered in the downtown area of the city of Pelotas. Currently it serves as a geriatric home to 87 elderly people, with a maximum capacity of 110. The responsibility of designing and technically establishing the Tele-geriatric project at the AMP was of the e-Health team of the Instituto de Cardiologia do Rio Grande do Sul (IC/FUC) together with the AGM e-Health Company (Brazil) and the nursing staff of the AMP. The project is financially supported by a donation received from a private tractors company headquartered in Brazil. The Tele-dermatology branch of the project is based on an "Iphone 5S" smartphone, "FotoFinder Hub" mobile platform, "Handyscope" digital dermatoscope, through which the skin images are acquired, stored and transmitted for specialized dermatological analysis and therapeutic recommendation. As a starting point, the method included the acquisition of skin images from regions at high risk of pressure ulceration - lumbosacral, trochanteric and calcaneal areas - and also from other existing skin lesions, including suspected skin cancer lesions as identified by the AMP nursing staff. The Tele-ECG method is composed by a digital ECG machine, a proprietary software for data management of the exams and an Android-based mobile platform for the ECG tele-transmission and analysis. Basal ECG exams are recorded at the AMP doctor's office at patients' admission and repeated, routinely, every 6 months. Patients identified with significant cardiac abnormalities are selected for additional ECG recordings, as requested by the medical staff. On-duty cardiologists access the ECG content for analysis through conventional computers or via their own mobile devices (tablets or smart-phones). In order to follow up the patients, a Web-based platform was developed for the management of both clinical and laboratory data. The software was

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built in PHP programming language and the data are stored in the MySQL database, allowing for information retrieval whenever needed. The management of data traffic and the backup solution is provided by a local server installed at the e-Health Centre of the ICFUC, located in Porto Alegre - capital city of the state of Rio Grande do Sul.

RESULTS: Skin images and digital ECGs from all 87 patients with a mean age of 74 years - 49 of them females - were acquired, uploaded and analyzed during the first semester of 2015. The dermatology sample included photos from the lumbosacral, trochanteric and calcaneal skin regions and also from some other areas or identified lesions. A total of eleven lesions (12,6%) were detected, including 10 patients with bed sores and one case of cutaneous carcinoma. Upon specialized dermatological analysis, made through the tele-dermatology platform, specific recommendations and therapeutic interventions were added to the medical prescription of each patient. The analysis of Tele-ECGs resulted in: six normal exams, eight diagnosis of bundle branch block, one case of third-degree atrioventricular heart block, six cases of atrial fibrillation, six patients with ischemic diagnosis, eighteen cases of atrial or ventricular enlargement and forty two exams with chronic or non-specific diagnosis. Clinical data of the 87 elderly patients were uploaded to the Web-platform, including information about comorbidities, medication, risk factors and scores for skin lesions, laboratory exam results, vital signs, and detailed anthropometric information. The content is made accessible for consultation by the staff of the AMP, available via personal ID presentation.

CONCLUSIONS: Taking into account the current knowledge and the availability of contemporary technology it is mandatory to review and to adapt existing health care infrastructure - hospitals, outpatient care units and geriatric institutions - in order to fit the needs of elderly people. In this century, the burden of chronic diseases reflects on an aging population, whose median life expectancy is expected to increase even more during the next few decades. Foreseeing and tackling health and well-being related issues of such an "elderly world" demands the adoption of immediate administrative policies all around the world, which include planning the construction of elderly-friendly cities and rebuilding existing infrastructure at both urban, rural and home levels. The Tele-geriatric project of the "*Asilo de Mendigos de Pelotas*" started in January 2015 aiming to improve the quality of health assistance to those elderly patients whose health condition is impaired for obvious reasons. At this moment, providing tele-dermatology and tele-electrocardiographic diagnosis, followed by the respective specialized advice, has allowed the timely adoption of appropriate preventive and therapeutic interventions to around ninety people living at the AMP. ■

Telemedicine System for Patients with Respiratory Monitoring Chronic Diseases

Raphael Andrade Mattos[1]; Pedro Lopes Melo[2]

INTRODUCTION: According to international guidelines for the study of respiratory diseases , it is essential to treat, monitor multiple factors of the respiratory system. Among these factors, the level of oxygen in the bloodstream is a vital parameter for sustaining life. The monitoring of peak expiratory flow (PEF) is essential for the management of asthma, which affects approximately 300 million people worldwide. The determination of maximal inspiratory pressure (MIP) for evaluation of respiratory muscles is essential to identify the presence of respiratory disorders.

The conventional methods of registry have significant problems associated with the fact that they are susceptible to operator error and not allow digital data storage, as well as the fact usually attributed to the burden on the patient to the measurement and registration. With the help of advances in telecommunications and computing, it was possible to optimize the system. This work is performed in home care services using telemedicine techniques that can enhance the care offered.

In this context, this paper describes the development of a system for monitoring of PEF, muscle strength and pulse oximetry via FTP communication protocol and a specific server for data storage.

METHODS: The module of PFE was performed by an adaptation in a low cost device for peak flow measuring (Mini-Wright, KW Med, Inc., USA). The resultant displacement was measured by means of a pair transmitter / receiver IR (TIL78 / TIL32). The signal derived from the receiver is amplified and associated with a low-pass filter to eliminate possible noises and the effect of aliasing.

With respect to muscle power module, the system basically operates at pressures range between ±350 cmH2O 24PCBFA6D using the pressure transducer (Honeywell Inc.). The signal associated with the pressure is amplified and adapted to a low-pass filter (Butterworth, sixth order, 30 Hertz).

The oximetry module used an Arduino shield of e-Health platform to perform medical and biometric measurements. Using the accessory Pulse oximetry, which is a noninvasive indicator of arterial oxygen saturation of functional hemoglobin, it was possible to measure oxygen saturation. Blood flow is affected by the concentration of Hb and HbO2, and their absorption coefficients are measured using two wavelengths 660 nm and 940 nm. Because of oxygenated hemoglobin and deoxygenated absorb different wavelengths.

The acquisition of signals was performed by a module Arduino UNO R3. This module contains an A / D converter with 10 bit resolution. The communication between the Arduino and the smartphone with Android 4.1.2 system was performed via Bluetooth (version 2.0) protocol.

The developed software was divided into two modules: the first for the patient and the second the hospital environment. The patient module includes the programs drawn up in Windows 8.1, for receive data via Arduino in a native

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language of the same, and the program in Android platform version 4.1.2 that presents and transmit the data via e-mail or FTP, via a 3G connection or Wireless.

In the hospital module, the program was developed using Labview 2012 (National Instruments). The created program allows to perform the analysis of the examinations and follow the general historical, sending recommendations and receive messages from each patient.

RESULTS: The system comprises the configurable hardware for the patient, composed by three modules required for the monitoring of the patient with respiratory disease. The signals obtained by the modules are converted and transmitted via Bluetooth to a smartphone with Android 4.1.2 system. Thus the patient can view the results of the examination, and transmit to a server via FTP, if according to the predefined parameters.

Through the home screen of Android applications, the patient will be able to select the type of test to be performed, the recommendation message to be read or exit the application. Once the patient have selected the type of examination, a second screen is opened, so it can start exam and send via email or FTP the validated exam. Each exam is always saved first automatically in the smartphone memory. The program also allows evaluation tests with up to 3 sec duration with a sampling frequency of 100 Hz. The messages are always sent and stored on the FTP server, then be downloaded and viewed by the doctor or patient.

In ambulatory module, it was created a program in LABVIEW for presentation, analysis and storage of signals stored in a server. Thus, the program downloads the files from the FTP server and presents them in the doctor's PC for analysis.

The first screen of the program allows the clinician to register a patient, by entering the data in the respective fields. After this, is created form of automatic a new folder with the name of the patient in the physician's PC and the server for the storage of exams.

For the analysis of the exams the doctor will select the program, the name of the patient, inserted into a list, the type of examination and the date to be analyzed. That done it is possible evaluate the test of highest peak and the general history of the patient. If it is necessary to evaluate all the tests for a specific date, these results can be viewed in the next screen of the program. Finally the last screen shows the field that the heath professional may use to write recommendations for the patient, as well as receive the patient's own messages.

CONCLUSIONS: A new tool for monitoring patients with chronic respiratory diseases was developed. A program in Labview 2012 to analyze the signals of the three examination modules was developed: it allows the evaluation of peak expiratory flow, muscle strength and pulse oximetry. Its program allows the physician to perform a practical analysis of all the historical examinations of each patient and send recommendations directly to the Android application created. The application also allows the exchange of messages, presents graphs of examinations performed, and sends them to a server or e-mail. The system allows increased interaction between the health professionals and patients, contributing to improve the monitoring of respiratory diseases. ■

How to Measure the Long-run Effect of Telecare on Chronic Diseases: An Application of DID-PSM

Tsuji Masatsugu[1]

INTRODUCTION: The reduction of medical expenditures by protecting people from chronic diseases such as high blood pressure, heart failure, stroke, and diabetes is the center of the issues all over the world, One possible measure is to monitor bio data of the elderly or patients at home including blood pressure, blood sugar, ECG, pulse, weight and so on, by using ICT, which is referred to as e-Health, telecare, or telemonitoring. Although actual implantations of telecare have been conducting in many countries, they are mostly experimental, and research related to their evaluation such as how much they contribute to reduce medical expenditures or days of treatment, to increase those QOL, for example, are very rare. More importantly, telecare is supposed to be useful for preventing chronic diseases, but there exists no research thus far on the long-run effect of telecare. Thus to analyze the long-run effect of telecare is most urgent and necessary, but it is the most lagged behind issue.

This study aims to present how to measure the long-term effect of telecare on chronic diseases by taking medical expenditures and days of treatment as outcome variables based on author's previous studies. In this study, "long-run effect" indicates about 10 years.

METHODS: This study is used survey data conducted in March 2012 in Nishi-aizu, a town located in Fukushima Prefecture, Japan and aims to demonstrate that telecare reduces not only medical expenditure but also days of treatment. The field research in March 2012 to obtain two basic data for statistical analysis such as receipt data which included individuals who were included in our previous studies of the period 2002 to 2006. Thus this research covers the period 2002 to 2010, that is, nine years in which data for 90 telecare users and 118 non-users for the period was employed here.

In this study, the receipt data of treatment conducted by medical institutions was obtained from National Health Insurance. The receipts for each month are kept at the town office, in which data such as name and address of medical institutions, birth date, name of disease, date of initial visit, medicine, and amount of medical treatment are described. In this paper, the following data are used: (i) name, (ii) birth date, (iii) either regular outpatient treatment or hospitalized patient treatment, (iv) name(s) of major disease(s), (v) date of initial treatment, (vi) number of days needed for treatment, and (vii) amount of medical treatment. The main objective is to estimate the difference of such outcomes between users and non-users.

The most common method of evaluating the effectiveness of a new drug or clinical intervention is the Randomized Control Trial (RCT), in which subjects are randomly selected and categorized into a treatment and a control group, and the effect is compared between two groups. The most serious problem of RCTs is avoiding bias between the two groups, which is referred to as sample selection bias. In order to avoid biases, DID-PSM is employed. It is a combination of DID (Difference in Difference) and PSM (Propensity Score Matching). The latter is as follows: Regarding user's

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(treatment) and non-user's (control) groups, subjects in two groups are selected for them to have exactly the same characteristics and the only difference is whether or not they use telecare. PSM is thus a rigorous method for avoiding biases caused by differences among subjects or samples. The former DID is comparing the average change over time in the outcome variable for the treatment group to the average change over time for the control group. By combining two methods, correct impact of telecare on outcome variables is obtained.

RESULTS: The results obtained by DID-PSM are summarized as follows:

Effects of telecare on all diseases

At first, the effect of telecare on outcomes of all diseases and the results of estimation on treatment days and medical expenditures are indicated. "Difference (t=0)" and "Difference (t=1)" denote difference between users and non-user group in 2006 (first period) and in 2012 (second period), respectively, and "Difference in difference" shows the final estimation of the effect. The results are also indicates according to "All users," "Users of 5-10 years," and "Users over 10 years."

All estimated coefficients have negative sign, but they are not significant. This implies that the users with over 10 years' use treatment days and medical expenditures are larger in 2006, but there is no significant difference in 2012. Therefore, it is hard to obtain the definite result, but the effect of telecare is not necessarily denied.

Effects on Chronic Diseases

Regarding the telecare's effect on treatment days and medical expenditures related to chronic diseases are examined. From the results of treatment days and medical expenditures, the significant effects are as follows: (1) treatment days of users with 10years' use ($p<0.1$); (2) medical expenditures of users with 10 years' use ($p<0.1$); and (3) medical expenditures of all users ($p<0.1$). Moreover, after using more than 10 years, those users reduce treatment days by 2.9 days, and medical expenditures by 41,975 yen per year per user, respectively. These are remarkable results obtained ever before.

Some remarks of the results must be particularly mentioned. As noted, telecare does not contribute to a reduction in treatment days and medical expenditures for all diseases significantly, but only for chronic diseases especially for those who have longer experience of usage, namely users over 10 years. Let us compares the effects obtained by the other estimation methods, such as simple OLS, System GMM, and Propensity score matching without difference-in-difference, used in our previous papers. The days of treatment and amount of medical expenditures are the largest in DID-PSM estimation than those obtained by using 5 years data. Those previous effects of telecare are underestimated, since sample selection biases were not controlled.

CONCLUSIONS: From these results, this study demonstrates that telecare have long-term effect on reduction of treatment days and medical expenditures in the long-run. When bias is not eliminated, the estimation obtained deviates from the true value. These findings indicate the value of DID-PSM in evidence-based research, and the rigorous scientific methodologies required to conduct it.

These results provide strong foundation on policy to support telecare projects. The number of local governments operating telecare in Japan has been rapidly decreasing. In 2000, 106 local governments were operating the systems,

but at present, only several are operating systems. One of the main reasons is that they could not bear operating costs related to telecare. If reimbursements from public medical insurance were admitted, they could have obtained additional revenues to operate systems, leading to reimbursement and the sustainability of the telecare project. In rural areas, telecare must be provided as a public policy, and therefore toward the further diffusion of telecare, establishing the evidence-based policy is required. An analysis in this paper provides significant and solid evidences for the diffusion and sustainability of telecare. ■

The Development of Skills for the performance of the Tutor in Distance Education (EAD) – a study that can bring contributions to telemedicine and telehealth

Claudia de Moraes Silva[1]

INTRODUCTION: The changes caused by social, cultural, economic restructuring and productive, triggered by technological revolution of recent decades and its impact on the professional experience in the area of health has brought new possibilities and challenges for permanent education in health on telemedicine and telehealth.

About 10 years ago, when performing a search with tutors of the first class of a national program of specialization in pedagogical training in the area of health, in Distance Education mode, I sought to identify the skills required for tutoring, in the light of the theory of communicative action of Jürgen Habermas. This theory assumes, among other things, that the communicative action between subject speakers and listeners through mutual understanding and arguments with claim to validity, and creates conditions for obtaining consensus negotiated, with the purpose of coordinating the social actions of rational and communicative.

In that study the focus was directed to the teaching practice in Distance Education into the reality and available resources a decade ago. A different scenario from the currently contextualized by telemedicine and telehealth but that however, holds several correlations with the practice of the teleconsultor and of the tutors in the courses and special interest groups (SIG) made.

METHODS: It was adopted a qualitative approach of research, by allowing the deepening in the subjective aspects of social phenomena. As methodological procedure, was used the focal group technique, by encouraging research through the interactive process itself, enabling the verbalization, in group, of perceptions, conceptions etc., the confrontation of placements, negotiating conflicts, the ability to argue, the collective construction of knowledge, the freedom to create and express ideas.

Focus groups were conducted in two Regional Centers of Teaching Support, in Rio de Janeiro, with the universe of six tutors, five of which participated in the technique. A list was drawn up with themes pertinent to the object of study and a central question that lead the discussion. In this way, the tutors were invited to express freely about their conceptions about how they developed their own skills to carry out the action of tutor in skills training course, which is held freely between the participants.

The content of the discussions was classified in order to contemplate the understanding of tutors on the notion of competence, their development in mentoring activities, the teaching practice in Distance Education, the relationship with majoring students and the possibility of developing the communicative and reflective competence in this context.

The speech lines examined allowed to notice the individualized, work almost craft work, of the tutors, in which each printed his own characteristics in the process of the intersection between two fields: the skills and training of the

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Distance Education. A work characterized by codes (to be interpreted) and very distinct from the procedures practiced by them until then, which gained even greater dimensions for being both targeted for training in the area of health.

RESULTS: For being an entirely new experience, tutors and students have developed, so at the same time, the skills in the training process itself. While the tutors ran the training process needed to create the conditions to develop their own skills, especially those related to the teaching practice in Distance Education. Therefore, both were subject to the same regulations.

The lack of physical presence prompted the guardian to value the response of the pupil, as a form of self-evaluation and evaluation of the process, aspects that are not always perceived in face-to-face teaching. These aspects include the different forms of language, subjectivity, the non orality, the meaning of the "tone of the talks", even writing.

It also became apparent that the experience of the educational relationship at distance opens the field for mutual understanding conducive to the development of communicative competence, insofar as the lifeworld is the translation of what the tutors reveal when they realize the other as a person with a body of knowledge, values and experiences that mobilize him to the communicative action.

CONCLUSIONS: The conception of educational activity combined with communicative action presupposes the broad understanding of the sense of questioning and critical capacity-building and of the initiative to find solutions to the problems. For this are required knowledge, skills, attitudes and values (elements that integrate the skills) developed in situations experienced in both the formative and daily professional process.

Bringing this analysis to the telemedicine and telehealth one can notice that, as well as the tutorship for the education in Distance Education (EAD), the teleconsultorship requires in its preparation, the development of skills and that needs to be understood with a complex educational practice that is of many aspects in which the learner and instructor roles become blurred in the exchange and consolidation of new knowledge. ■

A realist review of mobile phone-based NCDs care: developing evidence-based guidance for implementing mHealth in sub-Saharan Africa

Daniel Opoku[1]; Victor Stephani[2]; Wilm Quentin[3]

INTRODUCTION: This analysis of mobile phone-based non-communicable diseases (NCDs) care interventions in sub-Saharan Africa (SSA) identifies explanatory models that account for what, how and why mHealth interventions would or would not work. Most of the reported mHealth interventions in developing countries tend to yield positive outcomes, but it is often remarked that there is not enough evidence to support the scale up of these viable/promising pilot projects. In SSA, current reviews of these pilot-scale projects present us with frameworks for cataloging evidence to fill this gap. However, the challenges that NCDs – reaching epidemic proportions in LMICs – bring to low-resourced nations demand more than cataloging evidence but also providing an evidence-based guidance for developing and implementing innovative interventions to improve NCDs management.

METHODS: This study utilizes the realist review methodology, which follows a theory-driven approach to identify and explain the processes (mechanisms) that lead to outcomes of interventions and the context within which they operate. We searched four databases resulting in a hit of 6.137 articles for screening. Considering all study designs, the inclusion criteria were based on whether the study (1) took place in SSA, (2) used a mobile phone-based intervention, (3) included NCDs-related management, (4) included user-participants and (5) assessed/evaluated the mHealth intervention in relation to NCDs care. We present the preliminary results of the 17 studies selected for data extraction and analysis in this review.

RESULTS: We have identified Andersen's behavioural model of healthcare utilization and Davis's Technology Acceptance model as the two main theories explaining the differences in the use and outcomes of mobile phone-based NCDs care interventions in SSA. mHealth NCDs care interventions designed for healthcare worker-to-healthcare worker consultations were accepted if there was a trustworthy professional relationship among the healthcare professionals. The interventions had the potential to transform health services delivery and enhance access to (specialized) care if (a) they were deemed useful and offered advantages over the existing (referral) system as faster and less expensive access to consultations and (b) they were easy to use including their portability. The evidence also suggests that where there were positive patient-to-healthcare professional interactions, patients' predisposition (age, education, language and culture) and the enabling factors (access to mobile phone, transportation cost, travelling and waiting time) were important determinants for their need, use and/or unused of the interventions.

CONCLUSIONS: mHealth interventions have emerged as a result of the continuous increase in mobile phone usage, especially in SSA. While the predisposing mechanism is a good indicator for mHealth potential to improve equity and access to quality healthcare, the lack of access to mobile phone alone can instigate inequities in access to healthcare. Therefore, the underlying mechanism of patients' ability to access these interventions through owning, sharing or renting a mobile phone needs to be considered when designing and implementing mHealth NCDs care interventions in SSA. ■

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Bioethics a Telehealth in Speech, Language and Hearing Sciences

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INTRODUCTION: Brazil presents large distances and advanced centers access difficulties as obstacles to health care universalization. Therefore, health has been detached by the use of information and communication technologies and this actualizes telehealth. Speech Therapy and Audiology are health professions and the speech therapist and audiologist can contribute to the biopsychosocial welfare of society members wherever they are. Therefore, they can also use telehealth as a working method, but it is necessary to take care of ethical and bioethical issues of Speech Therapy and Audiology services. Universal Declaration on Bioethics and Human Rights (UDBHR) deals with the ethical implications that are involved in science and technology advances and it respects human person and the environment dignity. The aim of this study was to analyze how ethical and bioethical issues were addressed in telehealth Speech Therapy and Audiology legislation (Conselho Federal de Fonoaudiologia – CFFa – Resolution 427/2013), using the principles contained in the Universal Declaration on Bioethics and Human Rights.

METHODS: The method consisted of comparing Universal Declaration on Bioethics and Human Rights principles and what Resolution CFFa 427/2013 advocates. This comparison was supported by scientific literature on the subject.

RESULTS: The results showed that the UDBHR principles are supported in Speech Pathology and Audiology legislation except the one that addresses respect for cultural diversity and pluralism. Thus this legislation provides for the promotion of tele-assistance quality and efficiency to any Brazilian citizen and restricts tele-education Speech Pathology and Audiology diagnostic and therapeutic procedures only to professionals and Speech Therapy and Audiology students. These cautions anticipate failure possibility in the procedures that could disregards human dignity.

CONCLUSIONS: In conclusion it was verified that it is necessary to revise the legislation with regard to respect for cultural diversity and pluralism as well as it needs the wide dissemination of the resolution to speech pathologists and audiologists based on its critical analysis in order to ensure subsidies for accessible quality practice to all Brazilians regardless of where they live. ■

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Usability of Electronic Medical Records by Nursing Professionals: Integrative Review

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INTRODUCTION: The Patient Electronic Medical Record (PEMR) is a computerized version of the records on sheets. The objective of the records is register data about the health of patient. It is an efficient channel between the members of multidisciplinary group and ensures the historic of process, safety and management of health organization. PEMR is a primary source of information because generates administrative, education, research and legal knowledges.(1,2,3)

In this context, nursing has a fundamental role in the development and operation of PEMR, taking active participation in the health records of patients.(3) Interaction with technology facilitates the organization and/or planning of nursing care, however, professionals often report problems of navigation and difficulties to locate information.(4) Therefore, it is important to evaluate the usability of the PEMR systems to verify the quality of the software as regards their effectiveness, efficiency and satisfaction.(5)

The objectives of this study were 1) to identify papers in the literature that the nursing professionals performed the usability of PEMR and 2) check the relevant aspects of the applicability of PEMR for research in health and in particular in nursing.

METHODS: To attend the objectives of this study, it was performed an integrative literature review, according to defined criteria(6) and based on follow methodological steps: 1. Selection of the issue for review; 2. selection of the sample; 3. definition of the study characteristics of the sample based on inclusion and exclusion criteria defined by the authors; 4. Analysis of the results using an instrument adapted from Ursi(7); 5. discussion of obtained results and 6. presentation and dissemination of results.

To guide the search, was formulated the question: Electronic medical records used in health-care settings meet the needs of nursing professionals?

Searches for publications occurred on follow databases: BIREME, Scopus and Web of Science, from August 2014 to May 2015. The strategies of searches were refined in accordance with the inclusion criteria: type of document "article" available in full version; Languages: Portuguese, English and Spanish; "Nursing" as subarea; articles published in the last six years (2009-2014). Exclusion criteria: articles that were not in full version; studies in which PEMR usability testing was not performed by nursing professionals; and papers that did not meet the objectives and guiding question proposed in this study. Thus, it was established the following search strategy in the database and performed with the following combination: usability AND electronic medical records AND nursing.

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Using this criteria, it was found 500 publications, 20 on MEDLINE, 456 on Scopus and 24 on Web of Science. After the search, 13 articles were selected by refinement, as follows: 7 in MEDLINE, 3 in Scopus and 3 in Web of Science. After selection, it was used Ursi(7) tool for sample analysis.

RESULTS: The studies were published between 2009 to 2014, 4 (30.7%) in 2011; 3 (23.1%) in 2013, 3 (23.1%) in 2014 and 1 (7.7%) in 2009, 2010 and 2012. Impact factor of the journals ranged from 0.587 to 2.716, with an average of 1.88. What about the level of evidence, based on Stetler (1998), all (100%) of publications presented level IV.

In reference to the place of use of PEMR, hospital was the local with more indications, 10 studies (76.9%), followed by the Health Unit of Primary Care, Educational Institution and Academic Medical Center with 1 (7.7 %) indication each local.

Regarding PEMR software evaluation, papers were beyond usability analysis also checking its functionality, quality, efficiency, safety and satisfaction. The usability was performed in 9 (69.2%) studies, followed by efficiency in 7 (53.8%), safety and satisfaction in 6 (46.1%), quality in 5 (38.5%) and functionality in 3 papers (23.1%).

PEMRs used in health-care locals were approved unanimously (100%) of nursing staff. Of the total sample, 6 (46.1%) studies reported that the computerized record is a positive step for health care of patient, besides they considered that PEMR colaborates with the management of assistance; 3 studies (23.1 %%) listed advantages like saving features, data organization, ease up on the obtainment of epidemiological data and readability regarding medical prescriptions. However, 5 articles (38.5%) listed disadvantages as operational failures by loss of energy, screen freezing, difficulties to log and slow response time of computers or hardware and printers, resulting in lack of confidence in the software.

Regarding the efficiency of communication between the care team, 2 papers (15.4%) cited inhibition of multidisciplinary communication as a barrier to the use of PEMR, while other 2 papers (15.4%) emphasize improving in this communication. The difficulty to fill the PEMR was cited 2 papers (15.4%), while in 1 paper (7.7%) participants considered the filling process easy.

CONCLUSIONS: The use of integrative review method made possible to identify current knowledge on the subject. The results achieved may subsidize future studies addressing PEMR, as well as stimulate for the use of it, favoring the role of nurses in practice clinical. It was determined the importance of usability tests of PEMR by users, nurses, in the identification of difficulties and fails that may facilitate or hinder the dynamics of care in health institutions. Besides, it was identified a lack of this type of analysis in our country.

Professionals expect the PEMR offers speed, security, optimization tasks, integration and ease of communication between members of the interdisciplinary team and reduced communication errors, thus improving the quality of continuity of care and efficient management of health data. As well as optimization of working time to devote more time to direct patient care. By contrast, if these tests were not carried out, the problems and needs were not be identified and solved, causing dissatisfaction of professionals complicating the routine of work.

Thus, nurse may have more elements to use the PEMR, with parameters for an evidence-based action and increasing the probability of getting better results, acquiring more available time for direct patient care. ■

Does mHealth contribute to improved care for people with non-communicable diseases in developing countries? A systematic review of randomized controlled trials

Victor Stephani[1]; Daniel Opoku[2]; Wilm Quentin[3]

INTRODUCTION: The reasons of deaths in developing countries are shifting from communicable diseases towards non-communicable diseases (NCDs). We review studies assessing the health-related impacts of mobile health (mHealth) on NCDs in low- and middle-income countries (LAMICs) with the aim of giving recommendations for their further development.

METHODS: A systematic literature search of three major databases was performed in order to identify randomized controlled trials (RCTs) of mHealth interventions. Identified RCTs were reviewed concerning effects of the interventions on health-related outcomes.

RESULTS: The search algorithms retrieved 733 titles. 6 RCTs were included in the review, including a total of 1850 participants. mHealth was found to have positively influenced clinical outcomes, compliance rates, as well as quality of life related aspects. Furthermore, other outcomes such as patients' anxiety or patient-physician trust improved significantly. We also found that tailored interventions using a single service for the transmission (e.g. only SMS) showed the most positive effect. Limiting factors of the evaluation however, were the few numbers of RCTs, the heterogeneity of outcome measures and the fact that all included studies were conducted in middle income countries and mostly in urban areas.

CONCLUSIONS: Although mHealth is still in its infancy, it can emerge as an important tool for fighting NCDs in LAMICs. Therefore, further support by governmental institutions for coordinating and promoting the development of the required tools, as well as further research especially in low-income economies, with a focus on the evaluation of the long-term effects of mHealth is needed. ■

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